

# the **Rise** of Tidal Power

 **International**



**M**ore predictable than wind energy and solar power and more sustainable in the long term than coal power; tidal power generation has been boosted over recent years with an increasing number of facilities being developed around the world. This is largely attributed to an increased understanding of how best to harness the energy created by tidal forces, with innovative solutions being brought to the marketplace over recent years. Things have come a long way since 1966, when the French Rance Tidal Power Plant, the world's first large-scale tidal barrage power plant, was built.

**A rise in power generation using renewable energy sources has been evident over recent years; but what role does tidal power play?**

The energy potential of tidal power facilities is huge, with the Crown Estate, who manage the UK's seabed out to a 12nm (nautical mile) limit, reporting there is the potential for 95TW/h per annum from 32GW of installed capacity. The potential exists for 20% of the UK's energy to be drawn from wave and tidal power alone and the UK is beginning to emerge as a central hub for this type of power generation in Europe with 35% of all of Europe's tidal energy potential being off the coast of the UK.<sup>1</sup>

Unique to tidal energy is the confidence placed upon the consistent flow of energy, made possible by the regular flow of water, controlled by the moon and gravitational pull, which can be relied upon to the point that it is 'as regular as clockwork'. This reliance enables accurate forecasting of power generation, as opposed to wind power and solar power, where it is somewhat more difficult.

Recently, AkzoNobel has worked with two big players in the tidal power generation industry on large and technologically innovative projects. Both Andritz Hydro Hammerfest Strøm and Voith Hydro Ocean Current Technologies have both utilised protective coatings from AkzoNobel.

# Andritz Hydro Hammerfest

## Tidal Power Generation



The Hammerfest Strøm HS1000 tidal device from Andritz Hydro is currently located off the coast of Scotland and could be considered to be one of the most pioneering and important projects currently in progress for the production of renewable energy. With the first tidal turbine already at pilot production stage, the company are on track for deployment of a 95MW turbine array, off the north coast of Scotland, around 2015.

For such an important project, a coatings partner with extensive success in the power generation market was required. Andritz Hydro Hammerfest Strøm turned to AkzoNobel to supply their high performance, protective coatings in what is perceived to be one of the world's most severe environments; the North Sea. A coatings system has been specified for the Hammerfest Strøm project including AkzoNobel's heavy duty, chemical and abrasion resistant Interzone® 954 which is to be applied to the turbine. **"We have heard of the success of Interzone 954 in an offshore environment, so we were very pleased to see it on the specification"** said an ANDRITZ Kft. representative; manufacturer of the turbine. Intershield® 300 has also been specified and with its 15 year proven long term corrosion and abrasion resistance in harsh environments, it's easy to see why. Two of AkzoNobel's foul release coatings; Intersleek® 737 and Intersleek 970 were also specified for their high levels of durability and

their ultra smooth, low energy surface, which is designed to reduce friction and maintain efficiency. The collection of marine life on tidal blades is a common concern in tidal power generation, as a build up of such marine life can cause additional drag on blades; resulting in reduced efficiency. The build up of marine life is also known to cause sticking or even failure of moving parts within submerged turbines.

The environment is one of many important key factors within coatings selection in the renewable energy market; therefore Hammerfest's choice to use AkzoNobel's Intersleek coatings was no surprise, **"Intersleek includes zero biocides and boasts extremely tough and hardwearing characteristics, which denotes a reduced requirement for maintenance, which when carried out in deep water, is extremely costly and difficult"** explained AkzoNobel's Technical Service Representative for Central Europe.

# Voith Hydro

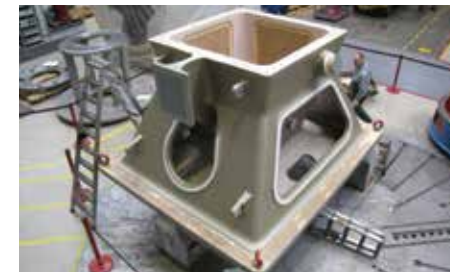
## Tidal Power Generation

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Another recent tidal device seeking the benefits of AkzoNobel's Intersleek coatings is the Voith HyTIDE Tidal Power device, from Voith Hydro Ocean Current Technologies, also located just off the coast of Scotland. **"The Voith HyTIDE Power Plant required an antifouling coating system that did not include biocides and that also boasted an excellent track record in severe offshore environments. This made Intersleek the perfect foul release system for the job"** said Daniel Christ of Voith Hydro Ocean Current Technologies.



Photos courtesy of Voith Hydro Ocean Current Technologies



This large tidal power device uses a simple yet robust system to drive the production of power. To reduce complexity, the technology used within the turbine is innovative, removing the need for lubrication of bearings; sea water is used instead. This is a new technological innovation, recently adopted by Voith Hydro Ocean Current Technologies, which is designed to be not only kinder to the environment than typical oil bearing lubrication, but also results in a reduced need for maintenance. Other advantages of the simple turbine solution include an adjustable rotor; which ensures optimal energy extraction. The turbine is also capable of being mounted onto a range of different foundations.

The expectation from those involved in the project is that just one single turbine from the Voith HyTIDE Tidal Power Plant, which has a nameplate capacity of 1.8MW will be capable of supplying upwards of 330MW/h energy annually (with a 50% conversion efficiency). Then consider the prospect of an array of hundreds of these turbines going into service

in the not too distant future and you will have an idea of the potential that is yet to be unleashed.

**"For such a large-scale project, corrosion protection as well as a high performance foul release was needed to protect the tidal power plant from the severe surrounding environment"** stated AkzoNobel's Sales Manager for Germany. Alongside Intersleek 970 and Intersleek 737, a system consisting of AkzoNobel's Interzinc® 52, Interline® 975 and Intershield® 300 was used. This system was favoured by those involved due to it being approved by the German Institute of Water Steelwork, for its excellent abrasion resistance and its proven track record for use in similar severe, offshore environments. Following completion of coating application and quality approval, the turbine is to be installed and will be in active service over the next two years.

It wasn't just the outstanding proven track record of AkzoNobel's protective coatings

systems that impressed those at Voith Hydro Ocean Current Technologies, they were also impressed by the testing of its foul release system that AkzoNobel carried out alongside an acclaimed German university.

The potential of pursuing wave and tidal power as a long term source of renewable energy is huge, with the capability of providing 16% of the world's energy needs.<sup>2</sup> The industry also promises to continue to grow and develop new and exciting methods of harnessing tidal energy over coming years. It's proving to be an exciting time for tidal power generation.

<sup>1</sup> UK Government Department of Energy & Climate Change

<sup>2</sup> Source: IEA-OES Annual Report, 2009