

NEED Summary sheet

By Sjoerd Groeskamp (13-03-2022)

[Original paper is found here.](#)



The Norther European Enclosure Dam (NEED) separates North Sea from Atlantic Ocean.

- Cost are 500 billion euro, which is cheap as we argue in the original paper.
- Protects for 20m sea level rise.
- Takes 20 years to built.

	NEED South	NEED north	NEED
Length	161 km	476 km	637 km
Average depth	85 m	127 m	
Max depth	102 m	321 m	
Volume			36 km ³ (= 100x Afsluitdijk)

- Required pump capacity of 40.000m³/s is possible. No need for peak-capacity as river outflow is buffered by Baltic Sea + North Sea basin size. Energy required is captured by 9 windmills of the type Haliade-x 12 MW.
- Dam breach (terrorism, other reasons) have less impact than coastal dikes. With NEED it takes weeks to months to rise the North Sea + Baltic Sea level. For coastal dikes it takes minutes to hours before cities are flooded.
- NEED blocks shipping routes. This requires building new harbors, sluices and other infrastructure. Yet, coastal protection will require continuous raising and adaptation of all harbors (from large ports to small marina's). Therefore NEED may be the better option.

- NEED creates a freshwater basin that can function as a reserve but is also changes to current ecology.

Updates and insights since the first paper in 2020.

[Groeskamp and Kjellsson \(2021\), Europhysic News](#)

- NEED can be built in phases. Each phase dampens wind set-up and tidal amplitudes, allowing for a little sea level rise to maintain coastal safety standards in northern Europe as they are today. If SLR becomes too much, we can still finish NEED.

[Hugo Nota \(MSc thesis - 2022\)](#)

- Without NEED, about 6000 km of European coast requires protection, with about 50cm SLR.
- From possibly 2m SLR NEED could be favorable compared to coastal defense.
- For more than 5m SLR, NEED is certainly favorable.
- It depends on the way we construct NEED.

[Tristan Keijzer \(MSc thesis - 2021\)](#)

Tristan interviewed experts about innovation and huge projects. Long thesis short, he concluded that politics, ecology, social acceptance and urgency will probably play a crucial role in the development in the further implementation of the project. How these factors are perceived in the societal debate will determine if a project like NEED will lead to success or not.

[F. Kollaard, et al \(MDP Project, TU Delft - 2021\)](#)

Kollaard et al. analyzed changes in the North Sea if NEED is built. Brief summary:

- Tidal amplitude reduces from 2m to 0.2m elevation.
- Tidal currents reduce from about 1m/s to 0.05 m/s
- Wave height are not affected by NEED
- Temperature of North Sea remains similar.
- North Sea becomes fresh, but maybe only in the top 40m. This depends how we pump out water (at surface or from below).

From Research Pim Koch (MSc thesis, ongoing)

- NEED is technical possible.
- Considering a closure mechanism, different construction methods, feasibility calculations and the seabed consistency.

Other points to consider:

- Once built, the top can be covered with Olivine (takes up CO₂ from atmosphere)
- Can be combined with tidal and wind energy generation and possibly lots of solar panels.
- Creates infrastructure in Europe (e.g., train connection along dam).
- Does not affect the way we use land.
- Does not require people to move to make place for dam.