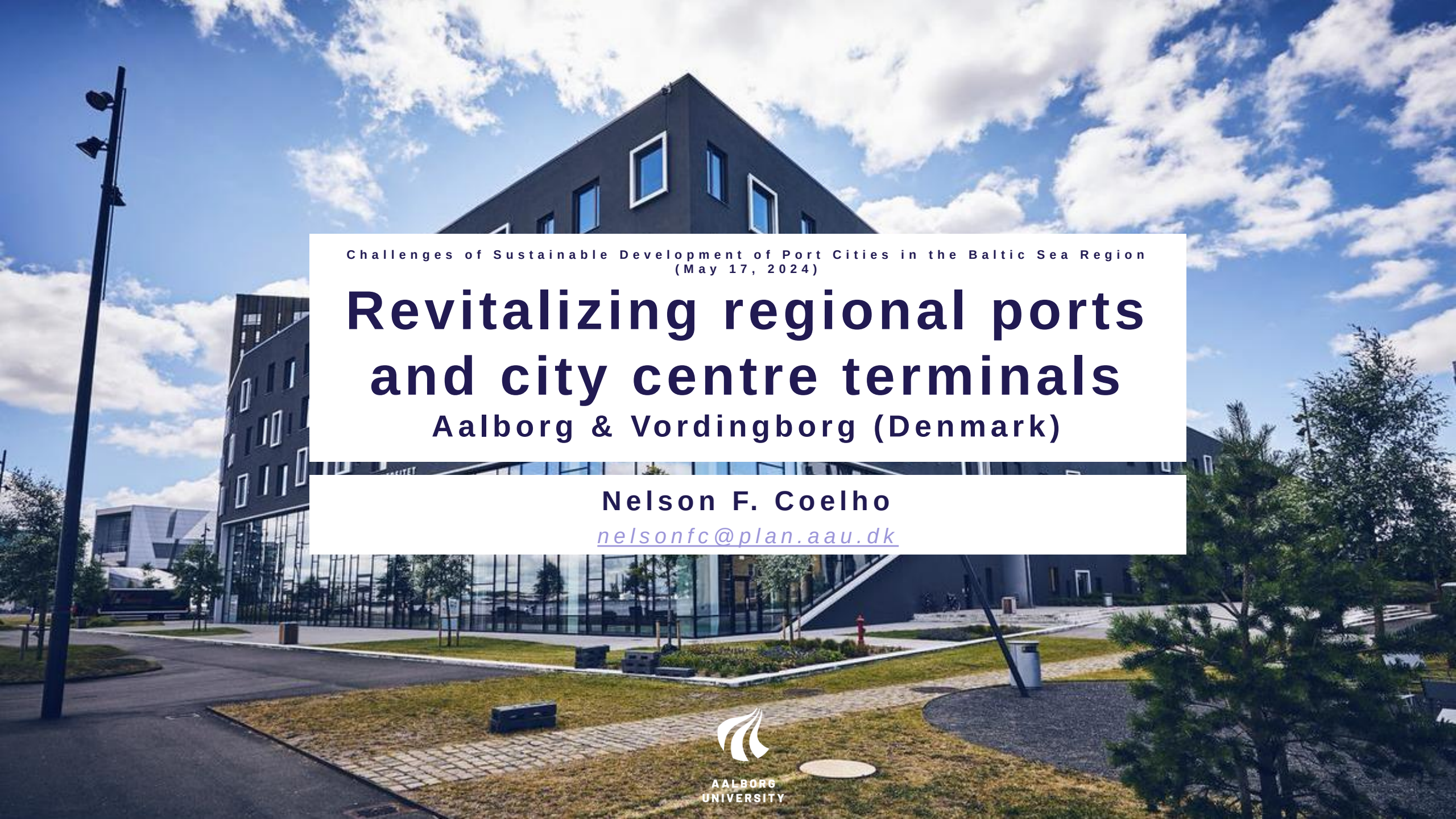

Challenges of Sustainable Development of Port Cities in the Baltic Sea Region
(May 17, 2024)

Revitalizing regional ports and city centre terminals

Aalborg & Vordingborg (Denmark)

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DEPARTMENT OF
SUSTAINABILITY AND PLANNING

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Aalborg Centre for Problem Based Learning
in Engineering Science and Sustainability
under the auspices of UNESCO

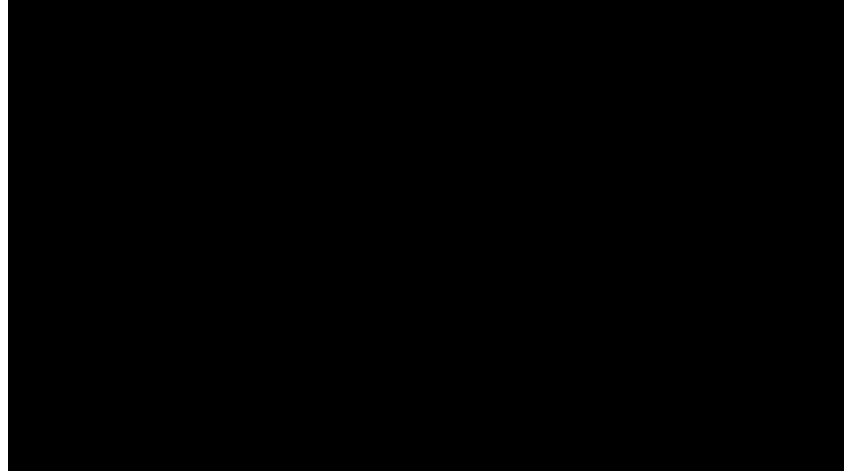
CENTRE FOR BLUE GOVERNANCE

Outline

- Research context
  - Factors of change introduced by AEGIS
  - Use-cases in Denmark: SME ports
- Geographical context
  - Port of Aalborg
  - Port of Vordingborg
- Sustainability challenges

Factors of change from the seaside

- Modality
  - Short-sea shipping
  - Inland waterway transport
  - Small and medium-sized ports
- Technological
  - Alternative fuels (and respective infrastructure)
  - Autonomous vessels
  - Autonomous cargo handling



Relevant outcome of project AEGIS

For UC-C – AHL (Shortsea shipping in the Kattegat/Skagerrak region, RoRo – trailers):

- A RoRo vessel (electric version) with
  - a capacity of 55 trailers
  - no on-board cargo handling system
  - a fully electric propulsion system with swappable batteries (5 FEU-sized rollable units)
  - a low to medium autonomy level (1–2 according to IMO)
- A RoRo vessel (methanol version) with
  - a capacity of 55 trailers
  - no on-board cargo handling system
  - a methanol-electric propulsion system
  - a low to medium autonomy level (1–2 according to IMO), autonomy-ready

For UC-C – VH (Combined SSS and IWW in the Baltic and European hinterland, dry bulk, containers, project cargo):

- A SSS-IWW multi-purpose vessel with
  - a capacity of 3,500 t or 156 TEU
  - an on-board cargo handling system consisting of a movable gantry crane to lift the hatch covers and move the wheel-house
  - a methanol-electric propulsion system
  - a low to medium autonomy level (1–2 according to IMO), autonomy-ready

Synergies between the vessel concepts developed for one use case might be used in other use cases, e.g. the mother vessel in UC-A might also be used in UC-C.

Figure 8 – RoRo vessel concept 1

Figure 9 – RoRo vessel concept 2

Sustainability challenges of waterfront development

- Citizen participation
- Public health
- Landscape rights
- Geographic isolation
- Economic stagnation
- Sector-wide unemployment
- Capacity building
- Disappearance of local industry
- Demographic mobility
- Policymaking and governance

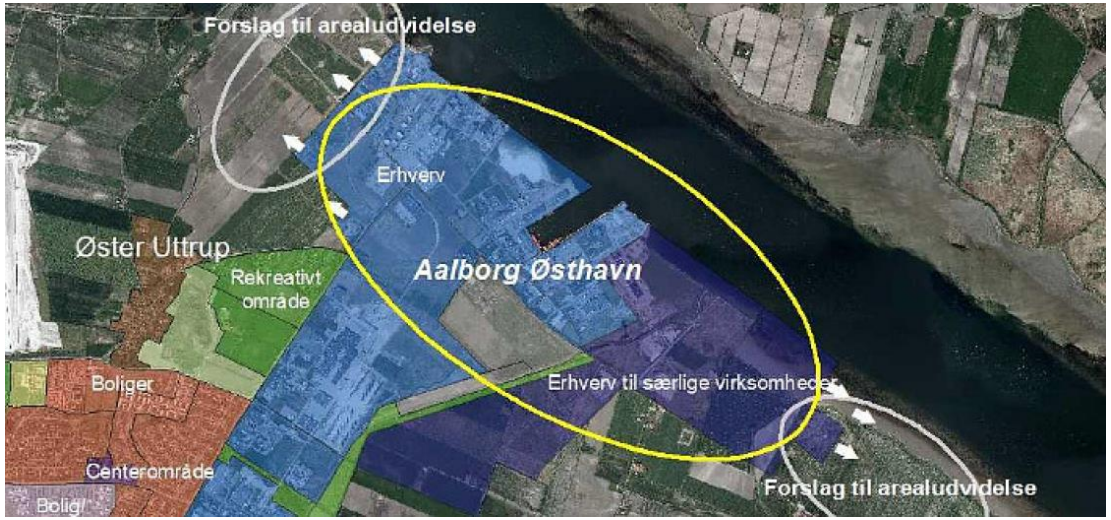
Port of Aalborg
Region of Nordjylland


arkivdk
Aalborg Stadsarkiv - 851-01B14511

PORT OF AALBORG

PORT OF AALBORG

PORT OF AALBORG



Terminal area

- Yellow: Containerterminal area with capacity of 75.000 TEU
  - Interface with Road, Rail and Ro-Ro.
- Blue: Future Ro-Ro terminal with capapity to service up to 75 trailer vessel
- Red: Railway tracks with unfold capacity and possibilities for huge expansion.

from the European Union's Horizon 2020
under Grant Agreement N°859992.

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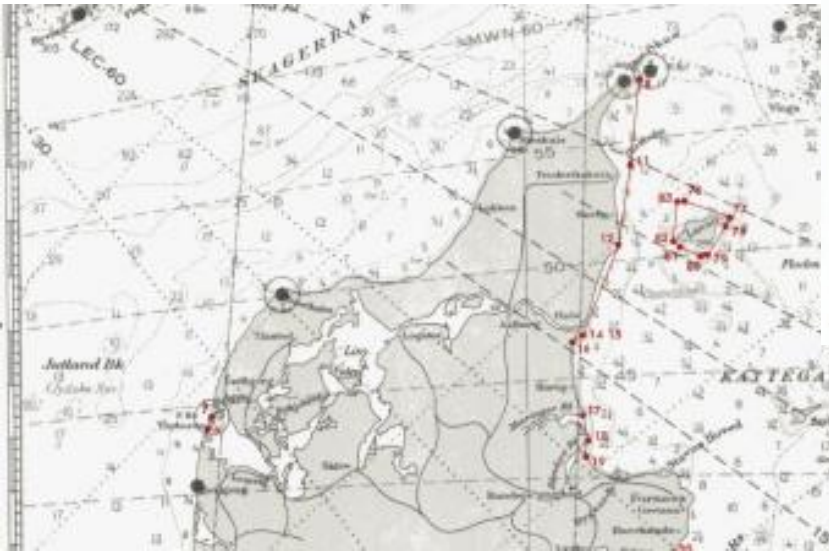
Figure 12 – Visual overview of complete future terminal operations at Port of Aalborg

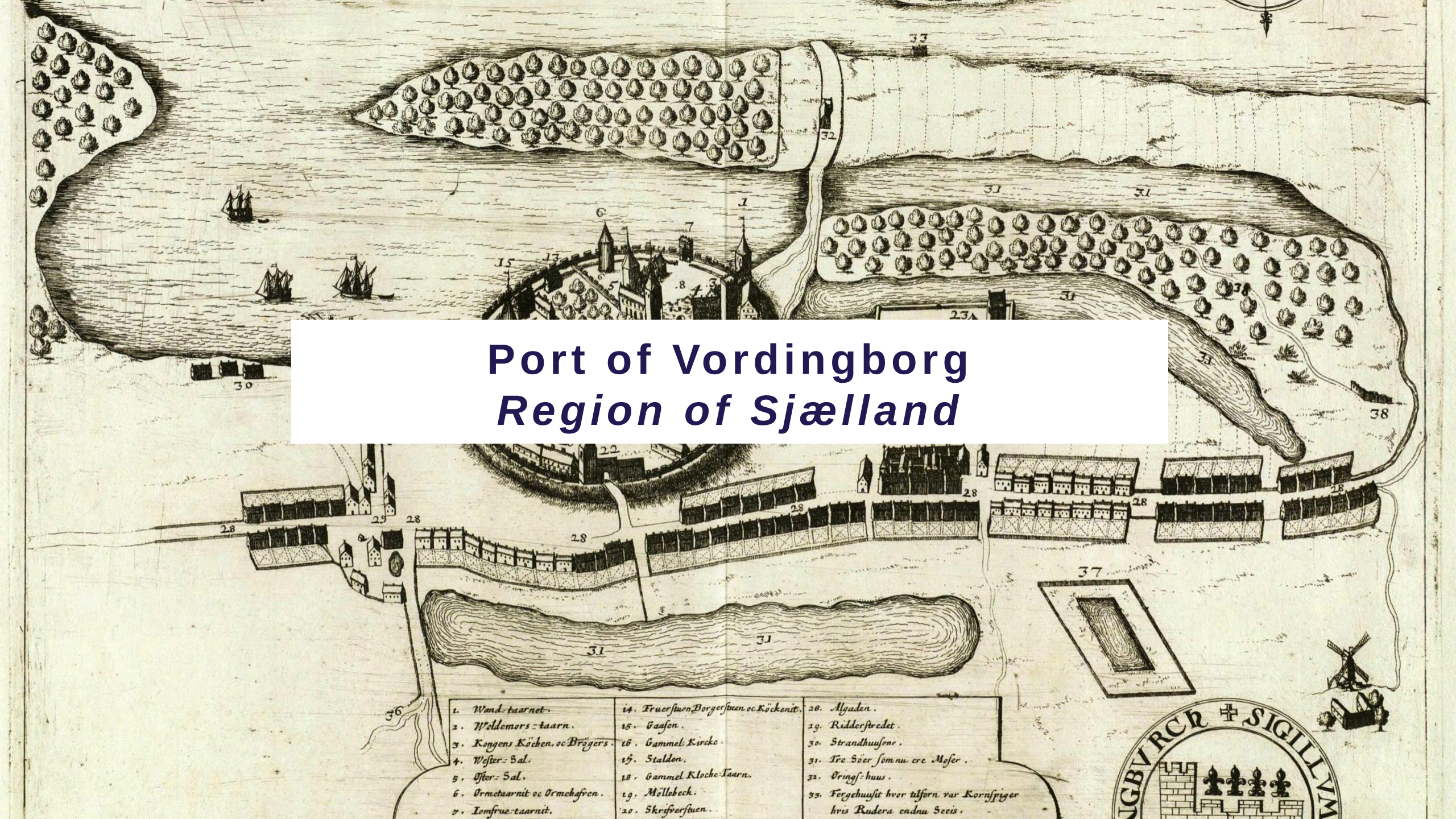
1. Hals Havn
2. Egense Havn
3. Mou Havn / Bro
4. Skudehavnen Aalborg
5. Vestre Bådehavn Aalborg
6. Marina Fjordparken Aalborg
7. Nørre Uttrup Havn (Sundby Hvorup Sejlklub)
8. Nørresundby Bådehavn
9. Nibe Lystbådehavn
10. Gjøl Havn
11. Attrup Havn
12. Haverslev Havn
13. Aggersund Havn
14. Løgstør Havn
15. Rønbjerg Havn
16. Livø Havn
17. Hvalpsund Marina og Erhvervshavn
18. Skive Søsportshavn
19. Sundsøre Lystbådehavn
20. Virksund Lystbådehavn
21. Hjarbæk Havn
22. Fur Lystbådehavn
23. Glyngøre Havn
24. Gyldendal Lystbådehavn
25. Ejerslev Havn
26. Nykøbing Mors Havn
27. Sillerslev Havn
28. Amtoft Lystbådehavn
29. Øst Vildsund Havn
30. Vest Vildsund Havn
31. Thisted Havn
32. Doverodde Havn
33. Thissinghuse Havn
34. Agger Havn
35. Jegindø Havn
36. Tambohuse Havn
37. Oddesund Havn
38. Venø Havn
39. Handbjerg Marina
40. Struer Lystbådehavn
41. Humlum Havn
42. Lemvig Lystbådehavn
43. Lemvig Marina
44. Thyborøn Lystbådehavn
45. Haarum Havn



LIMFJORDENS HAVNE

LIMFJORDENS HÄFEN

THE LIMFJORD HARBOURS



Port of Vordingborg

Region of Sjælland


Vordingborg
Vordingborg Slotsruin
Ore
Ore vej
Nyraadsvej
Lidl
Vordingborg Bibliotek
153
Oringepynten
Trellemarken
SBJV Storstroem Bridge Joint Venture I/S
Øens Dyr
Masnedø
Masnedøfortet
153
Masnedø
153
Google
Sallerup
22
Udby
Allerslev
Stavreby
Skaverup
151
Sandvig
Oreby
Ørslev
Røstofte
Mern
Kindvig
Nyord Sogn
Neder Vindinge
151
Balle Strand
22
E47
Viemose
265
Vordingborg
153
22
Nyråd
Stensved
59
Langebæk
Kalvehave
Bakkebølle
Stensby
Koster
153
Storstrømmen
Orehoved
Røddinge
E47
287
Gåbense
Dam
287
Vålse
Egense
Nørre Vedby
Bogø
Askeby
Store Damme
Sortsø
Vester Kippinge
153
E47
287

Stort produktionsanlæg er kommet nærmere

På Vordingborg Havn er der planer om verdens første power-to-X anlæg i stor skala.

Det oplyser Vordingborg Buisiness. Det er Arcadia eFeuls og de skal producere co2-neutralt flybrændstof hvor man bruger en masse strøm for vindmøllerne.

Firmaet har indgået kontrakt med den franske virksomhed Technip Energies som skal være med til at finde ud af, hvordan og med hvilke materialer anlægget skal bygges.

Arcadia eFuels og Technip Energies forventer, at produktionsanlægget i Vordingborg er i drift i 2026.

- Vordingborg - Ruhr area, Germany
- Vordingborg – Elblag, Poland

Figure 7 – Considered routes from Vordingborg to northern Europe

Analysis

Sustainability challenges of waterfront development

- Citizen participation
- Public health
- Landscape rights
- Geographic isolation
- Economic stagnation
- Sector-wide unemployment
- Capacity building
- Disappearance of local industry
- Demographic mobility
- Policymaking and governance

Sustainability promises of waterfront development (from AEGIS cases)

- Being **informed** of the vision of the port and what can change in terms of navigation around the area.
- Less air **pollution** because of alternative propulsion types.
- Smaller vessels are better for **visual pollution/noise** (especially for residents in the waterfront).
- Increased **economic activity** in the region can benefit local industries associated with transport and energy.
- Local industries may have facilitated access to new markets because of the proposed **new routes**.
- Potential for **new job types** in the region (namely in the energy industry).
- Autonomous terminals may link well with other such terminals (e.g. Aalborg) and create **new industrial partnerships** to **develop isolated regions** in DK.
- Having ports who are first-movers in new tech **forces public authorities to regulate and create new policy** and this opens the field for other ports.

Conclusion

- Waterfront changes driven by logistics: new waterborne transport systems
- Rehabilitation of smaller ports brings new life
  - Smaller ports were lost in competition and get a revival driven by reduction of CO2 strategies and by “coastal” shipping that was once outcompeted by trucks
- Challenge of coexistence between SME ports and Danish cities:
  - In **Aalborg**, to minimize potential risks to various aspects of urban life, the planning law requires the municipality to enforce strict zoning regulations, ensuring that industrial activities are kept separate from other urban functions.
  - In **Vordingborg**, the port negotiates with the city and residents to set terms to expand its maritime operations (new pier) and green energy production facilities (biofuels and efuels) in the periphery of the city, opting for a new concept of popup terminals.
- Coexistence can be achieved by *relocation* (Aalborg) or by *mitigation* (Vordingborg): every strategy has a price and depends on urban pressures

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