Tidal power plant

Brouwersdam

The provincial authorities of Zuid-Holland and Zeeland, Rijkswaterstaat and the municipal authorities of Goeree-Overflakkee and Schouwen-Duiveland are committed to the building of a tidal power plant in the Brouwersdam and a testing centre for turbines in the Grevelingendam. Together with the corporate sector, research institutions and NGOs, they wish to serve several public and private interests at the same time. The result will be a new icon for Dutch Delta technology with a regional, national and international impact.

The provincial authorities, Rijkswaterstaat (the executive agency of the Ministry of Infrastructure and Environment) and the municipal authorities want to use the Grevelingendam tides to restore water quality and to boost local development on and near the lake. Tidal fluctuations in the lake became a thing of the past with the construction of the Brouwersdam in 1921. A culvert in the dam will open up the lake to the tides again. The oxygen-rich sea water that will flow into the lake again as the tide rises and falls will improve conditions for nature, recreation, tourism and fishing, and also boost the regional economy as a whole.

Generating sustainable energy

The additional advantage of building a culvert in the Brouwersdam is that it can be designed as a tidal power plant: turbines that generate electricity using the flow of water through the dam. It is expected that a tidal power plant in the Brouwersdam can generate green power for all 50,000 homes on Goeree-Overflakkee and Schouwen-Duiveland. In that way, the plant will contribute to the realisation of government policy targeting sustainable growth and fulfill the ambitions of both municipalities to be energy-neutral in time.

GREVELINGENDAM TESTING CENTRE

In addition to the tidal power plant, the two provincial authorities have joined forces with the national government and the corporate sector to work on the creation of a Grevelingendam testing centre. In laboratories and then in the field, trials will take place to determine which turbine technologies are most appropriate for use in the tidal power plant. The testing centre and large-scale application in the tidal power plant represent an ideal opportunity to put the spotlight on the region and The Netherlands Inc. as experts in the field of energy industries.

"The construction of a culvert and a tidal power plant in the Brouwersdam are the crucial first stages in getting a number of developments in the Southwestern Delta under way. Together with the provincial authority of Zeeland and the municipal authorities of Goeree-Overflakkee and Schouwen-Duiveland, we hope to boost the regional economy. More opportunities for recreation and tourism, and higher revenues for fishing are important factors in the achievement of that ambition. The need to take action is demonstrated by the involvement of the national government, the corporate sector, research institutions, NGOs and Europe."

HANN WEIBER, MEMBER OF THE PROVINCIAL EXECUTIVE OF ZUID-HOLLAND
“Zeeland lives with the water like nowhere else. For a long time we saw it as an enemy, but we now wish to embrace it as a friend. We are testing turbines in the Tidal Testing Centre with a view to building a large-scale tidal power plant later in the Brouwersdam. The expertise we will acquire can be used throughout the world in other deltas.”

WIM DE RUYI, MEMBER OF THE PROVINCIAL EXECUTIVE OF ZEELAND

“Goeree-Overflakkee aims to be an energy-neutral island by 2030. The tidal power plant is a perfect match for our mission to achieve that goal. Sustainable energy production can be used to supply green power to many homes both in our region and elsewhere. Furthermore, the tidal power plant can play an iconic role on the world stage for the Dutch Delta, putting Goeree-Overflakkee and the surrounding area firmly on the international map. That is a win-win situation for the entire region!”

AREND-JAN VAN DER YUGT, ALDERMAN OF THE MUNICIPALITY OF GOEREY-OVERFLAKKEE
The benefits at a glance

1. A boost for water quality
   Letting the tides return to Lake Grevelingen will improve the water quality, and that will be good for a lot of flora and fauna in the area.

2. A boost for the economy
   Letting the tides return will improve the conditions for recreation, tourism and fishing, and for the regional economy as a whole.

3. Sustainable energy
   It is expected that the tidal power plant in the Brouwersdam will generate green power for all 50,000 homes on Goeree-Overflakkee and Schouwen-Duiveland.

4. Dry feet
   In time, the tidal power plant can be used to pump excess river water into the sea, helping to protect the Rhine Estuary and the Drecht Towns from flooding.

5. Opportunity for innovation and exports
   A tidal power plant like the one, with a relatively small height difference and fish-friendly turbines, will be a global first. This innovative form of delta technology will be an outstanding export product for the Netherlands.

SOUTHWESTERN DELTA

The tidal power plant is a development in the context of the Southwestern Delta programme. This Delta includes Zaanland, the islands of Zuid-Holland and the western part of Noord-Brabant.

Water is the economic motor here, providing ample opportunities for innovations and regional developments. The Southwestern Delta Steering Group, entrepreneurs and NGOs have been working together on a joint objective for many years: a climate-resistant, safe, economically vigorous and ecologically robust Delta with adequate supplies of fresh water, now and in the future. A tidal power plant that also acts as a carousel can be an important step forward in the achievement of this goal.

"We live in times in which functionality is becoming increasingly important. For example, we no longer want to live alone, exclusively for protection. Flood defences can also do several things at once. The plans for a tidal power plant in the Brouwersdam are an impressive example of this principle. They combine safety, water quality and ecology. At the same time, they allow us to team up with the regional authorities to generate sustainable energy. The government, research institutions and the commercial sector are using this tidal power plant as a way of co-creating innovative solutions for a sustainable society. And therefore an innovative and promising export product for the Dutch hydraulic engineering sector. Rijkswaterstaat is happy to contribute to innovations like this. The Brouwersdam: it gives you energy!"

JAN MUNCHER ENGERS, DIRECTOR-GENERAL OF RIJKSWATERSTAAT

"A tidal Lake Grevelingen is a major goal of the Steering Committee, which wants the Southwestern Delta to be Safe, Resilient and Vigorous. That can be achieved in Lake Grevelingen and the Volkerak-Zoom Lake by introducing a moderate level of tidal variation in Lake Grevelingen, allowing salt water to penetrate into the Volkerak-Zoom Lake, and linking the two waters. The tide will restore robust health to the water and that constitutes a basis for economic development. The tidal power plant delivers sustainable energy in an innovative way and contributes to flood protection in the long term."

JOHAN VAN DEN HOUTE, CHAIR OF THE SOUTHWESTERN DELTA STEERING GROUP, MEMBER OF THE PROVINCIAL EXECUTIVE OF NOORD-BRABANT.
Protection for Rhine Estuary and Drecht Towns
As well as generating sustainable energy, the tidal power plant can also play a role in terms of flood protection in the wider area. When the tidal barriers in the New Waterway and the Hartel Canal, and the Haringvliet sluices are closed during storms at sea and when the rivers are also discharging large amounts of water at the same time, there is a major risk of flooding in the Rhine Estuary/Drecht Towns region. Storing water temporarily in Lake Grevelingen is a possible solution and, in addition, the plant can also pump excess river water to the sea. Storing water in this way would, incidentally, involve additional measures in the Volkerak sluices and in the Grevelingen dam, and the national government needs to take a decision about these measures (see national structural concept).

Opportunity for innovation and exports
The tidal power plant in the Brouwersdam is unusual because of the relatively limited difference in the water level between the two sides of the dam (1.0 - 1.5 metres). Generating tidal energy cost-effectively and in a fish-friendly way with such a small difference has not yet been tried anywhere in the world. This is a fantastic opportunity to innovate and design new delta technology.

The culvert with the tidal power plant would cost an estimated 300 to 500 million euros, depending on the design of the plant. The provincial authorities and the national government are challenging market parties to devise an innovative and sustainable design.

NATIONAL STRUCTURAL CONCEPT
Working together with the provincial authorities, the water authorities, municipal authorities and NGOs, the national government is developing a structural concept for the coordinated development of Lake Grevelingen and the Volkerak-Zoom Lake. That concept involves the national government scrutinising the desirability and feasibility of the re-introduction of limited tidal fluctuations in Lake Grevelingen, the salinization of the Volkerak-Zoom Lake, and water storage in Lake Grevelingen. Important focus areas in the national structural concept are flood protection and freshwater management (Delta Programme), water quality (Water Framework Directive), nature conservation (Birds and Habitat Directive), and economy and innovation (top sectors policy).

"Our aim is to be a holiday island by 2040, with a leading water economy that will link homes, work, care facilities and recreation in a sustainable way. The establishment of a testing centre at the Grevelingen dam and the construction of the tidal power plant in the Brouwersdam are a perfect match for our ambitions. Both initiatives will put us squarely on the map, generate additional investment and around Schoonew-Daalveld and ultimately result in a sustainable economic sector, as well as generating a major boost for the fishing sector and nature conservation. Together with the other government authorities involved, we are determined to take the combination of economics and ecology to a higher level."

Ad Versieput, Alderman of the Municipal Authority of Schoonew-Daalveld

"A tidal power plant in the Brouwersdam will be an important component in the new regional water system extending from the Brouwersdam to the Volkerak-Zoom Lake. That new system will make the area safer, encourage a new economy with promising prospects, and provide solutions for the natural areas in the region that are threatened and under pressure. Three provincial authorities, six municipal authorities, local area managers and entrepreneurs have pooled their energies in the area around the Volkerak-Zoom Lake to work on the development of a new vision: Waterport! The tidal power plant backs up this vision by re-introducing the tides, salt water and new water dynamics. The plant will produce more than just energy."

Jan Hoogendoorn, Chair of the Waterport Initiative Parkerse Spuul
Timetable

2013-2014
Area development programme for Lake Grevelingen and Volkenak-Zoom Lake and a feasibility study (including financing) for the tidal power plant

2013-2014
Consultation of commercial parties and other stakeholders

Late 2014
National structural concept for Lake Grevelingen and Volkenak-Zoom Lake, including decision about the return of the islands to Lake Grevelingen

2015-2017
Selection and optimisation of turbine technology in the Grevelingendam Testing Centre

2015-2016
Permits, financing and investment decisions

2016-2017
Order for tidal power plant to a single consortium

2018
Start of work on tidal power plant

2020
Tidal power plant operational

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LETTER OF INTENT

Between

Council of Executives of the Province of Zuid-Holland, The Netherlands

Council of Executives of the Province of Zeeland, The Netherlands

and

Orkney Islands Council, Scotland, United Kingdom

regarding

Co-operation in the field of 'Tidal power generation at dams/barriers'

Endorsement of cooperation between EMEC and TTC The Netherlands

The Councils of Executives of the Provinces of Zuid-Holland and Zeeland and Orkney Islands Council, below referred to as "the Parties",

Considering

1. the existing Letter of Intent between the European Marine Energy Centre (EMEC) and Tidal Testing Centre The Netherlands (TTC NL: Dan Oever, Marsdiep and Grevelingendam) regarding cooperation in the field of testing facilities for marine energy technologies (attached);
2. the ambitions of the Provinces of Zuid-Holland and Zeeland (and Rijkswaterstaat and the Municipalities of Goeree-Overflakkee en Schouwen-Duiveland) to open part of the Brouwersdam to improve the water and nature quality of Lake Grevelingen, and hence the opportunity to generate tidal power at this location; the ambitions of Orkney Islands Council to improve road safety by abatement of wave overtopping, which could include a solution which would establish the opportunity to generate tidal power at the Churchill Barriers;
3. The ambitions of the Provinces of Noord-Holland and Fryslan to build both a tidal power plant while renovating the Afsluitdijk for reasons of water safety,
4. the Initiative of the four coastal Provinces of Zuid-Holland, Zeeland, Noord-Holland and Fryslan and Rijkswaterstaat to establish an International Action Group 'Energy from Water works' in the framework of the European Innovation Partnership Water, Water-Energy nexus (see attached template, soon available in English);
5. the objectives and approach of the project 'Energiedijken', in specific the project focus on combining water safety and water management with sustainable tidal energy production into an innovative concept for water defences with a large export potential; and the objectives and approach of the 'Protide' project, in specific the developing, testing and promoting of tidal energy in the coastal and estuarine zone;

Acknowledging

1. the role the Parties can play in facilitating research and development of marine energy technologies at EMEC and TTC NL as well as demonstrate such technologies at Churchill Barriers, Brouwersdam and Afsluitdijk;
2. the similarities of the challenges with regard to Churchill Barriers, Brouwersdam and Afsluitdijk cases;
3. the potential extra value of cooperation under the European Innovation Partnership Water;
4. the need to further elaborate potential cooperation to prepare decision making{}formal cooperation;
5. the need for future projects to be developed and approved through the respective Parties' formal Governance procedures where required.

The Parties

1. agree to endorse the Letter of Intent between EMEC and TTC NL, which means that the parties will provide non-financial support to the cooperation between EMEC and TTC NL and will promote the exchange of knowledge and experience on setting up and running testing facilities, including governance aspects;
2. express the intention to start cooperation in the field of determining the feasibility of tidal power generation at the Churchill Barriers, the Brouwersdam and the Afsluitdijk;
3. express the intention to position such cooperation under the EIP Water Action Group 'Energy from Water works';
4. express the intention to elaborate potential cooperation in the framework and during scheduled conferences of the 'Protide' and/or 'Energiedijken' projects;

Potential topics for cooperation

Strategy development for Churchill Barriers, Brouwersdam and Afsluitdijk:
- Public-public partnership (state, regional, local)
- Market consultation, business case development
- Public procurement, State aid, concession
- Public-private partnership: e.g. Design, Build, Finance, Maintain and Operate-contract
- Innovative financial arrangements
- Permits
- Grid connection
- Stakeholder and Risk management

Joint Fact Finding
- Impact on regional and national economy, innovation and export potential
- Impact on local environment; e.g. fish/mammal friendly-ness of turbines
- Cost-efficient and fish/mammal-friendly tidal power generation at low head

Application for financial means from European Union

Each party will be responsible for the expenses resulting from its own activities related to this Letter of Intent

This Letter of Intent does not create any legally binding obligations between the Parties

Kirkwall, 9 October, 2013, signed in three-fold,

Province of Zuid-Holland

Mr Gover Veldhuijsen
Executive for Economy and Energy
On behalf of the Council of Executives ('Gedeputeerde Staten') of Zuid-Holland

Province of Zeeland

Mr Ben de Vries

Orkney Islands Council

Steven Heddle

Copy of signed letter of intent will be sent to:

- Neil Kermode (EMEC)
- Han Weber (Chairman of Steering Group Tidal Power Plant Brouwersdam)
- Pieter Bergmeijer (TTC NL, Project manager 'Energiedijken')
- Ine Neven and Charles van Schalk (EIP Water Action Group)
- Leo van der Klip (Project manager 'Protide')
- Piet Ackermans (TTC NL, Project manager 'Tidal Testing Centre Grevelingendam')