

# SHI/SFW Expansion into Energy Storage Market

## Q&A Talking Points

### Why did SHI/SFW decide to expand into the energy storage market?

Today, we see intermittent renewable energy sources, like wind and solar, as a vital component needed to transform the world's global energy infrastructure toward a clean and sustainable energy delivery system.

But due to their intermittent nature, grid operators and power generators are facing growing challenges for maintaining power grid stability and power quality with increasing levels of wind and solar power. Higher levels of wind and solar is also revealing a need to reform market rules to put a higher value on dependable capacity, inertia and peak shifting. This need is evident in some markets today when power from wind and solar plants are being curtailed or given away at zero or negative prices.

We believe energy storage technology can be the game changer that can truly unlock the full potential of renewable energy by making renewable energy as dependable and affordable as conventional power.

There are several energy storage technologies available today, from large scale pumped hydro to small scale Li-ion batteries, but none can practically provide large-scale energy storage with the flexibility to be located wherever the grid needs them.

Our recent investment and partnership with Highview Power will allow us to bring a new energy storage technology, called CryoBattery™ to the market. CryoBattery is a liquid air energy storage technology that can store gigawatt hours of energy with the flexibility to be built practically anywhere.

The technology stores energy in the form of liquefied air and uses processes and equipment well proven in the gas industries.

Our mission has always been to provide innovative energy solutions to our customers, and we see this new partnership with Highview Power as doing just that. It is right in line with our vision for decarbonizing and decentralizing energy and fits perfectly with our wide experience in energy technology, engineering and plant delivery.

### How does SHI/SFW see CryoBattery fitting into future energy storage markets?

To date, pumped hydro continues to be the dominate energy storage technology since it can discharge large amounts of stored power to the grid over long periods of time. We see the need for large scale energy storage to grow as more and more renewables come online. But unlike the past, the grid will need this large scale energy storage in many places where elevated water reservoirs don't exist or can't be practically built, ultimately limiting the role for pumped hydro.

Over the last few years, Li-ion battery technology has become a popular choice for grid connected energy storage plants since it can be located just about anywhere with a grid connection, which solves the locational problem of pumped hydro.

But, even with declining module cost, Li-ion energy storage plants get very large and expensive to build when going to large scale. Since battery modules lose about 2% of their storage capacity each year, and need to be replaced every 8-10 years, plant life cycle cost become overwhelming for a large scale plant. In addition, their cradle-to-grave environmental impact starting from the mining of Lithium, cobalt and nickel to the disposal of spent modules, remains a big open question, as well, as their fire safety concern related to overheating. A CryoBattery plant compares very positively to this since it uses only conventional recyclable steel materials and has a life time of 30 years.

CryoBattery plants can be built at gigawatt hour scale and at this scale, occupies 10 times less space as a Li-ion plant and 100 times less volume than a pumped hydro plant. They can be built and connected to the grid practically anywhere they are needed. The plant's only byproduct is clean air.

The CryoBattery uses the same process and equipment to liquify, store and re-gasify air as used in the gas industry, all powered by grid electricity. It returns power to the grid using a conventional turbine generator commonly used in power plants. These features give CryoBattery a very low technology risk, 30 year plant life, high reliability and a competitive life cycle cost.

### Why did SHI/SFW choose Highview Power as a partner for entering the energy storage business?

Highview Power (HVP) is the one company which has developed and advanced liquid air energy storage technology further than all others. They started developing the technology in 2005 in partnership with the University of LEEDS in the UK. Since then, they have built a 2.5 MWh pilot plant and a 15 MWh grid connected pre-commercial plant in Manchester, England to prove out the technology.

HVP has enhanced the technology by developing systems to store the cold and hot heat energy within the process, doubling the round-trip efficiency of the plant.

We saw HVP as a very good technology developer in need of a partner like us, with project execution capability and a global plant delivery network, to bring the technology to market. It is a great fit for the both of us.

### What role will SHI/FW play in the new partnership with HVP?

We see ourselves in two primary roles as a partner. The first one is as lead investor and shareholder of the company. Our investment of \$46M, gives us ownership in the company and in this role we will be active in bringing the CryoBattery technology and business to the global market through utilizing our energy industry experience and worldwide delivery structure as well as in guiding the strategy to grow the company.

Our second role will be actively developing and executing projects for our existing and new clients worldwide. Under our partnership with Highview Power, SHI/SFW has full rights to the CryoBattery technology allowing us to provide energy storage solutions directly to our customers. Depending on the client and project needs, we can support projects in many different ways from engineering to full EPC scopes, alone or with partners.

### How does this move to energy storage fit with SHI/SFW's long standing boiler business?

Since our beginning, our mission has always been to provide innovative and environmentally sound energy solutions to our customers. Our vision today is focused on solutions related to decarbonization, decentralization and digitalization to help transform the world's global energy infrastructure toward a clean and sustainable energy delivery system. We see the Highview Power partnership as delivering on both our mission and vision.

Over our history, we have changed conventional markets by offering innovated solutions outside of the mainstream market. The prime example of this is our circulating fluidized bed (CFB) combustion boilers and gasifiers. While the mainstream market was building conventional pulverized coal and grate fired power plants, we were building power and industrial plants with clean-burning, fuel-flexible CFB combustion technology.

History has shown that our CFB technology set new standards for clean combustion and gasification from carbon neutral fuels as well as from not so clean fuels like: coal, lignite and petroleum coke.

As the needs of our client's change, we change too. A good example of this occurred in the late 2000s when climate change and CO2 emissions first became an important issue to Europe and the US. In response, we developed a carbon capture and sequestration (CCS) technology for our CFB boilers called "FlexiBurn".

Today we are focusing our talent on solutions to help transition our energy infrastructure toward renewables. The HVP partnership is a good example of us transforming with the market and customer's need with an innovative solution outside of the mainstream market.