Connecting Seas

NorthSEE – Baltic LINes MSP conference

Future scenarios workshop

Energy & Shipping

Kirsty Wright (NorthSEE), Magda Matczak (BalticLINes) and Ceciel Nieuwenhout (PROMOTioN)

North SEE

Interreg North Sea Region European Regional Development Fund EUROPEAN UNION

Baltic LINes

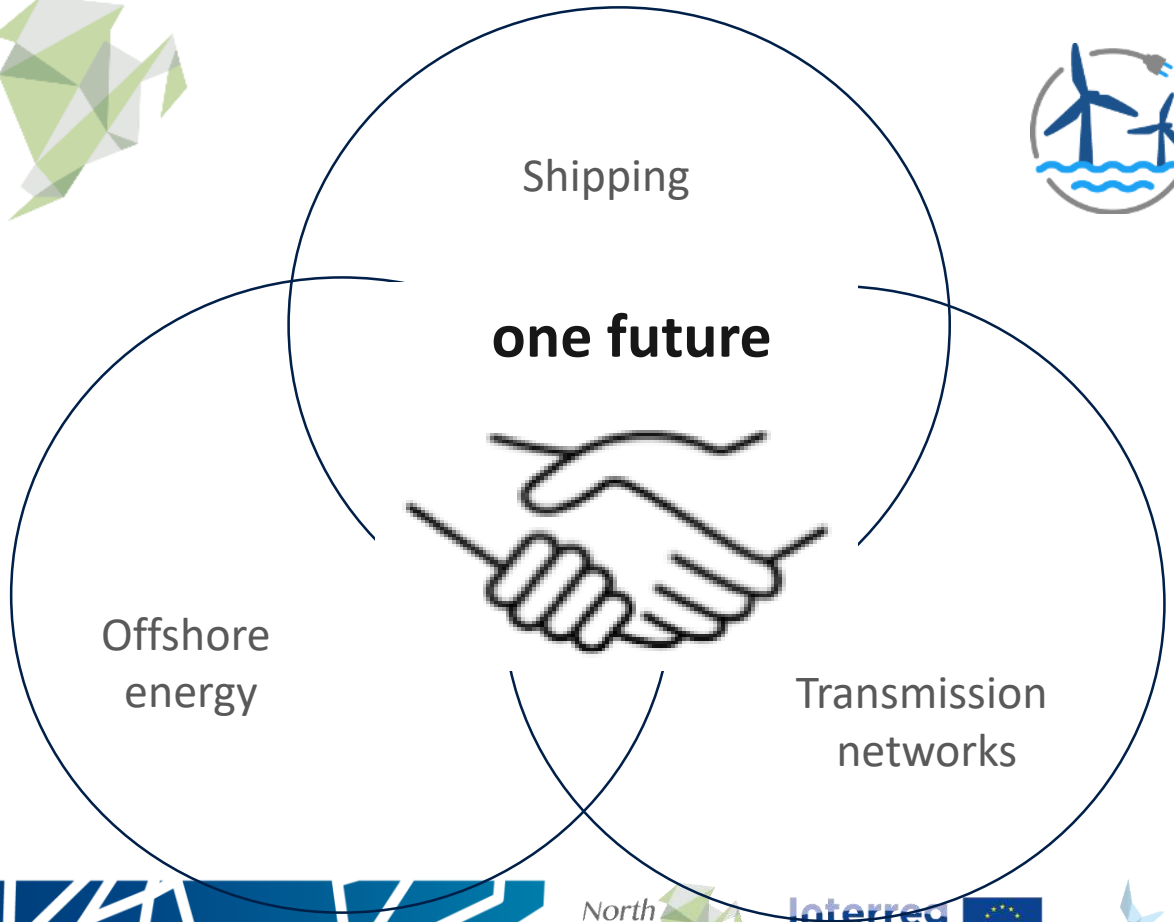
Interreg Baltic Sea Region EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND


IMPROVED TRANSNATIONAL COORDINATION AND COOPERATION
MEETING STANDARDS SET UP BY NATIONAL AND EU MSP LEGISLATION
BETTER ORGANISED USE OF BALTIC SEA SPACE
SHIPPING AND ENERGY SECTORS INVOLVED IN MSP PROCESS
IMPROVED TRANSNATIONAL CONNECTIVITY OF INFRA-STRUCTURES
SAFER DISTANCES BETWEEN SHIPPING AND ENERGY ACTIVITIES
REDUCED SPATIAL CONFLICTS BETWEEN SECTORS
TRANSNATIONAL ACCESSIBILITY OF MSP DATA
REACHING GOALS SET UP BY NATIONAL AND EU POLICIES
INCREASED KNOWLEDGE, COMPETENCES AND CAPACITY OF THE STAKEHOLDERS

Our session…

- to Explain
  - *why scenarios are being made and how MSP benefits from forecasts in different sectors for the plan making*
  - *the knowledge gained by projects on the future trends and scenarios on shipping (and energy):*
- to Deepen
  - *the understanding of the key technological trends and their respective planning implications & policy future targets (as reported in both projects)*
- to Brainstorm
  - *on translation to space requirements in both North and Baltic Seas (common spatial development scenario)*
  - *on where do we want to be in the future.*

3 presentations - 3 projects - 3 sectoral futures



PROMOTioN
PROGRESS ON MESHED HVDC OFFSHORE TRANSMISSION NETWORKS

The reasons …

BaltSeaPlan, 2011 - Shipping and fishery are critical stakeholders due to their importance for maritime space. They have often been critical of MSP as they have so far benefited from the "open space" approach predominant in the sea.

Connectivity across Baltic Sea space

… *planners do not only think about their own backyard, but focus on the connections of a given use…*

- Maritime Spatial Planners need to integrate the spatial demands of the shipping and energy sectors in their plans.
- The spatial plan is not only taking into account the current patterns but should also accommodate future sectors' interest.
- Planners need to understand how much marine space potentially is necessary on which location, for example, in 2030 or 2050 for various sea uses.
- Such thinking can be informed by scenarios discussing what might happen under certain circumstances and where this might occur.
- An example is autonomous shipping. Planners must understood what does this mean in spatial terms: more or less space, lesser of bigger conflicts with other uses etc?

A pan-Baltic approach to transnational topics

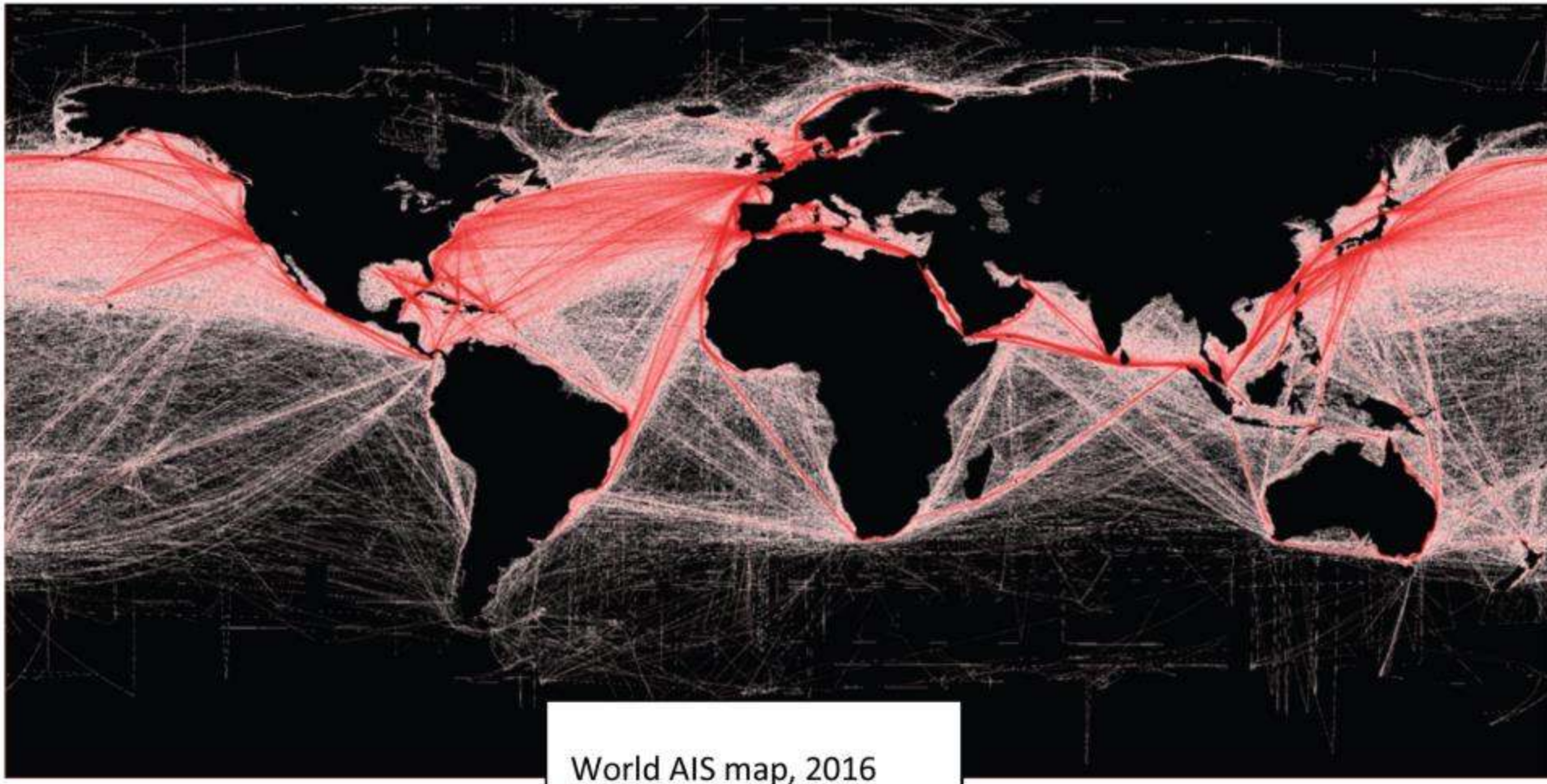
- *of particular importance for the sustainable development of the Baltic Sea Region;*
- *where all Baltic Sea states are affected by future developments;*
- *where the impacts of decisions go beyond the boundaries.*

Connecting Seas

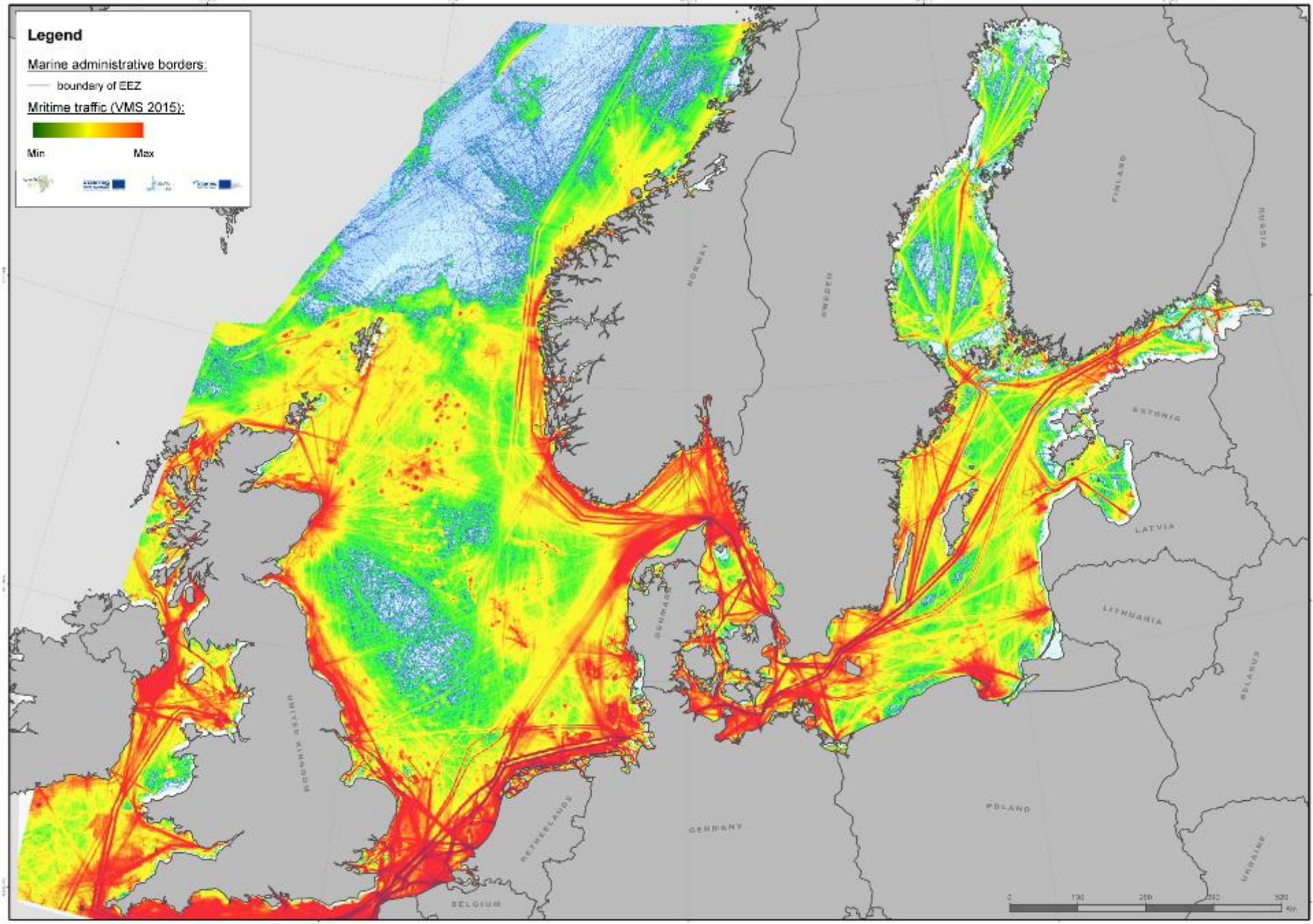
NorthSEE – Baltic LINes MSP conference

The future of shipping

Where do we go…



World AIS map, 2016


Legend
Marine administrative borders:
boundary of EEZ
Mritime traffic (VMS 2015):
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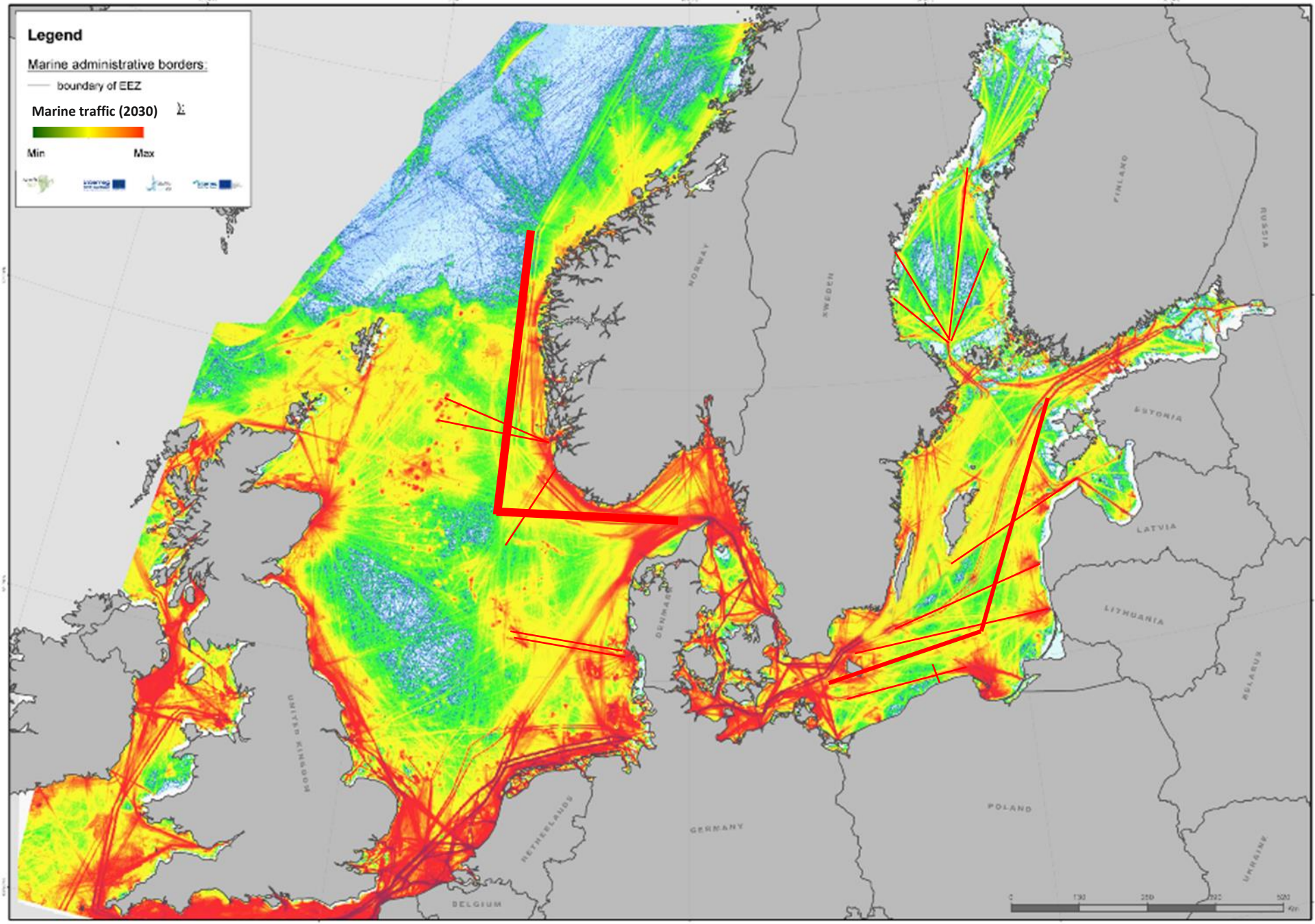
UNITED KINGDOM
UKRAINE


Legend
Marine administrative borders:
boundary of EEZ
Marine traffic (2030)
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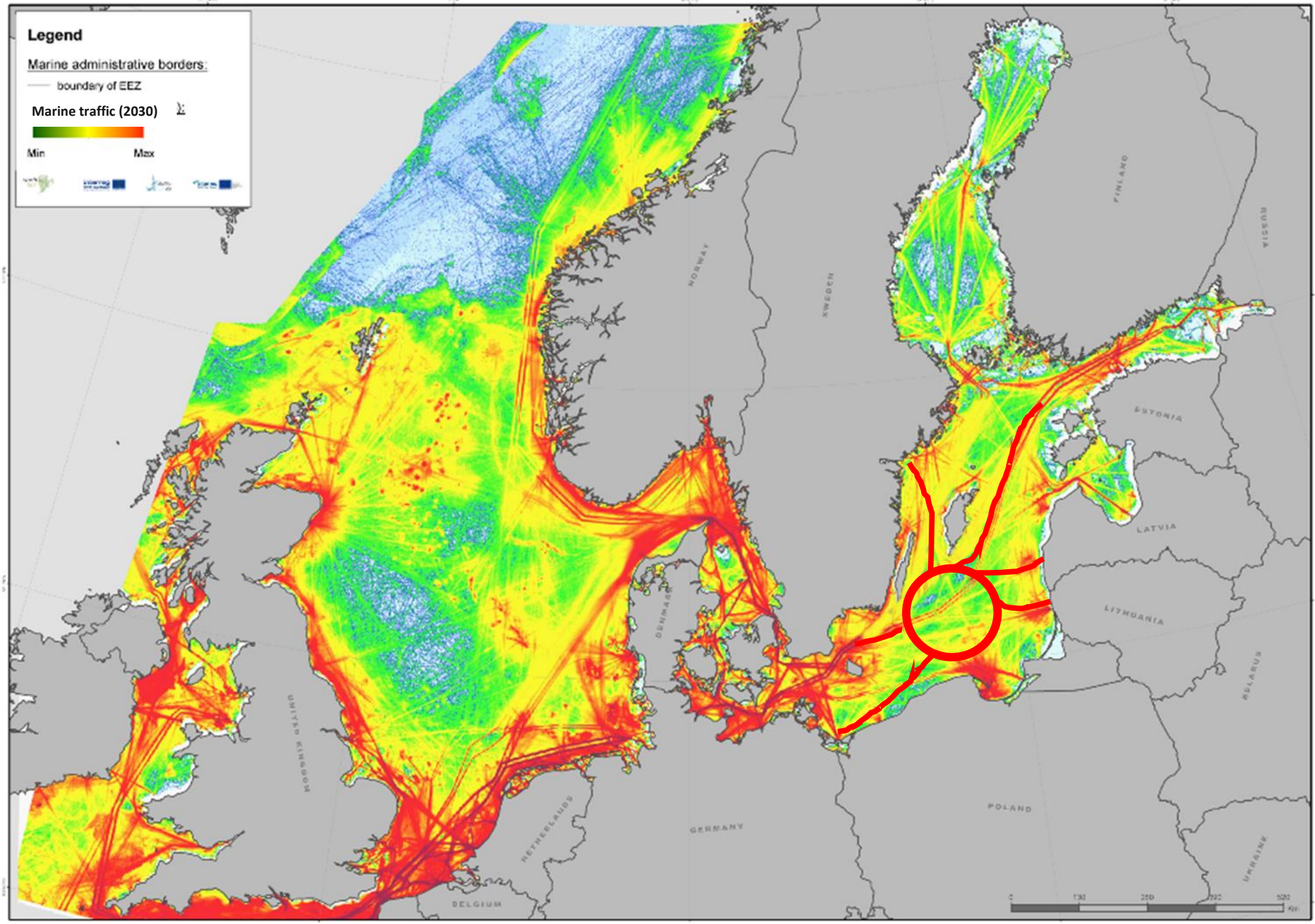
Max
NORWAY
SWEDEN
FINLAND
RUSSIA
ESTONIA
LATVIA
LITHUANIA
BELARUS
POLAND
GERMANY
DENMARK
NETHERLANDS
BELGIUM
UNITED KINGDOM
UKRAINE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BELGIUM
UNITED KINGDOM
DENMARK

Shipping – the Challenge for MSP

TRENDS EXPECTED IN KEY SECTORS

SECTOR	CURRENT DYNAMISM	DEVELOPMENT EXPECTED UP TO 2030
mariculture	0	slow growth so far, may pick up in future
military activity	0	no information available
dredging for ports	++	More dredging to be expected to cater for larger ships at hubports
ports (incl. LNG terminals)	++	Some port considerable extension plans; investments for deeper channels & landward cargo handling facilities; Connections to hinterland essential.
recreational boating	++	increase in parallel with expansion of tourism
seafloor habitats (reefs)	++	Added protected zones likely to be established as more data becomes available
shipping (goods, passengers)	++	continuous increase in number of ships, shipping frequency and volumes transported
shipping (oil)	++	continuous growth in oil transportation & size of tankers; Gulf of Finland significant location of main oil terminals
transport infrastructure on land	++	investments in rail and road infrastructure expected, but will take time. Focus on main transport axes and access to ports.

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Main Drivers and Enablers for future shipping activities

¬ Global economic growth

- ¬ - the shipping market is highly dependent on the global and regional economic development. Globally transport overseas has increased over the last decades. The shipping market is expected to grow.
- ¬ The number of ships sailing the North and Baltic Seas will be dependent on the development of the EU market. If the demand for foreign goods is low, the number of ships will be low as well. To lower the costs for transportation, shipping companies increasingly use one larger vessel to go to major ports instead of having several smaller vessels going to different ports. The dispersion of the goods is then done with smaller short sea ships.
- ¬ In the Baltic Sea economic growth of commercial shipping seems to be bipolar. It can be mainly attributed to increasing trade volumes of Russia and the recent increase in the Polish ports performance.

¬ Environmental regulations

¬ EU transport policies

- ¬ The European Commissions' ambition to shift transport from road to sea supports this development. On the other hand there are EU initiatives to support rail connections which can be competitive to shipping.
- The European Commissions' rail corridors' plans may support the selected ports infrastructure development.

Main TRENDS

- **Increase of ships size**

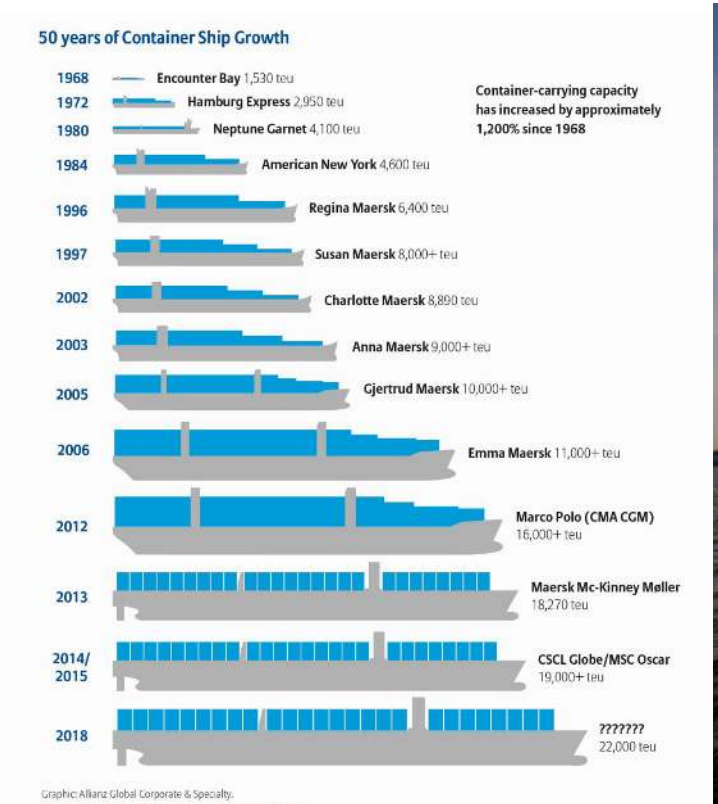
Extra space for manuvering!

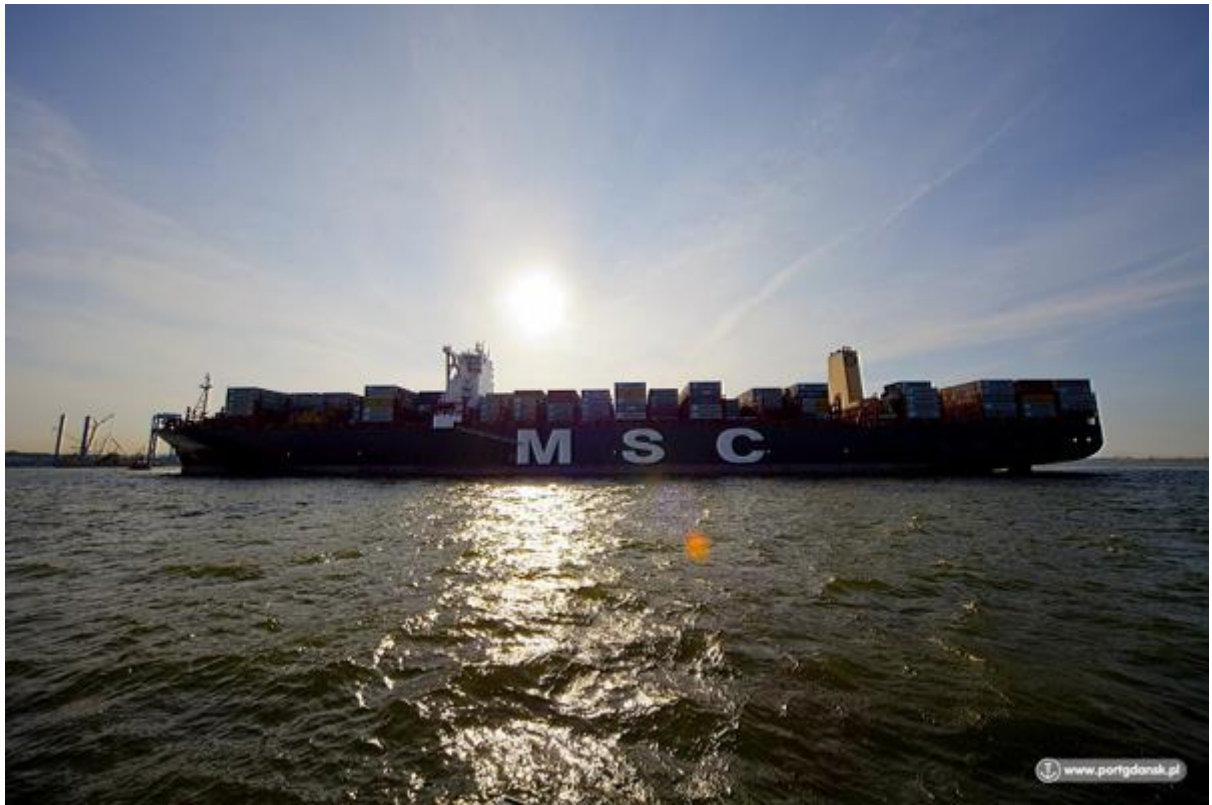
More space in harbours!

The world existing fleet will change its parameters -fewer vessels but newly launched vessels are bigger / have larger DWT.

Baltic Sea has its limits!

Port enlargements!





Main TRENDS

- **Short Sea Shipping growth together with inland shipping**

Containers will be loaded on more fuel efficient and flexible vessels. A possible growth of short sea shipping and the amount of short sea vessels can be expected.

Foreca

2010 20

■ Tank ■

EUROPEAN REGIONAL DEVELOPMENT FUND

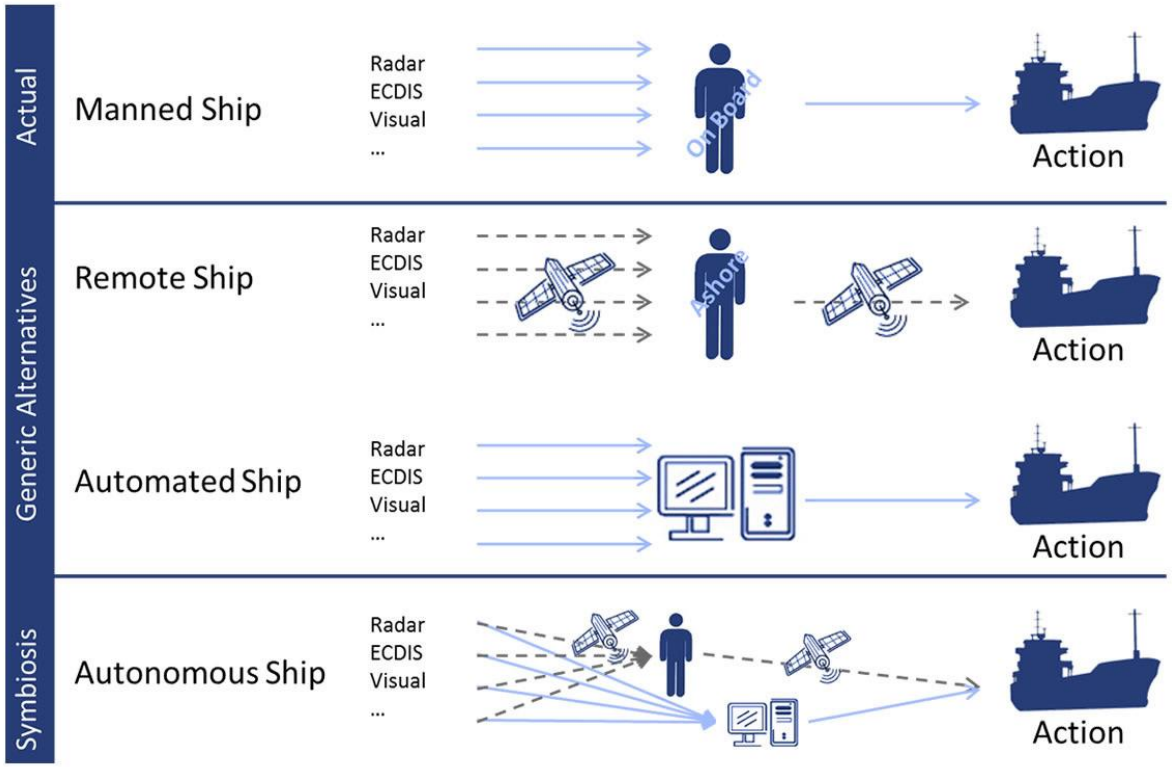
EUROPEAN UNION

Main TRENDS

¬ **Autonomous vessels**

Separate routes?

bigger buffers?



Trains of ships!

Baltic shipping scenarios

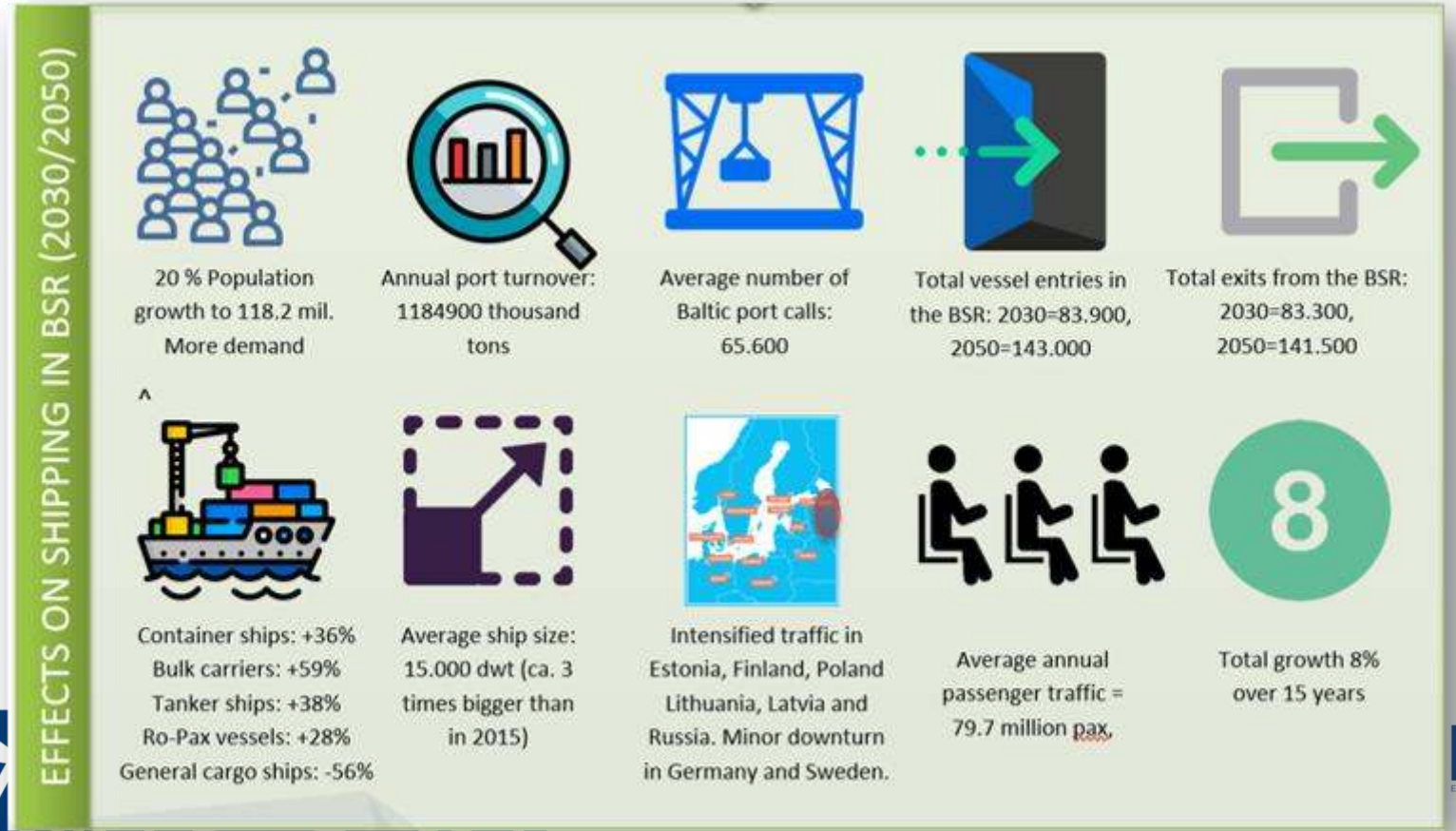
LIMITED GROWTH

- growth driven mainly by the countries of Central and Eastern Europe and, to a small extent, Russia
- strong regulatory pressure

Baltic shipping scenarios

SUSTAINABLE GROWTH

- extrapolation of the current growth
- economic growth driven mainly by the Central and Eastern Europe countries, including Russia, as well as powerful economies of Germany and Sweden



Baltic shipping scenarios

FAST GROWTH

- growth driven by all countries in the region, population growth and enrichment
- environmental regulations stimulate development of technological innovations

EFFECTS ON SHIPPING IN BSR (2030/2050)

30 % Population growth to 128 mil. Far more demand.

Annual port turnover: 1 251 400 thousand tons

Average number of Baltic port calls: 73.200

Total vessel entries in the BSR: 2030=87.600, 2050=143.000

Total exits from the BSR: 2030=87.000, 2050=141.500

Container ships: +43%
Bulk carriers: +76%
Tanker ships: +50%
Ro-Pax vessels: +43%
General cargo ships: -37%

Average ship size: 15.000 dwt (ca. 3 times bigger than in 2015)

Intensified traffic in Estonia, Finland, Poland Lithuania, Latvia and Russia. Minor downturn in Germany and Sweden.

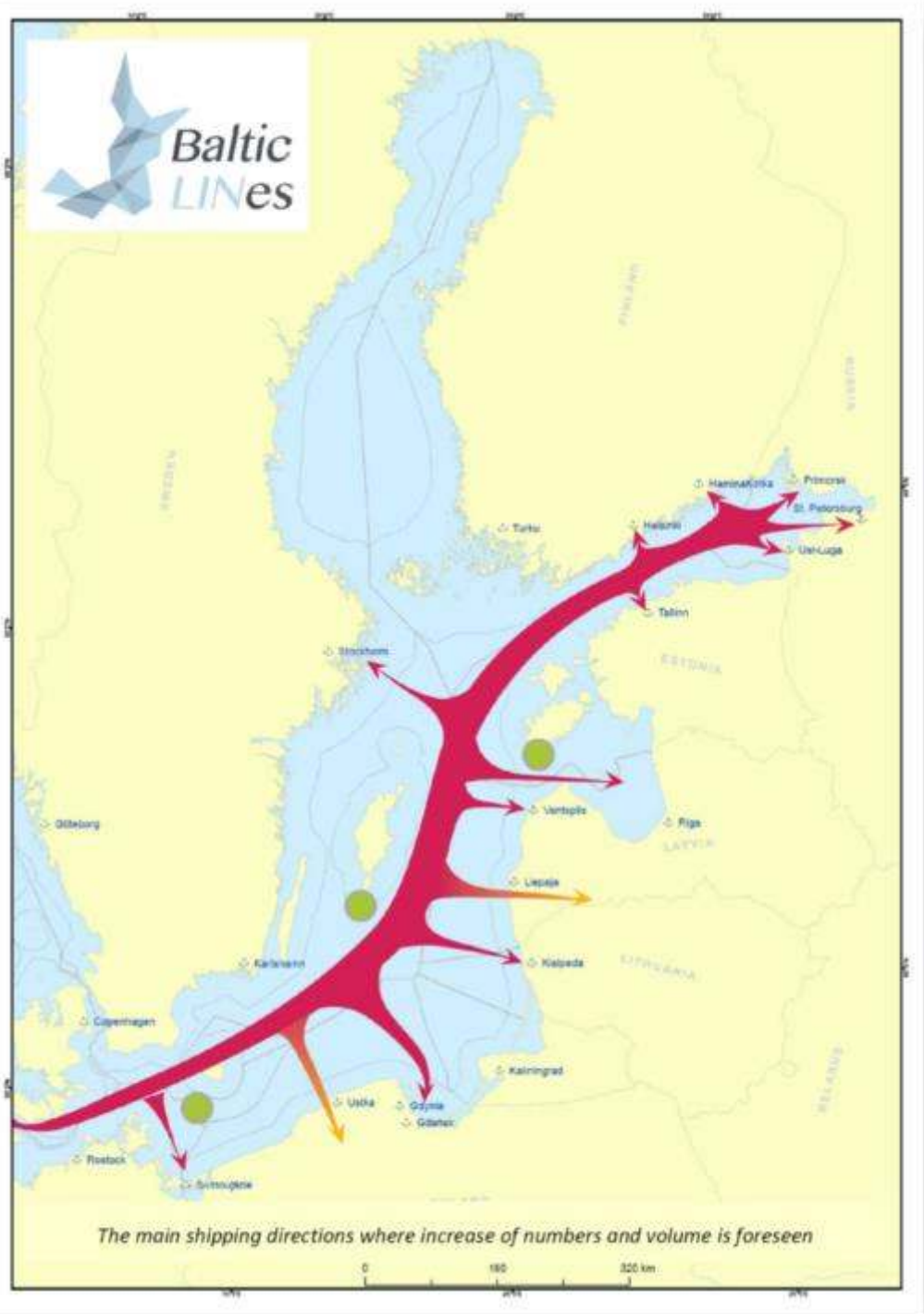
Average annual passenger traffic = 80.8 million pax.

Total growth 12% over 15 years

Main Challenges for MSP – shipping pattern changes

to minimize the different types of risks related to this intensity and traffic concentration:

- **Collision risks** – will require better spatial organization of ship traffic including also local shipping and leisure traffic.
- **Environmental risks** - will require new type of knowledge and know-how and orchestration of different policies in order to properly address them.
- **Governance risks** - will require a clear agreement on responsibilities related to this issue between MSP and other sea governance regimes would be desirable although very challenging.

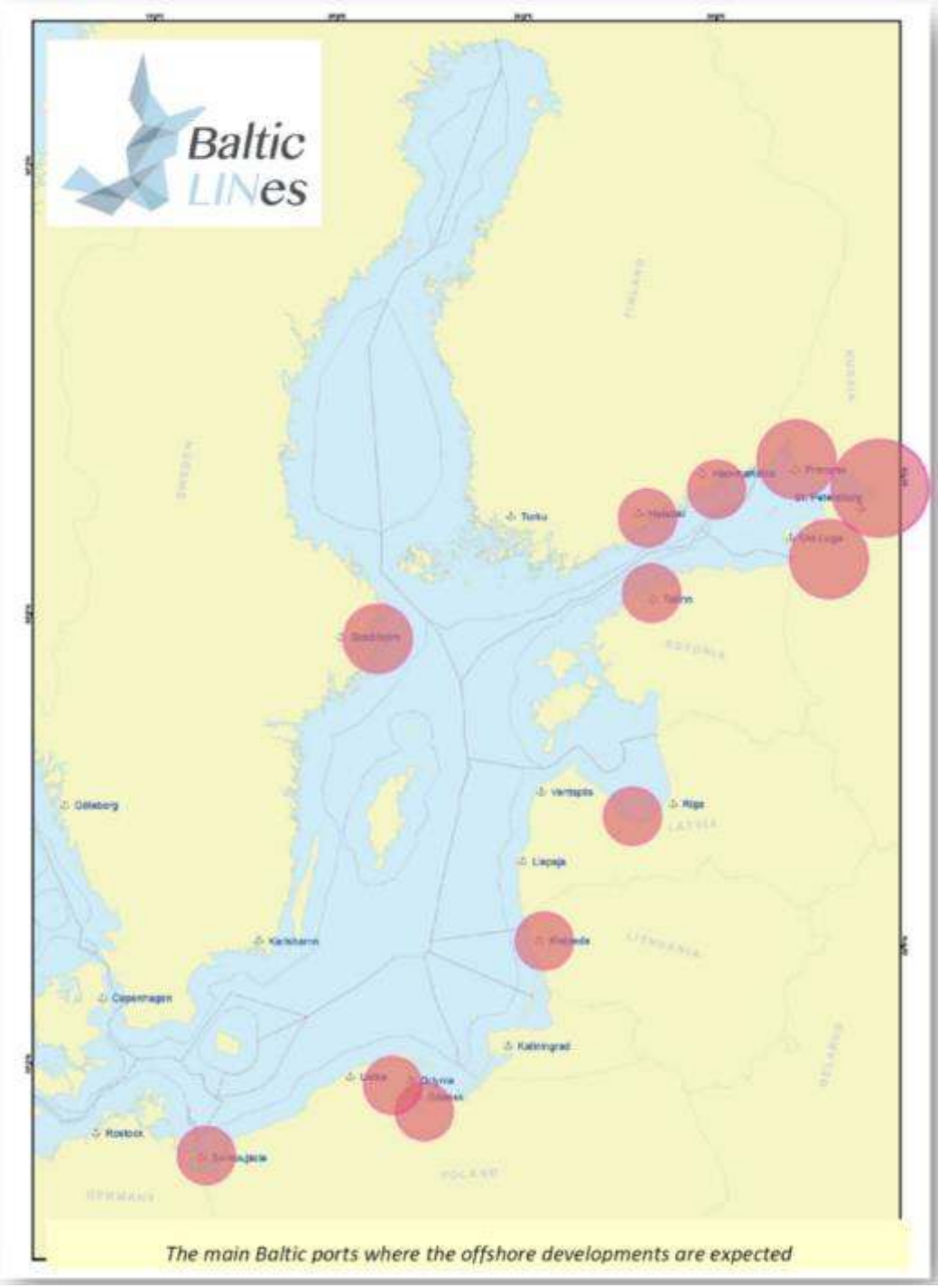


The main shipping directions where increase of numbers and volume is foreseen

Main Challenges for MSP – ports offshore development

to reserve the adequate space for port development in line with eco-system based approach.

- **high level of uncertainty** that concerns both the new port technologies and consequences of port development for the dynamism of the coast.
- **increased environmental pressures -** ports are located in the land-sea interface which as a rule are ecologically productive e.g. photic zone etc.;
- **intensity of conflicts** related to port development .



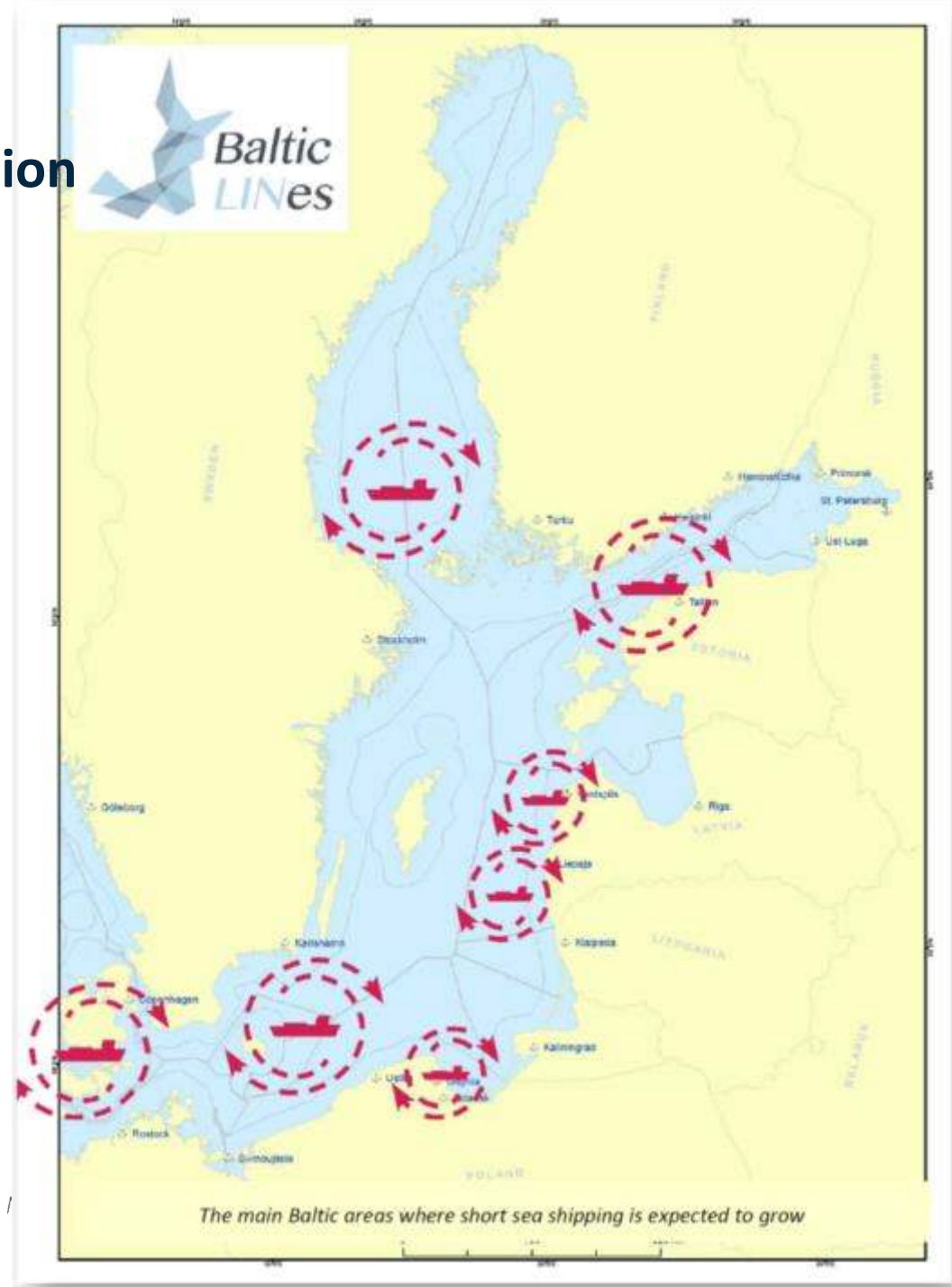
The main Baltic ports where the offshore developments are expected


Klaipėda Port Plan
BALTIC SEA

Main Challenges for MSP – short sea shipping intensification

- the intensity will increase of spatial conflicts in the indicated coastal waters, demanding more attention from the MSP process.
- the problems for MSP are similar to the ones listed under challenge no. 1.

typical coastal conflicts between various types of short sea shipping themselves and with other coastal depended sectors like tourism national defense and artisanal fishery will require to find a way how to make priorities among various sectors and coastal uses respecting their and how to civilize pressure from additional technical infrastructure on coastal defense.



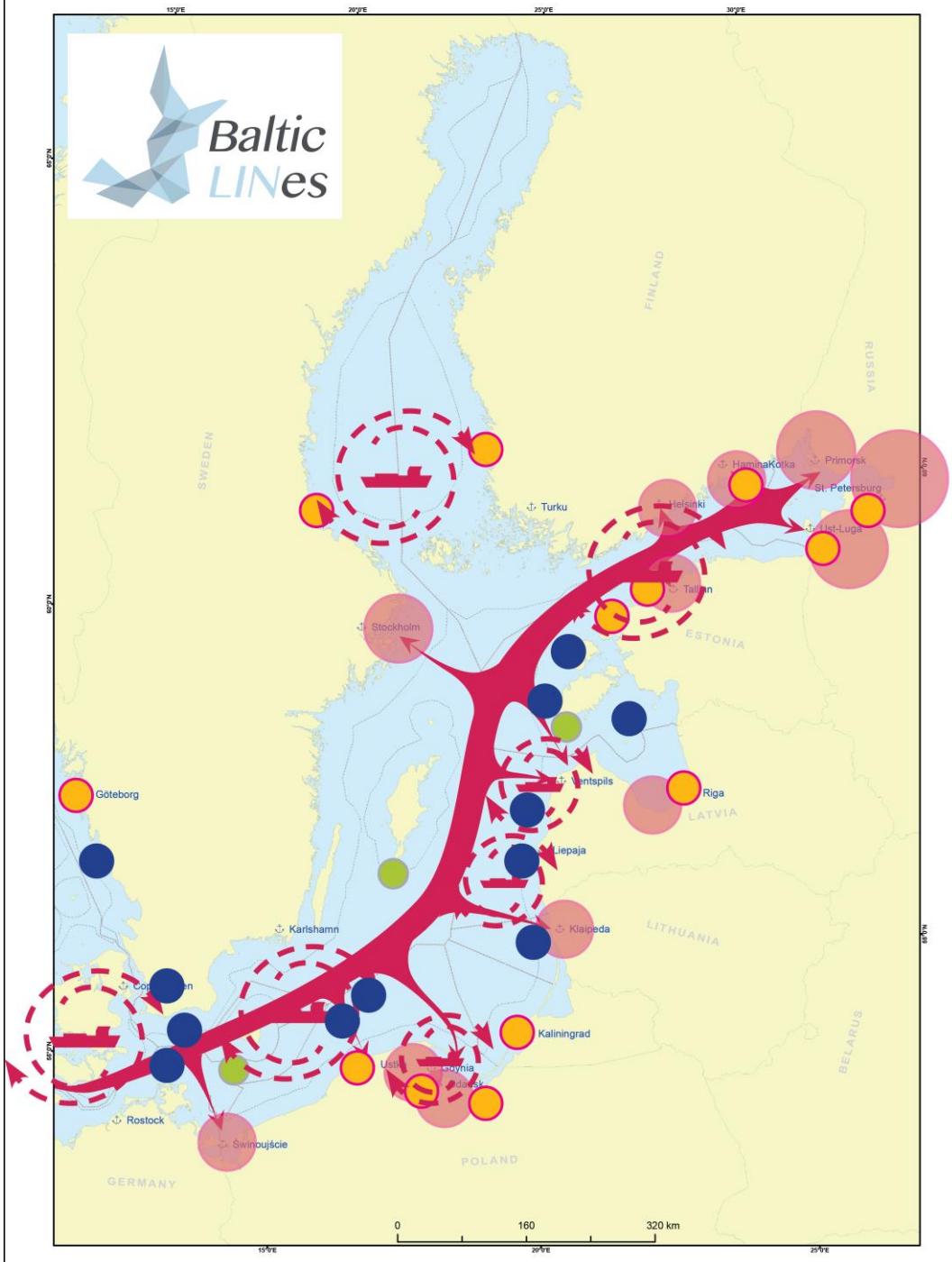
The main Baltic areas where short sea shipping is expected to grow

Main Challenges for MSP – main directions of influence

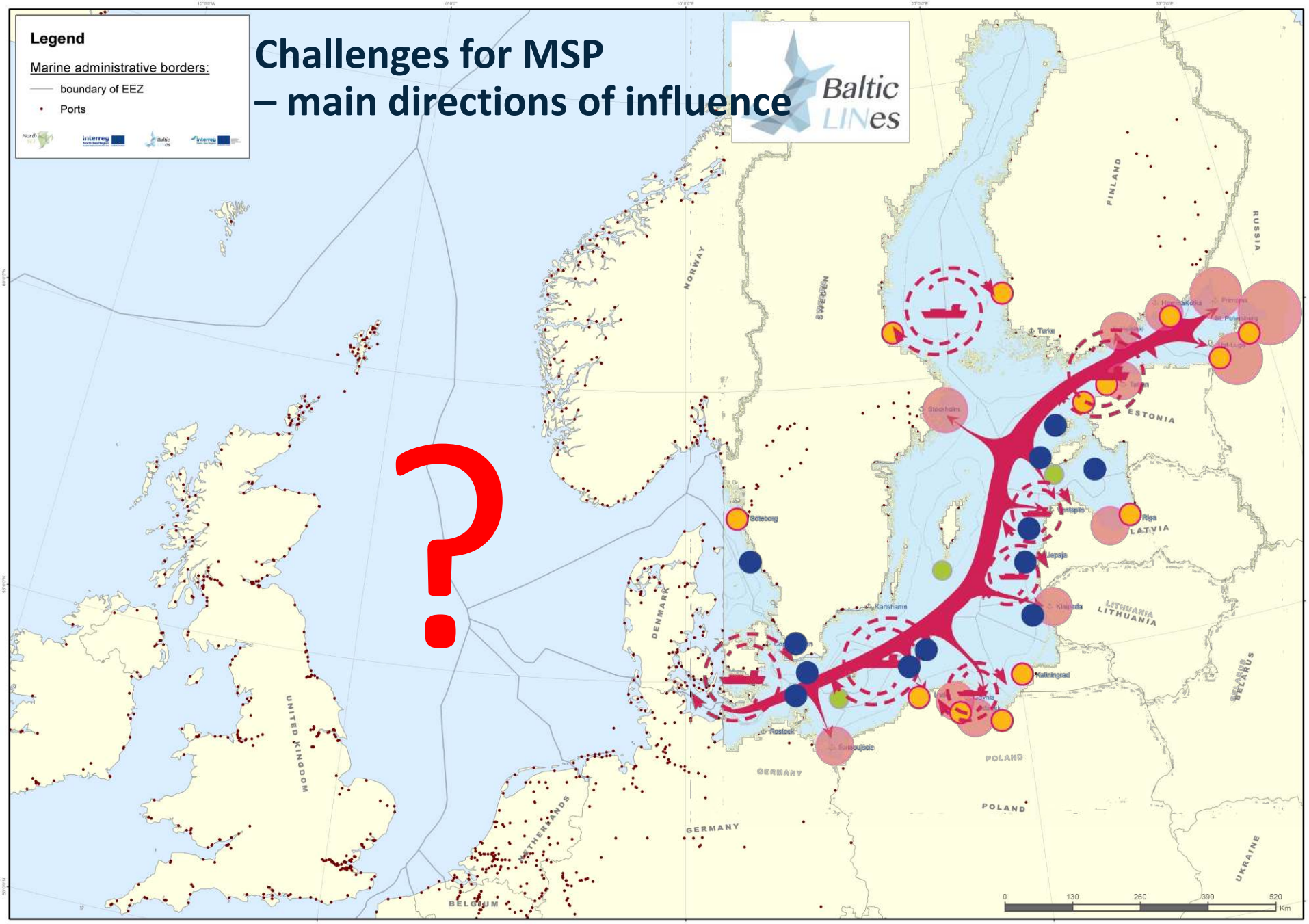
Autonomous shipping - ?

Growing offshore services!

more space for manuvering!



Challenges for MSP – main directions of influence



Connecting Seas

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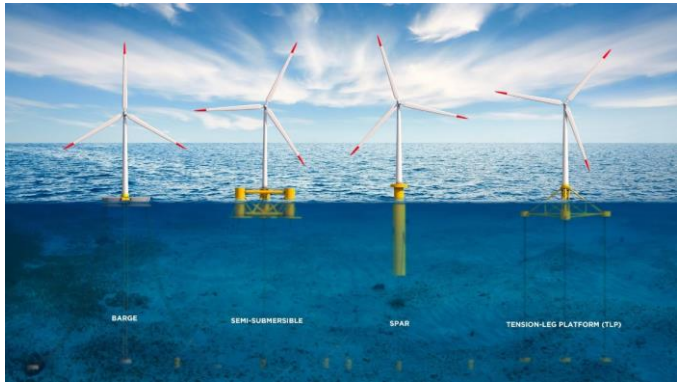
The future of energy



Kirsty Wright (NorthSEE) Marine Scotland

Where do we go?…

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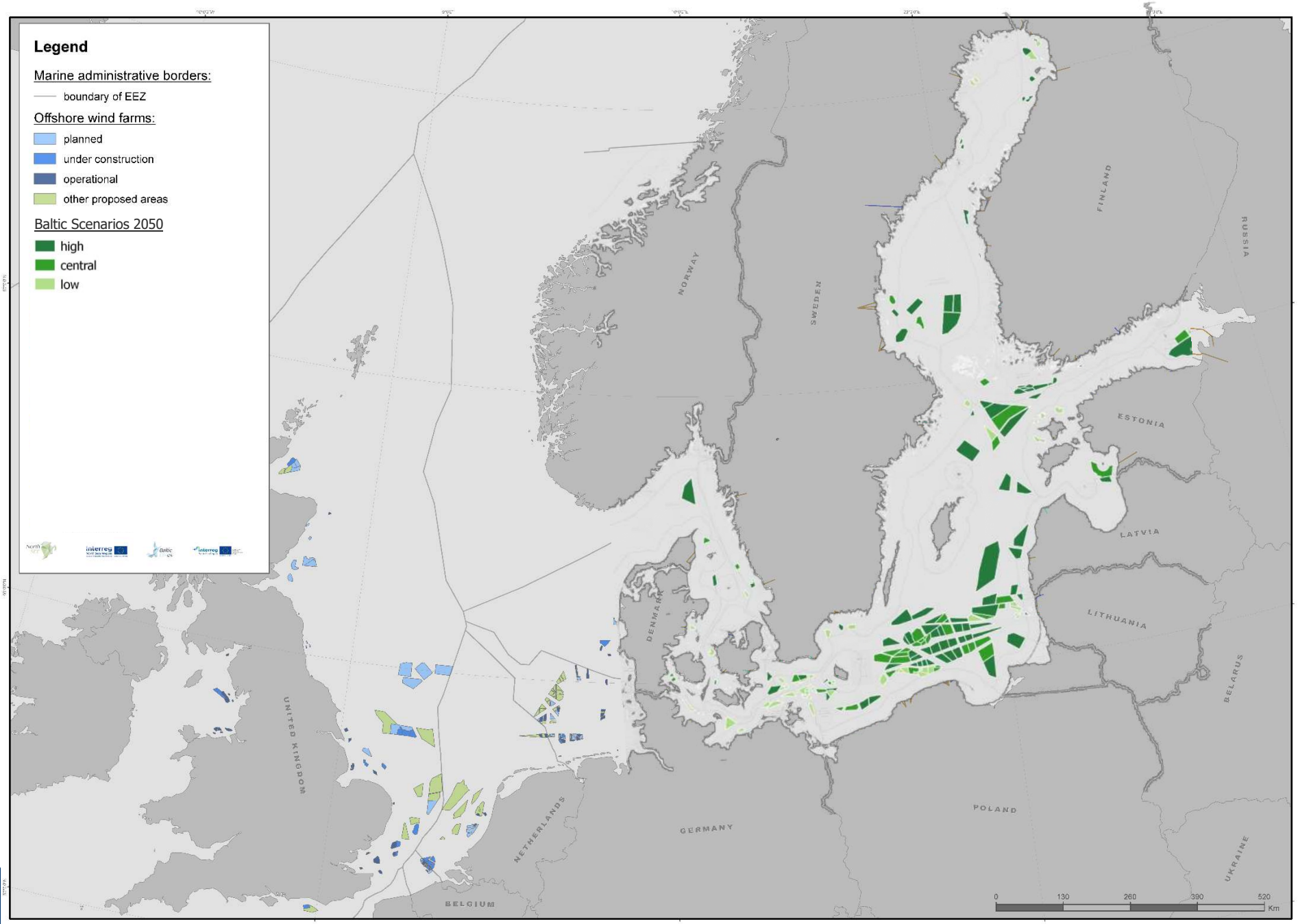

Legend
Marine administrative borders:
boundary of EEZ
Offshore wind farms:
planned
under construction
operational
other proposed areas
Baltic Scenarios 2050
high
central
low
NORWAY
SWEDEN
FINLAND
RUSSIA
ESTONIA
LATVIA
LITHUANIA
BELARUS
DENMARK
UNITED KINGDOM
NETHERLANDS
GERMANY
POLAND
UKRAINE
BELGIUM
0
130
260
390
520
Km

Driving the future of energy across sea basins

Drivers for offshore

- Better wind conditions offshore and better energy yield
- Possibility to build larger turbines and larger parks
- Reducing visual impact if turbines are out at sea

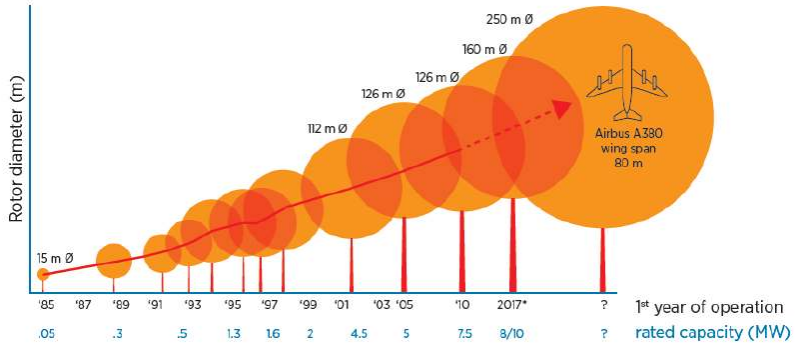
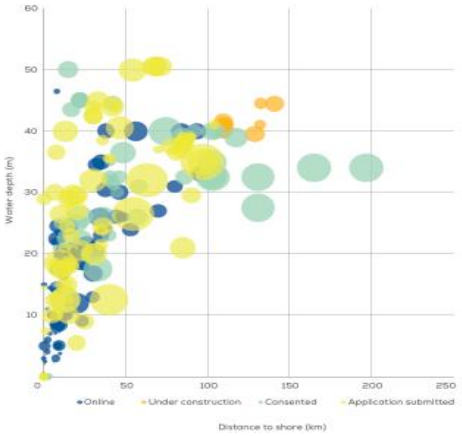
Drivers for renewable energy

- Meet renewable energy targets and carbon reduction goals
- Transition from finite fossil fuels to ‘greener’ energy
- Energy efficiency

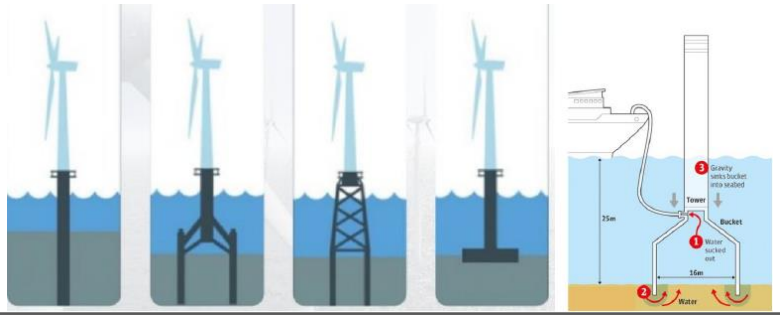
Drivers for offshore grid and interconnection

- Fully-integrated EU internal energy market – energy to flow freely across borders without any technical or regulatory barriers
- Interconnection demand and increased need for electricity (electric vehicles)
- Energy security and stability

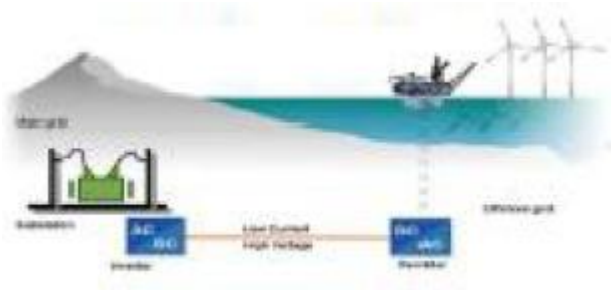
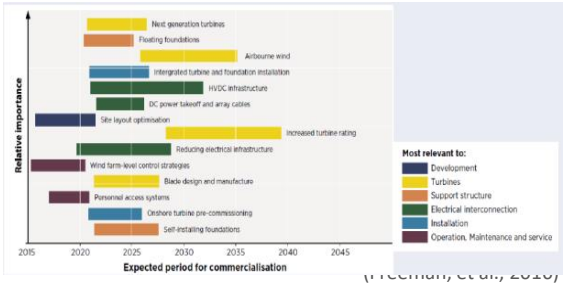
Future energy industry trends

Trends	Opportunities & implications for MSP
Turbine technology  (Lako & Koyama, 2016)	• The current trend is to build larger, more powerful turbines (8 MW in 2016, 12 MW in 2019!) • Provide an opportunity to produce more energy per turbine • Less turbines per MW would mean less cables per MW • Fewer, more powerful turbines may be favoured over more, less powerful turbines due to spatial restrictions • Implications of larger wind turbines for birds • Visual impact & public perception
Increasing farm sizes Development area & number of turbines  (Fraile, Mbistrova, Pineda, & Tardieu, 2018)	• The trend is towards larger wind parks • World's largest is Walney Extension off England – 659 MW & around 20,000 soccer pitches in size • Wind farms with 100 plus wind turbines – London Array 175 turbines • Would be more economic • Requires overall less cables if production is concentrated • BUT more space required and more chance of spatial conflict with other marine users

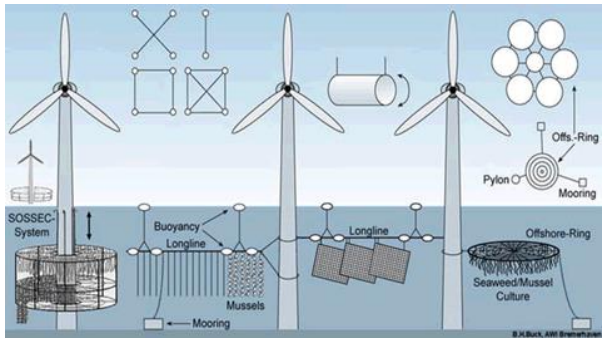
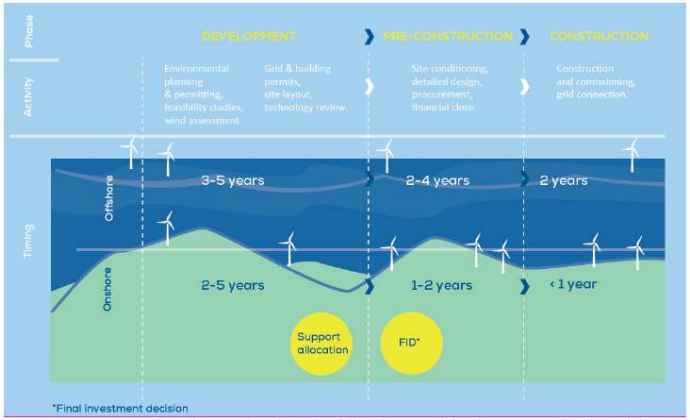
Future energy industry trends

Trends	Opportunities & implications for MSP
Sub-structures and deeper waters 	• Bigger turbines require stronger sub-structures • Constructed in deeper waters, bottom-fixed projects average water depth of around 30 m • Development in sub-structure technology can support moving to deeper water areas • Reduce spatial conflict in congested inshore areas and avoid higher densities of marine users
Floating turbines  (Source: Equinor/ Statoil)	• Unlocks deeper water sites (In European waters, 80% of all the offshore wind resource is located in waters 60 m and deeper) • Can support larger wind turbines (12-15 MW) • World's first in the North Sea – Hywind Pilot Park 30 MW, 5 turbines – water depth of 95-120 m • BUT unexploited areas might now get attention for offshore wind • Longer cables to shore • Ice conditions – not likely in Baltic Sea

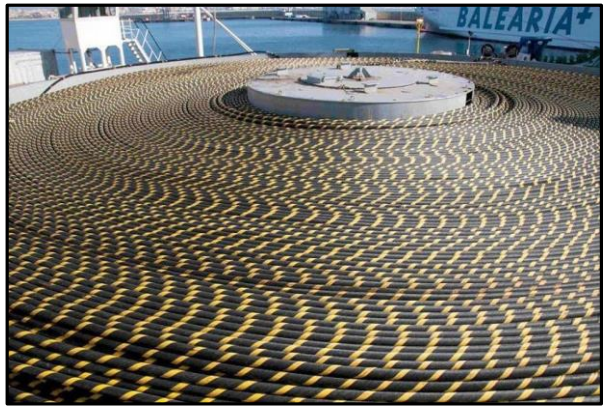
Future energy industry trends

Trends	Opportunities & implications for MSP
Transmission technology 	• Development of transmission technology will allow building further at sea • Clustering of cables increases economy and efficiency of the use of sea area • Grid development will provide new opportunities for offshore wind development • Less dependence on the Russian electricity in the Baltic States
Research & Development 	• Is supported, but needs more investments • Site layout optimization – can be influenced by MSP – space used more efficiently • Optimal offshore grid design – less and more efficient cables

Future energy industry trends

Trends	Opportunities & implications for MSP
Multi-use 	• Wind turbine sub-structures provide opportunities to combine other uses • Increase spatial efficiency, more than one marine user will occupy less total area • Spatially advantageous for countries with smaller or busy marine areas
Planning processes 	• Improved planning process could support finding the best areas • Apply industry mapping together with governments • More flexibility • One stop shop from governments. • Simplified procedures for testing sites • A common Baltic wide framework for environmental assessments. • Promotion body for facilitation the industry to develop and implement projects

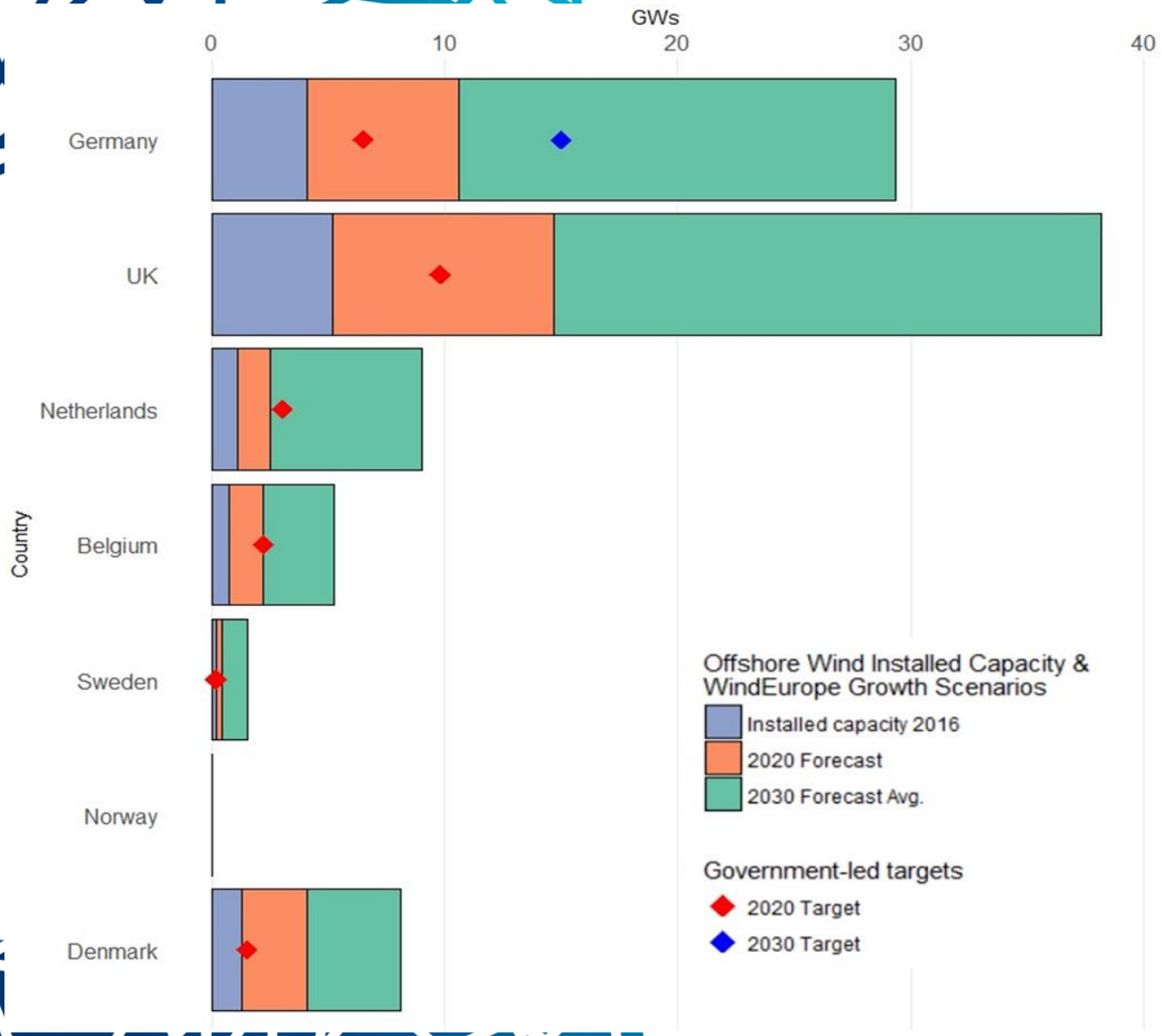
Future energy industry trends

Trends	Opportunities & implications for MSP
Ocean energy 	• Alternative solution to traditional grid-connected applications – plug into local and isolated energy markets • Scotland leading the way – MeyGen – 4 tidal turbines deployed – consent for 86 MW capacity • Better grid may open up opportunities for wave energy in long term
Increased interconnection demand 	• Meet EU 15% interconnection target by 2030 • Improve energy security • Provide more grid connection points on land to transfer offshore energy to the grid

Future energy industry trends

Trends	Opportunities & implications for MSP
Floating Energy Hub Island 	• TenneT ambition of 100 GW capacity (2030 – 2050). Energy atolls & plug at sea concept – Belgium, Germany & the Netherlands • Central hub to connect offshore wind farms and interconnectors to from multiple countries - located in Doggerbank • Improved North Sea interconnection across borders, energy security and grid stability • Energy storage capabilities? • Host O&M activities for offshore wind
Decommissioning & Carbon Capture and Storage  	• Use of decommissioned oil and gas pipelines for CCS – Scotland & Netherlands • Help combat climate change & achieve carbon reduction targets • Decommissioning will free up marine space and reduce conflicts with other marine users • Safety risks of infrastructure being left in-situ

Future Outlook for Offshore Wind – Growth Scenarios



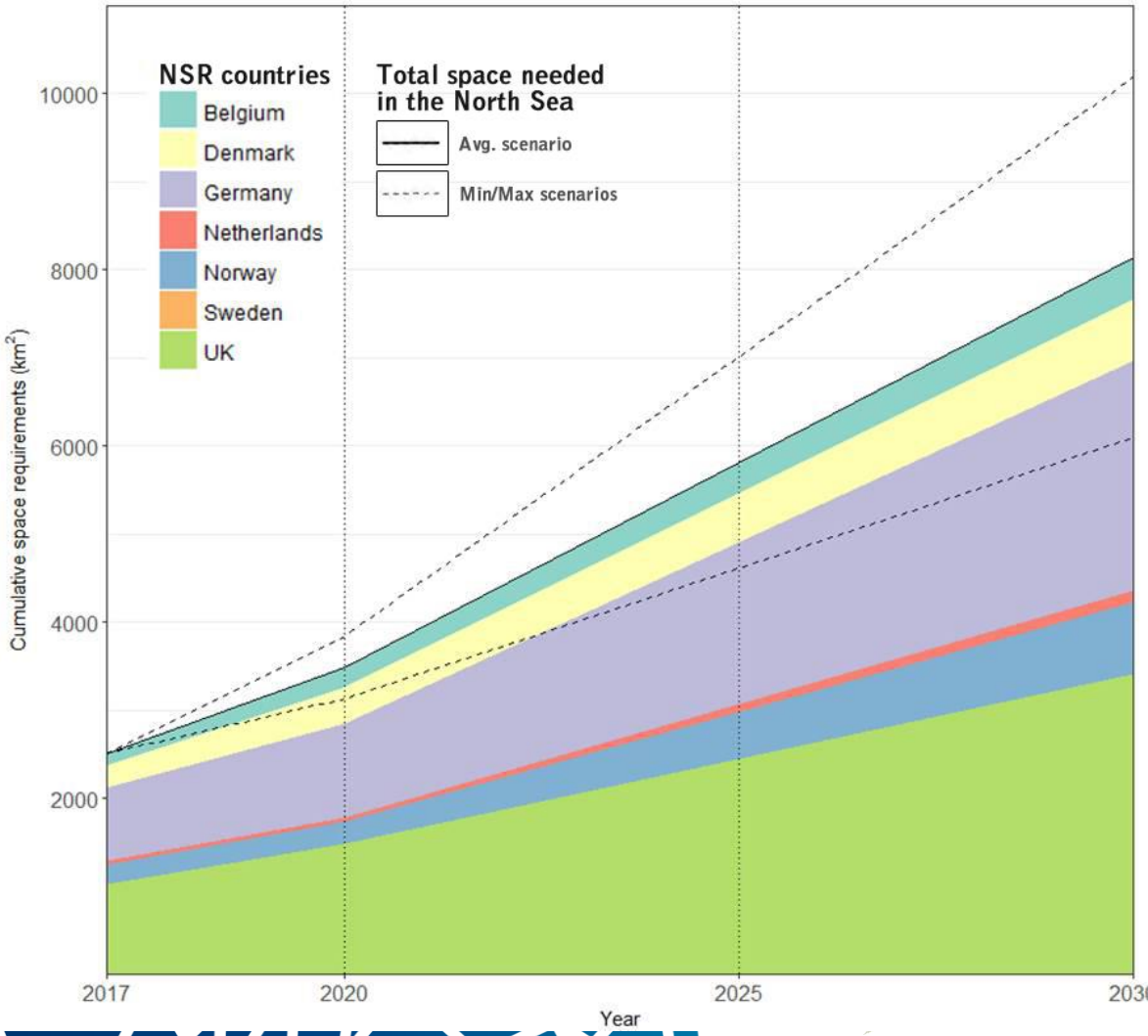
Baltic LINes

Interreg Baltic Sea Region

EUROPEAN REGIONAL DEVELOPMENT FUND

EUROPEAN UNION

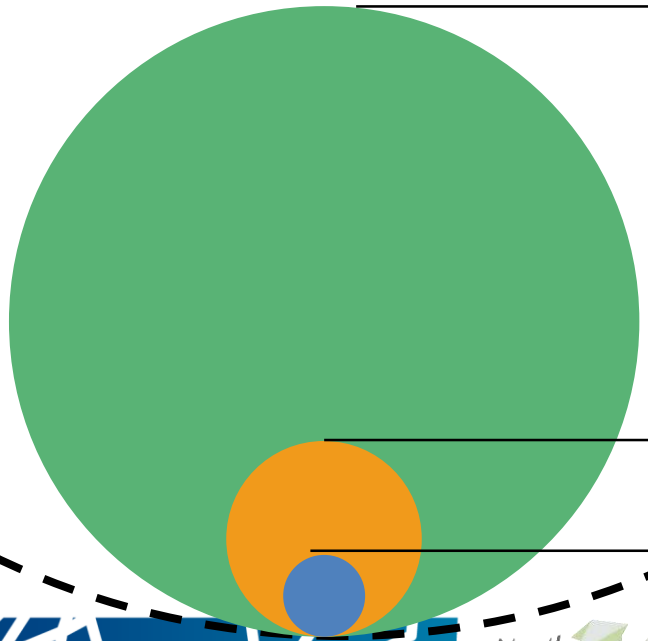
Space requirements for fulfilling 2020 & 2030 growth targets for offshore wind



Average scenario: Total space occupied by offshore wind farms:
3,500 km² by 2020
Over 8,000 km² by 2030

(Based on average scenario and assumptions of 1 km wind turbine spacing and incremental increase in turbine size from 7 MW to 15 MW)

Offshore wind growth targets in the North Sea



2045 – 230 GW

2030 – 70 GW

2020 – 21.7 GW

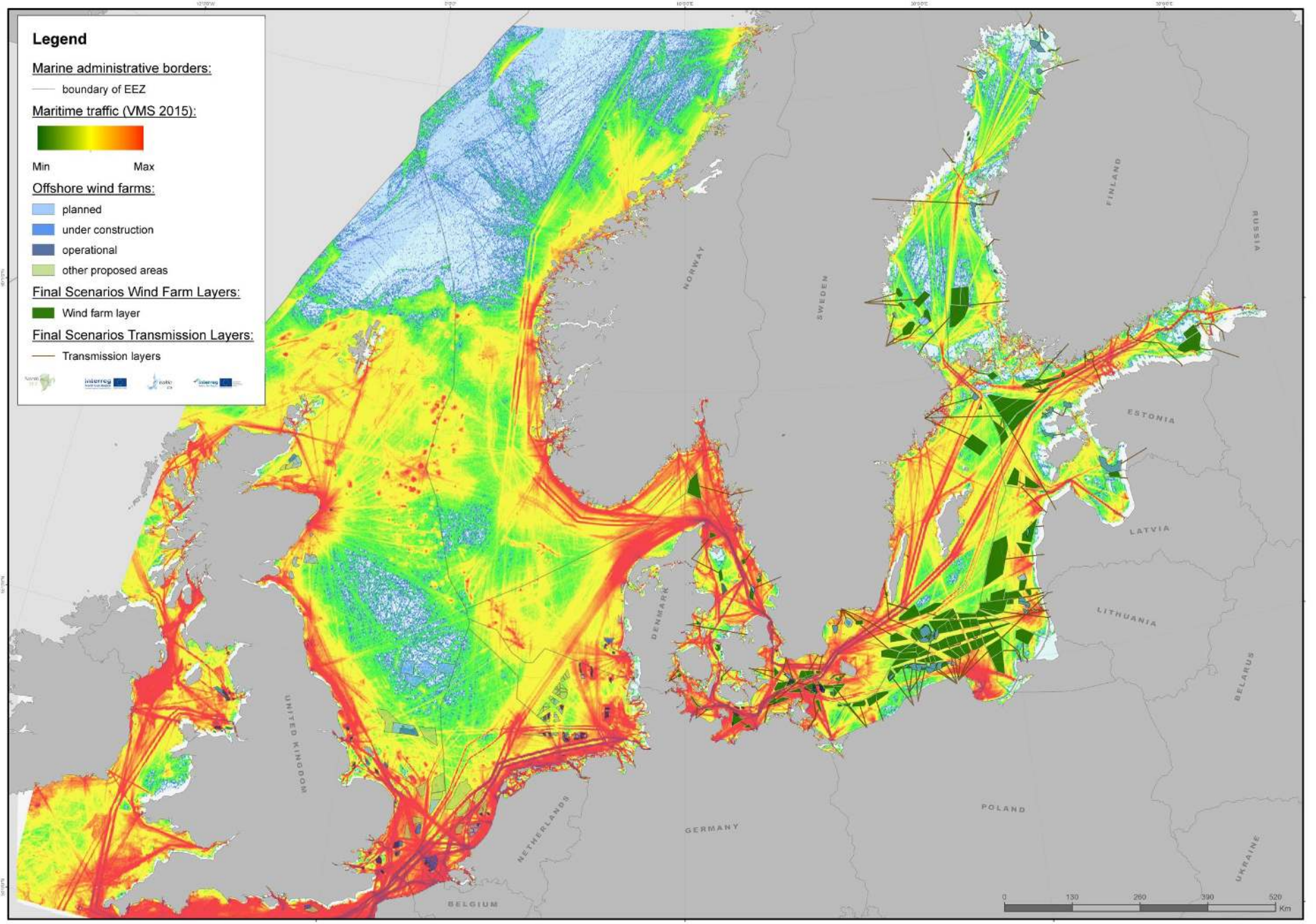
2016 – 9.1 GW

Spatial requirements to meet future targets

Offshore energy production scenarios (MW)							
		2030 scenarios			2050 scenarios		
Country	2017	2030 Low	2030 Medium	2030 High	2050 Low	2050 Medium	2050 High
DK	880	1 620	1 769	2 169	1 769	3 926	8 768
DE	689	2 124	2 368	3 300	8 542	17 737	49 732
EE		225	425	900	2 042	2 807	4 722
FI	90	235	448	539	2 694	10 722	34 511
LV				133	824	2 093	5 762
LT			50	100	1 672	3 343	8 232
PL		1 464	1 727	3 411	4 981	20 109	61 193
RU		144	433	1 040	1 040	9 305	25 901
SE	206	386	757	1 157	4 496	11 030	26 055
TOTAL	1 865	6 198	7 977	12 749	28 060	81 072	224 876
Sea area	**0,10 %**	**0,33 %**	**0,42 %**	**0,68 %**	**1,51 %**	**4,34 %**	**12,03 %**

Recommendations for energy and MSP

- In order to realise the targets for renewable energy – need a development plan (Baltic Sea) or designate spatial areas to safeguard space for future offshore wind parks in suitable locations (North Sea)
- Identify cable routes and grid connection points on land
- Identify suitable locations for floating wind
- Create concrete national energy policy roadmap to achieving 2050 energy targets
- There needs to be a link between future energy trends and spatial policies
- Encourage multi-use – efficient use of space


Legend
Marine administrative borders:
boundary of EEZ
Maritime traffic (VMS 2015):
Min
Max
Offshore wind farms:
planned
under construction
operational
other proposed areas
Final Scenarios Wind Farm Layers:
Wind farm layer
Final Scenarios Transmission Layers:
Transmission layers
NORWAY
SWEDEN
FINLAND
RUSSIA
ESTONIA
LATVIA
LITHUANIA
BELARUS
DENMARK
UNITED KINGDOM
NETHERLANDS
GERMANY
POLAND
BELGIUM
UKRAINE
0
130
260
390
520
Km

Connecting Seas

NorthSEE – Baltic LINes MSP conference

Future scenarios workshop

Energy & Shipping

DISCUSSION

Validation exercise

- What future trends have we not covered?
- Any other futuristic/unexpected trends that may influence shipping and energy?
- Do you agree with the way we have interpretated the spatial implications of future trends?
- How can planners help industry?

Considering both sea basins, do you see any…?

- Similarities and differencies in conditions and trends
- Relationship and dependance
- Market discrepancies – influencing space?
- Should these Regions be planned jointly? To what extend?