

## Integrating flood management and sustainable energy

*Lessons from five attempts to realize multifunctional Energy Dams*

### Introducing the case Grevelingendam

#### 1. Introduction

The Grevelingendam was built between 1958 and 1965 as a part of the Dutch Delta works (construction in reaction on the major flooding disasters in 1953) and closed the Grevelingen from the Krammer-Volkerak en so from the rivers upstream. It was part of the national water security strategy to shorten the coastline of the Netherlands. Because of the realization of the Brouwerdam (1971) this water safety function is not that manifest anymore. The Grevelingendam with its 6 kilometers long provides a road connection between the island of Schouwen-Duiveland (Zeeland) and Goeree-Overflakkee (Zuid-Holland) which nowadays has strong economic value for this region. From the moment of realization until now, the dam more and more received recreational functions. At the Grevelingen side there is a windsurf hotpot and the Eastern Scheldt side is a kitesurf spot and used as beach in the summer. To mitigate the consequences of the Eastern Scheldt works (most expensive Delta work), in 1984 a sluice (siphon) in the midst of the dam (Flakkeese Spuisluis) was realized in order to hold at level the salinity in the Eastern Scheldt. From 1987 on, this sluice has no function anymore. In recent years, the sluice is discussed to be reopened for water quality improvement of lake Grevelingen as well as a location of a tidal test center for innovative energy production.



## **2. Tidal test center as pilot for large scale innovative energy production**

Onwards from the creation of the Brouwersdam (1971), the water quality of the lake Grevelingen always has been an issue of concern for governmental agencies (declining salinity, augmenting levels of phosphate, lack of oxygen). To improve the salinity and keep the water salt, in 1978 the Brouwersluis was constructed to make a new connection with the North Sea. However, this connection proved not to be big enough to get a dynamic system in lake Grevelingen with oxygen exchange between the surface and the deeper parts. This led to deterioration of the water quality of the lake which caused negative effects for nature and economy (recreation and shellfish-fishery). Already in 2005, governmental explorations concluded that re-using the Flakkeese Spuisluis could recover estuarine dynamics (in the east part) in the lake Grevelingen. Together with topics on tourism, nature, recreation and spatial planning, energy generation, the Flakkeese Spuisluis is mentioned in the “Zicht op de Grevelingen” (2006) report.

In line with the thoughts on combining topics on energy and water quality at lake Grevelingen, several local authorities (Nature and recreation authority Grevelingen) initiated (2007/2008) research on the potential of using the Flakkeese Spuisluis for energy generation as well. On account of this report several other public bodies (National water authority and province of Zeeland) followed this example. Most of these examinations are on water quality (Nolte et al., 2008; Nolte en Spiteri, 2009; Nolte en Spiteri, 2010), but the earlier mentioned additional topics became more prominent as well. None of them focus on the Grevelingendam in particular, but in several occasions the dam is part of the study. Conclusions of these examinations emphasize the feasibility of a culvert in the Brouwersdam combined with a profitable energy plant (Vrijling, van Duijvendijk en Jonkman, 2008). These conclusions provided basis for further development of plans and led to the installation of a commission on MIRT Grevelingen (2009).

The main focus of the MIRT commission was the improvement of water quality around lake Grevelingen. The exploration of possibilities, strengthened by the involvement of municipalities and regional authorities, had to lead to several applicable future scenarios in which feasibility and desirability were preserved. From this moment on the Flakkeese Spuisluis each time was discussed in regional meetings with the Secretary of State and later on with the minister of Infrastructure. In October 2013 the minister decided to reopen the Flakkeese Spuisluis, unless the fact that private parties did not have a conclusive business case. This decision triggered public and private organisations to think and work on multiple use scenarios.

One of the partnerships that hitched on to this ‘multiple use’ purpose of the Grevelingendam was an knowledge-alliance on the realisation of a Tidal Test Centre. In the shadow of the Brouwersdam, this test facility had to be the first stage in the technical development of turbines. The expected costs of the program of development were estimated at 1.3 million. The parties involved placed several requests for subsidy to cover these costs. Half of the budget needed had to come from the INTERREG subsidy program and for the other half the alliance reached out to public authorities. At this point, Nature and Recreation authority tried to connect public and private actors and accelerated the process of development. Together with mostly private actors they constructed a shared ambition in which organizational goals and ambitions are combined.

After the Nature and Recreation authority was forced to not interfere in the project development anymore (due to tender-rules), the Province Zeeland became the initiator of the Tidal Test Centre. The Province South Holland would focus on the tidal energy plant in the Brouwersdam. The Province Zeeland took the lead position and tried to trigger involvement of more market parties with success. The province managed to bring them together, and several months later a new knowledge-alliance was born. Province Zeeland entitled Antea Group as project leader whereupon the character of the initiative became more privately loaded. The actors involved slightly differed from the former partners, but the goal of the joint activity stayed the same. This new private initiation led to a Letter of Intent that was signed in February 2012. The focus of this LOI was for the major part on the realisation of a test facility in the Grevelingendam, but for some of the partners some heartiness towards the tidal power plant in the Brouwersdam played a role as well. In this phase of the project there were almost no public authorities involved any more. This situation was in line with the thoughts of most private actors who wanted to keep the collaboration mainly private. Up to this point in time they were convinced that initiative-costs could be easily covered without additional financial resources of public authorities. Unfortunately, the parties involved were not able and up to the investment asked for and some of them left the cooperation. Lack of financial resources and uncertainties about frameworks and possibilities were the main triggers of these exits.

The second meeting on the realisation of the test facility, in December 2012, was dedicated to the topics division of labour and contribution. At this moment still the lack of funding was an issue. This lack of funding created a situation, in which both public and private parties adopted wait-and-see strategies. As a result of this situation the process of development decelerated. But with the start of Pro-Tide, in January 2013, and the integration of both projects a kick-start was forced again. The realisation of the Tidal test Centre was appropriate for inclusion in the Pro-Tide project since both projects tended to further technology on tidal energy. This opportunity was grasped by Antea Group and together with Zeeland and Zuid-Holland they developed a project outline. The main driver of this outline was the joint fabrication of a business-case and an agreement on cooperation by private parties.

In March 2013 the first workshop on Pro-Tide took place. Some of the initial LOI partners were present, but most of them were not involved any more. Especially the position of turbine developers was represented well, and most of these parties were new to the collaboration. The main goal of the session was to get clear insight on the goals and means of the joint activities. Which parties are in and which are out, and what is the specific role of each party were topics discussed? Along with the clarification of these topics the development of the tidal power plant at the Brouwersdam was discussed as well. New deadlines were set for the decision on involvement. A project timeframe was formulated as well.

In the weeks after the meeting it became apparent for Antea Group and the provinces Zeeland and Zuid-Holland that there was still little benevolence towards the development of the test facility. Despite the fact that the necessary steps at this point in time had a highly technical focus, external initiative and engagement on other subjects would have been welcomed with open arms. Antea Group worked on the project plan during these weeks and finished it in April 2013. The first phase of the project plan described research on engineering and construction for the test facility. The second phase comprised building

activities and exploitation. Activities in the first phase could be covered by funds acquired from INTERREG. In these same months TTC NL enlisted for an OP-Zuid subsidy. The request encompassed an aggregate amount of 300.000 euro. The request got rejected by the OP-Zuid commission, which led to a situation where the funds needed for development were still missing (unless the fact that Province Zeeland maintained its subsidy of 100.000 euros).

In the following months (from April on) the project-development showed no further progression. But behind the scenes Antea Group was busy with the development of a Requirements Program. Unfortunately full-time dedication was impossible. Lack of funds was still the main cause. Because of that, it took Antea Group until December 2013 to deliver the Program of Requirements. During the months that passed, Antea Group executed research on object conditions (Grevelingendam), licenses needed and technical requirements for testing. These findings were based on conversations with several public and private organisations in which 'must haves' were discussed. In November 2013, a large contribution to the progress was made by the Ministry of Infrastructure and the Environment. The minister sanctioned the commissioning of the Grevelingendam and allocated 5 million euros for this job.

The delivery of the Requirements Program led to a new task for Antea Group. On the basis of the earlier mentioned findings, the organisation had to facilitate four more workshop on Pro-Tide. In the first months of 2014 a 'market consultation' took place as well. During this consultation several market parties and public authorities discussed the potential and profitability of a tidal power plant in the Brouwersdam. Due to these events the enthusiasm regarding 'tidal energy' was triggered, through which actors became more involved again. For the next four workshops the following topics were decided on: *Cooperation and Competition, Technics and Innovation, Negotiation and PPS and bundling and progression.*

The second (first was in January 2013) workshop on Pro-Tide, on the 12<sup>th</sup> of February 2014, enjoyed lots of attention. By using a mutual gains approach the parties involved tried to align their interests and desires. This approach was necessary because the various new stakeholders brought in several new perspectives. The workshop brought what had to bring and gave the facilitating parties some insight in these new perspectives, goals and interests.

The subject of the third Pro-Tide workshop was determined before the beginning of the workshop-series. According to this planning the subject should cover 'technics and innovation', but several days before the workshop the facilitating parties (Antea Group and Zeeland) changed it. The facilitating parties noticed that 'financial resources' was the number one topic discussed during the first two workshops. And since realization was impossible without those resources they decided to focus primarily on this subject. REBEL Group was instructed to design several different financial scenarios. Based on 'rent', 'energy production', 'investments' and 'subsidies' they developed several different compositions. Despite this effort, there was still no final calculation by the end of the workshop. Opinions were still divided. The only shared conclusion stated that external financial resources were crucial. The fourth and last workshop was organised on the 9<sup>th</sup> of April 2014. The discussion started where it ended in workshop number three, but this time a lot more actors were involved. The same conclusions were drawn again. Without public investment the rent

would turn out too high. And to realize public investment, the social benefits needed much more elaboration.

The months after the Pro-Tide workshops showed little progress. The first major breakthrough was the entrustment of permit-research to Grontmij by the Ministry of Infrastructure and the Environment on the 16<sup>th</sup> of July 2014. The implementation of this task clarified that the national Water Authority was still prepared to re-install the Grevelingendam and to redevelop the siphon installation.

## **Case Outcome**

The different steps in the process show problems concerning investment and participation. Both topics need further elaboration. The issues were initially coupled by public authorities and were passed on to private organizations because realization of a tidal test facility is not a main activity of public actors. But in this transfer the initiative lost its public character and focus on social spin-off. A problem that created issues with investment possibilities later on. The search for investment possibilities is the main activity right now and because of this most parties are not intimately involved any longer. Most of them lost track of the developments and are waiting for signals that describe progression.

## **Observations and lessons learned Grevelingendam**

### **1. Initiative and coalition-building**

If public parties initiate public private collaboration, it is important that all parties stay involved during the process and create *public alignment*. It is pretty difficult for private organizations to deal with different public authorities. With these always changing conditions it is impossible for private organizations to decide upon final figuration. In line with this statement it is important to describe the different views of public authorities as well. Most authorities approach the issues in a different manner.

Public authorities need to pay attention to how they present their problems and possible solutions. It is difficult for the private organizations to engage themselves in processes with scope that's narrowing continuously. There's no problem if the narrowing down is a product of combining interests and ambitions. But if it's caused by ongoing imposition of limitations by governing authorities it leads to an unworkable situation for private organizations. Because private organizations expect opportunities, they invest time and money. If these expected opportunities disappear because of this 'narrowing down', they feel like they spilled the invested time and money.

### *Partnership composition*

The initiating parties should extensively overthink who to invite for participation and who not to invite for participation. For a successful collaboration you need complementary and fitting actors. The turmoil during the start of the project and the rapid invitation of several different actors led to a situation where lots of actors were involved. Most of them didn't even know what to get from it but were only present because they wanted to know what was happening. Parties should focus on the strategic and cultural fit

of all actors. If actors with different thoughts and manners are involved, it is likely that their wishes and opinions will cause white noise and slow down the process.

### *Leadership and roles*

PPP partnerships need leadership to succeed. In the common search for shared goals and ambitions true leadership is important because the start of the collaboration will most likely show divided points of view. And sometimes, when actors try to align their differences, conversation and discussion lead to silted situations where some guidance from above could prove to be very helpful.

In case of the Grevelingendam, we can speak of extant leadership. This position is clearly assigned to Antea Group. This actor initiated cooperation in the first place (after GZH) and facilitated the five different workshops on Pro-Tide. At the same time, one of the organizations enthusiasts on 'tidal energy' held a position in TTC NL and is cooperating on a different level in the lobby on tidal energy. Since the organization wants to be progressive and innovative it is participating in the process as well, trying to protect their interests. This position showed to be somewhat difficult from time to time. Some participants stated that a combination of facilitation and participation could be described as questionable, whereby it aggravated the quality of the collaboration. Piling up roles with one actor can cause a skewed hierarchy as well. If one actor embodies several roles they take on a large amount of input. Based on these both points, one can say that overlapping and double roles within one partnership can be confusing for actors and trigger delay.

Public authorities need to promote that they all address spatial planning issues from different perspectives. The national water authority is involved because they own the asset and they want to improve water quality. At the same time they want to draw up constraints and frameworks to protect their primary objective on water-safety. PZH and PZ are involved because they want to advance employment, tourism and innovation in their regions. They care less about the primary objective of the national water authority, and this is the same the other way around.

## **2. Defining the business case**

A PPP construction should entail public as well as private profitability. On the public side of the table the actors need to unfold a business-case to get the figures at a glance. On the other side of the table the public parties need to run a social cost-benefit analysis to prove that participation will result in non-financial benefits. These non-financial benefits, such as the acceleration of innovation, job creation and improvement of water-quality, need to be translated into hard numbers to justify the investment.

In case of the Grevelingendam did not make a social cost-benefit analysis (MKBA). The actors knew what different social benefits could pop-up, but failed to unite them early in the process. This is strange because the collaboration originally started because of a MKBA on the redesign of lake Grevelingen. GZH took the lead and tried to build upon the results of this MKBA. Later on, when Antea Group took over the lead position the focus switched from MKBA to business-case formulation. From this moment on there was a solid focus on numbers whereby social impact was overlooked. But the focus on numbers led to timid actors as well because some of the actors were not up to investment-talks yet. As a result of these

problems, a lesson learnt can be that both the MKBA and business-case development need to be subjects of discussion during the whole process. Besides that, they need to be developed step by step so actors involved can absorb possible unexpected events.

### **3. Arranging collaboration around realization**

Earlier on we described the blurring effect of superfluous actors. It had its influence on the fixation of the scope. The same can be said of a major focus on numbers. If the partners are too busy with moneymaking strategies, they lose a clear focus and shared ambition. Without a clear focus and a shared ambition it is impossible to find fitting partners and investors. So a major search for money triggers scope expansion, and scope expansion triggers weaning of actors on its turn. And when actors wean the partnership needs to search for more actors and money again. In this context it's an ongoing story.

This same story led to another problem. The proverb 'Rome was not build in a day' can be applied to the development of the Tidal Test Centre Grevelingendam as well. A partnership might need baby-steps to reach its goal. It is often simply impossible to reach short-term success. In this case the process needs a step-by-step approach where a decision is a follow up from an earlier one because it is built upon the captured content of all that was prior to it. The more stakeholders involved, the more steps needed.

Lack of investment was proved to be the bottleneck in the realization of the test facility in the Grevelingendam. It slowed down the process intensively and led to a permanent entering and leaving of actors. In every PPP with a focus on innovation, both sides should always remember that the subject is cost-intensive. If you want to participate, it will cost you.

### **4. Exploitation and management**

It proved to be very difficult to find a construction to enable the exploitation of a private test facility. Private actors have not the means to invest in such a facility and the fear the complexity to arrange a joint venture to collectively exploit the test facility. Finding one (trusted) private actor interesting to exploit the test facility was ultimately the solution for this difficult puzzle.

#### **Note**

The various projects are still "under construction" and the planning processes are rather dynamic. This description is completed early 2015. That means that still many aspects are not clear, or still highly changeable.

This description is based upon the master thesis of Harmen Wolf (M.Sc. Public Administration, Erasmus University Rotterdam) and completed by Corniel van Leeuwen (junior researcher).