Renewables Grid Initiative

RGI Offshore Workshop "Stakeholders' perspectives on offshore grids and the marine environment"
27 and 28 June in Bergen, Norway
A workshop kindly hosted by Statnett

Agenda:
Day 1: current status of offshore grid expansion, need drivers, environmental impacts, challenges during permitting and construction, stakeholder engagement – focus on offshore interconnectors, some findings also relevant for connections of offshore wind farms
Day 2: visit to Hardangar fjord, solutions on how to embed pylons into landscape

Participation:
>50 participants from TSOs, NGOs, authorities, industry, academia and politics

Next steps:
In addition to the informative element of the workshop, possible work streams for an RGI Learning Group on this topic[1] were discussed. Based on these discussions, the RGI Secretariat will develop a work plan for this Learning Group within the coming months.
On the second day, a field trip to the Hardanger fjord, where a new electricity line is currently being built, showed Statnett's different attempts of embedding pylons into the landscape and the challenges they face in building a grid into the fjord environment. Participants were able to e.g. observe a helicopter that brought in different parts for the new pylons from one side of the fjord to another.

1. The Need for Offshore Grids

Covers presentations by Einar Wilhelmsen, Zero; Erlend Draget, WWF Norway; Ivan Scrase, RSPB plus case study presentations by Thor Anders Nummedal, Statnett; Mark Pearce, National Grid; Maarten Abbenhuis, TenneT and Bjorn Sanden, Stattnet

Climate change, and its potential for devastating impacts on nature and the environment, are the starting point for many NGOs to engage in debates on the future of renewable energy and energy infrastructure. NGOs recognise that if national energy systems are to depend more and more on renewables, they need to be interconnected in order to ensure security of supply. Offshore interconnectors play an important role in this respect.

In June 2013, the "Joint Norwegian-German Declaration" was published and signed by 20 organisations from both countries, from both the industry and civil society (including WWF, Zero, Greenpeace, 50Hertz and TenneT). It clearly states that both German and Norwegian politicians should continue their efforts to rapidly increase the shares of renewables, reduce greenhouse gas emissions and increase energy efficiency. Moreover, they call upon Norwegian politicians to make its hydropower reservoirs available to balance growing amounts of renewables in other countries.

While grids help reduce climate impacts by promoting an expansion of renewables, they can also negatively impact wildlife and local environments. Further, energy targets and plans must be developed to be compatible with other agreed European aims, such as protection of the terrestrial and marine environments and bringing an end to the decline of biodiversity.
Thorough planning and - if necessary - compensation need to be in place to minimise negative environmental impacts as much as possible. When planning new lines, the question of how the best projects with the least environmental impacts can be identified, needs to be addressed. Grid planning should always consider alternatives to constructing new lines, and alternative technologies and routes

1 Further information: http://renewables-grid.eu/activities/learning-groups/grid-expansion-in-marine-environments.html

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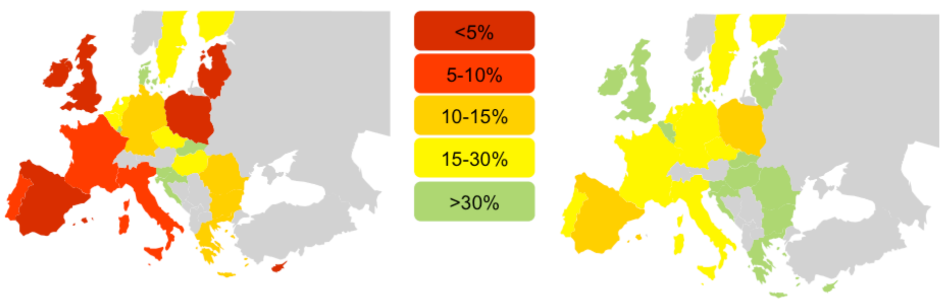
that can help minimise overall direct environmental impacts.

For TSOs, offshore interconnectors have two main benefits:

a) Security of supply: An interconnector provides backup capacity, which helps balance out the volatility of renewable electricity production between two countries and reduce the local need for generation and grid capacity.
b) Market integration: Integrated electricity markets make it possible to harvest the price difference between the two integrated markets. Secondly, generators profit since they can enlarge their sales market.

An illustration from the European Commission showing the rate between import capacity and net generation capacity, before and after the implementation of Projects of Common Interest after 2020, displays the potential for further market integration. This potential is particularly obvious for the UK, Poland, the Baltic states, and Spain where nowadays, the connection level lies at less than 5%.

Import capacity/net generation capacity before and after PCI implementation – 2020+



Source: European Commission, DG Energy, status June 2013
(Based on draft list of PCIs – numbers may differ in final list to be published by end of September 2013)

More information:

- Joint Norwegian-German Declaration: http://jointdeclaration.org/

2. The Current Status: Grid development in the Northern Seas

Covers presentation by Theresa Schneider, RGI

A comprehensive overview of planned and ongoing grid development in the Northern Seas would be very useful for many stakeholder groups (e.g. environmental authorities, NGOs). Such an overview is, however, missing. This is partly due to the fact that plans from TSOs are very much dependent on outside developments. Business cases can change quickly. Therefore, overviews of planned offshore developments are rapidly out-dated. An institution that would systematically collect and update plans from TSOs and third party developers is missing.
Nonetheless, a good starting point for an overview is the Ten-Year Network Development Plan (TYNDP) 2012 developed by ENTSO-E. While the current TYNDP does not include any plans for merchant projects, future plans are foreseen to do so.[2]

2 Merchant transmission projects: for merchant (private) projects, in contrast to regulated projects, the costs of constructing the proposed transmission facilities are recovered through negotiated rates instead of cost-based rates.

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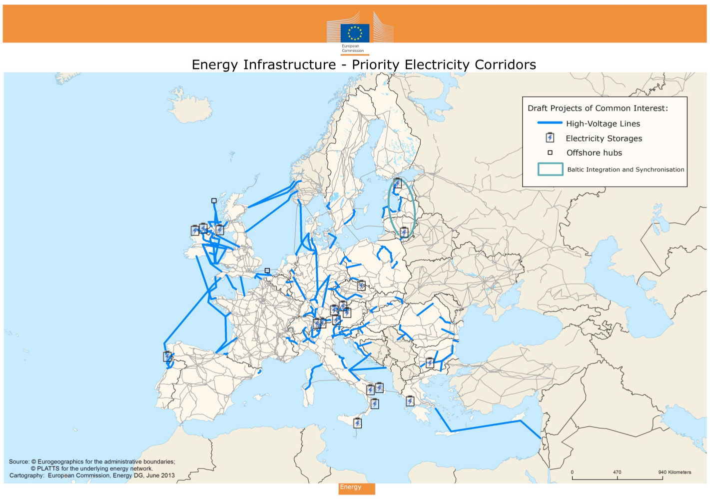
At the moment, there are operational interconnectors with a transmission capacity of around 8,000 MW in the North Sea. The TYNDP proposes a list of projects for this area, which would roughly double the capacity by 2022. Even though the transmitted capacity in the Baltic Sea is not as high as in the North Sea, it is supposed to increase by one third within the next ten years.

Interconnection	Operational	Under construction	TYNDP	Total
NO-DK(W)	950	700		1,650
NO-NL	700		700	1,400
NO-DE			1,400	1,400
NO-UK			1,400	1,400
UK-NL	1,000			1,000
UK-BE			1,000	1,000
SE-DK(W)	740			740
SE-DK(E)	1,700			1,700
NL-DK(W)			700	700
UK-F	2,000		1,000	3,000
UK-IE	1,000		1,000	2,000
Total	**8,090**	**700**	**7,200**	**15,990**

Interconnection	Operational	Under construction	TYNDP	Total
DE-DK	600		600	**1,200**
EST-FIN	350	650		**1,000**
SE-DE	600			**600**
SE-FIN	1,350			**1,350**
SE-LIT			700	**700**
Total	**3,500**		**1,300**	**4,800**

Own illustrations, based on TYNDP 2012

The current draft list of Projects of Common Interest (PCIs)[3] contains a wide range of offshore interconnector projects in the North and Baltic Sea. However, it is not yet clear, which of these projects will be included in the final list. Thus, maps or overviews should be considered with care.



© European Commission: current list of PCIs – not all of the proposed projects will be part of the final list. Total number of lines between UK and Ireland in particular, are expected to be decreased since they compete with each other.

Open questions/concerns:

- The timing of newly planned projects remains uncertain. This makes forward planning and early engagement by stakeholders, such as authorities and NGOs, difficult.
- Maps can be misleading since they convey a seemingly clear picture of plans, which are in fact rather uncertain. Thus, publications need to be careful of what they display.

3 In May 2013, the EU regulation on guidelines for trans-European energy infrastructure came into effect. This legislation introduces a new procedure to identify PCIs which contribute to the following objectives on a European scale: 1) security of supply, 2) integration of renewable energy sources and 3) social and economic welfare. In the new PCI rules and requirements, a new permitting procedure will apply at national level.

- To date, merchant projects have not been included in the TYNDP; their business cases can change quickly thus increasing the risk of insecurity.

More information:

- ENTSO-E Ten Year Network Development Plan (TYNDP (https://www.entsoe.eu/major-projects/ten-year-network-development-plan/tyndp-2012/)

3. Political Setting and Spatial Planning Procedures

Covers presentations by Theresa Schneider, RGI; Jos Spits, TenneT; Martina Doppelhammer and Fotios Papoulias, European Commission

TSOs have stressed that more political clarity is essential in order to realise investment to the required extent. Participants have noted that political clarity is difficult to achieve due to different member state ambitions. However, the 20-20-20 targets were a helpful instrument in foreseeing medium-term developments. There was disagreement whether NGOs and TSOs could jointly urge governments and the EU to develop targets for 2030 due to the fact that TSOs have stressed their neutral role as policy implementers, rather than shapers.

In March 2013, DG Maritime Affairs proposed legislation for maritime spatial planning and integrated coastal management. Maritime spatial planning aims at reducing conflicts between different users of the sea (fisheries, shipping industry, military, tourism industry, fossil and renewable energy sectors, pipelines and cables) while protecting marine ecosystems. The Commission's proposal foresees Member States drawing up maritime spatial plans that identify the most effective future spatial development. Moreover, they should develop integrated coastal management strategies and establish appropriate cross-border cooperation. Offshore grids will be part of these plans. This should ease the work of authorities and NGOs, who will get a better understanding of what to expect in the coming years.

The EU-supported project "Twenties" has analysed the challenges and barriers in the permitting process of ten offshore grid projects. Based on the analysis, eight main recommendations can be drawn:

1. EIA procedure as transnational reference: the Environmental Impact Assessment should be the backbone for the planning and routing of a new line. Since there are European requirements to be followed in every country, the procedure is suitable for the coordination of cross-border projects.
2. Best available installation technology as reference: a neutral body (such as e.g. OSPAR[4]) should develop a list of best practices, based on substantial studies, for installation technologies. One advantage of such a list would be, not having to repeat these studies for every single project. At the same time, the application of technologies with least environmental impact is ensured.
3. Overall cable routing evaluation: currently, impact assessments and routing are done on a national level. A holistic, cross-border approach in evaluating the environmental impacts of an interconnector would help in finding the most suitable route.
4. Balancing out the benefits of interconnectors among other sea users: as described above, there are many competing users of the sea whose interests need to be equally considered. One instrument that could achieve this is Maritime Spatial Planning (MSP).
5. Early screening of route design: it is very important to have a good understanding of possible routes and obstacles early on in the project, in order to avoid delays at a later stage. Again, MSP could help in this respect.

4 OSPAR: The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. Work under the Convention is managed by the OSPAR Commission, made up of governmental representatives of 15 Contracting Parties and the European Commission, representing the European Union.

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6. Transnational standardisation of required documents: the workload of TSOs could be substantially reduced if permitting documents would have common standards in all countries. This would also help authorities in exchanging insights.
7. Landing point most critical: public opposition is, in many cases, one of the main reasons for delays. Therefore, the landing points and onshore connection of interconnectors need to be planned carefully. A thorough analysis of stakeholders and continuous involvement is indispensible (see section "Stakeholder engagement" below).

In May 2013, new EU legislation for energy infrastructure (Guidelines for trans-European energy infrastructure) came into force. Under this legislation, the Commission was asked to develop a guidance document for streamlining environmental assessment procedures for energy infrastructure projects of common interest. This streamlining approach intends to improve and better co-ordinate environmental assessment procedures by reducing unnecessary administrative burdens and creating synergies, while ensuring a high level of environmental protection. The document contains six specific recommendations: a) early planning, road-mapping and scoping of assessments; b) early and effective integration of environmental assessments and other environmental requirements; c) procedural co-ordination and time limits; d) data collection, sharing and quality control; e) cross-border co-operation; f) early and effective public consultation.

In addition, the Commission is finalising guidance on *electricity, gas and oil infrastructures and Natura 2000*, that will identify the potential impacts from energy infrastructures on species and habitats protected under EU nature legislation, and suggest mitigation measures and best practices to address them. It will be a non-legally binding document, to assist parties involved in the development and approval process of energy infrastructure developments (authorities, investors, TSOs, consultants, site managers, NGOs, etc.)

Open questions/concerns:

- Political uncertainty and questions whether EU 2030 targets would help/ whether TSOs could engage in discussions about 2030 targets
- How can the process of selecting energy infrastructure projects of common interest improve in terms of transparency, participation and consideration of environmental impacts? How would this contribute to the achievability of subsequent 'streamlining' and environmental protection at the national level.

More information:

- European Commission: Streamlining environmental assessment procedures for energy infrastructure; Projects of Common Interest (http://ec.europa.eu/environment/eia/pdf/PCI_guidance.pdf)
- European Commission: Natura 2000 Guidance (http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm)
- European Commission: Proposal for directive that establishes a framework for maritime spatial planning and integrated coastal management (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0133:FIN:EN:PDF)
- Twenties project: http://www.twenties-project.eu/node/1

4. Environmental Impacts

Covers presentation by Hans-Ulrich Rösner, WWF

Offshore grids do have impacts on marine environments and coastal regions. One example of an especially challenging region for offshore grids is the Wadden Sea. This area is both a World Heritage Site and (most parts of it) a National Park due to its manifold biodiversity, among other things. Despite this, the area is being used by fisheries, the tourism and energy industries (oil drilling, on- and offshore wind

farms), shipping companies, and many cables on the seabed, including telecommunication as well as power cables.
Environmental impacts of cables occur mainly due to large-scale construction work. Once the cable is in operation, heated mudflats and maintenance work disturb the wilderness. The three neighbouring countries of the Wadden Sea – the Netherlands, Germany and Denmark – have adopted a Wadden Sea Plan in 2010, which clearly states that the environmental impacts of cables should be kept to a minimum. This should be achieved by a) a minimum of cable corridors; b) a minimum of cables; c) use of best available technology. If crossing a protected area, such as the Wadden Sea, cannot be avoided (what should always be the preferred option), minimization is then the second choice. For any unavoidable impact, suitable mitigation and, if necessary, compensation measures are essential. If protected areas are affected by long-term impacts, mitigation should also finance any protection work and services in said areas. Moreover, society should reflect upon the limits of growth and address the question: at what point can protected areas no longer bear intrusion?
There was no agreement among participants on whether old cables should be removed or not. While WWF argued that there was too much waste in the North Sea and it should be disposed of, others questioned whether removal would cause additional disturbance.

One fundamental condition for proper environmental protection is the availability and accessibility of relevant data. There are many projects and initiatives that try to solve the problematic lack of data availability and accessibility. A good point of reference is the European Marine Knowledge 2020 Initiative from DG Maritime Affairs. It helps industry, public authorities and researchers find data and make more effective use of it, thus improving the understanding of the sea's behaviour. However, databases cannot replace thorough assessments, which are necessary for each single project (see e.g. work done by National Grid and Statnett on their NSN interconnector project, section "Case Studies" below).

In October 2012, the Sea Bed User and Developer Group together with the Marine Conservation Society, RSPB, The Wildlife Trust and WWF have published a Joint Statement on Marine Conservation in the UK. In this statement, both NGOs and industry call for the establishment of a coherent and well-managed network of Marine Protected Areas (MPAs) as soon as possible. Furthermore, they call upon the government to commit to an increase of baseline data as well as understanding of environmental and industry impacts.

Open questions/concerns:

- Is the removal of old cables a disturbance to the environment or does it have a positive effect?
- There are uncertainties when it comes to grid impact on different sea species; broad and long-term studies are missing
- Data availability: how do stakeholders know where to find what data?

More information:

- OSPAR Commission: Assessment of the environmental impacts of cables: http://qsr2010.ospar.org/media/assessments/p00437_Cables.pdf
- European Marine Knowledge 2020: http://ec.europa.eu/maritimeaffairs/policy/marine_knowledge_2020/
- Scotland's marine atlas: http://www.scotland.gov.uk/Topics/marine/education/atlas
- Joint Statement on Marine Conservation: http://www.wildlifetrusts.org/sites/default/files/joint_sudg_engo_statement.pdf

5. Case Studies

Covers presentations by Thor Anders Nummedal, Statnett; Mark Pearce, National Grid; Maarten Abbenhuis, TenneT and Bjorn Sanden, Stattnet

The NSN interconnector between Norway and the UK

- Connection between UK and Norway
- To be operational in 2019/2020
- 730km
- HVDC
- Project promoters: National Grid and Statnett

Interconnector projects of this kind face multiple challenges. The most decisive one is a lack of long-term certainty of electricity markets. Decisions on market design (e.g. capacity markets and the role of their interconnectors) are important for project promoters and their investment decisions.

Another major challenge for project promoters is connecting two different systems and ensuring that they both match, e.g. in terms of market arrangements or the regulator models.

One of the peculiarities of the NSN interconnector project is the technology used, which will allow offshore generators to be connected to the grid in the future. This may enable TSOs to realise their visions of a meshed North Sea Grid, at a later stage.

Planning goes hand in hand with substantial environmental assessments. Surveys determine both the route and engineering decisions. Statnett and National Grid have done a detailed seabed survey, including desktop studies and fieldwork with four vessels. They surveyed 4,440 km since the dc cable needs a certain corridor width. Any costs in conducting these surveys are considered to be an investment as they reveal every detail of the environmental conditions; this helps the following: the Environmental Impact Assessment (EIA), the laying of the cable, as well as the engineering design of the cable manufacturers.

The NORD.LINK interconnector between Germany and Norway

- Connection between Germany and Norway
- To be operational in 2018
- 514 km
- Project promoters Statnett (50%), TenneT (25%) and Kreditanstalt für Wiederaufbau (German government-owned development bank)

There are several challenges concerning the technology and the laying of the new power line. In Norway, the cable needs to be positioned 400 meters under the water's surface while in Germany, the seabed is very flat. This requires ample discussions with suppliers on how to lay the cable and which technology to use.

Another fundamental issue is the supply chain's capacity, since there are not many manufacturers who can realise a project of this size.

More information:

- NSN: http://www.statnett.no/en/Interconnectors/Interconnector-Norway-UK/
- NORD.LINK: http://www.statnett.no/Interconnectors/Interconnector-Norway-Germany/

6. Stakeholder Engagement

Covers presentations by Irene Meldal and Julie Evensen, Statnett; Jens Müller, Nord Stream

For offshore grid projects, landing points often pose the biggest challenges. Similar to onshore projects, communities tend to oppose the project. Consequently, TSOs can learn a lot from onshore experiences when planning and realising offshore interconnectors.
Statnett faced strong public opposition during a grid development project in the Hardanger fjord region in 2010. As a result, the Statnett approach towards stakeholder involvement has been reshaped substantially. In order to gain support for the project, Statnett has decided to discuss its need in detail with respective stakeholders. Considerable time has been spent on looking into alternative solutions to grid expansion for their new project in Oslo, which started in 2011. Already, at such an early stage, 890 people participated in a public consultation in response to a report Statnett published, mainly dealing with the need. So far, feedback on this new approach has mainly been positive but its success can only be evaluated once the project has reached a later phase.

Concerning stakeholder engagement, offshore grid projects can learn from other infrastructure projects, such as gas pipelines. The Nord Stream pipeline is one of the biggest recent projects of such kind. At the beginning, the project had to deal with massive public opposition, often relating to geopolitical fears that the pipeline would rekindle the hegemony of Germany and Russia. Media showed a massive distrust towards the project and the operator consortium. One major challenge for the permitting procedure was that consents from five different countries had to be obtained, that all have different procedural requirements in place. Moreover, four additional neighbouring countries were involved based on the ESPOO convention.[5]

Nord Stream faced these challenges by implementing three main principles: a) meticulous compliance and permitting procedures; b) open dialogue and transparency; c) clear organisation and structure as well as precise project management.
Concerning the permitting procedures, Nord Stream tried to combine the different processes as much as possible. They brought together a consultation group made up of authority representatives from the nine countries. Together with this group, a common framework for the environmental assessments, the required documents, necessary reports etc. was developed.
Concerning stakeholder engagement, Nord Stream was successful in developing a very detailed analysis of all stakeholders and establishing a database with more than 8,000 contacts. Moreover, at the beginning, an international representative opinion poll helped reveal what people thought about the project. Throughout the project, a knowledge pool was established. All questions ever raised were addressed here and information was prepared in a way that suited different information needs. One of the first publications was a 10 Q&A booklet, which was translated into different languages and received very positive feedback. An issue management tool was used to compile, register, respond to and document all received requests and questions. With these tools, Nord Stream managed to respond to media requests

5 ESPOO convention: The Espoo (EIA) Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries (http://www.unece.org/env/eia/eia.html)

within one day, to all others within two weeks time.
One of the main success factors was Nord Stream's decision to survey several route alternatives at the very beginning. Otherwise, a later survey of additional routes would have meant a new permit application and subsequent delay of three to six months. Moreover, local needs and stakeholder concerns were addressed throughout the consultation process since different alternatives were still possible.
Environmental studies were not only a positive investment to keep Nord Stream better informed when planning and building the pipeline, but also helped build up credibility and trust within the public. It gave the Nord Stream consortium a positive reputation and thus, contributed to gaining public support.

More information:

- Nettplan Stor Oslo: http://storoslo.statnett.no/
- Nord Stream: http://www.nord-stream.com/

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