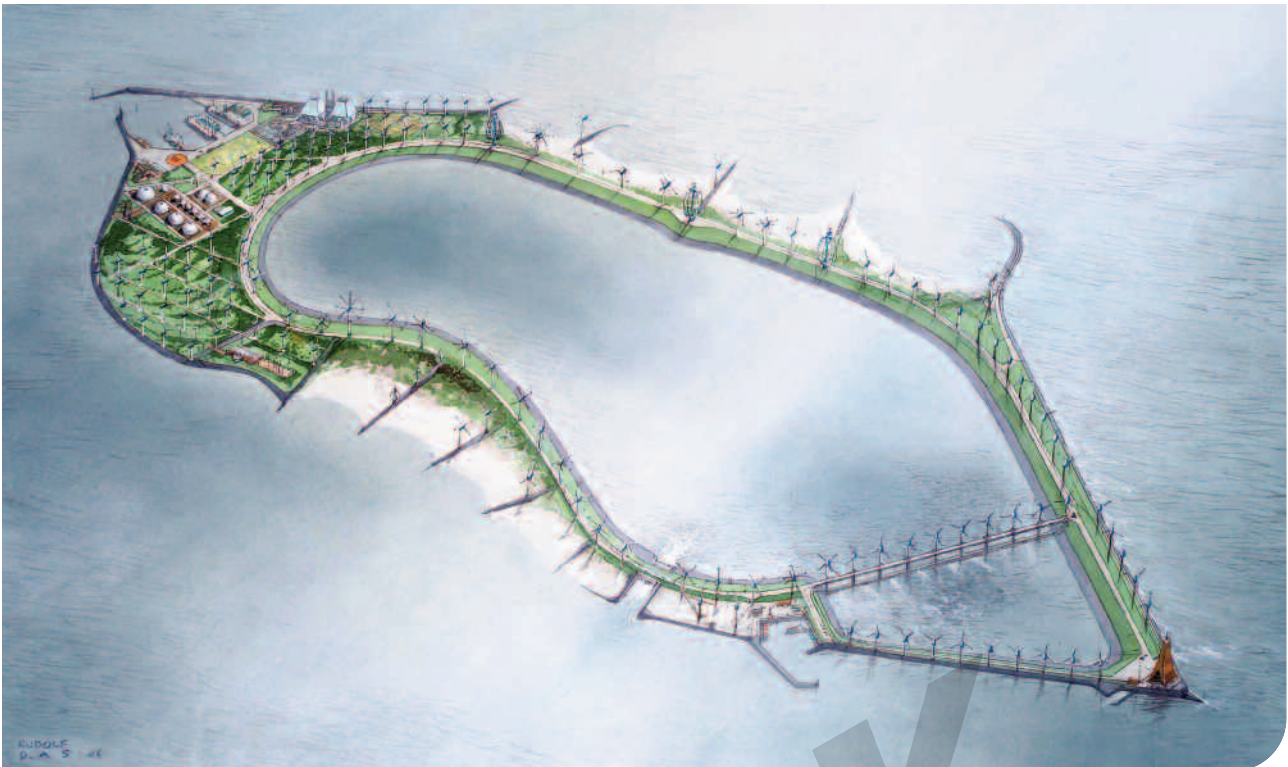


Large-scale electricity storage.

Energy island offers innovative solution.



Electricity storage has a large added value for the energy sector. Storage increases the technical reliability of energy supplies. Storage stabilizes the cost price of electricity and it contributes to the reduction of CO₂ emissions. Large-scale electricity storage is an exception today.

Higher efficiency

The addition of electricity storage in the electricity net has many environmental advantages, especially in combination with a large amount of wind energy in the electricity system. In this situation electricity power stations need to be taken offline less often, especially at night, or run at a low capacity. By day the stored electricity can be used as a result of which no extra peak power station needs to be used. This increases the energy efficiency of electricity production. The production

of wind energy can moreover be used at any moment, as a result of which the CO₂ emissions for the total electricity production are reduced.

Energy Island

Therefore, KEMA and the civil engineering firm Lievens bureau have collaborated with the designers Das brothers on an innovative concept for large-scale electricity storage: the Energy island. This island contributes to the technical reliability of energy supplies, the stabilization of the cost price of electricity and the reduction of CO₂ emissions. The first result of their study for the energy companies is a design for the Energy island in the North Sea off the Dutch coast. The island also offers numerous other possibilities, varying from coast protection to ports and from aquatic biomass to tourism.



The Energy island would essentially consist of a ring dyke, sealed with bentonite and enclosing an area approximately 10 kilometers long and 6 kilometers wide. To prevent groundwater entering the enclosed lake by percolating through the substrata, the energy island would be sited at a location where there was a layer of clay tens of meters thick beneath the seabed. The water level in the inner lake would be between 32 and 40 meters below that of the surrounding North Sea. It is envisaged that the lake 40 km². When there is a surplus of electricity, sea water is pumped out of the lake into the surrounding sea; when there is a shortage, sea water flows into the lake while driving a generator. The storage capacity is sufficient to provide more than 12 hours of power, sufficient to supply an average of 1,500 MW to the onshore power grid for at least twelve hours.

Feasible

From the feasibility study, it is clear that a large-scale storage facility in the form of an Energy island is technical realizable. Key factors in this regard are the presence of a layer of clay tens of meters thick beneath the bed of the North Sea and the fact that the

technical feasibility of the engineering work involved has already been demonstrated in practice. Suitable pump generators are already available.

Innovative offshore solution

Our present partners would like to continue working with us. There are also construction companies with experience in offshore activities that have expressed an interest in designing and building the Energy island, of several islands. These parties combined should be capable of creating an innovative offshore solution, thereby adding a new piece of the Netherlands to the map in the literal as well as the figurative sense.

Why work with KEMA?

KEMA has decades of experience in the electricity sector. We are able to provide well-informed answers to your questions. KEMA is a reliable, impartial service-provider active in the fields of technological and business consultancy, measurement, testing and certification. Our multi-disciplinary teams provide active and critical support to help you think the issues through. This collaborative approach quickly yields tailor-made, practical solutions.

Cost savings

Scenario analyses for the year 2020 show enormous annual savings on operational costs when electricity storage is an integral part of the electricity system. The cost saving becomes larger as the gas price increases. Instead of replacing one or more existing peak power stations (or building a new one) investment can also be made in a large-scale storage system. A significant asset of the innovative island as compared with other storage systems like CAES is that it is capable of serving more purposes than just electrical storage, thereby adding more value to the Energy island. The Energy island is an innovative concept that can be attractive in the medium and long term for the Dutch electricity supplies.

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