

**Case Study**  
**19<sup>th</sup> January 2010**

## **Allard Architecture researches onshore, near shore and off shore wind energy**

***Adjusting to the decreasing amount of architectural work in the FGC, Allard Architecture was approached by the most sustainable energy producer of the Netherlands to fine-tune their design and presentation skills for use within the specialist field of wind energy.***

Taking an open-minded approach to the work with the client enabled solutions with dual purpose and reasoning to be achieved, creating an outcome that generated something extra to the original requirement.

Allard Architecture was asked to undertake three different types of work and research: onshore, near-shore and off-shore.

### **On-shore**

After being approached to help with the planning and location of an on-shore wind farm, Allard Architecture used research carried out by the University of Wageningen to help achieve a design solution that would benefit both the immediate community and local ecology.

Through the creation of dykes in the delta works in the south of the Netherlands, previously shallow seas have become a mixture of new reclaimed land and freshwater lakes within the Dutch landscape. This creates a problem in that some of the rivers that used to flow out to sea now flow into these freshwater lakes. Fertilisers used on the field crops are therefore washed into the lakes and enable blue algae to grow and thrive. This in turn prevents both the local community using the lake for recreational activity and the penetration of sunlight to other underwater marine ecosystems.

In an initial proposal for a cluster of on-shore wind turbines, Allard Architecture suggested creating an adjacent natural filtration lagoon that used electricity generated by the wind turbines to systematically pump through and cleanse the algae contaminated water. This process involved creating a barrier adjacent to the original shore, and funnelling the clean fresh output water of this natural filtration system to a harbour that was being proposed by an expanding nearby town for recreational activity.



creating natural helophyte filter

Further development steered the project in the direction of a more overall solution which used research carried out by the University of Wageningen and studied by Allard Architecture. The work explored the reintroduction of monitored amounts of salt water into the lake ecosystem in order to control the quantity of algae. In the past only localised areas of lake water around the slues gates have been able to be cleansed, but Allard Architecture suggested that through combining some of the

power generated through one of the turbines with a water pump and underwater piping, salt water could be reached further inland and allow local communities and the underwater ecosystem to benefit from algae free waters.



current situation



governmental advice



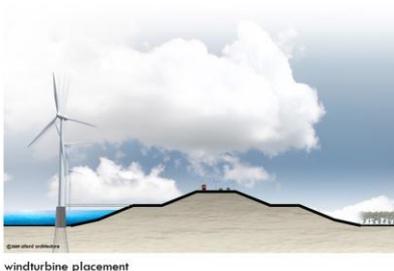
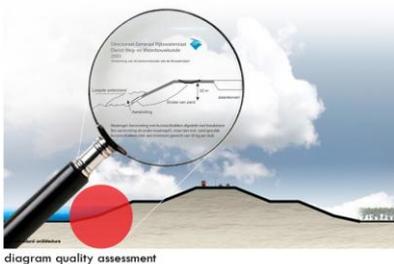
proposed windfarm and saltwater circulation

### Near-shore

The Dutch are famous geographically for their dykes and flat landscapes following an enormous amount of historic human intervention to reclaim and protect their land from the sea. With twenty seven percent of the land actually being below sea level, and sixty percent of the population living within this area, the dykes have both an essential physical and emotional importance.

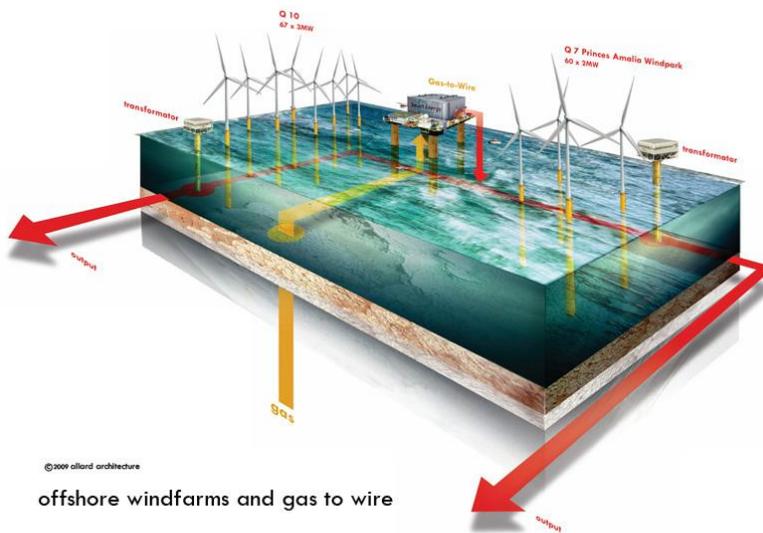
In a report carried out by the governmental department (the Rijkswaterstaat) who is responsible for the dykes upkeep and maintenance, it was outlined that more is needed to be done in order to protect and maintain the dykes in order to ensure their ability to protect the historic land. One of the proposals put forward by Allard Architecture, and the director of the leading Dutch green energy supplier, was to develop a strategy for the integration of wind turbine structures to the existing dykes. It is however an enormous task to eliminate the fear within the minds of the Rijkswaterstaat when proposing an extra function to be carried out along the dyke networks.

Therefore, rather than building directly on the dykes, it was suggested that the wind turbines would be constructed adjacent to the dykes on the North Sea side. By building up an array of wind turbines along the existing man made dyke interventions, a physical protection barrier is established. Revenue for the maintenance and upkeep of other dyke networks is also able to be generated through the selling of green electricity produced by the turbines to national energy suppliers.



**Off-shore**

When asked to research the combination of off-shore wind and natural gas field energy production, Allard Architecture looked at utilising a shared ring cable infrastructure in order to transfer the generated power back to the shore. The idea put forward was to create the ability for an overlap between two forms of off-shore energy production. When the wind is blowing, the turbines generate power and utilise the underwater cable network to transfer electricity back to the shore. When there is no wind, gas-to-wire turbines extract natural gas from gas fields and transfer the electricity generated using the same underwater cable network. This combination of wind and gas allows specific off-shore sites to be constantly generating power.



systematic overview

Through extensive overfishing of the North Sea, mankind has exploited and damaged the natural habitats used for the replenishing of fish stocks. Trawler nets of colossal size scoop enormous quantities of sea life out of the water, as well as damaging the seabed where new life is cultivated. Allard Architecture believes that clusters of off-shore wind turbines should be considered new protected nature areas. By looking at the off-shore wind park from an underwater perspective, the bases to the turbines become a simple series of underwater columns. Spanning between these columns, algae nets are placed creating new marine habitats aiding the cultivation and development of new underwater life.

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