Nordic Connector – Fixed connection over Kvarken

Update 14.2.2024

Why fixed connection?

The project
- Basic information
- The technology
- Construction visions

Nordic Connector – logistics upheaval

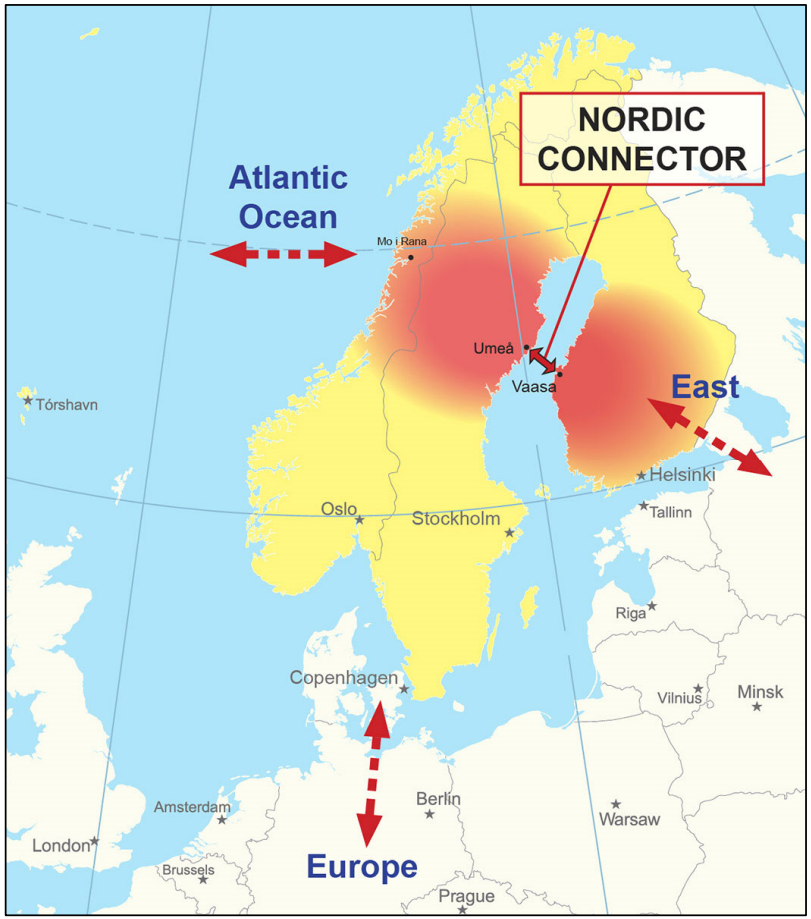
New prospering economic zone

NATO defense strategy

Threat perceptions in media
- Catastrophic environmental impacts?
- Pack ice pressures
- Bombing and sabotage

Financing

Conclusions

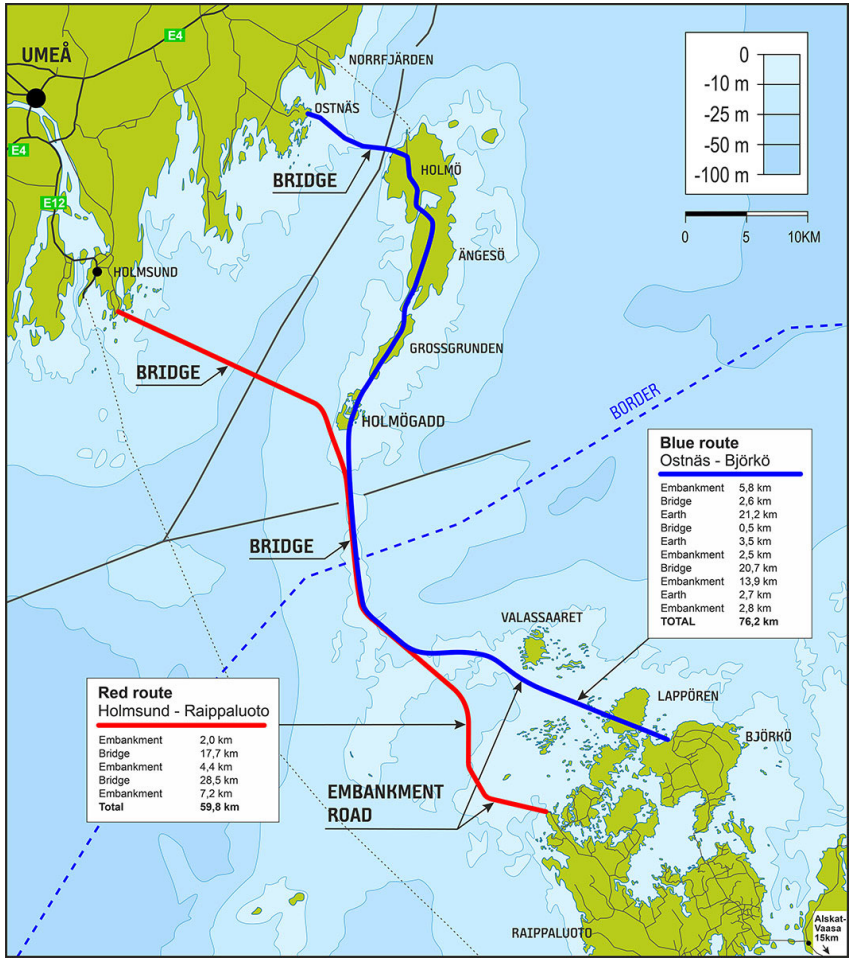


Why fixed connection?

- Both in Sweden and Finland the real GDP per capita has been in stagnation since 2007 and declined steeply recently
- High logistic costs and long delivery times hamper Finnish and Swedish industries
- The fixed connection would create a transportation corridor all the way from the Atlantic Ocean to Far East
- A new prospering economic zone would be created around the Kvarken region
- The fixed connection would improve security of NATO's Northern flank in the new geopolitical situation

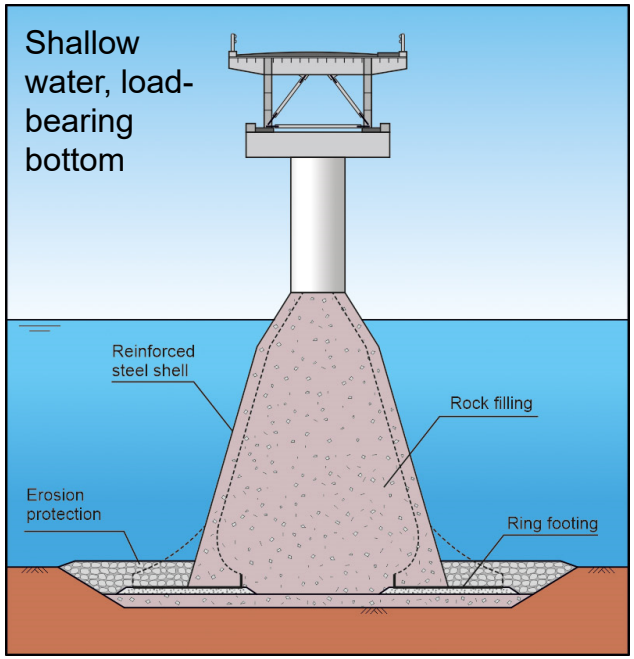
Basic information

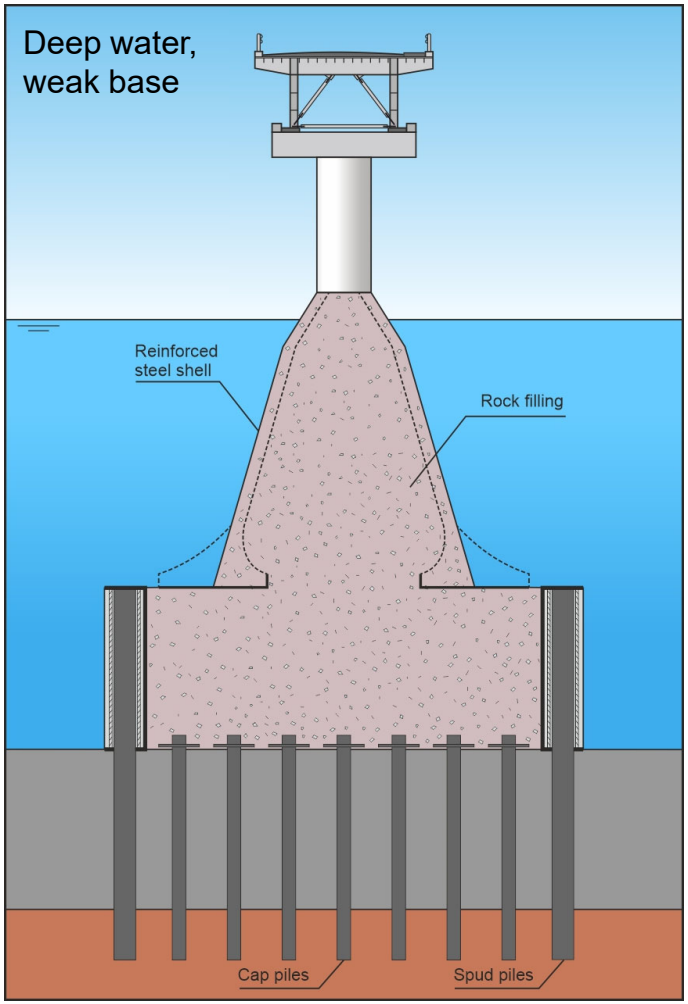
- The fixed connection includes bridges, embankment roads, road improvements and possibly a tunnel.
- Cost estimate 2020, 3-5 billion euros depending on route, inflation 20% since then.
- Geotechnical investigations are needed for a better cost estimate.
- Route should utilize shallow water areas, since bridge segments are an order of magnitude more expensive than embankment segments.
- A railway would not produce benefits because of added logistics costs, and the difference in rail gauge. Rail line would double the cost.



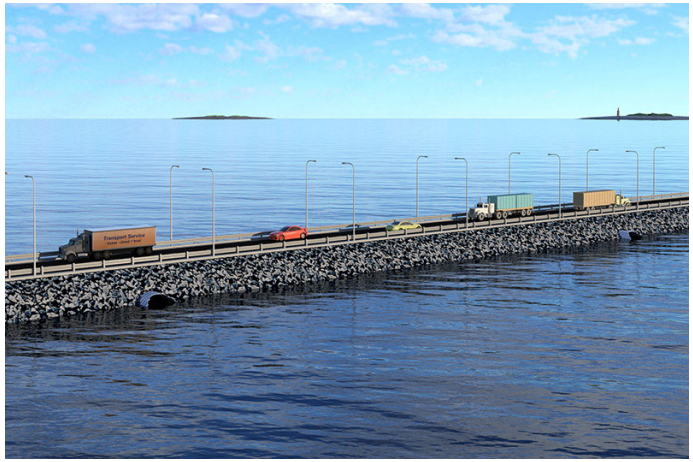
New foundation technology for rapid offshore construction

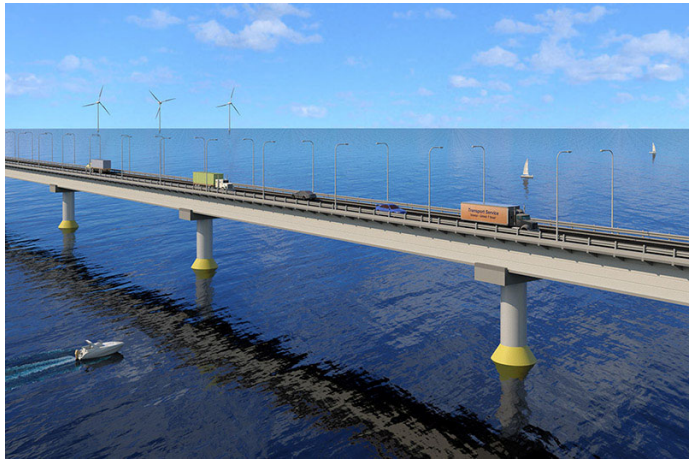
- Light steel shell structure is easy to lift in place.
- Crushed rock fill provides structural mass.
- Rock fill supports the steel shell structure and prevents stability loss.
- Ring footing anchors the tensile side and increases the moment arm at the compression side.





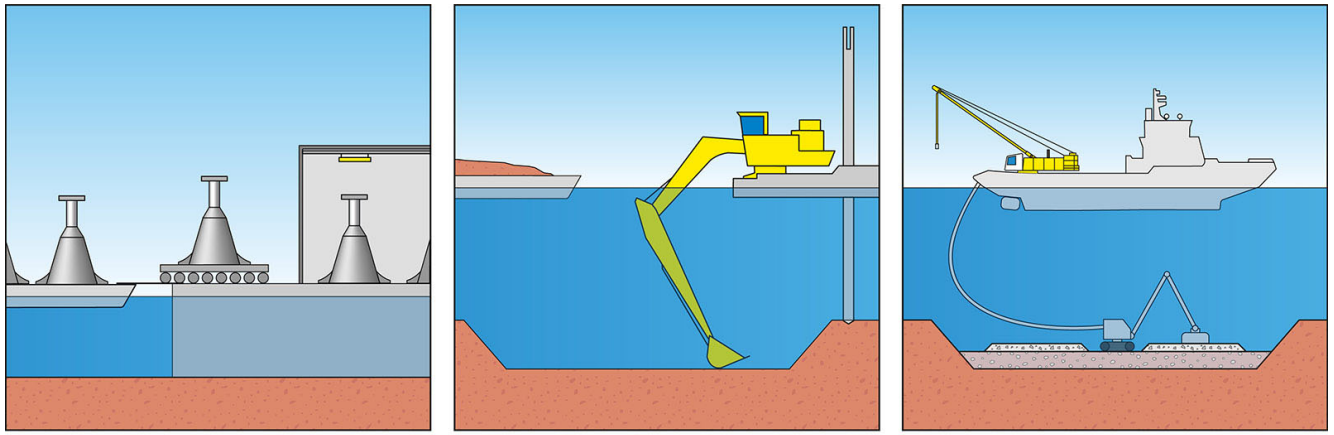
Visualizations



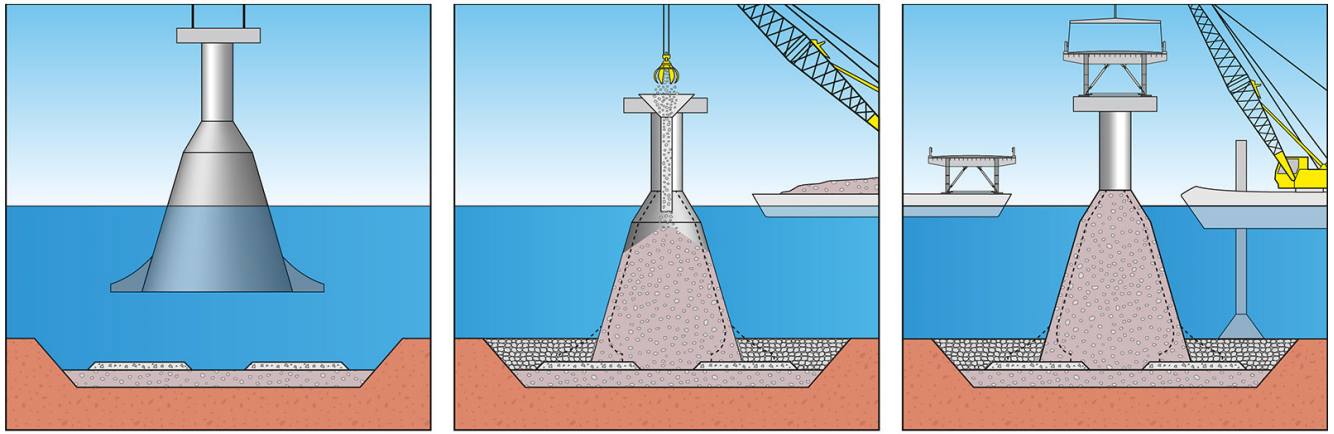


Bridge construction sequence

- Existing technology, tested and proven in the construction of Tahkoluoto offshore wind farm in 2017, for example.
- New bridge can be erected on a prepared seabed at a rate of 100m/day.



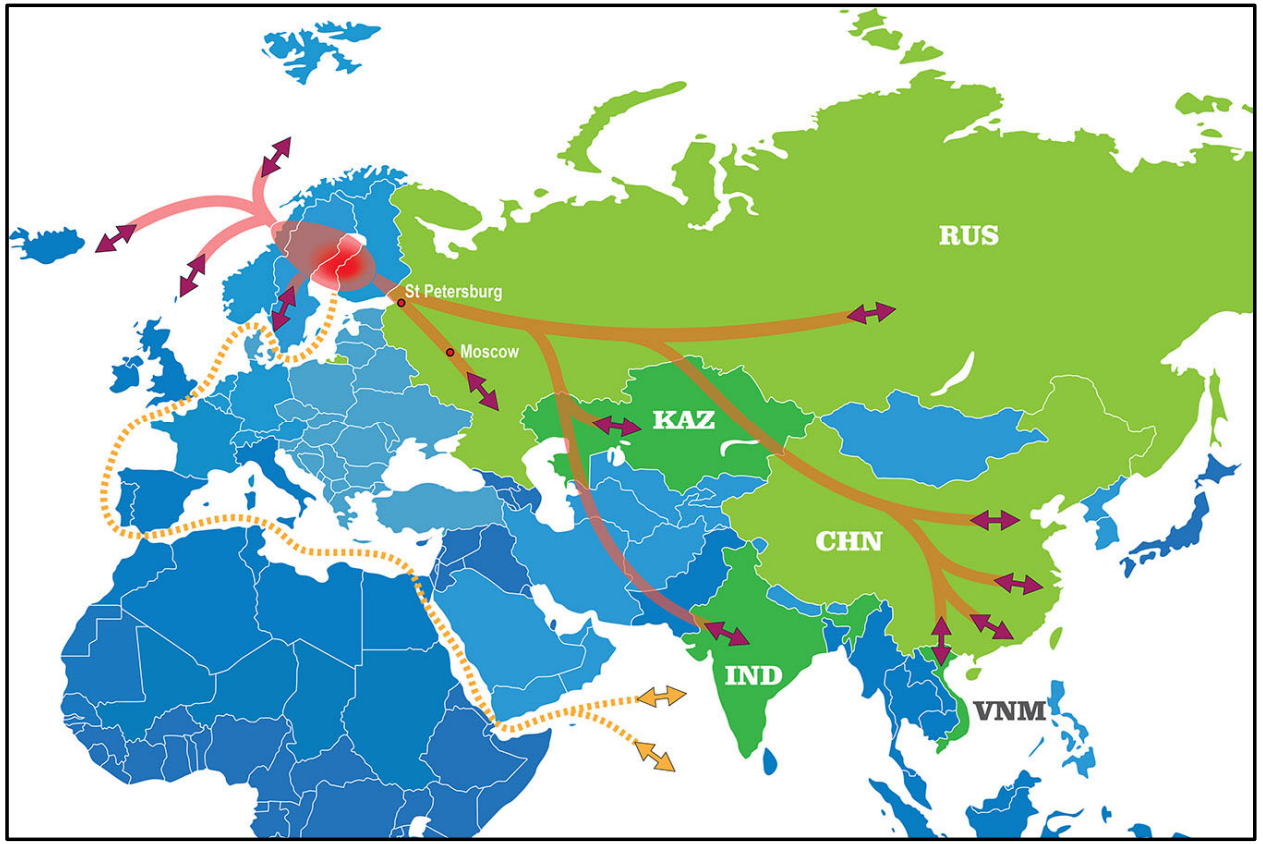
1. Manufacturing of steel shells
2. Dredging, possible mass exchange and compaction
3. Leveling layer and fine leveling



4. Lowering of the foundation
5. Filling the foundation and erosion protection
6. Raising the bridge

Nordic Connector- logistics upheaval

- The center of the world economic activity is moving eastward.
- The customers, suppliers and partners of Nordic industries are increasingly in the East.
- Goods travel between Scandinavia and Far East 6 weeks by sea and 2 weeks by land.
- Nordic Connector would strengthen the land route between Atlantic Ocean and China, India and other far eastern countries

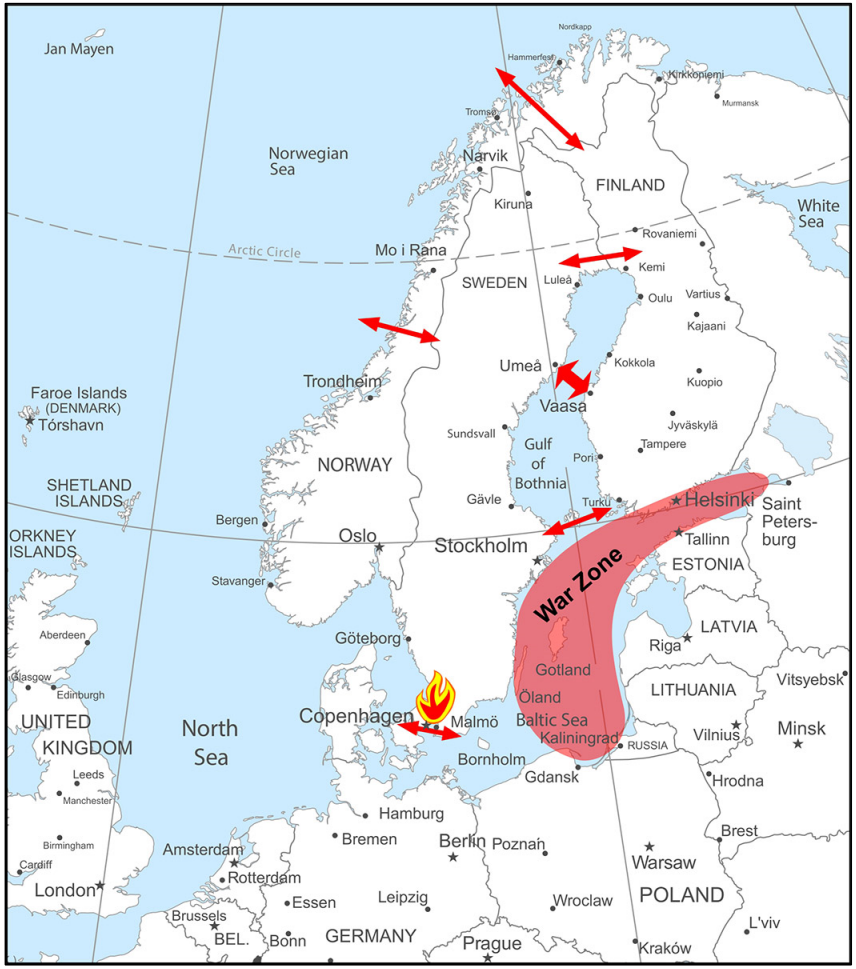


New prospering economic zone

- Nordic Connector would create a prospering economic zone around the Kvarken area in the same way as the Öresund Link did for Sweden and Denmark.
- With decreasing logistic costs, faster delivery and more stable delivery schedule, the economic impact would be felt in a wide area extending from central Norway to eastern Finland.
- The Kvarken area would become a huge tourist attraction with the fixed connection.

NATO defence strategy

- Finnish eastern border is half of NATO's land border against Russia.
- In case of a military conflict commercial sea traffic in the southern Baltic Sea would be easily blocked.
- Other traffic and supply routes would become strained.
- The fixed link from the Atlantic Ocean through Kvarken to Finland would significantly increase the capacity and resilience of transport and supply chains to NATO's northern flank.

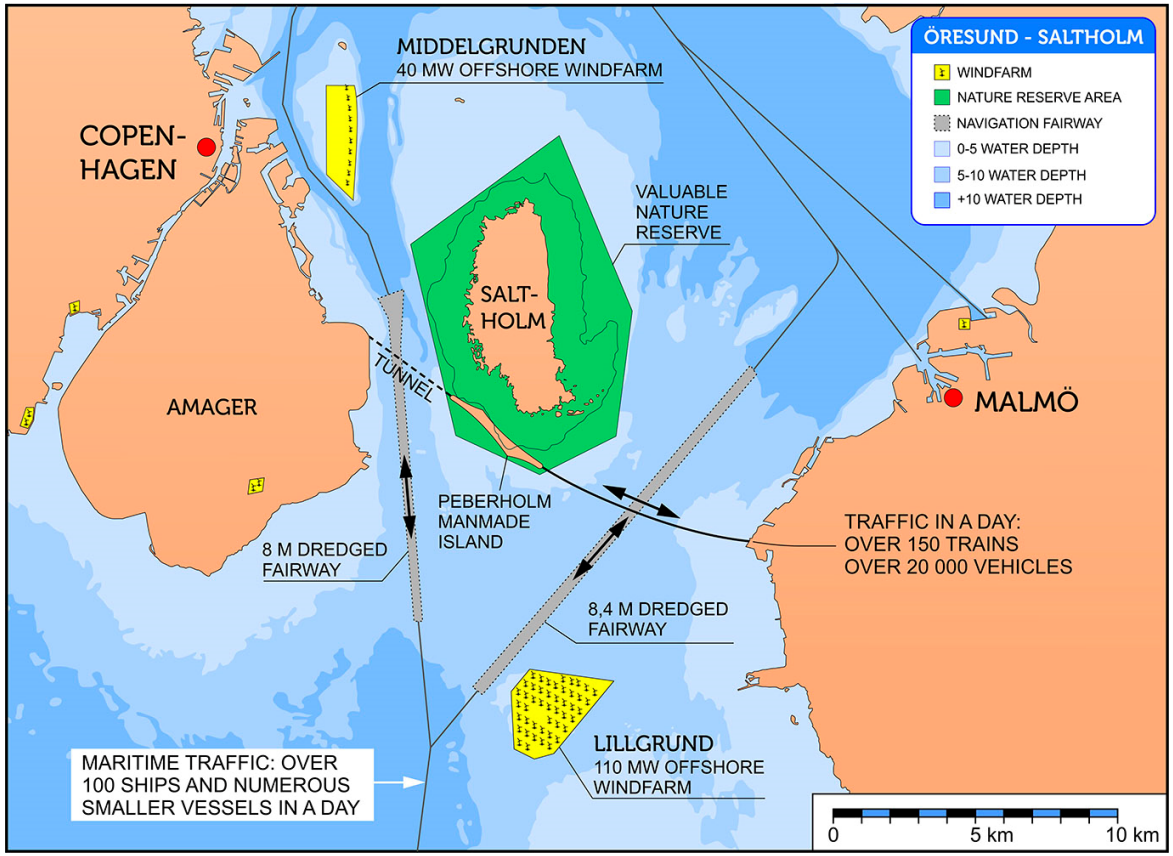


Catastrophic environmental impacts?

- Nordic Connector goes through a world heritage area. However, the specific feature is earth rise, and the connection would not change that. Features like flads and slacks will be passed.

- The main environmental impacts of the connection would be like those of an ordinary highway, i.e. footprint effect, changes in local currents and scenery impacts. Users of the connection would enjoy fantastic scenery.

- Nordic Connector will go through nature reserves, with little impact though. The Swedish and Finnish parliaments will decide the future of the project. The bureaucratic power structures can't prevent it.



The Öresund Link goes through a nature reserve. The richness and versatility of nature has increased around manmade island.

Pack ice pressures

- There are about 200 ice resistant offshore structures in the Gulf of Bothnia, some in very exposed locations. This issue is well under control.

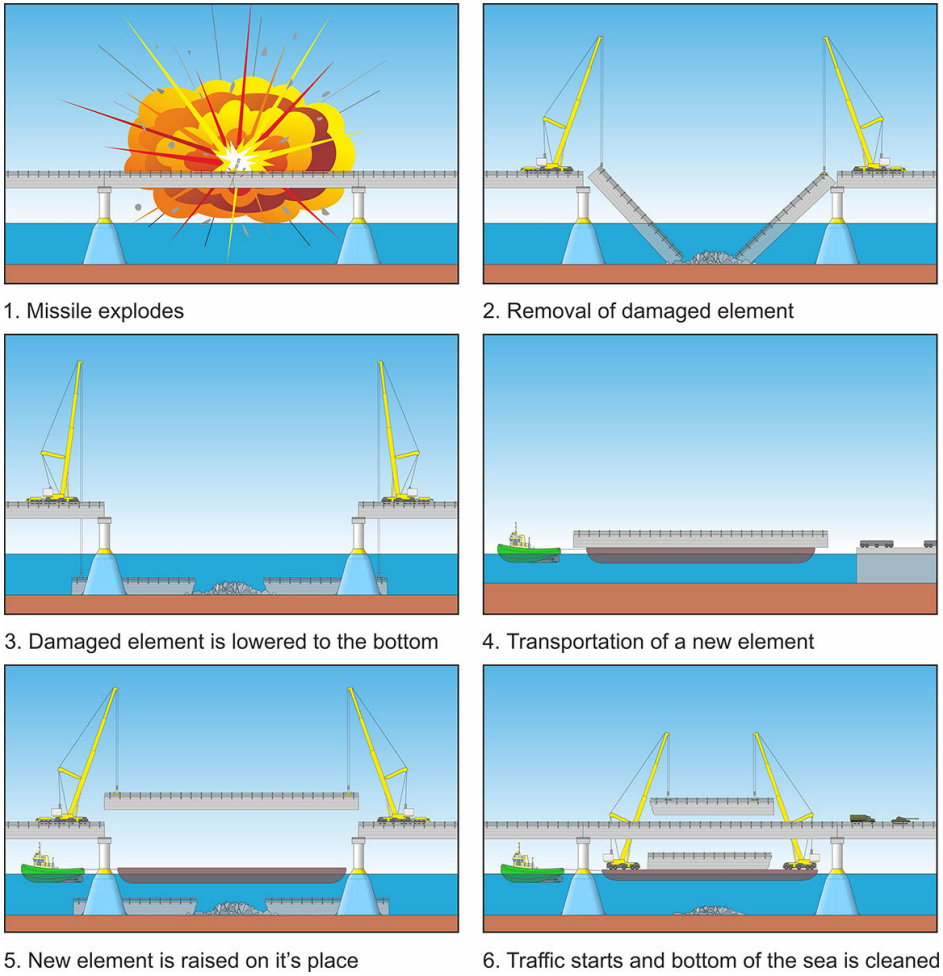
- The bridges are not in the area of heaviest ice loads.

The pilot turbine of Tahkoluoto offshore wind farm in pack ice in 2011.

An ice ridge has hit the test cone around the Kemi I lighthouse in the severe ice winter 1986. Ice loads were measured.

Bombing and sabotage

- Nordic Connector will serve NATO and the security of supply already before a possible political crisis develops into a war.
- It is possible to damage the bridge, but it will not be easy.
- In a basic case the bridge can be repaired in 24 hours if spare deck elements are manufactured under increasing military threat.



Financing

- The cost would be divided between Sweden, Finland and the EU.
- Norway may also become involved at least by improving connections between Mo i Rana and Umeå.
- Road tolls are likely.

Finnish contribution is easily arranged by cutting rail traffic subsidies and eliminating economically disastrous rail investment projects.

Conclusions

- Nordic Connector would have significant economic, security and geopolitical implications.
- It is possible to design and build the connection in 5 years.
- At this stage a proper prefeasibility study is needed (3 months, 8 experts from Finland and Sweden, geotechnical investigations).
- An opportunity for Swedish and Finnish metal and construction industries.
- The project has no severe environmental impacts but an attempt to go around natural reserve areas will sink it.

Nordic Connector would help create prosperity, competitiveness, co-operation and security for the Nordic countries