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PROJECT INTERVIEW — UK, WALES, DINORWIG

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Project Interview

Dinorwig Pumped Storage Power Plant, Wales, UK

Dinorwig, known as the electric mountain, is among the largest pumped storage projects in Europe, but after 40 years of operations the plant was in need of refurbishment. Making it fit to serve the needs of our future energy system meant replacing the main inlet valves and in 2021 ANDRITZ secured the contract from First Hydro for six new spherical valves and governors. HydroNews spoke with First Hydro's Tom Hay and Mike Jones about the importance of pumped storage hydro in powering the energy transition.

Interview with Tom Hay & Mike Jones

from First Hydro, responsible for the management and operation of PSP Dinorwig

Tom Hay is Head of Business Development and Strategy UK Flexible Generation and commercial lead for the First Hydro refurbishment program.

Mike Jones is the Engineering and Development Manager leading the engineering and execution phases.

Tom Hay

Mike Jones

With a maximum gross head of close to 550 m, Dinorwig features a single pressure shaft with a diameter of up to 10.5 m that feeds all six Francis turbines. The main inlet valves are the only isolation point between this high-pressure shaft and each of the pump turbines. Their function is safety critical, but also vital for the power plant maintenance program. The main inlet valves are crucial to the plant's performance, too. ANDRITZ is therefore very proud of its important contribution to making Dinorwig fit for the future with six new spherical main inlet valves.

Please introduce yourselves and First Hydro.

Tom Hay, Head of Business Development and Strategy UK Flexible Generation and commercial lead for the First Hydro refurbishment program and Mike Jones, the Engineering and Development Manager leading the engineering and execution phases. First Hydro Company is responsible for the management and operation of the 1,728 MW Dinorwig power station and the 360 MW Ffestiniog power station. Both are pumped storage power plants.

"Pumped storage plants are highly flexible and can provide a wide range of services adapting to a wide range of market conditions."

How supportive is the present national and global market environment for your business objectives?

As renewables penetration increases and thermal capacity retires there is expected to be an increased demand for flexible generation and storage such as that provided by pumped storage. The revenue streams for flexible generation are often unpredictable and high risk, and this increases the importance of long-term revenue structures to underpin the investment. The current UK Capacity Market provides such a structure, allowing the possibility of 15-year contracts for new build and refurbishment investment programs, although the main inlet valve replacement is not supported by such a contract.

How important is this hydropower project in supporting First Hydro's plans to transform the energy sector?

When it was commissioned in 1983, Dinorwig Power Station was regarded as one of the world's most imaginative engineering and environmental projects. It is still one of the largest pumped storage plants in Europe. Dinorwig remains key to First Hydro's portfolio and plays a vital role in balancing the UK National Grid. The main inlet valves are critical for operating the units and their replacement is a key part of extending the life of Dinorwig beyond 2050.

What are the main drivers for your organization to rehabilitate large-scale hydropower assets?

Dinorwig remains competitive against other forms of flexible generation and storage, including Lithium-ion batteries. Pumped storage plants are highly flexible and can provide a wide range of services adapting to a wide range of market conditions. Dinorwig was commissioned in 1983 and is 40 years old. Now it requires a major refurbishment program to stay operational and meet future expected demand.

Does First Hydro have plans to expand its footprint beyond Wales?

First Hydro is focused on Dinorwig and Ffestiniog. First Hydro is owned by ENGIE (75%) and Brookfield (25%), and both owners already have much wider international participation in electricity generation assets.

With a total capacity of 1,728 MW, Dinorwig is one of the largest pumped storage power plants in Europe.

For more details on the project and the technical specifications please see the article about Dinorwig in the latest issue of HydroNews, No. 36.

"Liaison at an early stage remains the best control measure available to mitigate risk to both parties in designing a safe plant that meets operational requirements."

Do you see an advantage in working with major contractors or suppliers in the early stages of project development to optimize the overall plant concept and implementation schedule?

First Hydro has collaborated with ANDRITZ since the early stages of the design of the main inlet valves. Liaison at an early stage remains the best control measure available to mitigate risk to both parties in designing a safe plant that meets operational requirements. It also permits the development of realistic delivery programs and balanced terms and conditions, whilst allowing the team to build trust and to develop a project which is mutually beneficial over time.

How do you see your collaboration with ANDRITZ, and how would you assess this partnership?

The collaboration with ANDRITZ on the main inlet valves has been very positive. The First Hydro and ANDRITZ teams have worked closely together to develop a detailed design and to meet a challenging timeline. The open collaboration, with both parties providing competent resources, has enabled inclusion of several design improvements, optimization of the construction and installation program, and quick solutions to arising issues.

Pressure test and Factory Acceptance of the first of six spherical valves for Dinorwig in the presence of the customer in autumn 2022

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The Transport

In the autumn of 2022, Factory Acceptance of the first of the spherical valves for Dinorwig was completed at the ANDRITZ manufacturing facility in Ravensburg, Germany. Transporting the 160-ton valve to the destination of Llanberis began in January 2023. Dimensions of 5.56 × 4.80 × 3.95 m meant the transport vehicle could only use roads at night, so completing the challenge took several days. In April 2023, the first two spherical valves arrived safely in Wales. Installation and commissioning took place subsequently.

The new components were specifically designed to meet daily operational requirements in ensuring grid stability.

To further ensure reliability, the SCADA control system and the connection to ANDRITZ' own Metris DiOMera platform provide condition-based and predictive information on the status and maintenance needs of the installed components.

The first spherical valve on its way to installation