



POWER - Partners Offering a Water Energy Revolution

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Total budget: € 2.140.343,-

EVD contribution: € 933.910,-

Duration: 36 months

Start date: 01-01-2012

Consortium: 8 Dutch beneficiaries

Lead: Strukton (NL)

Coordination: ARCADIS (NL)

Website: <http://www.powerdtp.nl>

Key Words: Dynamic Tidal Power, DTP, hydraulic engineering, China, sustainable energy, tidal energy, business development, innovation

The 3-year POWER programme started in January 2012 and aims to create strong partnerships between the various Dutch disciplines and Chinese parties to establish lasting business for Dutch engineering and energy companies in China, with spinoff leading to global business in coastal and offshore energy engineering. The POWER programme is constituted around a feasibility study on the development of Dynamic Tidal Power (DTP), an entirely new method to generate clean and predictable renewable energy for millions of homes.

Progress of the POWER programme in China

In August 2012, China's National Energy Administration formed a group of top Chinese companies and research institutes to carry out joint studies of Dynamic Tidal Power with the POWER consortium.

In an agreement between China and the Netherlands signed in Beijing on September 27, 2012 both countries have agreed on the joint development of Dynamic Tidal Power.

The targets of the POWER programme have been registered under the United Nations Sustainable Energy for All initiative.

POWER consortium members

Strukton BV, NL (*lead*)

ARCADIS Netherlands BV, NL (*coordination*)

Delft University of Technology, NL

Hulsbergen Hydraulic Innovation & Design (H2iD), NL

Ingenieursbureau Oranjewoud BV, NL

IMARES, institute of DLO, NL

DNV KEMA Energy & Sustainability, NL

Pentair Nijhuis, NL

Sinosphere, HK





Ningde DTP Demonstration Plant in China

DTP is an innovative way to use the natural tidal movement for generating massive amounts of sustainable energy. A dam-like structure of at least 30 km in length with large series of turbines is built perpendicular to the shore in a shallow sea basin. Studies have shown that a large DTP dam along the Chinese coast could feature installed capacity of 15.000 MW or more, placing it among the world's largest hydropower projects.

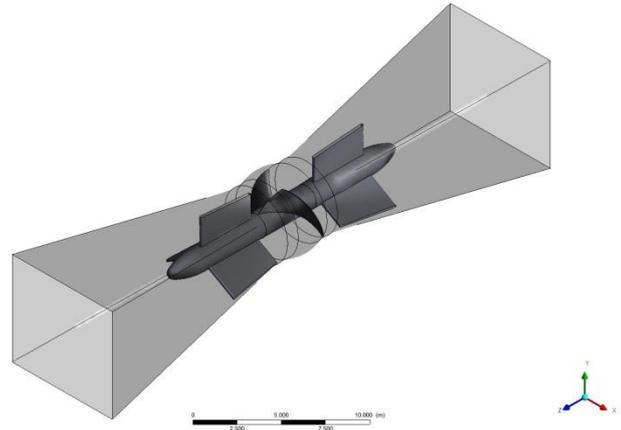


Figure 1. Conceptual design of Ningde turbine (Nijhuis)

Ningde DTP Demonstration Plant

A pilot project of DTP could be integrated with a planned coastal development project, such as a sea bridge, island connection, deep sea port, land reclamation, offshore wind farm, etc., if these were built in a suitable environment.

Chinese and Dutch consortia are considering undertaking a first 15MW demonstration project in China that would not involve construction of a dam, but instead feature a newly cut channel through a long peninsula with a narrow isthmus at Ningde in Fujian, China. The location is unique, in that a natural peninsula interferes with the tidal movements in the same way that a DTP dam would, causing a build-up of hydraulic head over the isthmus connecting the peninsula to the mainland. Cutting a channel and fitting it with low-head bi-directional turbines, would demonstrate many of the principles and technologies required for DTP, and allow stakeholders to gain valuable experience and proof of concept required to scale up to the next level.

Ultra-Low Head Turbines

Special ultra-low head fish friendly turbines are being developed for the Ningde DTP demonstration plant by POWER consortium member Pentair Nijhuis. The Ningde site features a head over the turbines of about 0.9m and flow rates of several thousand m³/s, requiring special turbines. To generate ocean energy while protecting marine eco-systems, the project will feature turbines which do not kill fish as they pass through.

Business Case

Social and environmental impacts of the project appear to be positive: In addition to energy generation, the channel will help improve the water quality in the Sansha Bay, and the site could incorporate a shiplock to protect fishing vessels from typhoons. The site can also be used for testing of other ultra-low head turbines. well-rounded business case is being prepared, which addresses the most important technical challenges, and which shows the attractiveness of the project. It is expected that a Chinese state-owned power generation company will be the investor of the Ningde project.