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Double Degree Master :

Msc. Water And Coastal Management

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Title :

What does the Hydrogen strategies of the Netherlands and Germany mean for the ports located along the Wadden Sea region?

Master thesis research

14.03.2021

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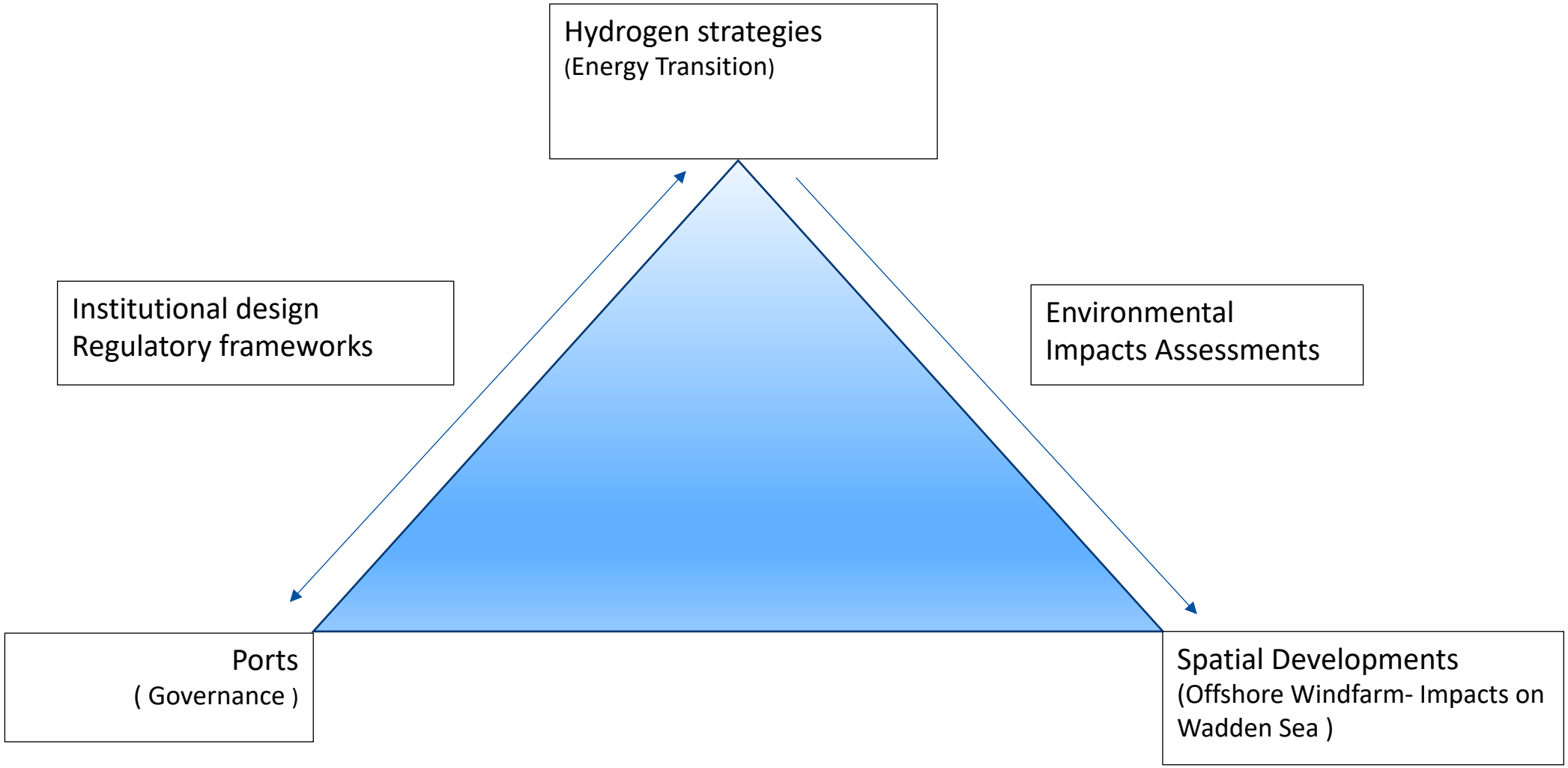
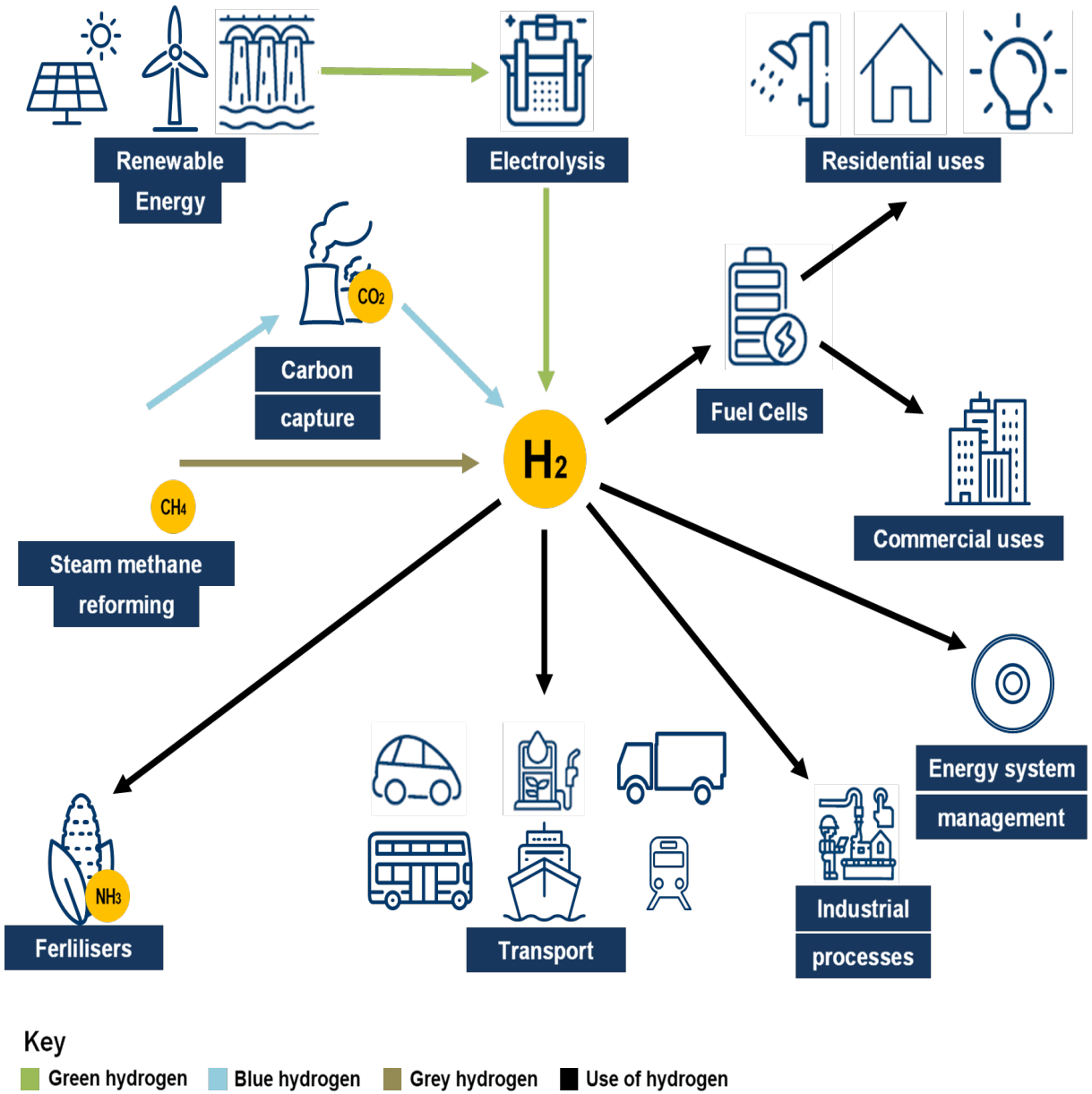
Conceptual Model



Research questions:

1. **What are the current developments and planned transformation linked to hydrogen economy developments in the Dutch and German parts of the North Sea? How are these developments linked to the ports of the respective countries? Who are the stakeholders in the governance of these ports?**
2. **What are the challenges and opportunities for these ports in the developments of a hydrogen economy?**
3. **In which ways can these ports deal with the potential environmental risks associated with hydrogen economy developments to the Wadden Sea?**
4. **How can these ports facilitate the connection of the hydrogen energy produced in the North Sea to the existing coastal energy infrastructure?**
5. **What can be improved on the current North Sea maritime/marine spatial planning to enable these planned transformation processes?**

Hydrogen as the key element



Hydrogen Roadmap

Grey Hydrogen

Niche developments

Experimentation and Exploration

Blue Hydrogen

2020 – 2030

Carbon Capture & Sequestration

Green Hydrogen

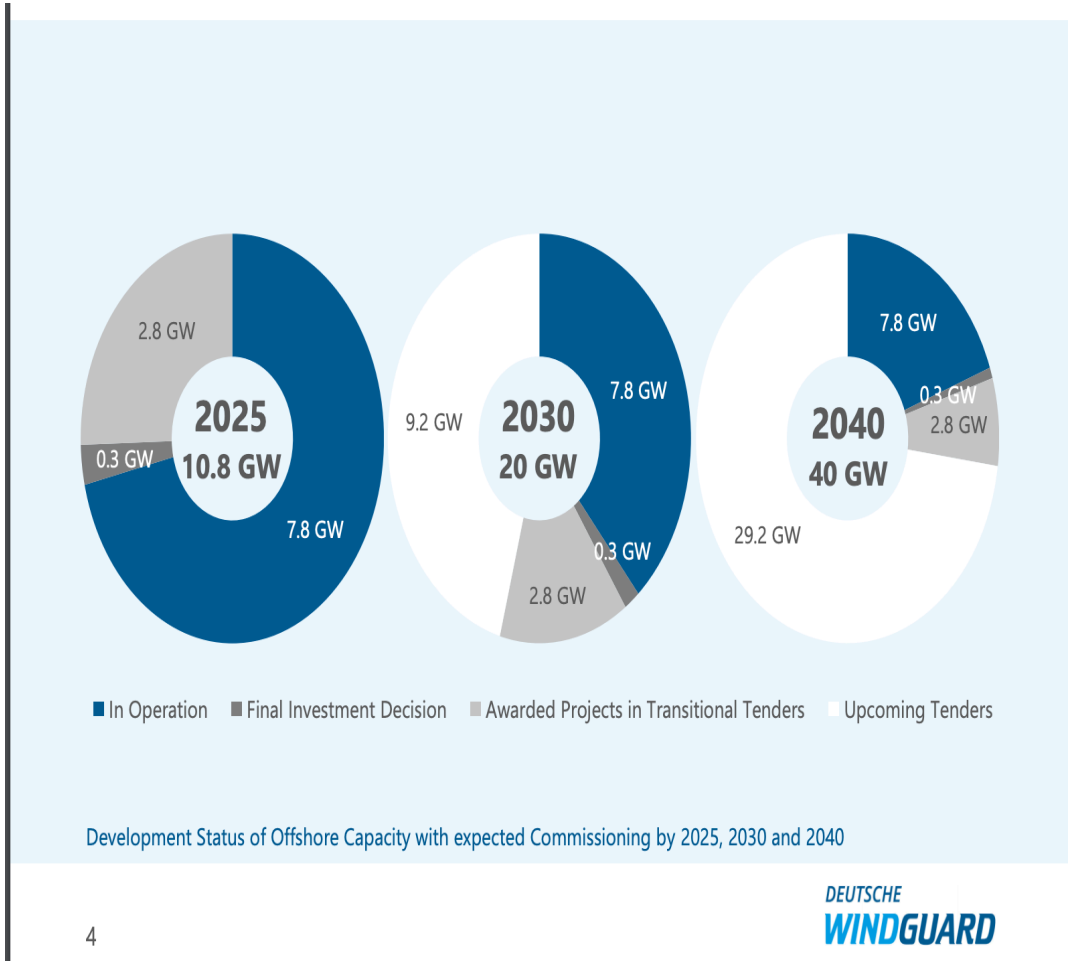
2030– 2050

Scalable

Gradual expansion of Offshore wind energy

Scaling up for Offshore wind farms capacities:

- To meet the demands of the planned hydrogen economy
- To meet the normal energy demand
- To meet the energiewende goals



Roles of Ports in the Hydrogen Strategies of The Netherlands and Germany

Wadden Sea port are already receiving point;

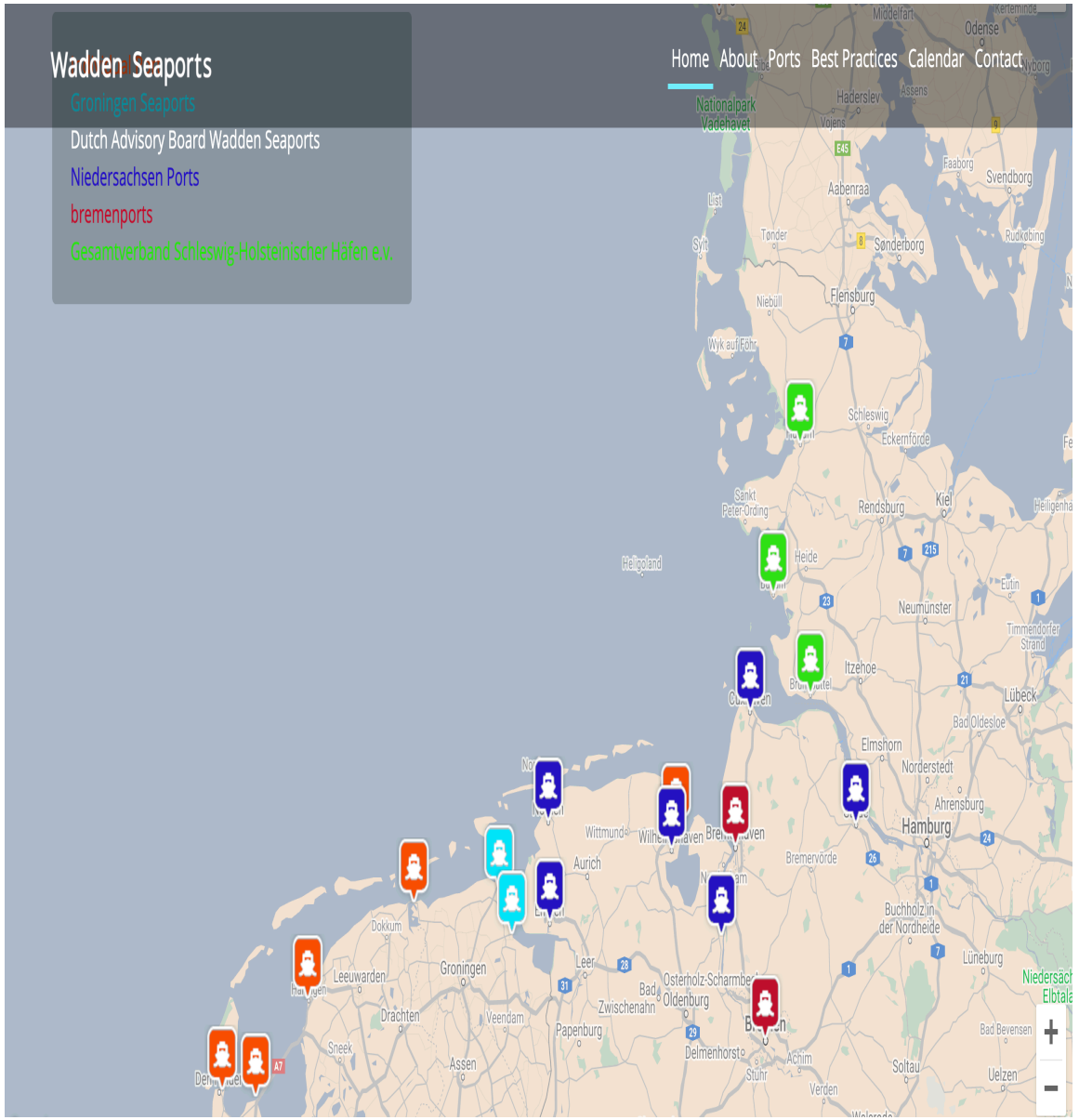
- For electric transmission cables from North Sea offshore windfarms
- For pipelines carrying Natural gas from the North Sea platforms
- Crude oil, coal and gas point of Imports

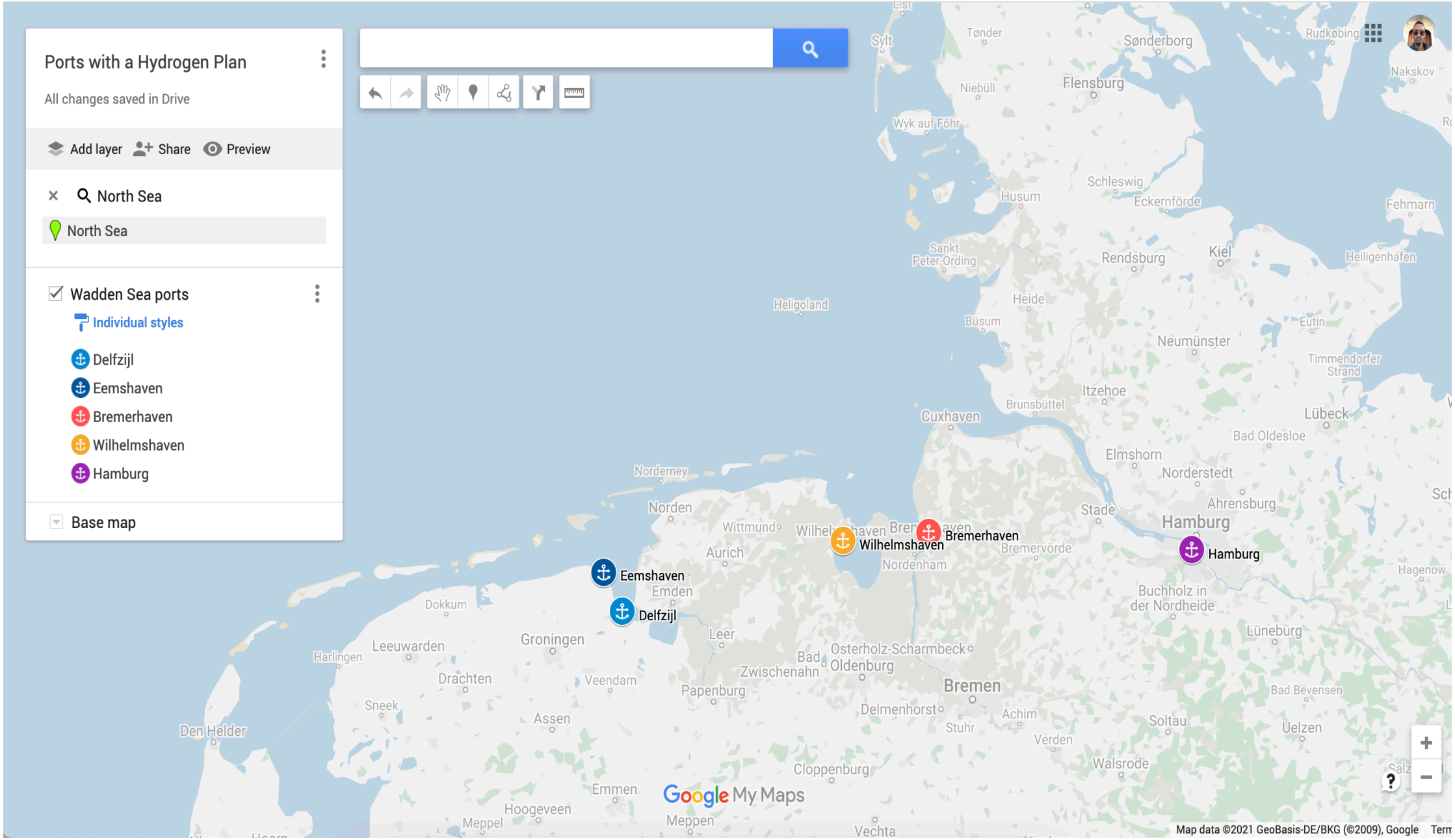
Energy hubs

- Hydrogen production
- Usage
- Storage
- Transhipment & Transportation

Offshore wind farm Services

- Construction, assemblage & shipment
- Operation & Maintenance
- Transmission





Titel der Präsentation — Untertitel der Präsentation [Eingabe im Folienmaster]
Titel Vorname Name — Einrichtung

Ports Located along the Wadden Sea region

1. **What are the challenges and opportunities for the ports in the developments of a hydrogen economy?**

2. **How can these ports facilitate the connection of the hydrogen energy produced in the North Sea to the existing coastal energy infrastructure?**

3. **In which ways can these ports deal with the potential environmental risks associated with hydrogen economy developments to the Wadden Sea?**

Wadden Sea

Potential risks and environmental hazards associated with these developments include;

- Offshore wind farms related risks
- Shipping related risks

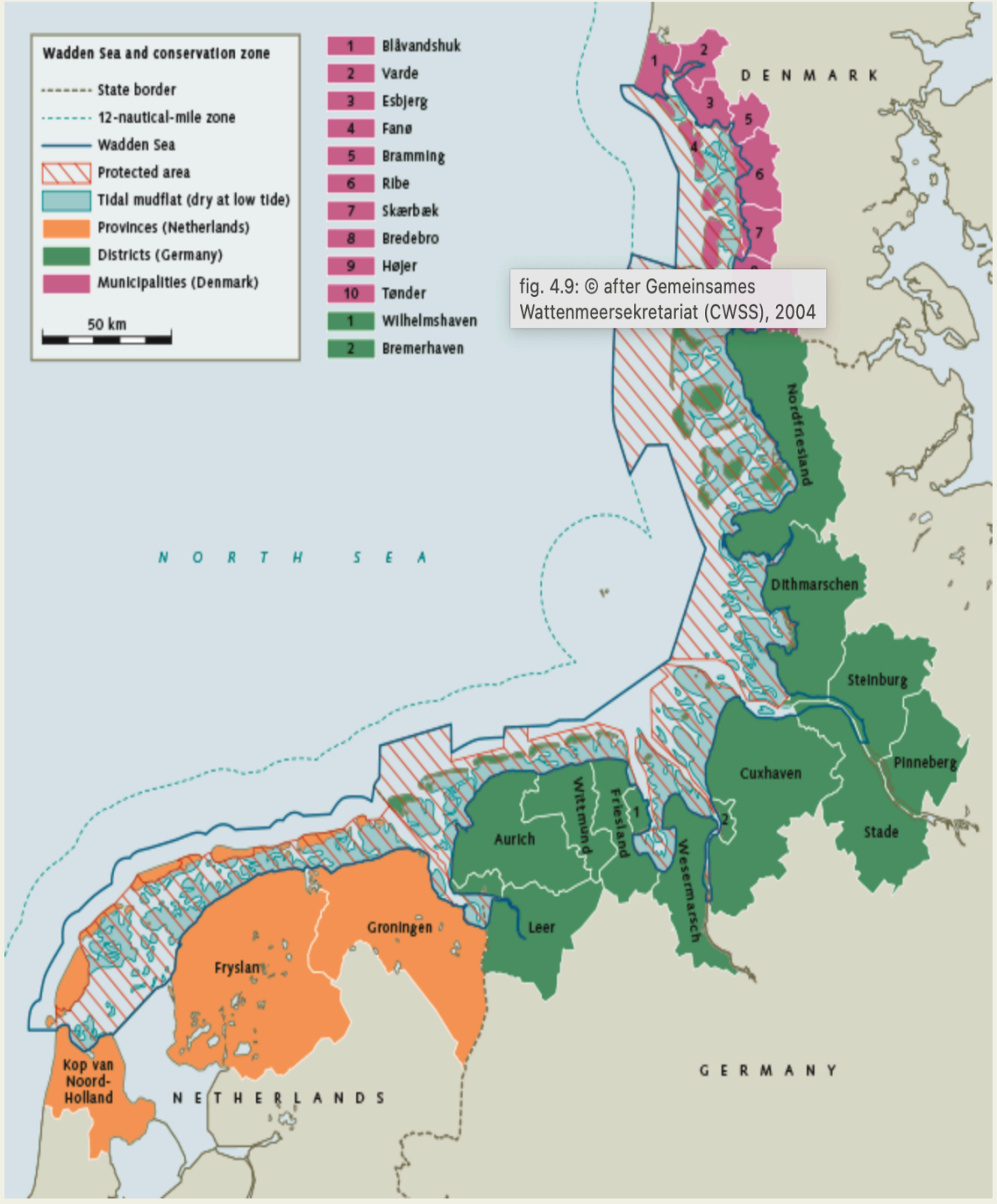
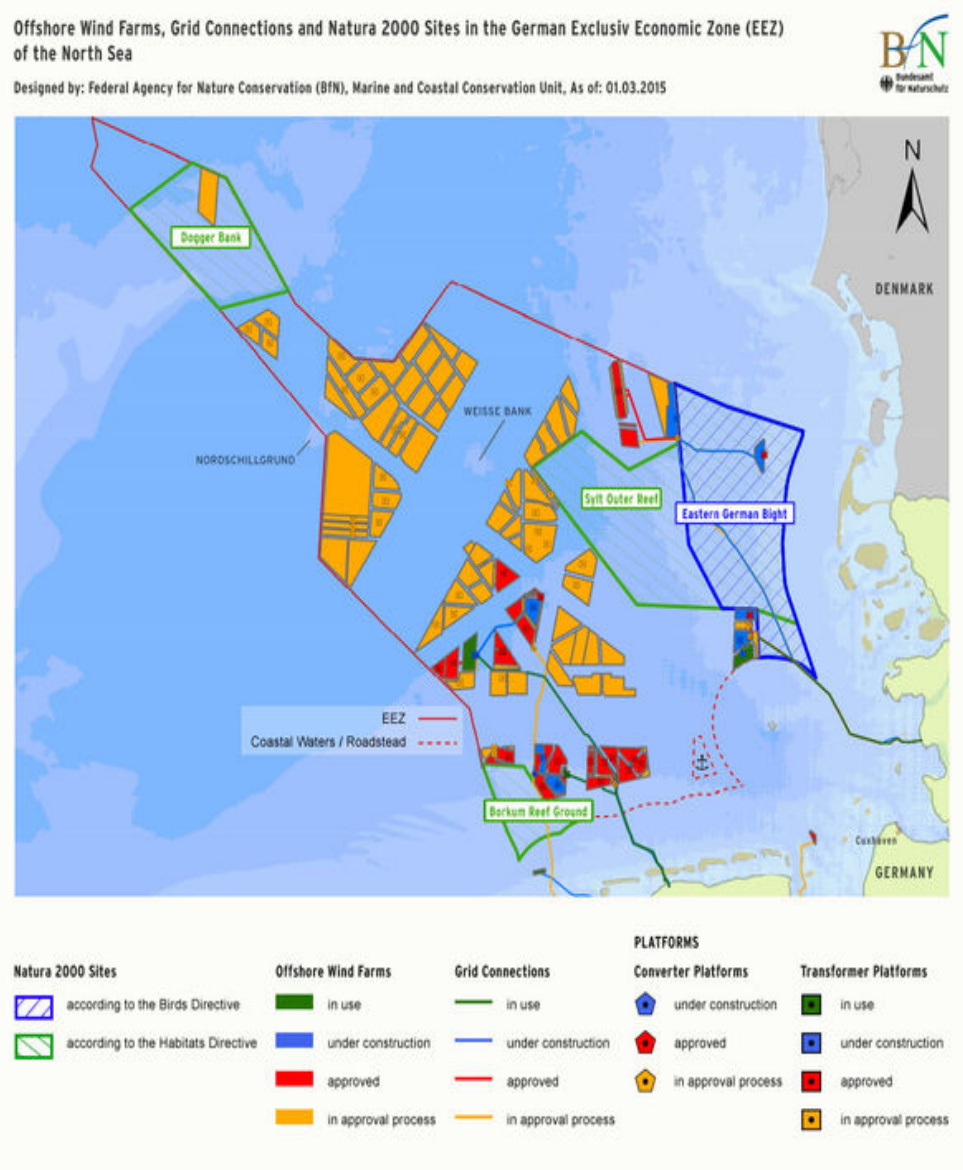


fig. 4.9: © after Gemeinsames Wattenmeersekretariat (CWSS), 2004



Impact & Potential Risks related to offshore wind farms

Construction related risks

- Pile driving noise
- Shipping noise
- Destruction of Benthic communities

Installation & Operational risks

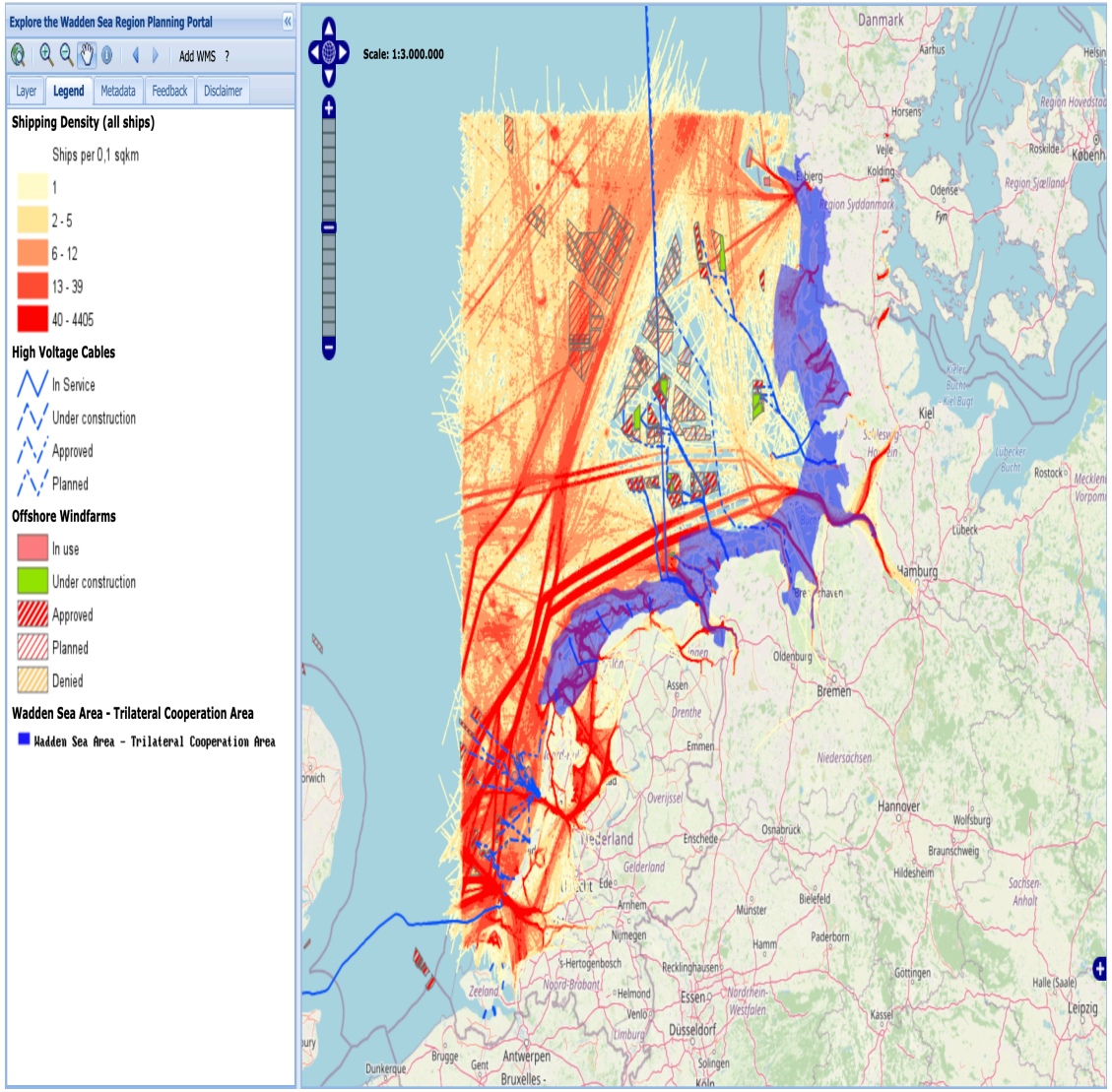
❖Interference with migration routes
❖Collusion with birth Bats, bats..

Accidents

❖Collusions with ships

❖Collapse of turbines

Potential risks related to increasing Shipping Traffic on the Wadden Sea



Operational Emissions

- ❖ Pollution
- Underwater Noise
- Air
- Water

Accidental Influences

- ❖ Oil spills
- ❖ Collusions
- ❖ Cargo loss
- ❖ Emergency grounding

Discharges

- ❖ Scrubber wash water
- ❖ Illegal discharges

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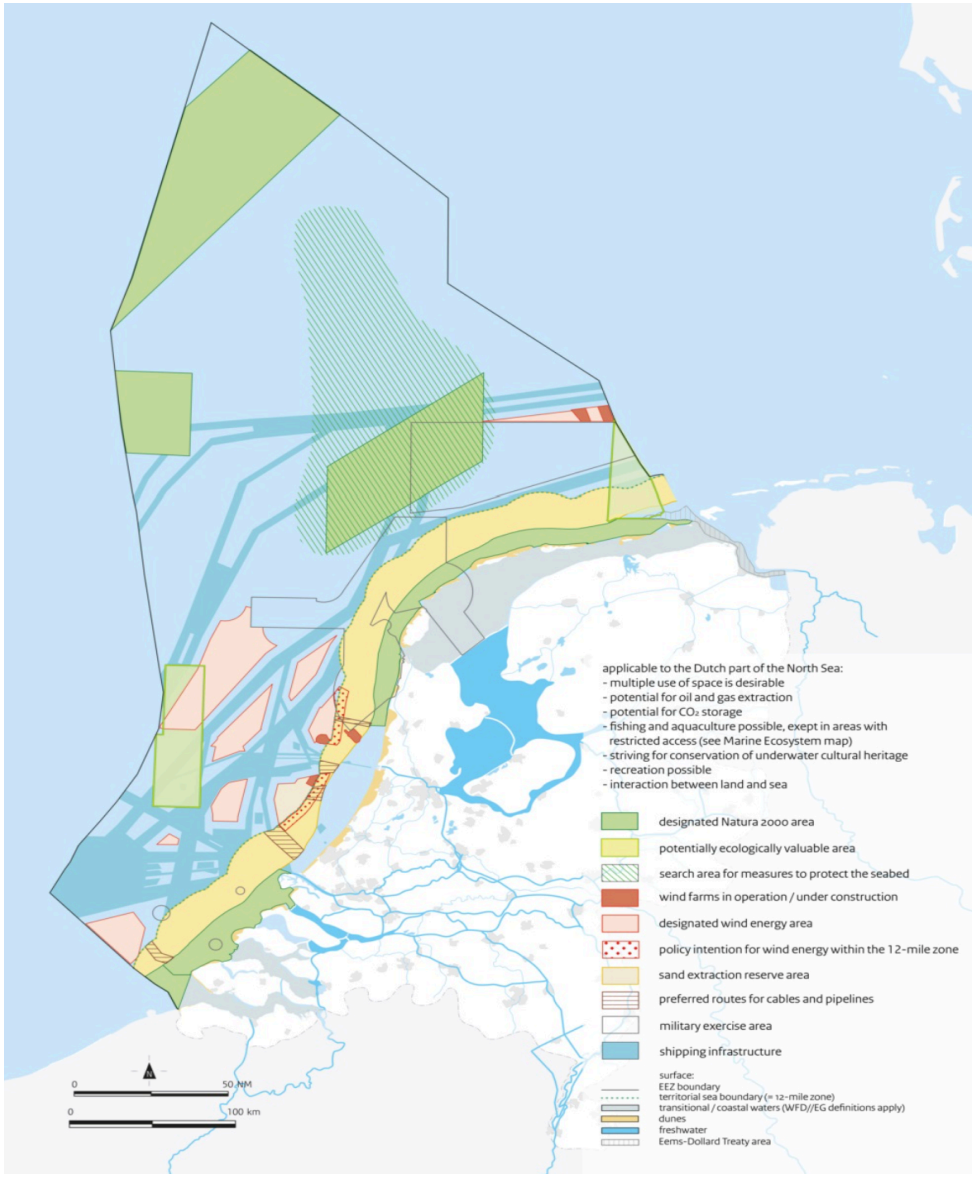
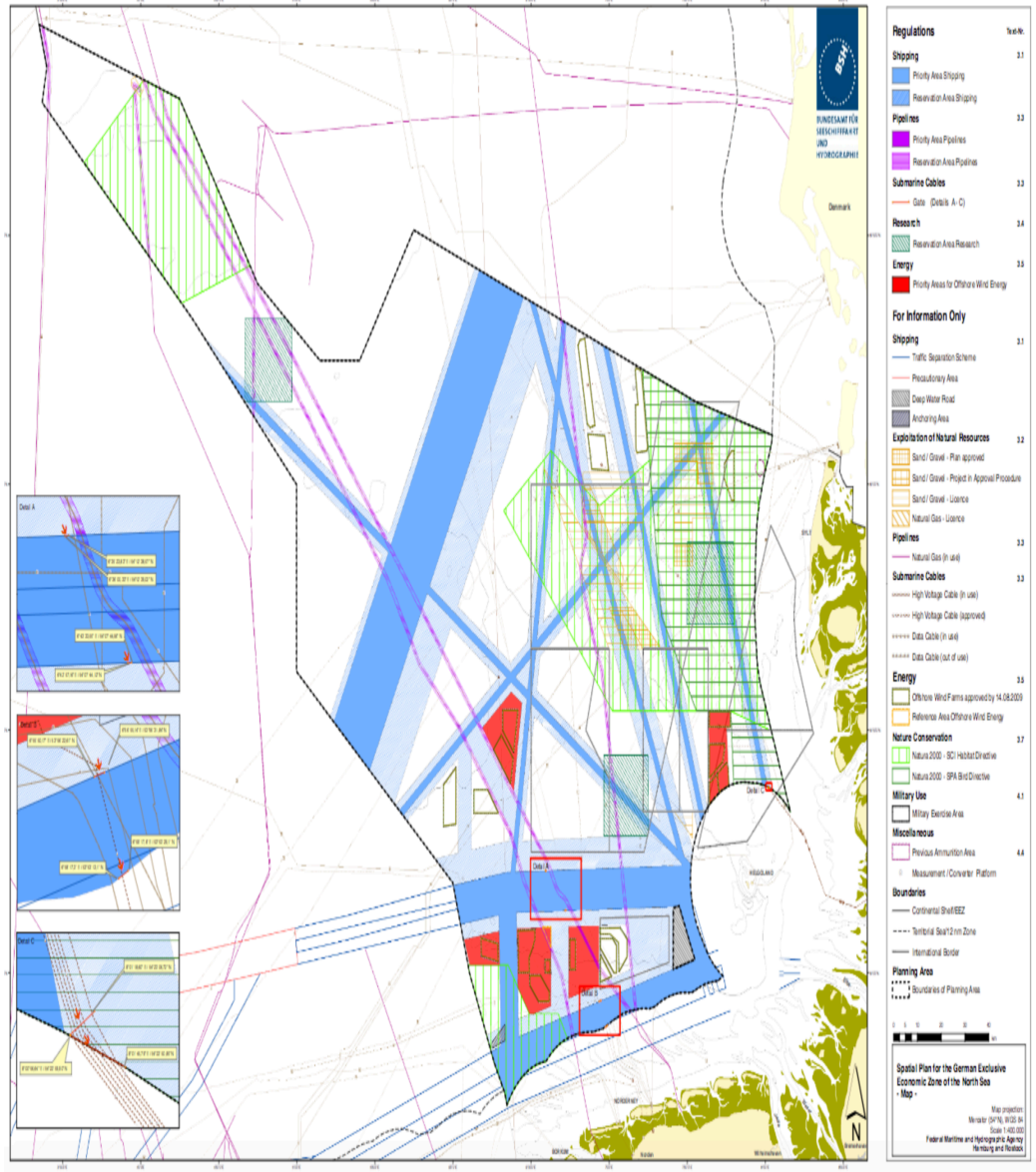
What can be improved on the current North Sea MSP to enable these planned spatial developments while maintaining the natural processes in the Wadden Sea?

MSP Netherlands



MSP Germany



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Questions and Feedback

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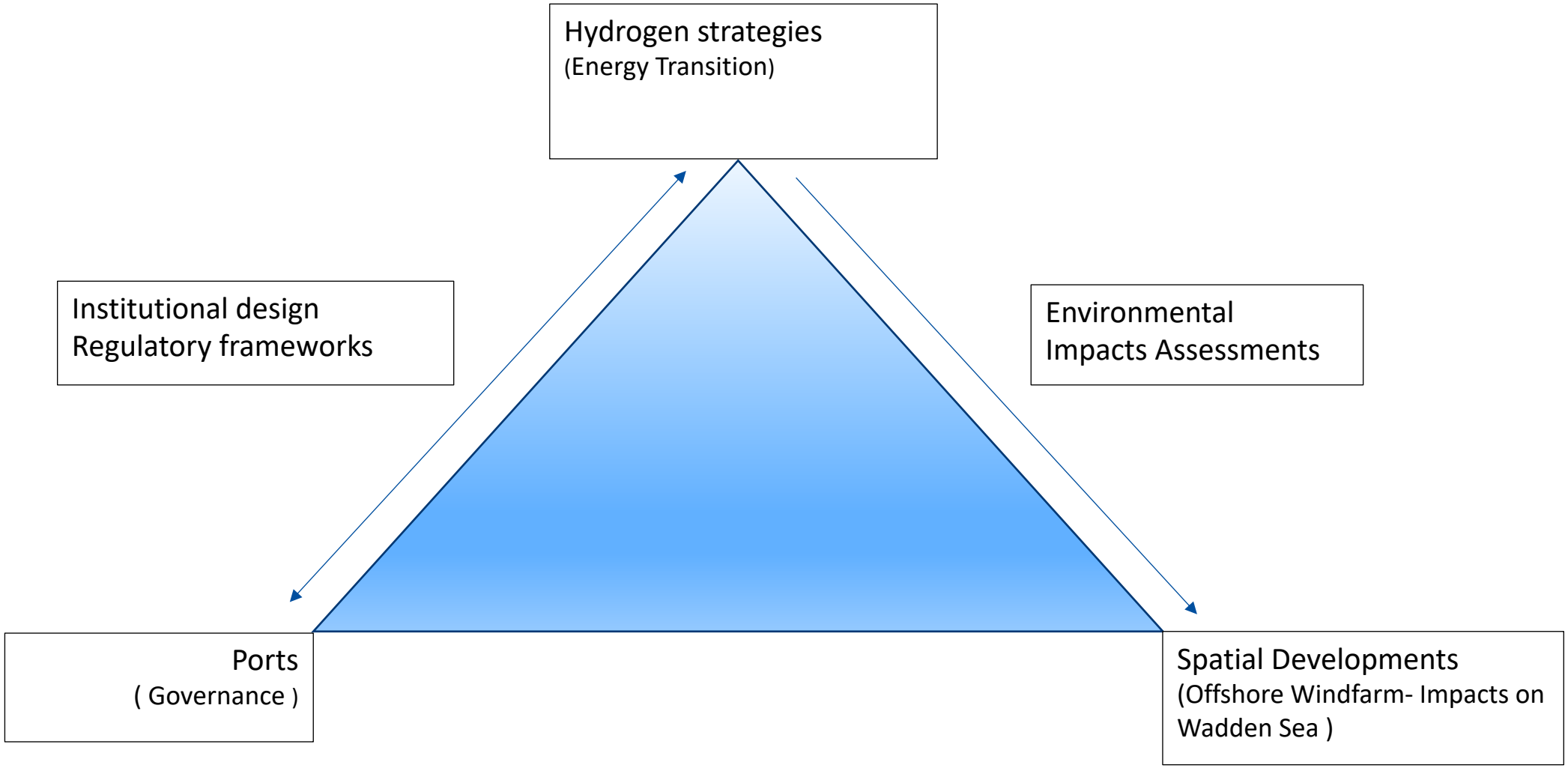

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