Baltic LINes

Coherent Linear Infrastructures in Baltic Maritime Spatial Plans

Baltic InteGrid

Integrated Baltic Offshore Wind Electricity Grid Development

Stakeholder views on the future of offshore energy and grid in the Baltic Sea

Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

Introduction

Baltic LINes and Baltic InteGrid projects organized a stakeholder workshop to discuss future development of offshore energy production and grid in the Baltic Sea region. The workshop took place in Copenhagen in October 30-31, 2018. There were altogether 40 participants representing industry and administration as well as different related projects. There were participants from all Baltic Sea countries and even beyond.

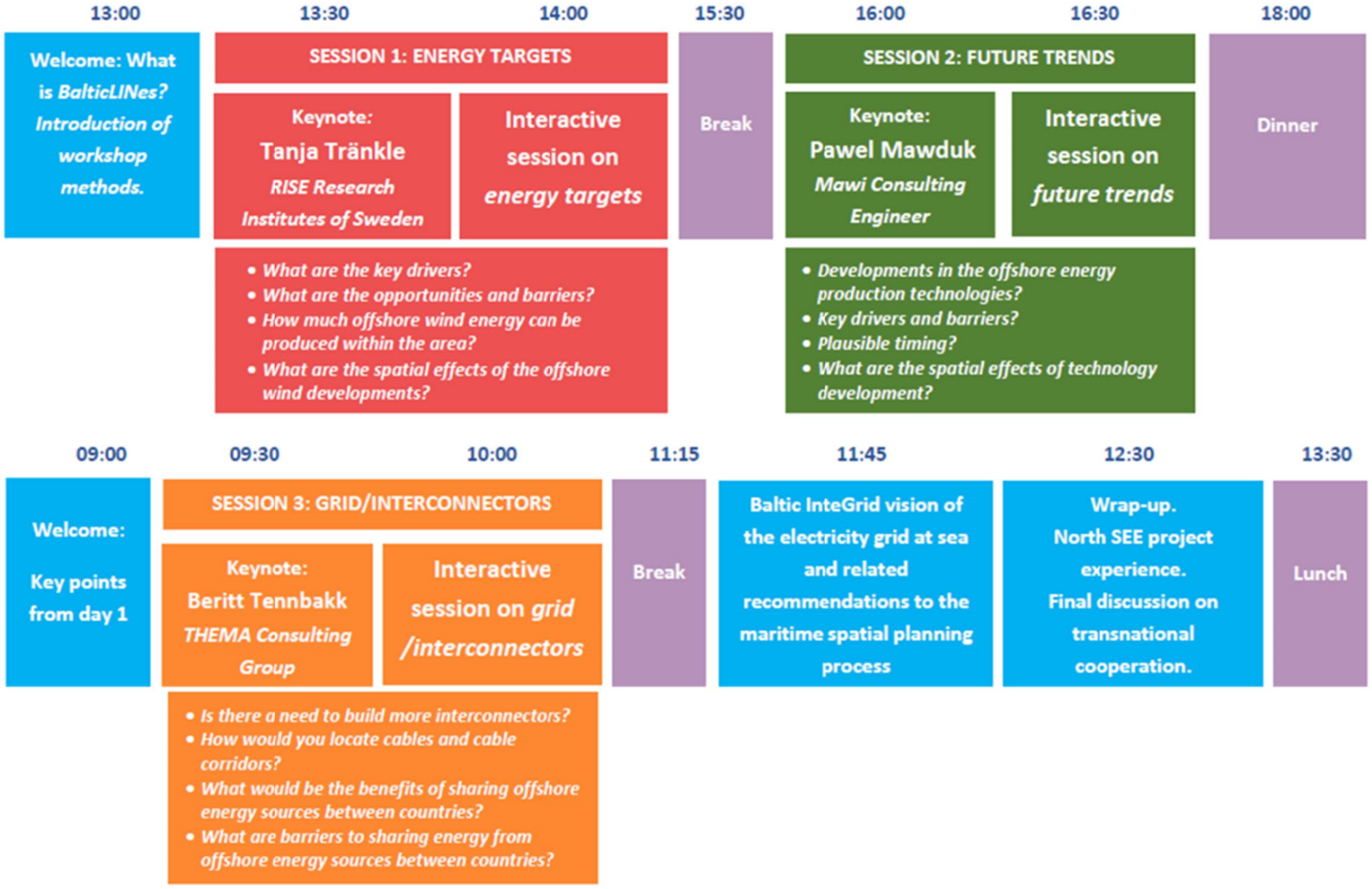
The workshop was built around a draft of report "Baltic LINes Energy Scenarios for the Baltic Sea 2030 and 2050" on future energy scenarios. Draft findings of the scenario report were taken as starting points for discussions during the workshop. The workshop utilized also the MSP Challenge software to illustrate and simulate spatial aspects of the future developments. The MSP Challenge was used to show the participants the spatial assumptions of the scenario report, which were then discussed and modified by the participants.

The workshop was split into three sessions that focused on a) the development of offshore wind production and related targets, b) future trends in offshore energy technology, and c) developments in interconnectors and grid. Each of the session started with a keynote speak that was followed by a group work. The participants were split into three geographical groups: Southern Baltic Sea, Central Baltic Sea and Northern Baltic Sea. The group works collected first the participant's views on the topic, which was followed by working on the spatial aspects with the MSP Challenge software. Each of the session includes also visiting to the two other geographical groups. The keynote speakers were:

- Tanja Tränkle from RI.SE: "Energy Targets Baltic Sea Region"
- Paweł Mawduk from Mawi Consulting Engineer: "Future trends in offshore renewable energy"
- Berit Tennbakk from THEMA Consulting Group: "Some preliminary insights from the BEMIP Offshore Wind Cooperation Study"

In the end of the workshop there were also presentations by the Baltic Integrid project on the project findings and draft recommendations and a presentation of NorthSEE project.

Workshop agenda on the next page presents the topics and structure of the workshop. Presentations can be found here: https://vasab.org/event/bl-energy-challenge/


13:00
13:30
14:00
15:30
16:00
16:30
18:00
Welcome: What is BalticLINes? Introduction of workshop methods.
SESSION 1: ENERGY TARGETS
Keynote: Tanja Tränkle RISE Research Institutes of Sweden
Interactive session on energy targets
Break
SESSION 2: FUTURE TRENDS
Keynote: Pawel Mawduk Mawi Consulting Engineer
Interactive session on future trends
Dinner
What are the key drivers?
What are the opportunities and barriers?
How much offshore wind energy can be produced within the area?
What are the spatial effects of the offshore wind developments?
Developments in the offshore energy production technologies?
Key drivers and barriers?
Plausible timing?
What are the spatial effects of technology development?
09:00
09:30
10:00
11:15
11:45
12:30
13:30
Welcome: Key points from day 1
SESSION 3: GRID/INTERCONNECTORS
Keynote: Beritt Tennbakk THEMA Consulting Group
Interactive session on grid /interconnectors
Break
Baltic InteGrid vision of the electricity grid at sea and related recommendations to the maritime spatial planning process
Wrap-up. North SEE project experience. Final discussion on transnational cooperation.
Lunch
Is there a need to build more interconnectors?
How would you locate cables and cable corridors?
What would be the benefits of sharing offshore energy sources between countries?
What are barriers to sharing energy from offshore energy sources between countries?

The working group results

Below key points of the discussions in the three group works are presented (energy targets and offshore wind development, future trends in offshore wind and interconnectors/grids). The groups represented different geographical areas on the Baltic Sea. In the northern Baltic Sea group there were representatives from Russia, Finland and Sweden. The Central Baltic Sea group covered Estonia, Latvia, Lithuania and Sweden, while the Southern Baltic Sea group had participants from Denmark, Germany and Poland. The MSP Challenge software was used to facilitate discussion on spatial effects of the topics. The results have been considered in the finalisation of the scenario report "Baltic LINes Energy Scenarios for the Baltic Sea 2030 and 2050" and therefore not repeated here.

Session 1. Energy targets and wind energy development

The groupwork started with a discussion on drivers of offshore wind energy development in the Baltic Sea. The drivers to start the discussion were taken from the report: "Baltic LINes Energy Scenarios for the Baltic Sea 2030 and 2050" prepared for the project by RI.SE institute in Sweden. The drivers were:

- Availability of space
- Demand for renewable energy (RES in the energy mix)
- Transmission capacity
- Investments into offshore wind
- Technological development opening new areas
- Technological development lowering capital costs (CAPEX) and operational costs (OPEX)
- Political priorities
- Changing financial schemes
- Military interest limiting areas
- Grid design

The groups were asked to assess the importance of the drivers and also an approximate timing when they would be influential. They were also encouraged to suggest new drivers or ignore some of the given ones, if they did not found them important or relevant. The following table summarises results of the three regional groups. As clear identification of the possible timing of drivers turned out to be difficult the table focuses on the importance drivers.

The outcome of the group discussions revealed some differences between the regions and thinking of the participants. The Southern and Central groups highlighted political target setting and policy making as the most important ones, while the Northern group did not find political target setting and policy-making driving the development currently as much as economic aspects. Transmission capacity and grid development were found similarly important drivers, but again here the Central and Southern groups had similar views, while the Northern group diverted. In the Southern and Central Baltic areas grid and its capacity is seen as a limiting factor today, which is not the case currently in the north.

In the Northern group availability of space for wind farms offshore and onshore was not seen as an issue currently, but it will become more important driver in the future. This reflects the current conditions of land-use and sea-use in the North. In the Central group lack of space for new wind farms on land was raised as an important driver that increases interest to build offshore wind production.

The Southern group emphasized the need to involve companies and stakeholders into decision-making. Also the Central group highlighted importance of communication and knowledge of the general public. In the northern group technology development and its impact on the costs of offshore wind became highlighted more than in the other two groups.

Drivers in the Northern Baltic group (in order of the importance)	Drivers in the Central Baltic group (in order of the importance)	Drivers in the Southern Baltic (in order of the importance)
Investments into offshore wind energy - Willingness to invest was seen as the most important and directly stemming from the development of cost, grid design and transmission capacity - All drivers effect willingness to invest	Communication/promotion/knowledge - Reduce complexity of policy to make it more understandable for developers and the general public (urgent need) - The sector needs to provide more input and knowledge to make the energy transition political priority. This includes technical knowledge to politicians, but in an understandable way.	Setting the targets - For now setting the targets has the highest importance - This is combined with the availability of space and also the ambition (as a result the importance might vary in different countries with different space and targets)
Technological development will lower capital and operational costs - Price of the technology is currently in a strong decline	Non-availability of onshore wind - For countries which have limited land availability (e.g Estonia), this is a key driver, for countries which have enough space this is less relevant (e.g. Sweden)	Political priorities - Political priorities are also very important - Dependent on the political priorities offshore wind might be strongly supported or has lots of barriers if shipping or other sectors got the political priority
Grid design - Is a critical growth factor in the future as the increase of electricity transmission is expected to grow	Solutions for balancing production and consumption - Finding ways how to geographically organise this (e.g. production in North, consumption in South) - Storage opportunities (incl costs) as an important factor	Investments into offshore wind - It is also very important, but in a later stage (after setting the targets and clear political priorities) - For new OWF it is significant to invest (otherwise there won´t be new OWF despite high targets and political priorities for OWF
Transmission capacity - Not currently a limiting factor, but will become more important as the need of transmission increases.	Grid - The possibility and will to develop a meshed grid - Development of a united productivity body which would focus on sharing of energy production among the Baltic Sea country	Transmission capacity - Currently it is more a barrier than a driver (red dot on the flipchart) - The current transmission capacity is not so high so that it limits the development of OWF, in the future (with a hopefully better transmission capacity) this may be a driver

Availability of space - Not currently a limiting factor in the northern Baltic Sea, but it's importance will increase in the coming decades	Financial - The prices for the grid are partly determined by the current stakeholders using it, which are the traditional fossil fuel producers. Decentralisation of the grid (smaller regional networks) could decrease their influence and make renewable energy production more competitive. Another solution could be to convince this more conservative sector of the need to change to renewables, and thereby make them 'our friends'. - The prices for CO2 in the emission trading system also influences the demand for renewable energy production in general, including offshore wind.	Market value of offshore wind - This a bit combined with investments into OWF, as the market value is important for investments
Loss of onshore space - Related to the previous and developing in a similar way: currently a lack of space on land is not an issue, but will become more severe. - Stems from not-in-my-backyard attitudes		Grid design and development - The grid design is seen more as a barrier - Grid development can support to solve this barrier so that it becomes more a driver for OWF
Political priorities - Is an important factor, but already today economic drivers are more important - Is likely to change in the future, but the direction of change is uncertain		Involving local companies - This has not the highest importance, but helps to achieve a higher acceptance in the region - It is good not only have global companies, local companies should also be involved and should benefit from more OWF
Electrification - Demand of electricity is increasing creating demand		Stakeholders´ integration/ consultation - This supports also to achieve a higher acceptance - Stakeholders from other sectors can inform about their concerns or wishes so that this could be considered
Technological developing opening new areas - Will open new areas, which might be important in the future, but as currently there is no lack of space even for the available technology		Military interest for space - Military interest for space acts as a barrier for OWF as they limit the possible availability of space
Not in my backyard - Is acknowledged as a factor for individual projects, but not a very important driver on the industry level.		Demand for renewable energy - For the future (2030 or 2050) the demand for renewable energy can act as an important driver (if there would be no demand, there would be no need for new OWF)

The next part of the group work discussed the spatial effects of the offshore wind developments. This discussion was facilitated by using the MSP Challenge software. This was done by showing to the group work participants the areas where new offshore wind parks are suggested in a draft of this scenario report. The participants were asked to comment them and suggest changes. The outcome of the discussions led changing the suggested wind parks and proposing new ones.

The groups suggested changes in the areas presented in the scenario maps based especially on the participants' understanding of current technical and economic feasibility. They did confirm that in the long run building offshore wind parks, for instance, far away at sea and in deep waters may become feasible. They emphasized that industry should be consulted more broadly to get a better picture of potential development.

They also commented that many of the suggested areas conflict with other uses and natural features of the marine ecosystems. The groups suggested leaving more area for shipping and to avoid protected areas and known bird migration routes. Also known gravel extraction areas should be avoided. The Southern Baltic Sea group made a general suggestion that large offshore wind parks could have wide corridors through the wind parks to allow shipping and bird migration.

The Northern and Central groups discussed also the idea of locating wind parks in border area of two or more countries. They commented the concept might be possible in the future, but currently such plans do not exits in those areas.

The participants pointed out that combatting climate change would require action quick, not by 2050. The 2050 scenario needs to be implemented earlier, in 2040 or even before to reach the Paris agreement goals. Now is the time to start working and speed up the process. The participants of the Northern group were a bit skeptical about the feasibility of presented high-end scenario. They commented that as the offshore wind energy capacity should increase rapidly showing very hypothetical long-term scenarios that are based on technologies that do not exist may be counterproductive.

In the Northern group there was a more general discussion about the scenario thinking and methods that was inspired by the suggestions in the draft scenario report. It was reminded that one should be careful with the maps that are produced. The current scenario map does not inform about substantial uncertainty related to the long-term scenarios as they are presented visually in a same way as shorter-term scenarios that are based on actual plans to build wind parks.

Session 2. Trends in wind energy technology

The second session started with a presentation of a poster that described the main technological trends in the draft scenario report. The trends were:

- Change in turbine technology (especially size of turbines)
- Increasing size of wind farms
- Sub-structures
- Floating turbines
- Development of transmission technology

- Technical development and research
- Multi-use of wind energy sites
- Decommissioning of OWF

One of the discussion points was also OWF planning processes and development of them.

The table presents key points in group discussions:

Technology trends	Opportunities	Barriers
Change in turbine technology (especially size of turbines)	- The current trend is to build more and bigger turbines - Provide an opportunity to produce more energy per turbine - Less turbines per MW would mean less cables per MW	- Permitting may be more difficult as higher turbines cause more disturbance (visual and radar disturbance) - Bigger turbines require more solid sea bottom - Requires larger wind parks
Increasing size of wind farms	- The trend is towards larger wind parks - Would be more economic - Requires overall less cables if production is concentrated	- Competition of the use of sea areas - Permitting procedures may be more difficult
Sub-structures	- Bigger turbines require stronger sun-structures - Development in sub-structure technology can support moving to deeper water areas	- Cost of stronger sub-structures - The vessels that are used in building of sub-structures set certain conditions (have to of certain depth)
Floating turbines	- Floating wind technology could be a solution in areas where sea bed conditions are not suitable for building sub-structures - Technology is available to be used in deep water areas	- Ice conditions in the northern Baltic Sea are a challenge - More expensive structure than the conventional - Not tested in the Baltic Sea yet - Baltic Sea is generally too shallow for floating wind
Development of 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	- Needs more R&D investments to achieve real innovations
Technical development and research	- Is supported, but needs more investments - Significant opportunities by R&D	- North Sea is more of an innovation test bed than Baltic Sea – does North Sea solutions work in the

		Baltic Sea
Multi-use of wind energy sites	- Wind turbine sub-structures provide opportunities to combine other uses - Can have positive spatial effects in making the use of sea areas more efficient	- Security and safety issues – insurance is complicated - Little experience or tested - Not easy to find concrete examples, after all
Planning processes	- More flexibility, means more adjustments in the current plans. - A common Baltic wide framework on environmental receptors which need to be considered in Environmental Assessments. - Apply industry mapping together with governments. - Promotion body for facilitation the industry to develop and implement projects. - One stop shop from governments. - Simplified procedures for testing sites - Improved planning process could support finding the best areas	- Technology changes faster than the process - Too much flexibility causes uncertainty for environmental assessments. This could lead to the need to have more than 1 assessments, or courts rejecting plans because the assessments are not correct - Implementation of MSP - MSP to promote long-term thinking for the whole sea use (would help wind energy operators to know what to expect)

The groups discussed also spatial implications of the technology development. Most of the technological trends that were discussed would make the use of the sea space more efficient. For instance, larger wind parks would require less cables and energy transmission could be more concentrated.

It was reminded that the current trend towards larger turbines does not significantly increase the efficiency of the sea use. This is because large turbines cannot be built very close to each other. In effect it would lead to larger wind parks. It was asked can spatial efficiency be subsidized, instead of the offshore wind park itself. For example, could a tender be launched for the maximum amount of eco-system services to be produced, instead of the maximum amount of energy?

Improved planning would support this clustering effect and also reduce conflicts between different uses. The role for MSP processes would ideally be that of a facilitator rather than simply a technical process. The MSP should also strengthen long-term thinking in development of the activities at sea. It was also pointed out that MSP could have a role in technology development by designating test areas for new technologies.

Session 3. Developments in interconnectors and grid

The third session in group works discussed energy transmission. The groups focused of both interconnectors between countries and the development of the grid system as a whole. In general the groups had a view that more interconnectors need to be built in the future as demand for electricity is increasing and the benefits of between interconnectors are clear. It was also reminded that there are existing plans to build new cables. There is also a need to develop the overall grid system in the region as it would increase security. Also the development of common market is for seen. Reducing the dependence on the import of electricity from Russia in the Baltic States was also mentioned as one driver to develop interconnectors.

The following table summarises the main befits and challenges of developing

Benefits	Challenges
The Baltic Sea region can become an export market for renewable energy	High level of cooperation needed, for example in the market design, to make the grid a success story. Do countries want to co-operate? What are the incentives?
Economic benefits for OWF development. - Lowers the costs of connecting to the grid for the operators if the national authorities will carry the costs of interconnectors. - The grid enables funding for cross-border offshore wind projects	TSOs do not have harmonized legislation/ agreement or guidelines. International agreements could solve this.

Increases stability of the electricity system and grids - as a whole and - decrease the interruptions or blackouts in certain regions	Decision-making processes by several public and private actors as well as permitting processes should be synchronized.
Would lead to more efficient use of space and resources	Russian frequency is used in the Baltic States. The policy to change this is unknown, because it is a delicate subject in politics.
Would stabilize price difference between countries (*could be also a barrier as the price might decrease in one country*)	Market barriers - Interests of domestic energy producers (e.g. Vattenfall in Sweden) can be seen as more important than an equal market, thereby influencing the actual energy transported.
Even if no wind energy is being produced, the grid could still be used for transporting other energy (e.g. hydro).	Political barriers: Need to ensure national security of supply

The groups discussed also possible solutions and prospects that would support development of interconnectors and the grid system. A lot is depending on better coordination of decision making. One aspect is the private-public relationships. Offshore wind operators are private actors, while the grid development is in the hands of public actors. This requires more cooperation between the different types of actors. Linked to this is that this collaboration should be supported national by collaboration of between different governmental departments. There is also an international aspect to this as the participants identified a clear need to further increase collaboration between national grid authorities.

The role of MSP was also discussed in this connection. It was seen that MSP could be important in promoting the need for better connections and thus support the requested collaboration between grid authorities. MSP could be the main driver for the energy transition and to promote the establishment of a pan-Baltic grid.

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