

DHI CASE STORY

HELPING ATLANTIS TUNE TO THE TIDES

Providing comprehensive analyses of tidal energy resource sites

Tidal flows vary greatly with geography, across the globe. Also, interaction between turbines within a prime spot can impact the intensity and direction of tidal flows themselves – locally and regionally. As such, the success of sustainable, financial risk-reduced and cost-effective tidal power generation depends on the accurate knowledge of tidal energy flow at specific sites. In short, it is imperative to identify the best site within an area of interest, to make successful tidal power generation a reality. With our global experience, state-of-the-art software and dedicated Decision Support System (DSS), we helped our client – Atlantis Resources Corporation – to do just that.

TIDAL TURBINES – HERALDING THE FUTURE OF RENEWABLE ENERGY

Tidal turbines take up approximately 1/1000 of the space of a wind turbine for the same yield due to the greater density of water. Also, the resource is 90% predictable. However, in order to ensure optimisation of the resource, it is necessary to identify an area with sufficient flow, combined with the appropriate depths, at a suitable distance from land and free from shipping lines and other environmental impacts.

As such, the tidal energy sector is still in the pioneering phase. In comparison with conventional hydropower and wind energy, tidal power is a difficult resource to tap into and many uncertainties still surround successful tidal power generation. However, it is



Atlantis 1MW AR1000 turbine prior to installation for open ocean testing at the European Marine Energy Centre (EMEC)

becoming increasingly likely to succeed and at DHI, we have an important role to play in its future success. Curiosity and a common sense approach are pre-requisites for development of any kind. These coupled with science and accuracy (numerical models) are set to make tidal power the 'next big thing' in the renewable energy sector.

SUMMARY

CLIENT

Atlantis Resources Corporation (Atlantis)

CHALLENGE

- Large variance in tidal flows worldwide
- Inefficient utilisation of tidal energy resources
- Lack of knowledge on tidal site characterisation
- Financial risks and uncertainties for companies and investors

SOLUTION

- Detailed site investigations and analyses
- Accurate site modelling and a dedicated Decision Support System (DSS)
- Comprehensive planning and forecasting of yield to the power grid
- Recommendations for optimal tidal power generation sites

VALUE

- Enabling the client to select optimal sites for tidal power generation
- Aiding in the development of tidal power generation sites
- Significant financial risk reduction for the company and investor
- Marked contribution to the green/renewable energy sector
- Tidal energy knowledge made globally accessible through our MIKE software

CHARACTERISING TIDAL POWER SITES WORLDWIDE

Globally, we have identified many potential sites for different types of turbines. Even though just a fraction of these are being developed currently, once full-scale turbine technology is proven, our service will help slash development time from years to months. We have a proven ability to assess the power resources of an area – to quickly and simply screen new sites, slowly building up confidence in potential sites to go hand in hand with planned investments.

The inability to develop a site due to uncertainties, limited knowledge of the site and associated constraints poses great risks for investors and companies alike. Atlantis was on the lookout for prospective sites for tidal power generation and it needed to quickly and accurately determine which sites were the most promising for prospective development. Atlantis needed certainty and a partner who believed in its ideas and was prepared to join it on the entire journey. We were exactly what Atlantis was looking for and it contacted us seven years ago to begin a global search for areas with high tidal currents.

Based on our recommendations, Atlantis started approaching governments for rights to exploit tidal resources within their respective countries. Once the areas were secured, we were free to assess the resource further through different project phases, with quantifiable and declining uncertainties throughout. We have assessed a dozen such sites globally.



Final assembly test in the dry between turbine nacelle and test foundation

CLIENT TESTIMONIAL

“ DHI has been by our side and helped us from the early inception till today – and we look forward to continued close collaboration in the future.

Timothy Cornelius—CEO—Atlantis Resources Corporation

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EMPOWERING ATLANTIS TO MAKE INFORMED DECISIONS

Our solution was a comprehensive analysis of each prospective turbine deployment site using our modelling skills and experience. We make that analysis available to Atlantis in a MIKE customised-based DSS, where it can freely combine its know-how from turbine design and economics. This gives the client a simple interface to a complex problem, by way of models which can be reused time and again for different environmental approvals, detailed planning and even forecasting of the yield to the power grid.

By reducing uncertainties, we empowered Atlantis with the information required to convince developers about the feasibility of certain sites for tidal power generation. Today, construction of the world's largest planned tidal power project—MeyGen (398MW), will commence soon in the Pentland Firth, Scotland. Its completion is scheduled for 2019. Issues related to array effects and optimisation still persist. We are meeting these challenges by engaging researchers worldwide, involving ourselves in internal research and integrating state-of-the-art knowledge on a daily basis into our MIKE software and MIKE customised online interfaces and services.

SPREADING OUR KNOWLEDGE GLOBALLY – MAKING IT ACCESSIBLE

By being early entrants into the tidal power world, we have accumulated novel knowledge, which was encapsulated in our MIKE by DHI software. It has thereby been made available globally and is being used by nearly all site and turbine developers. Thus, our tidal knowledge is significantly benefitting the tidal energy industry. In a recent review by the U.K. Crown Estate, it was found that of all the bidders that have won rights to install tidal and wave arrays around the U.K., more than 90% used the MIKE by DHI software.

THE LONG LASTING EFFECTS OF A TRUSTING RELATIONSHIP

Our success in the site selection process for Atlantis stems from our long relationship with the latter. Together with our client, we have achieved deep trust and understanding. It is a shining example of how implicit trust, in-depth scientific knowledge, global expertise and the willingness to go forward, can lead to better and greener solutions for the planet.