

OIL AND GAS

One of the leading forces in the transition to a low carbon future is battery storage. A technology that was, only a couple of years ago, immature and expensive is now beginning to show significant cost competitiveness. The most common choice of battery storage technology to date has been lithium-ion. Latest research undertaken by Bloomberg NEF showed that the benchmark levelised cost of electricity (LCOE) for lithium-ion batteries has fallen 35% since 1H2018. With technology improving and costs decreasing, significant opportunities exist for utilising battery storage technology on many projects.

A substantial portion of the focus has been on the power sector and the benefits that battery storage can provide, including projects across Australia, the Middle East and the US. Some of the issues being solved by these projects include grid stabilisation and prevention of blackouts. For example, \$40mn is reported to have been saved by Tesla's 100 MW/129 MWh lithium-ion battery project in South Australia and 20 MW energy storage facility linked with Neon's 309 MW Hornsdale wind farm in Adelaide, Australia.

New opportunities

However, within the oil and gas sector, some green shoots are emerging for the utilisation of energy storage systems. For example, a GE system is being implemented in some platform service vessels to provide back-up power in the event of a power blackout, as reserve power in the case of engine failure or to assist in smoothing out peak power fluctuations, minimising the need to run additional engines to provide continuity of vessels' operations. These new energy systems are self-contained and only require simple electrical connections. Their design not only reduces power losses, but also achieves a reduction in emissions as well as fuel efficiency benefits.

Meanwhile, Woodside Petroleum plans to install this year a 1 MWh battery on its offshore Goodwyn A gas production platform. It will replace one of the existing gas turbines as well as reducing the facility's reliance on a back-up diesel generator, thereby reducing emissions as well as operation and maintenance costs.

Powering the future



The oil and gas sector offers the battery storage industry a number of opportunities, writes Tracy London, Partner, Bracewell.

Significant opportunities lie within the LNG sector, where, according to Wood Mackenzie, about 90mn t/y worth of LNG development projects around the world will reach a final investment decision (FID) and start construction over the next two years. Capital expenditure – for both LNG plant and upstream infrastructure – will total more than \$200bn between 2019 and 2025. Battery storage can benefit these projects by providing back-up or reserve power as part of the turbine configuration within these facilities, as well as reducing fuel gas consumption, operation and maintenance costs and carbon emissions.

The Darwin LNG facility in Australia's Northern Territory, which although only entering the front-end engineering and design (FEED) phase for expansion, will be

the world's first LNG plant to integrate battery technology. According to the majority owner, ConocoPhillips, the facility will include a 4 MW lithium-ion battery to enable one of the gas turbines that power the facility to be switched off, cutting fuel and emissions by around 20%. The current Darwin LNG plant uses five 4 MW gas turbines, with one running as back-up or 'spinning reserve' in the event of failure elsewhere and one in reserve for ship loading procedures.

Not only are the opportunities significant for onshore LNG facilities, but battery storage technology will also be useful for the forecast growth in floating LNG (FLNG) projects. FLNG technology offers lower production costs, reduced time to first production and fewer environmental impacts than land-based alternatives. In addition, a potential advantage of a floating facility is that it can be moved relatively easily to an alternative offshore location as the original gas resources decline or economics change.

However, one of the constraints within a FLNG vessel is that space is limited. Therefore, more compact and lighter equipment to fit the deck space can be very valuable. Many small- to medium-scale FLNG projects are considering aero-derivative gas turbines – given their high power per unit weight, but also their lower gross power output compared with industrial gas turbines. The benefit of these type of turbines combined with battery storage may provide the perfect solution for powering the FLNG vessel and its liquefaction trains within the size and weight design constraints.

Even if the industrial gas turbines are determined to be the technology of choice within the FEED stage, particularly in relation to larger FLNG vessels, providing battery storage within the configuration will not only provide greater efficiency and fewer emissions from the turbines, but will also optimise space on the vessel's deck, as it will eliminate the need to have an additional turbine built into the design to provide the required reserve power.

The future for the utilisation of battery storage is bright within LNG and FLNG projects, especially as we continue to see considerable improvements in the technology as well as decreasing costs. ●