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Report

Towards a Meshed North Sea Grid

Policy challenges and potential solutions from a Norwegian perspective

WP 3 NSON: Political challenges

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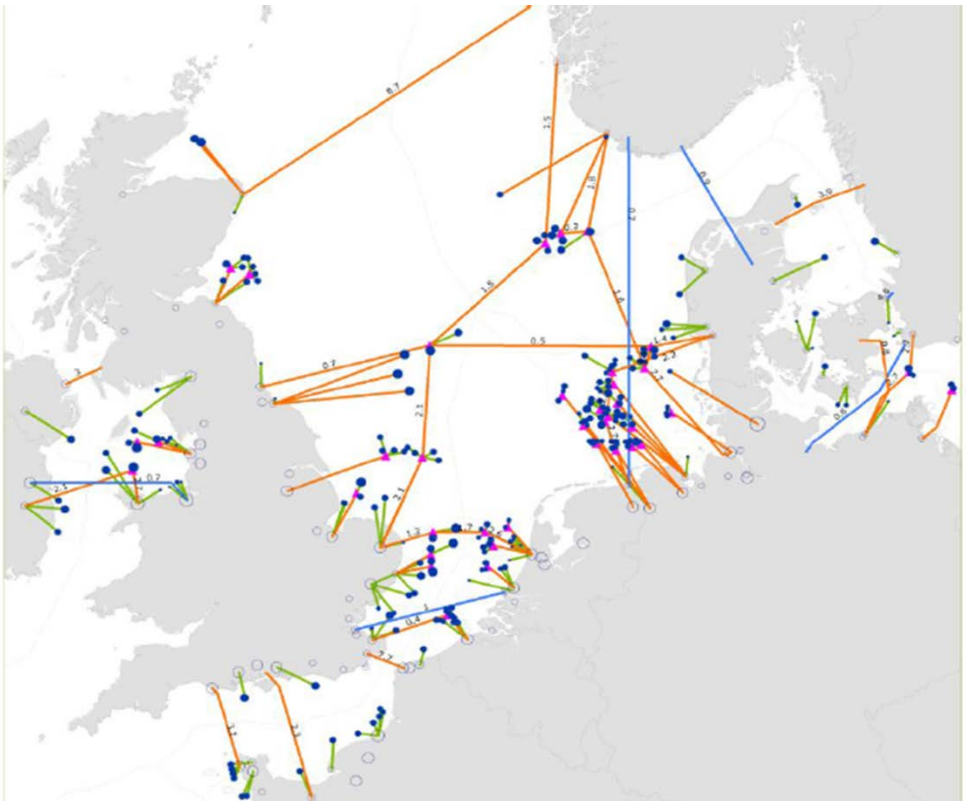

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Towards a meshed North Sea Grid. Policy challenges and potential solutions from a Norwegian perspective

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ABSTRACT
Political, regulatory and societal drivers and barriers for the realization of a meshed off-shore grid between North Sea countries is here assessed. The Norwegian context is the point of departure, but with clear references to relevant processes at the European level. At the EU level there is an overall drive towards establishing common infrastructure for electricity distribution across borders, but no concrete measures concerning a meshed grid. At the Norwegian level, there is currently no clear commitment towards a North Sea Grid development. Norwegian authorities' approach to off-shore infrastructure, and related processes in the EU and NSCOGI, has thus far been characterized by a wait-and-see attitude. The Norwegian approach is characterized by socio-economic perspectives, with limited attention towards possible long-term and cross-sectoral effects; such as innovation, and new industrial possibilities. Off-shore wind power development could constitute a 'proxy', and licensing procedures for such installations have been in place for some years, but without any economic incentives. Furthermore, interconnector projects between Norway, the UK and Germany could be considered as potential steppingstones towards a meshed grid. However, harmonization between different national licensing systems stands out as challenging, and there is limited experience of coordinating the licensing of cross-border projects. Closely related to this is the question of public acceptance, including the possible need for on-shore grid upgrading which can trigger local resistance.

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Glossary

ACER The Agency for the Cooperation of Energy Regulators, a European Union Agency

CEDREN Centre for Environmental Design of Renewable Energy (www.cedren.no)

EEA The European Economic Area

EIA Environmental Impact Assessment

ENTSO-E The European Network of Transmission Operators for Electricity,

IA programme - Impact assessment programme as part of the licensing procedures

IEA International Energy Agency

Meshed grid – an offshore electricity grid connecting production unit to radial connections between countries

MS – Member state (EU)

MoPE Ministry of Petroleum and Energy

NSCOGI The North Sea Countries' Offshore Grid Initiative

NSON North Sea Offshore and Storage Network

NVE – Norwegian Water Resources and Energy Directorate -The Norwegian Energy regulator

NUP – Nettutviklingsplan – The National Grid Development Plan developed by Statnett

PCI – Projects of Common (EU) interest

Radial connection – direct interconnector between two countries – normally through sea cables

RES Renewable Energy Sources

SET Plan The Strategic Energy Technology Plan

SIA Strategic Impact Assessment

TEN-E The trans-European Networks for Energy

TYNDP The 10 Years Network Development Plan prepared by ENTSO-E

1. Introduction

The background for this report is the project North Sea Offshore and Storage Network (NSON) project. The NSON project is aiming at providing an overview of the status for development efforts related to an off-shore, meshed grid in the North Sea beyond radial connections – within a multidisciplinary framework, building on technological, economic and political scientific insights.

NSON, funded by the Research Council of Norway (2013-15), is the Norwegian part of a collaboration with other research institutions in North Sea countries; the United Kingdom (University of Strathclyde), Technical University of Denmark, Germany (Fraunhofer), and the Netherlands (ECN). The project is a preliminary assessment and shall provide a foundation for a broader EU-oriented project in order to realize a meshed North Sea grid (SINTEF, 2013). The project is organized in four work packages, and building on the insights produced, the overall objective is to formulate a strategic research agenda for the realization of an offshore grid in the North Sea.

The present report is a deliverable from *Political challenges and possible solutions* (WP 3). The major aim of this WP is to provide an assessment of societal, political and regulatory drivers and barriers for the realization of a common offshore grid whereby different North Sea countries cooperate. The present report takes the Norwegian context as the major point of departure, but with clear references to relevant processes at the European level – not least within the framework of the EU energy policy and the efforts on cooperation between North Sea countries through NSCOGI (the North Sea Countries' Offshore Grid Initiative).

Much of the former research and documentation related to a North Sea offshore grid is characterized by a strong focus on technical and economic aspects and with less emphasis on the political and societal challenges and potentials. Whereas the former two aspects constitute concrete factors that are considered as part of investment decisions and implementation of infrastructure projects, the political and societal challenges often constitute background variables and contextual factors which can condition and frame the technological and economic options. Hence, the NSON project's work package on Political challenges and solutions, in addition to addressing specific political and regulatory solutions, can also be seen as providing a background and context for the other variables focused in the project. Hence, this report is aiming at representing a complementary perspective to the technical and economic approaches towards a meshed offshore grid in the North Sea.

In line with the major issues of this part of the project, two research questions are guiding the assessment of the present report:

- *What planning and permitting challenges and benefits will occur as a result of moving towards an offshore grid solution?*
- *Which types of regulations and policy areas are necessary or desirable to harmonize or combine, and which organizations/institutions could be responsible for such development?*

A major focus of the analysis is therefore the potential for harmonized policy measures and common institutional structures in order to develop and eventually administer a meshed off-shore North Sea grid, as a joint cooperation between the North Sea countries. The report will discuss this potential seen from a Norwegian perspective. Furthermore, given the NSON project's ambition of establishing an applied research activity supporting the actual realization of a North Sea grid, this report will also focus on issues and tasks that are considered to be essential parts of such a research agenda.

During the last four decades, several interconnectors have been established between Norway and other North Sea countries, including Denmark and the Netherlands. New interconnectors are now being projected between Norway and the UK and Germany, respectively (Ministry of Petroleum and Energy, 2014a). Hence, radial off-shore structures are already in place, as well as new one being projected. However, an official, politically decided plan for meshed grid structures, eventually building on the different nationally based and bilateral interconnectors, is still lacking. Nevertheless, several initiatives have been taken at the EU level, as well as between European countries during the last decade in order to assess the foundation and potential of a common grid structure in the North Sea. This report will therefore address how current relevant initiatives and processes could constitute a foundation for measures pertaining to developing a meshed off-shore grid in the North Sea.

An important analytical perspective guiding the approach of this report is the connection and dynamic between the relevant levels of decision-making; from the EU ('supra-national') level, all the way towards the local level within the concerned countries. This implies a focus on 'governance', which builds on the acknowledgement that the directionality and coordination of complex societies imply different approaches than traditional policy paradigms such as a classic top-down steering model. A strengthened focus on governance is therefore in accordance with the growing interaction between multiple societal groups (Pierre & Peters, 2005). This perspective is taken further with the concept of ‘multi-level governance’ which focuses on the dynamics between several levels of decision-making and intertwined policy areas (Bache & Flinders 2004; Hooghe & Marks 2003; Smith 2007). The concept encompasses both public and non-governmental strategies and actors (ibid.). For a meshed North Sea grid the relevant decisions and, premises for these decisions, are to be found both in Norway itself and within a European context. Taking a Norwegian perspective, this implies – more concretely – that we will analyze relevant European processes, then relevant Norwegian policy processes, before focusing on Norway's positioning towards the European processes.

A supplementary analytical reference is social acceptance of energy-related infrastructure. Stronger consciousness and knowledge regarding measures for public involvement can modify the conflict potential and the general resistance against the construction of energy infrastructure (Devine-Wright & Batel 2013). A growing research literature focuses on public involvement and how to design plans and projects in order to ascertain that local opinions are reflected, as a way of preventing conflicts during the construction and phase-in of energy infrastructure (see e.g. Batel & Devine-Wright 2014; Aas et al. 2014). 'Social acceptance' can also be understood in different ways. It has been emphasized that this concept must be nuanced and differentiated according to the part of the societal context it is actually meant to capture (Wüstenhagen et al. 2007; Wollsink 2012). One can distinguish between three levels or dimensions of social acceptance: (1) Socio-political acceptance; (2) Market acceptance; and (3) community acceptance (ibid.). Socio-political acceptance can be understood as the general acceptance for policy strategies and measures for a meshed grid at the European and national level. Community acceptance can be associated with the more concrete ramifications of an offshore infrastructure construction – not least related to landfall points and eventual reinforcements of on-shore grids, which will impact upon concrete landscapes in local settings. Market acceptance is, however, also an important aspect in relation to how different economic interests are affected, for example via eventual variations in energy prices ensuing the construction of offshore infrastructure.

The report opens in section 2 with an overview of crucial initiatives in a European context, which will be conducive for future, joint initiatives in the European energy system, and thereby influencing Norway's policies towards such initiatives in the North Sea region. In section 3 we discuss the political framework and policy measures in Norway in light of the EU policy framework. In section 4 we address the way Norway and Norwegian actors are positioned towards the relevant EU processes highlighted in section 2. Section 5 presents a summarizing assessment of potential drivers and barriers, whereas section 6 provides a discussion concerning the potential for harmonization of different mandates and policies. Section 7 concludes the report and provides recommendations for further policy development and research.

2. Policy processes and regulations at the EU level

The European Union has set quite ambitious, strategic goals for the development of common energy infrastructure in Europe, in order to strengthen the security of supply and the functioning of the internal energy market. This priority is also related to the EU strategy on climate change mitigation with its objectives of increasing the share of renewable energy sources, as well as the ambition of becoming a more innovative, competitive economy. Recently, these intertwined strategic goals have been accentuated by the EU Commission's launch of a strategy for a European Energy Union, in February 2015 (ENDS Europe Daily, 2015). The Commission's proposal is to be discussed by the European Parliament and the Member States during 2015, and the Member States' conclusions are expected to be drawn before the summer of 2015 (Norway's EU Delegation, 2015a, 2015b).

An important point of departure providing directions for the infrastructure-related policies at the EU level, is the EU climate-energy package – finally adopted in late 2008 (European Commission, 2008b). This strategy is considered as the major framework for the EU priority of reducing energy consumption and increasing the use of renewable energy (Skjærseth 2013). The targets of climate-energy package of 2008 were: 20 % less emissions of greenhouse gases, 20 % more renewable energy used, and 20 % more efficient energy usage – all targets by 2020, and compared to the level in 1990 (European Commission, 2008b). The target with the most substantial, direct influence on the problematic discussed in this report is the one set for increasing the share of renewable energy – by 20 % by 2020, but to be fulfilled by differentiated national commitments and targets for each Member State (European Union, 2009a). An important aspect of this is the ongoing increasing share of intermittent renewable energy production in Europe, which is considered to reinforce the need for both market-based and infrastructure-related flexibility – across borders (European Commission, 2015b).

Recently, the energy-climate strategic framework has been updated towards 2030, whereby the EU is set to achieve 40 % reduction of GHG emissions with respect to the 1990 level, which is to be reviewed according to the outcome of the international negotiations within the UNFCCC framework (European Commission, 2014a). The EU has also decided to achieve 27 % more renewable energy production and higher energy efficiency – respectively, as compared to the 1990 level (ENDS Europe Daily 2014; European Commission, 2014a). However, the 27 % target for renewable energy is not set to be legally binding for the Member States; it is a so-called 'indicative target'. That is, the various national measures initiated should jointly contribute the overall fulfilment of this target (ibid.).

Nevertheless, the concrete follow-up of the 2030 targets is not finally settled, and new measures can be proposed from the Commission. A stronger focus on a transition towards a renewable energy system in Europe represents, however, also a potentially interesting possibility for the Norwegian energy sector and related industries.

2.1. European strategies for infrastructure development

The establishment of a common European energy infrastructure has been on the agenda since the 1990's, but gained a momentum in 2008-09 with the adoption of the climate-energy package. In addition, the EU established a European Energy Programme for Recovery (EEPR), on the background of the international financial crisis (European Commission 2015b: 6). The EEPR included the identification of interconnection projects across the EU, and the mobilization of financial resources (ibid.). This program has contributed to realizing several interconnection projects between Member States, by spending approx. 650 million EUR on such projects since 2009 (ibid.). Infrastructure development can also be seen in relation to cross-border exchange of electricity, which is a priority target for the EU: 10 percent of all installed electricity production

capacity is expected to be part of such exchanges by 2020. This target was decided by the European Council in October 2014 (European Commission, 2015a).

In the *second strategic energy review*, published by the EU Commission in 2008 (COM(2008) 781 final) the creation of a North Sea offshore grid is promoted as one of six priorities in the EU's Energy Security and Solidarity Action Plan, as well as being considered as one of the building blocks for a future European supergrid:

> *"In line with the work of the European coordinator and the Communication on Offshore Wind tabled by the Commission together with this Strategic Energy Review, a Blueprint for a North Sea offshore grid should be developed to interconnect national electricity grids in North-West Europe together and plug-in the numerous planned offshore wind projects. It should become, together with the Mediterranean Ring and the Baltic Interconnection project, one of the building blocks of a future European supergrid. The Blueprint should identify the steps and timetable that need to be taken and any specific actions that need to be adopted. It should be developed by the Member States and regional actors involved and facilitated where necessary by action at Community level."* (European Commission 2008a: 5-6).

Shortly after this, the 'Energy Infrastructure - Blueprint for an integrated European Energy Network' was published in 2010 (European Commission, 2010b). In this Energy Infrastructure Blueprint (COM(2010) 677 final) the creation of a North Sea Grid is identified as one of the priority corridors for achieving an electricity grid fit for Europe's 2020 goals (ibid.).

In 2013, the Commission put forward a 'Long term infrastructure vision for Europe and beyond' the Commission put emphasis on the EU's overall priority of (European Commission 2013a). In this document a meshed North Sea grid stands out as a strategic goal (ibid: 6):

> *"Further expanding a truly meshed off-shore grid in the Northern Seas. While the current list of projects of common interest does include about 20 interconnectors and relevant internal reinforcements, there is only one grid-ready off-shore hub involving anticipatory investments as a forerunner for the future integrated off-shore grid. The technology challenges are being pursued by major manufacturers in this area. The design and coordinated development and management of the future meshed grid and storage solutions, as well as appropriate regulatory and financing solutions remain to be developed. "*

It is important to note that developing a meshed offshore grid, as opposed to radial connections (including interconnectors between countries), have the benefit of reducing the need for onshore connection points (Welle et. al 2011 and Veum et. al 2011). This can prove to be important in the future seen in light of the extensive plans for grid development as well as the public opposition towards onshore landing points. The EU Commission points to this in its Commission Staff document from 2011 (SEC, 2011), emphasizing that there is usually less opposition to offshore projects since citizens are not directly affected by installations (ibid.) At the same time, the Commission underlines that "*strong resistance of citizens living in the vicinity of landing points can prevent the timely connection of wind farms*" (ibid: 12).

In sum, the Commission has provided a strategic framework for the development of common, border-crossing European energy infrastructure within which a North Sea grid is identified as an important area. However, the more concrete follow-up of these strategic goals must also be seen in connection with the process of establishing a common European market structure for energy.

2.1.1. The development of an internal energy market and the reinforcement of EU coordination pertaining to infrastructure

The objective of an internal energy market was addressed for the first time in 1988 (Eikeland, 2012). Deregulation and the establishment of a common market constitutes one of two main policy areas (in addition to the environment) where the EU Commission can propose common legislation with effect for energy, and where qualified majorities apply (supra-national decision-making). The linkage with the environmental aspects of energy is, however, seldom made explicit (Ruud et al., 2011b). The process before the 'first generation' of deregulation directives (Electricity and Natural gas, in 1996 and 1998, respectively) was long and cumbersome (ibid.). These directives included, moreover, no strong enforcement mechanisms, and, as it turned out, did not lead to a functioning internal energy market. Some incremental changes were undertaken through amendments of the Electricity and Gas directives in 2003, through 'the second liberalization package' (Eikeland, 2012).

More significant changes did appear, however, in 2007 with the '3rd internal energy policy package' (ibid.; European Commission, 2007a). The revised liberalization measures were prepared within the wider framework of a more consolidated and integrated policy approach to climate and energy (ibid.). A recurrent issue in the EU debates on further deregulation and market development has been how to ensure an *ownership unbundling* between commercial interests related to energy production and distribution. The EU focus on unbundling has been based on indices that vertically integrated companies misuse their ownership of networks to give own supply business better terms of access than their competitors (Eikeland, 2012). The proposal for a third package included new and stricter rules for unbundling and better functioning markets for electricity and natural gas. The proposal also emphasized a stronger coordination of national market regulation, and grid/transmission regulation (in parallel to increased focus on security of supply). Finally – and not least, the package included stronger mechanisms for border exchanges (again linked to concerns of security of supply) (Ruud et al., 2011b).

As part of the third energy market package, the European Network of Transmission Operators for Electricity, ENTSO-E, was established in 2009. The ENTSO-E is to work on common European strategies for grid development – not least through the 10 Years Network Development Plan (TYNDP). The ENTSO-E is also an important partner on the work on network codes – which is now part of the comitology procedures (see section 2.3). The ENTSO-E was established in tandem with a similar cooperation organization for the national TSO's for natural gas; an *ENTSO-G*. The ENTSO-E and ENTSO-G are provided with parallel mandates and functions vis-à-vis common infrastructure development and coordination of national TSO activities and plans.

In the aftermath of the establishment of two ENTSO-units, the Agency for the Cooperation of Energy Regulators (ACER), a European Union Agency, was also created as part of the *Third Energy Market Package,* in order to further progress on the completion of the internal energy market both for electricity and for natural gas. ACER was officially launched in March 2011 and is seated in Ljubljana, Slovenia. ACER's missions and tasks are defined by the Directives and Regulations of the Third Energy Package, especially Regulation (EC) 713/2009 establishing the Agency (European Union, 2009b). The overall mission of ACER is to complement and coordinate the work of the national energy regulators at EU level, and work towards the completion of the single EU energy market for electricity and natural gas. ACER plays a central role in the development of EU-wide network and market rules with a view to enhance competition. It coordinates regional and cross-regional initiatives which favour market integration. It monitors the work of European networks of transmission system operators (ENTSOs) and notably their EU-wide network development plans. Finally, it monitors the functioning of gas and electricity markets in general, and of wholesale energy trading in particular.

In total, given the current mandates, the ENTSO-E is more 'hands-on' concerning the relevant project development and strategic framework pertaining to a North Sea Grid, as compared to ACER. When comparing different statements in Communications and other strategic documents, the Commission is generally more positive and explicit, as compared to the positions forwarded from the national TSO's and ENTSO-E, when it comes to creating and facilitating a meshed grid in the North Sea. The Commission is highlighting the economic benefits of such a grid (European Commission, 2010b: 26):

> *"Due to different national strategies for off-shore development (tendering, private, national TSO) and project-driven cost analysis (minimize costs for each project individually) the grid development usually ends up with point-to- point and suboptimal solutions....*
> *Clustering of wind farms in hubs could become an attractive solution compared to individual radial connections, when distance from the shore increases and installations are concentrated in the same area. …"* and furthermore: *" In order to realise such cost reductions, a more coordinated, planned and geographically more concentrated offshore wind development with cross-border coordination is absolutely necessary."*

The Commission calls on ENTSO-E to develop and facilitate necessary coordination between the Member States to develop such a grid (ibid.). However, as can be seen in the ENTSO-E's most recent proposal for a 10 Year Network Development Plan (TYNDP), the development of a cross-border, large-scale and meshed grid is still seen as immature and thus not included in this plan (ENTSO-E, 2014a).

The concrete regulation of the electricity flows between the Member States is anchored within the Regulation on cross-border exchanges of electricity (Regulation no. 714/2009) (European Union, 2009b). This entails a work on specifying network codes, which can be understood as the main requirements for how energy flows are to be managed in cross-border infrastructure. The organization of the follow-up of the Regulation is based on a comitology procedure whereby an expert group with national representatives are to agree upon further technical specifications of the exchanges. This applies to both landbased and off-shore energy infrastructure. Technical specifications for interconnector flows are the main focus of this works, but these have clear economic ramifications and will impact upon the functioning of the market. Other political considerations are not an explicit part of this work, and there is no explicit focus on public engagement. However, draft network codes and related documents are to be consulted by stakeholders (ibid.).

The expert groups for network codes are facilitated by ENTSO-E, and consist of representatives of national authorities and TSO's. They receive inputs from the Commission and ACER, and draft proposals for codes which are then presented by ENTSO-E, before eventually being adopted by the EU Commission. These standards will later be adopted by the Commission, if acceptable for the EU as a whole – and then constitute the EU legislation in this field. This also pertains to the interconnectors and sea cables. This means that the expert groups define technical standards that will regulate the actual amount of exchange, and thereby set an important agenda for the functioning of future interconnectors, and indirectly the market framework for future meshed grids.

In sum, the support of the EU Member States is crucial in order to succeed with the visions and plans for more common European energy infrastructure, and increased cross-border exchanges. This requires a willingness to commit resources and contributing to a coordinated effort. Hence, in this regard it is of interest to look at one of the major initiatives taken by the Member States themselves, in the form of the North Sea Countries' Off-shore Grid Initiative (NSOCOGI).

2.2. The North Sea Countries' Grid Initiative (NSCOGI)

In light of the EU's strategic orientation, as reflected in the above-mentioned documents, a need for stronger regional cooperation and coordination emerged. On this background, the North Seas Countries' Grid Initiative (NSCOGI) was established in 2009 based on a Memorandum of Understanding (MoU). The political declaration launching the NSCOGI was signed by Belgium, Denmark, France, Germany, Ireland, Luxemburg, the Netherlands, Sweden and the United Kingdom on December 7, 2009. Norway joined on February 2, 2010.

Representatives from the governments, ENTSO-E (European Network of Transmission System Operators), ACER (the Agency for the Cooperation of Energy Regulators), the national regulators, the Commission and experts have since participated in three working groups (WGs). These WGs are each chaired by two governments. Working Group 1 on Grid Configuration & Integration, has worked on identifying future technical grid configurations for an offshore grid infrastructure as well as some assessment of cost-benefits considerations (NSCOGI 2011a). Working Group 2 on Market & Regulatory Issues, has concentrated on the regulatory and market challenges involved in the potential development of an offshore grid in the North Sea (NSCOGI 2011b). Working Group 3 on Planning & Authorization Procedures is of a particular relevance for the present report. This work group is assigned to examine planning and authorization procedures in each signatory country, and to point out possible barriers and risks in national regimes. In addition to this, it has a mandate to address concerns related to developing efficient and streamlined procedures for coordinated planning and permitting (NSCOGI 2011c). Thus, the objectives of WG3 is very much in line with the ambitions of the EU energy infrastructure Blueprint of 2010.

Based on the work of the WG 3, NSCOGI published in 2012 procedural guidelines to support the national competent bodies with recommendations in planning and authorization procedures – both in a national and international context (NSCOGI 2012). The guidelines apply to all offshore electricity infrastructure projects in the North Sea, Irish Sea and English Channel. The objective is to strengthen the national authorities' ability to deal with administratively and technically complex projects of laying, building, and operating offshore electricity infrastructure projects in the North Sea. The guidelines are non-binding, and are coordinated with the guidelines following from the EU Commission's work on streamlining administrative approaches to prioritized cross-border infrastructure projects. The EU approach to these projects will be further explained in the next section.

2.3. Towards EU Projects of common interest (PCI) on infrastructure

In 1996, as part of the EU efforts of completing the single market, the trans-European Networks for Energy (TEN-E) were developed (European Commission, 2010a). The purpose was to provide a more political impulse to energy infrastructure investment. The focus was on the feasibility stage of gas and electricity network projects which contribute to the working of the single market, particularly cross-border initiatives (ibid.). Later revisions of TEN-E have incorporated criteria for sustainability and security of supply (ibid.).

The TEN-E framework has thus been developed since the 1990's, through successive TEN-E Guidelines and a corresponding Financial Regulation. In its 2010 review of the TEN-E framework, the Commission points to the developments occurred between the 1990's until 2010; not least the adoption of the climate-energy package and the 20-20-20 targets, the phase-in of an internal energy market and shifting geopolitical trends with consequences for the energy market and Europe's security of supply (ibid.).

The TEN-E Guidelines have formed the basis for the approach towards Projects of European interest, and later developed into Projects of Common Interest (PCI). Projects of European Interest are projects to have a cross-border nature or significant impact on trans-border capacity. It is, however, important to note that PCI projects encompass not only renewable energy and electricity. Of the 34 projects granted with EU funding in 2014, 16 were related to gas and 18 on electricity (EU Commission, 2014b). Hence, it is important to be aware that the EU approach to infrastructure and energy provision is not only bound to renewable electricity.

The Guidelines were first adopted in 2006, in order to ensure a strengthened coordination and cooperation between Member States, and between the Member States and the EU institutions (European Commission, 2010a). A major challenge identified has been the lack of coordinated authorization procedures for the localization of the concerned networks, related to the necessary licensing in different countries. Hence, there has been a particular need for an improved coordination and more effective processes for licensing of the cross-border projects. Hence, the Commission started to focus on measures for streamlining planning and authorization procedures for cross-border projects (ibid: 8).

In light of this, the EU started its work on amending the guidelines for cross-border energy infrastructure projects. In late 2012 the EU institutions found a compromise regarding a common agreement for new guidelines which were to identify and speeding up such projects (ENDS Europe Daily, 2012). A main element of this agreement was to define a time limit for the planning and licensing process under the auspices of national authorities. The compromise resulted in a time limit of 3,5 years (ibid.). This time limit as well as other guidelines concerning cross-border projects, not least the Projects of Common Interest – were then codified into an amended regulation called 'Regulation on guidelines for trans-European energy infrastructure (Regulation (EU) No. 347/2013, of 17 April 2013) (European Union, 2013).

The Regulation states that electricity and gas projects, to be eligible for the lists of Projects of Common Interest, should be part of the latest available TYNDP (Regulation 347/2013, preamble). The Regulation furthermore stipulates that regional groups should propose and review potential PCI's leading to the establishment of regional list of PCI's (ibid.). These groups are to be composed of national TSO's, energy regulators, project promoters and stakeholders (ibid.). ENTSO-E has, furthermore, an advisory role and comments upon the proposed PCI projects.

Main components of the Regulation concerning the obligations of the Member States' authorities are (ibid.):

- Give "priority status" of the highest national significance possible for PCIs in the respective country. This implies giving authorisation with overriding public interest.
- Establish a competent authority integrating or coordinating all permit granting processes ('one stop shop'). Creation of a work group including all the individual national authorities involved in the permitting process.
- Harmonisation of participation aspects and environmental assessments should be ensured through application of the Aarhus Convention and Espoo Convention. Although MS are requested to coordinate their assessments where possible.
- Creation of a clear time-limit not compromising the protection of the environment and public participation.
- Creation of a stable and predictable framework for investments (with appropriate long-term incentives)

The TEN-E Regulation only provides the main targets and framework for a more coordinated handling of PCI projects. As far as more concrete procedures are concerned, the EU Commission has issued a non-binding guidance document (European Commission, 2013b). This document is intended to support member states in defining adequate legislative and non-legislative measures to streamline the environmental

assessment procedures and to ensure the coherent application of EIA procedures required under the Union law for PCI (ibid.). Furthermore, the Member States should by May 2014 publish *Manuals of Permit Granting Process Procedures* applicable to PCIs, as a coordinated effort across different, concerned national authorities. It is unclear to what extent and how the EU Member States have followed this up[1].

Finally, based on the regional groups' proposals, the EU Commission is to select and nominate the PCIs to be promoted within the PCI framework, and which are then provided priority funding from the TEN-E funding scheme, as well as to be treated as efficiently as possible during the planning and authorization phases (ibid.). The list of PCI's will be reviewed and renewed every second year (ibid.).

The 2013 regulation is often referred to as the "new TEN-E Regulation", seeking to facilitate the permitting of projects which are of significant European interest. The regulation is a one of the building blocks for achieving a new energy infrastructure policy to optimize network development at European level as called for in "The Blueprint for an integrated European energy network".

One of the main focus areas concerning grid development in Europe has been the challenge of delayed and lengthy permit granting procedures due to legal issues or public acceptance **(**ENTSOE-E, 2014 b). According to the Commission fragmentation in the national permitting processes, as well as insufficient coordination between national authorities in cross border projects, can entail very long lead times (European Commission, 2010a). The Regulation EC 347/2013 facilitating the development of PCI projects has tried to partly solve these problems through time-restrictions and "one-stop-shops".

2.4. Other relevant EU policies and regulations

In addition to what is being planned and developed as part of a common infrastructure strategy for Europe, as formulated in the above-mentioned documents from the EU Commission, and through the work of the ENTSO-E, a number of other EU regulations and policy support measures are also of importance for a future North Sea Grid.

Promotion of renewable energy
The follow-up of the Directive on the promotion of renewable energy, adopted in 2009 as part of the Climate-energy package, where each EU Member State has obligations in order to fulfil national targets, also has significance with respect to a North Sea Grid (European Union, 2009a). Under the Directive there is no common EU approach as to the support of renewable energy production: Each Member State is to set up and manage its own support scheme. However, the EU Commission encourages the Member States to cooperate on establishing common support schemes and the EU RES Directive provides guidelines as to how such support can be accounted for when crediting towards different national targets.

Thus far, only Norway and Sweden have established a common support scheme, in the form of a common certificate system whereby eligible, renewable electricity production obtains a certificate and related economic support. However, the Norwegian-Swedish certificate system does not provide economic support at a level necessary for the development of a meshed off-shore grid. Hence, innovation and development of new technologies have not been the main focus of this system. Besides, the system has been criticized for being skewed in favor of Swedish wind power plants as compared to Norwegian ones, since the Swedish tax system has provided additional alleviations as compared to the Norwegian taxes. However, the Norwegian government has aimed at rectifying this difference by promising measures which will adjust the different ways of accounting depreciation of the concerned renewable energy installations. Recently, an agreement

[1] No oversight or status is available at the EU Commission website.

was signed with the Swedish Government aiming at reducing the fiscal differences between the two national regulations (MoPE, 2015). Still, however, these regulatory changes do not imply any increases in the support level, and hence, no additional impetus for off-shore grid development or off-shore wind power in Norway.

Technology development

In addition to the framework provided by the climate-energy strategy, the EU has for a number of years also been developing a technology policy for energy which is seen as a response to the energy and innovation challenges Europe is facing in the global competition – in addition to the other energy concerns (market, security of supply and climate-change).

The Strategic Energy Technology Plan (SET Plan) is considered to be the technology pillar of the EU's energy and climate policy (European Commission, 2007b). The EU's Strategic Energy Technology (SET) Plan was established in 2008 as the technology push framework of the EU's energy and climate policies. It is based on a three pillar implementation structure: a Steering Group, European Industrial Initiatives (EIIs) and the European Energy Research Alliance (EERA) and is supported by an information system (SETIS). The Steering Group on Strategic Energy Technologies has enabled a structured dialogue with Member States resulting in increased alignment of national energy research and innovation policies and has promoted a move towards joint actions to deliver common objectives with greater speed and effectiveness (European Commission, 2013c).

The SET Plan prioritized those technologies most relevant to the energy and climate policy objectives for 2020: wind, solar, electricity networks, Carbon Capture and Storage, bioenergy, nuclear, fuel cells and hydrogen, energy efficiency. The European Industrial Initiatives (EIIs) set-up for all these sectors have defined priority research and innovation areas through Technology Roadmaps including a dedicated roadmap on materials and focused their action on large projects of European value. Through the EERA national research capacities are pooled to develop new solutions that will impact beyond 2020. Off-shore wind power is covered by the EII on wind power, whereas off-shore grid can potentially be covered by the European Electricity Grid Initiative (EEGI).

Maritime spatial planning

The European Commission has identified the lack of appropriate upfront planning and coordination procedures particularly to have severe consequences for cross-border infrastructure projects. S*uch procedures were said to be "crucial for offshore infrastructure projects, which often span large areas such as entire regional seas*. " (SEC, 2011: 11). On this background, the Commission carried out an impact assessment for maritime spatial planning. Several benefits, as a result of maritime spatial planning, are identified: such as reduction of conflicts, investment willingness, increased coordination between administrations in each country, increased cross-border cooperation and protection of the environment (ibid.). In July 2014, the European Parliament and the Council adopted a directive establishing a common framework for maritime spatial planning in Europe (European Union, 2014). Each EU country will be free to plan its own maritime activities, however, it is underlined that local, regional and national planning in shared seas would be made more compatible through a set of minimum common requirements.

2.5. Towards a European Energy Union

As mentioned above, the EU Commission recently forwarded proposals concerning the establishment of an Energy Union (EU Commission, 2015a). The proposal is in the form of a brief strategy document, and contains proposals for main strategic goals and priority areas, but less concrete policy proposals (ibid.). An important aspect is the ambition of providing a stronger and more centralized coordination of the EU's

energy policy, across the different national domains. That is, to reinforce the EU governance on areas where the EU institutions already have a certain legal foundation for governance, such as consumption, network codes, financial arrangements and state aid rules, as well as the role of the EU energy regulator, ACER (ibid.).

The most relevant parts of the Commission's proposal, given an NSON context, are related to a reinforced ambition of increasing the share of common, cross-border infrastructure. The overall goal, reported on by the Commission, is to achieve 10 % minimum interconnection of installed electricity production capacity of the Member States by 2020 - a goal that will be achieved for most of the Member States if the foreseen PCIs are implemented. In its Energy Union proposal the Commission echoes a former proposal of increasing this ambition to 15 % by 2030 (EU Commission 2015a: 8). The Commission further stipulates an increased focus on investments and funding of the larger degree of interconnected infrastructure (ibid.). A strong priority will continue to be the realization of the PCI's (ibid.).

Connected to main strategy document for Energy Union, there is also a specific strategy for interconnectors (EU Commission 2015b). The Commission here maintains that in order to succeed with an internal energy market, increased interconnection between the Member States must be a political priority for the EU in the years to come (ibid.). A major instrument for speeding up the construction and phase-in of cross-border interconnectors will be to employ the Project of Common Interest framework. The Commission also refers to the financial instrument for the funding of PCI's – the so-called Connecting Europe Facility (CEF), as well as the EU Structural and Investment Funds, in addition to the recently established European Fund for Strategic Investment (EFSI) (ibid.). An important objective set forth by the Commission is to facilitate the matching of funding, investors and projects (ibid.).

Furthermore, it is worth noting that the Commission aims at establishing a new Energy Infrastructure Forum in 2015, in order to discuss and find solutions to issues that are common to all regions across Europe, and where relevant, neighboring countries (ibid.). Although this strategy does not mention specifically anything off-shore meshed grids, the EU's framework conditions for interconnectors as reflected in this recent communication, will be an important reference for the further development of this framework as well as the related EU support for specific interconnector projects. The EU scheme related to projects of common interest (PCI) already includes sea cabled interconnectors, as highlighted above, including the scheduled interconnector between Norway and the UK.

3. Policy processes and regulations at the national level in Norway

3.1. National policies and policy signals

The launch of the Climate and Energy package in Europe with its ambitious objectives from 2008/09 also coincide with positive national policy signals in Norway on the promotion of renewable national energy resources, including offshore wind power which was seen as "a potential to become the new oil" (quoting Åslaug Haga 2008; see Heidenreich, 2015). This was in the aftermath of the first political agreement between the political parties in the Parliament on the future Norwegian climate policy (Climate agreement, 2008). Included in this agreement there was a decision on establishing a demonstration program for the development of off-shore energy technologies to be managed by the renewable energy agency, Enova (ibid.). However, in the most recent climate policy agreement, approved by the parliamentary majority in 2012, neither off-shore wind or other off-shore energy technologies are mentioned explicitly (Stortinget, 2012).

As a response to the positive political signal on offshore wind from 2008, Statnett began to explore the potential for a meshed grid (Statnett, interview). However, the issue of meshed grid was handled in

connection with offshore wind development and not as a part of the national grid development per se (ibid.). A 2012 white paper on grid policy (White Paper 14 (2011-2012) focuses mainly on the permitting process related to the national (on-shore) transmission grid, whereas it barely touches upon the issue of creating a large scale North Sea Offshore Grid (MoPE 2012a). The white paper only mentions the offshore grid as one of the European Commission's four priority corridors, and that Norway is likely to be affected by the processes going on in EU concerning the development of an integrated European grid.

A report published in 2012 by an expert group mandated by the Government evaluated the general energy- and power balance for Norway towards 2030 and 2050 (NOU 2012a). This work included the issues of a North Sea grid and offshore wind power, albeit without providing any specific recommendations in this regard. The government responded to the commission's report later in 2012, but apart from seeing increased transmission capacity overseas as important, the issue of creating a large scale meshed grid in the North Sea and their work in NSCOGI, is not elaborated further or commented upon (Ministry of Petroleum and Energy, 2012b: ch. 9). However, related to energy production and, more specifically off shore wind energy, the development of an eventual meshed grid in the North Sea is commented on – indicating a step-by-step and wait-and-see attitude. The development of an *eventual* meshed grid is seen as a long-term future option that will happen gradually (ibid.). The Government maintains that if one continues to develop off-shore wind parks, radial networks can be connected together and developed into a meshed transmission grid in the longer term (ibid.).

This wait-and-see attitude can partly be explained by the stage of technology development in off shore wind energy as seen both by the government and the energy review (NOU 2012: 9): *"Offshore wind power represents a new priority area with relatively an immature market and technology. Offshore wind power constructions and other types of offshore wind power production represent a future possibility for wealth creation if one develops competitive technologies in the course of time"* (ibid.). Thus, even though the government showed a rather reserved attitude concerning the development of a meshed grid in the North Sea, off-shore wind energy production and the development of a fitting grid were seen as having a big potential in the future.

However, under the Minister of petroleum and energy Ola Borten Moe in 2011, the more positive position formerly taken to off-shore wind power shifted: *'It makes no sense to me to use lots of tax billions to build a wind farm offshore only because it has to be offshore'* (quoted in Heidendrich, 2015).

Nevertheless, at the same time, a positive attitude towards the technology remained, as indicated in the proposal for the state budget for 2013 where the government underlined the importance of supporting R&D to develop off-shore wind constructions to bring the costs down (MoPE, 2012b). Statnett sees this change of position towards a 'more moderate enthusiasm for renewable offshore infrastructure' partly in connection with the socio-economic assessments conducted after the 2012 energy expert commission (Statnett, interview). These assessments concluded that off-shore solutions were not socio-economically profitable (ibid.). Furthermore, the national energy regulator NVE does not consider a North Sea Grid as a socio-economically profitable alternative today (NVE, interview).

The Ministry of Petroleum and Energy (MoPE), on their side, more clearly states that the North Sea Grid is not a policy objective at the moment, whereas the current focus is on the development of interconnectors which are considered to be more profitable (MoPE, interview). Consequently, given the Ministry's position, interconnectors will also be the main focus of Statnett.

In the most recent MoPE state budget document, offshore wind power is still mentioned, but only by referring to the ongoing process of approving a strategic environmental assessment resulting from an NVE-coordinated process (MoPE, 2014b). There are no concrete references to a North Sea Grid, nor the possibility

of a meshed grid related to offshore wind power. The focus concerning power exchange is primarily related to interconnectors, and more specifically the two interconnectors just having been approved (Norway-UK- and Germany, respectively[2]).

Another approach to a meshed North Sea grid can be observed in relation to the issue of providing the petroleum production installations in the North Sea with land-based, renewable (hydropowered) electricity. This could be seen as more of a step-by-step development towards a meshed grid. The mandatory assessment of possibilities of using electricity onshore to operate new offshore petroleum activity has been followed up by the newly approved petroleum project Johan Sverdrup (MoPE, 2014b). This requirement is a result of the climate policy focus in Norway, where one has been increasingly aware of the need for reductions in the emissions of greenhouse gases related to the country's off-shore petroleum activities. In the most recent climate policy agreement, approved by the Parliament in 2012, the electrification of the above-mentioned petroleum field was agreed upon as a climate policy measure (Stortinget, 2012).

Interestingly, at the same time, in its political 'platform document' (political strategy for the in-coming government), the acting Norwegian government states that: "Norway should be a front-runner nation within environmental energy consumption and production both within hydro-, wind- and bioenergy and other renewable energy alternatives" Furthermore that "the energy transition in Europe represents great possibilities for value creation in Norway based on national energy resources" (Sundvollen, 2013).

Moreover, the government has an ongoing process of developing a new white paper on energy policies where energy supply, climate change and industry development are supposed to be seen within a more coherent energy policy framework. This white paper has been foreseen in the government's statement of accession, and was long expected to be put forward in 2015, but is now postponed to 2016.

Although one can point to a current lack of political and overall strategic priority of the development of a North Sea Grid in Norway, there are ongoing processes related to research and innovation that can be of interest. Offshore renewable infrastructure is likely to have a more paramount role in the policies for technology development which is one of the main priorities of the conservative government (Sundvollen, 2013). Furthermore, the focus on off-shore technology development is quite apparent in the national R&D strategy for the energy sector, Energi 21. Offshore wind power is here one of six prioritized research priorities (Energi 21,2014).

Finally, the current Norwegian government has stated in their declaration (Sundvollen, 2013) that they want to change the Energy Law so that other actors than Statnett will be able to own and operate interconnectors. However, no concrete signals in this direction have been provided by the Government thus far.

3.1.1. Statnett and the mandate for grid development

The Norwegian grid development is managed by the national TSO Statnett. Statnett is responsible for the formulation and publication of an annual, national Grid Development Plan ('Nettutviklingsplanen', NUP). The Plan is developed by Statnett, with inputs from the Government, and also builds on regional grid development plans – formulated by the regional grid operators. The NUP Plan is also considered to be an important communication instrument for Statnett (Sataøen et al., 2015, forthcoming). The NUP Plan is not part of any decision-making process at the governmental level or within the Parliament – in contrast to, for example, Sweden where the Parliament is to approve the national TSO's investment plan (ibid.).

[2] For further information, see: http://www.statnett.no/en/Projects/interconnctors/

In the most recent NUP Plan, Statnett points to the projected interconnectors towards Denmark, Germany and the UK, and states that these constitute the main focus towards a Nordic and European energy system development (Statnett 2013: 103). The interconnectors are considered to be important contributions from Norway to Europe's shift towards a de-carbonized energy system (ibid.).

When it comes to formal features of the licensing process for national grid in Norway, the system has been characterized as lacking a clear guidance from the political level (Sataøen et al., 2015, forthcoming). In Norway the grid companies themselves are the main drivers of needs assessment, through regional and nationwide power system reports – like Statnett's NUP. Local or regional political authorities have no prominent role in the Norwegian system and the central political level appears only in the appeals process. Contrasted with the British and Swedish system, the Norwegian system is very much expert-oriented and dominated by power system considerations (ibid.).

3.2. Incentives and plans for off-shore wind power

Since there has been little policy development in Norway related to an off-shore grid per se, policy strategies developed for offshore wind power can be seen as a possible driver within a Norwegian context. We will in this section, therefore, highlight some main features of this strategy and its current status.

Enova, Norway's public agency for the promotion of renewable energy, energy efficiency and new energy technologies, was until 2011 the main public supporter for both on- and off shore wind power – in the form of investment support. This was changed with the implementation of the technology neutral joint certificate market with Sweden, established in 2012. Due to the immature development of off shore wind power constructions, it is still possible to apply Enova for investment support for developing full scale demonstration wind power projects. This technology area lies within Enova's priorities for the support of full scale demonstration of new energy and climate friendly technology (the New Technology Program). The primary objective of this policy instrument is to test new technology in real life conditions that is normally associated with high risks and costs (Enova 2015).

The Energy Law regulates energy production in Norway *on-shore*, but does not apply to offshore wind power (Lovdata, 2015a). A new *Maritime Energy law* was therefore planned, and finally approved in 2010, in order to regulate such activity (Lovdata, 2015b).

As part of its white paper on Norwegian climate policy from 2007, the former governmental parties agreed to develop a national strategy for wind power production and other maritime renewable energy sources (Ministry of the Environment, 2007). In addition to a specific Maritime Energy law, the MoPe established a Directorate group led by NVE with the mandate to suggest feasible maritime areas for off-shore wind power development (NVE, 2010). The MoPe agreed on the suggestions made by the NVE-led report which included 15 specific areas or zones (MoPE, 2010a). Soon after this, the NVE started the work of mapping user-interests in these 15 agreed-upon areas. The NVE has also conducted a strategic impact assessment (SIA) regarding commercial, societal and environmental interest in and around the areas for examination. The 15 areas considered in the SIA operation are both areas considered for bottom fixed installations and floating turbines. The NVE report on this SIA was published in December 2012 (NVE, 2012a). The assessment provides a knowledge base for decision-makers on which areas to open up for license applications for the development of off-shore wind power (ibid.).

The 2010 NVE-coordinated report also pointed to the issue of grid connection as an important area to develop in parallel with an eventual phase-in of off-shore wind power (NVE, 2010). In this regard, the report

refers to research on connecting wind farms directly to interconnectors and the development of a 'super grid' (ibid: ch 3.5.2 and 3.5.3). Costs and technology challenges are underlined as main barriers to promote a North Sea Grid and, the report maintains that a more likely outcome is the gradual development by interconnectors (ibid.).

As the latest step in the processes pertaining to off-shore wind power development in Norway, the NVE's SIA report of 2013 has been subject to an open hearing. However, the MoPe has not yet concluded on the results of this process, and not yet decided which areas to open up for license applications (NVE, 2013). And again, meshed grid is not assessed or explicitly mentioned.

3.3. Relevant permit and authorization processes

Given the situation with little attention towards off-shore meshed grids, but with a legal framework in place which is to regulate all off-shore energy infrastructure, we will in this section outline the main features of the licensing processes applying to such infrastructure. We will, in addition, highlight some main aspects of on-shore transmission line licensing, since such projects may be seen in relation to each other. This presentation will highlight the Norwegian procedures which eventually are to be coordinated, or even harmonized with similar procedures in other European countries or at an EU level, in order to realize a meshed grid in practice.

The regulations for an offshore grid will be different than the ones pertaining to on-shore grid, since energy installations off the coast are to be regulated by the Maritime Energy Law from 2010 (MoPE, 2010; Lovdata, 2015). The same procedures will apply for off-shore wind power (ibid.). For interconnectors, licenses are granted based on both the Energy Law and the Maritime Energy Law (ibid.).

3.3.1. Offshore grids and wind power installations

Permits to develop commercial offshore wind power will only be given after an SEA is approved, according to the Maritime Energy Law (Vindportalen, 2014). The final permission is then granted by the MoPE. The application has to include an EIA specifically for the given project (Lovdata, 2015b).The process is the same as for offshore electricity grids. A challenge concerning offshore wind power is the limited experience with such installations both internationally and nationally. Environmental consequences are not well known, and are also depending on variations in depths of water (NVE, 2010).

As explained above the overall SEA for offshore wind power that is supposed to open up for permit processes offshore, has still not been approved by the ministry. Hence, until now only one offshore wind power project – closer to the coast, and not subject to the Maritime Energy Law, has been licensed (Havsul 1; on the North-Western coast, off the county of Møre og Romsdal). Moreover, only one demonstration project for off-shore wind power has so far been conducted – HyWind outside Rogaland county, on the

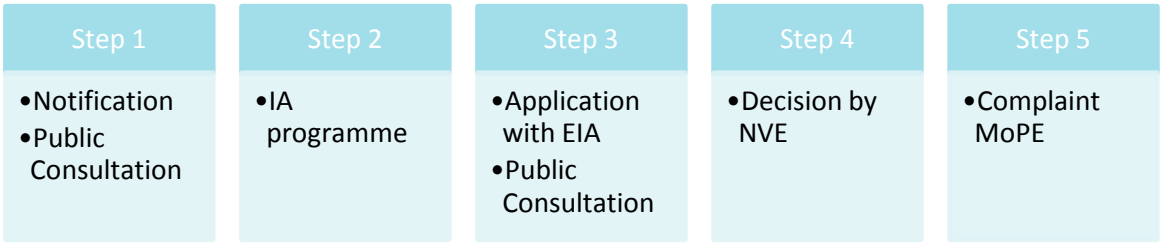
South-Western coast of Norway. This concept will however be further developed in Scotland due to more favorable investment climate for pilot projects than in Norway (Forskningsrådet, 2012).

Grid infrastructure outside the sea boundary will be regulated by the Maritime Energy Law, in parallel with the processes for offshore wind power installations. A final permit or license is to be granted by the MoPE. The application has to include an EIA specifically for the given project. The permit process follows the same steps as for offshore wind production installations. In addition to the permit for interconnectors and meshed grid the developer also has to get a license for the export and import of electricity, according to the Energy Law.

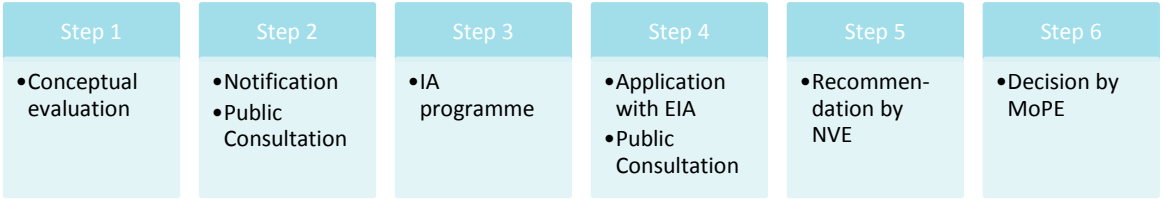
For offshore electricity grid that also affects areas inside the sea boundary – or *on-shore*, the process has to be coordinated with the permit and licensing process required by the Energy Law. The planned electrification of Utsirahøyden thus follows a coordinated permitting process according to the Energy Law, the Maritime Energy Law and the Petroleum Law. The process is coordinated by the NVE (Statoil, 2012).

3.3.2. On-shore grid licensing

The permit process for grid development onshore varies according to size and novelty of the construction. The construction of new transmission lines over 132kV normally requires a permit process that includes EIA. The process follows the following steps (NVE 2009):



The importance of improved early political involvement has been recognized as an important and previously neglected aspect of the Norwegian grid development regime, and a reform of the system was approved by the Parliament in 2012 (White Paper on grid development/Ministry of Petroleum and Energy 2012a). Following this decision, in large transmission line projects there is now a pre-assessment phase where the Ministry of Petroleum and Energy conducts a concept evaluation (ibid.).The construction of new transmission lines over 300kV normally requires a permit process under the new grid regime that requires in addition to the process over a conceptual evaluation in the beginning plus that the decision is to be made by the MoPE instead of NVE. The complaint procedure does as such not exist since the final decision now lies with MoPE:



3.3.3. Summary

Different grid solutions including connections to interconnectors are discussed by NVE in the Strategic Impact Assessment in 2010. In addition to the view that meshed grid at this point is not seen as realistic, there are no plans for larger offshore wind power development in Norway, according to Statnett and NVE (Interviews, Statnett; NVE). As discussed earlier, a meshed grid is not likely to be developed if there is no off-shore wind power development. NVE points to the limited interest for developing offshore wind power today (NVE, interview), and Statnett maintains that a number of realistic, substantial plans for offshore wind power development must exist if a meshed grid is to be profitable (Statnett, interview). In addition to off-shore wind power, an additional perspective within a Norwegian context is the potential related to the electrification of the petroleum installations. Such technological up-gradings could also be developed in connection to a North Sea grid (c.f. Statnett, interview).

	Offshore grid	**Onshore grid (>300, >20km)**	**Onshore grid (>132kV, >120 m)**	**Onshore grid- Voltage upgrading (regional and transmission grid)**	**Offshore wind power**
Project developer	TSO	TSO	TSO/Regional grid company	TSO/Regional grid company	Private company
Laws	Maritime Energy Law	Energy Law	Energy Law	Energy Law	Maritime Energy Law
Permit authority	MoPE	MoPE	NVE	NVE	MoPE
Appeal authority			MoPE	MoPE	
EIA	Yes	Yes	Yes	NVE decides	Yes
Expropriation		NVE If private agreement is not reached	NVE If private agreement is not reached	NVE If private agreement is not reached	

Table 1: Summary of processes and procedures for licensing of on- and off-shore grids, as well as off-shore wind power.

3.4. Permitting and social acceptance

Permitting processes constitute an arena where stakeholders, citizens and local inhabitants being affected by an infrastructure project can be involved and provide inputs to the process; this can be termed the study of 'public engagement'. A growing body of literature is analyzing public engagement in relation to energy infrastructure (Wolsink 2012, Devine-Wright & Batel, 2013, Knudsen et al., 2015, forthcoming). To date, however, few studies have been conducted on social acceptance related to offshore grids. An exception is a study by Hansen et al. (2011) who looked at challenges facing European TSOs with regard to permitting challenges for ten offshore interconnector projects. The interconnectors Skagerrak 4 (between Norway and Denmark) and NorNed (between Norway and the Netherlands) were among the projects evaluated. A key finding was that landfall points were subject to major criticism by stakeholders (Hansen et al., 2011: 32). In the Norwegian cases reviewed, however, conflicts with regard to landfall points were not mentioned and no major conflicts were identified (ibid p. 41).

A North Sea grid will also depend on acceptance of other technologies and developments, such as reinforcements of the domestic grid. Onshore grid development can, however, be highly controversial, as recent projects in Norway have shown (Ruud and Kielland Haug 2011). Opposition has been based on arguments regarding negative impacts on nature and landscape and a rejection of the very purpose a North Sea offshore grid, namely export of electricity. In the Sima-Samnanger case on the west coast, one of the main arguments was that the grid was built for exporting electricity to European consumers and not to secure the energy supply in the region (ibid.). A closely connected argument was that Norwegian consumers and the industry would see the current cheap electricity price rise as a consequence of a more integrated European market and that the project essentially was a stepping stone toward a role for Norway as green battery for Europe (ibid.). Similarly, in Ørskog-Sogndal at the west coast, and Sydvestlinken in South-Eastern Norway, local citizens feared that the export of electricity to Sweden would result in higher electricity prices in Norway (Knudsen et al., 2015, forthcoming).

4. Norway's approach to European energy policy-making and off-shore grid related initiatives

Due to its relevance for the market rules, which are an essential part of the Agreement on the European Economic Area (EEA), Norway is committed by most of the energy-relevant legislation in the EU. Norway is, moreover, considered to be an important partner for the EU in the energy field – particularly by its supply of natural gas. However, the country's hydropower resources and off-shore wind power potential also represent interesting areas for the EU.

Due to the EEA Agreement, there is a formalised, institutional framework to manage contact and negotiations with the EU institutions. By not being a Member State Norway lacks, however, the formal opportunity to influence decisions during the decisive final phases of the decision-making process (Ruud and Knudsen, 2009). The potential influence for the Norwegian government is primarily related to the more technical-administrative preparatory phases. Non-governmental actors, on the other hand, are less bound by such formalized frameworks (ibid.).

An important aspect of the EEA Agreement is the possibility for Norway and Norwegian governmental actors to access the Commission during the preparatory phases of EU policy formulation and law-making through technical-administrative working groups (ibid.). For the formulation of national positions vis-à-vis the EU, and as a preparation of the actual national adoption and implementation, Norway has established an EEA-specific decision-making structure and procedures, mainly managed by each sectoral ministry. Issue- and sector-specific committees are dealing with EU law proposals, policy plans and programs with a regulatory aim, as well as the EEA-relevant legal acts already adopted by the EU. The committees provide arenas for mediating between different interests, as well as to clarify how EU legal acts can be transposed into Norwegian legislation. There is a specific ministerial committee for energy policy issues, in which several ministries participate and co-ordinate the Norwegian positions.

Although there is a formal framework in place enabling Norwegian authorities to further positions vis-à-vis EU energy policy processes at an early stage, a number of challenges persist. First, there is no comprehensive Norwegian energy policy strategy towards the EU and European countries. The positions taken by Norway on the energy field, must also be seen in relation to the traditional split and discrepancy in the Norwegian energy policy field between an on-shore, national energy sector mainly based on hydropower – and an off-shore internationally- and export-oriented petroleum sector. This fragmentation also influences the general policy development as well as Norwegian positions towards the EU (Knudsen et al., 2008; Ruud & Knudsen, 2009).

Secondly, policy analyses have pointed to the relatively stronger political leverage given to petroleum and natural gas compared to renewable energy when considering Norwegian public authorities' energy policy positions and activities towards the EU (Ruud & Knudsen, 2009; NOU 2012b). Natural gas figures prominently on the agenda at the regular contact meetings between the Norwegian minister for petroleum and energy and the EU energy commissioner (the EU-Norwegian energy dialogue), whereas fewer references are made to the provision of renewable energy. This is the case for both renewable energy production and capacity from Norway towards European countries. However, Norwegian authorities' succeeded in the 1990's to undertake an 'innovative adaptation' to a deregulated European gas market, albeit at the same time ensuring Norwegian interests (c.f. NOU 2012b). Based on these experiences, one can contend that the formal framework for cooperation between Norway and the EU does not constitute any unsurmountable barrier for a stronger engagement for renewable energy-related infrastructure development – such as a North Sea grid. What is required is a clear political commitment and renewable energy policy goals towards Europe.

In its official comment to the EU Commission concerning the climate and policy strategy towards 2030, the Norwegian government has emphasized the need for a reinforced infrastructure, including interconnectors and capacity to compensate an increasing share of intermittent renewable energy provision (Norwegian Government, 2014). The Government does not, however, explicitly mention infrastructure development, such as the North Sea grid, in this regard. However, at a more overall level, the Norwegian government emphasizes the need for ensuring further development of an internal energy market and related infrastructure development (ibid.).

This approach was also echoed in the Government's recent White Paper on climate policy (Ministry of Climate and Environment, 2015), where the Government states that Norway is to base its policy on the EU climate policy framework, focusing on the use of the Emission Trading Scheme, ETS (ibid.).

In its comment to the EU Commission proposal for an Energy Union, the Norwegian Government echoes the need for well-functioning and efficient energy markets – with adequate infrastructure and an effective legislative framework – are preconditions for security of supply, and for developing an effective climate policy in Europe (Norwegian Government 2015). The Government here also points to the work with network codes, and emphasizes that these are needed in order to complete the internal energy market (ibid). The Government points to the cooperation within and between the ENTSOs and ACER as crucial, and that Norway through the EEA agreement is entitled to be a part of this process (ibid). The Government contends that new network codes need to be proportionate in relation to their objectives and should not lead to overregulation (ibid.). Furthermore, the Government maintains that the development of interconnectors should be based on voluntary agreements between the relevant TSOs and other developers (ibid.).
More specifically with regard to the development of North Sea Grid within an EU framework, Norwegian positions must also be seen in line with the formal mandates Norway can undertake in the relevant arenas of cooperation.

As far as the European energy regulator ACER is concerned, Norway has thus far not been a formal member. Norway's eventual entering into the ACER structure is not yet clarified, and have been considered in relation to Norway's adoption of the third energy market package (Stortingets EU/EØS-nytt, 2013; Europalov, 2015). This package is still not adopted by the Norwegian parliament. A hearing on the different proposals of the Directive on the electricity market (EU Directive 2009/72/EC), is arranged during the winter of 2015 (Ministry of Petroleum and Energy, 2014c). The question of attending ACER is not explicitly part of this hearing, and the Government has not taken any official position in this regard. The Government is now preparing a law proposal for the Parliament for the final adoption of the third energy market package legislation. This proposal should therefore also include the Government's position towards ACER. In principle, participation in ACER seems to be in accordance with the EEA Agreement, and the Regulation establishing ACER also states that third countries associated with the EU (not full Member States of the EU)

– like Norway, can be members of the Agency (Europalov, 2015). However, as far as the cooperation between national TSO's for electricity, the ENTSO-E, is concerned, Norway takes fully part.

4.1. The Norwegian Transmission System Operator's (Statnett) and ENTSO-E

The Norwegian TSO Statnett takes fully part in ENTSO-E. Every second year the ENTSO-E puts forward a common grid development plan for Europe, "Ten Year Network Development Plan" (TYNDP). The most recent TYNDP was published in December 2014 (ENTSO-E 2014 a). The TYNDPs also serves as the major platform for the selection of Projects of Common Interest (PCIs), EU-funded pan-European network development projects (see also section 2.2here) (ENTSOE-E 2014 b; European Commission 2013a). The newly approved interconnection sea cables between Norway and the UK has been selected as parts of the most recent lists of PCI's (ENTSO-E, 2014b).

In the ENTSO-E cooperation, Statnett has been involved in developing a Regional Investment Plan (RIP) for the North Sea, which was published along with the TYNDP 2014 (ENTSO-E 2014 a). In addition, Statnett, NVE and MoPE are also participating in the regional group on Electricity (NVE, interview). In the report (not yet approved by ACER), the need for interconnectors are strongly underlined and it is also only projects involving interconnectors that are examined as mature and realistic projects. Even though the report does not evaluate in detail the need for a large-scale meshed infrastructure based on a broader regional coordination, the report presumes this to be developed in the future (ibid.).

The planned and envisioned interconnectors in the long term planning are not seen as counterproductive to a meshed grid, but rather as main facilitators of RES- and market integration and building blocks for a future offshore grid (RIP 2014). This attitude is further repeated by the CEO of Statnett Auke Lont in an interview with International Oil and Gas Newspaper concerning electrification of the petroleum offshore sector.[3] He here compares the development of a meshed or integrated offshore grid with the development of the electricity grid onshore in Norway. The integrated onshore grid was developed by connecting several individual radials from hydro power plants to industry plants bit by bit. He sees the development of the offshore grid developing the same way. Statnett also substantiates this point of view in an interview stating that the attitude towards a meshed grid in ENTSO-E is sober-minded, and that the cooperation is focused on bilateral interconnectors that can eventually end up as a meshed grid in the future (Interview, Statnett). Investments in interconnectors are in themselves costly. In addition, an offshore grid solution also faces substantial technology challenges (ibid.).

As mentioned in section 2, the concrete regulation of the electricity flows between the Member States is anchored within the Regulation on cross-border exchanges of electricity (Regulation no. 714/2009) (European Union, 2009b). As explained in section 2, the comitology procedure is part of the follow-up of this Regulation – through the work of different expert groups. A major challenge here, seen from a Norwegian view point, is that Norwegian authorities do not have formal access to these expert groups (Jevnaker, 2012). However, through its participation in the ENTSO-E Norwegian actors can influence on the premises delivered from that organization.

4.2. The Norwegian Government and participation in NSCOGI

As mentioned in section 2.1, NSCOGI is a government initiative consisting of Ministries, TSOs, National Regulators, and the European Commission aiming at achieving a common regional basis for offshore

[3] Interview with CEO of Norwegian TSO Statnett, see: https://www.youtube.com/watch?v=aW7Pn809JqY

infrastructure development (European Commission, 2008a). Two of the four main goals for NSCOGI's work include identifying and tackling barriers to offshore grid development and facilitate a strategic, coordinated and cost-effective development of offshore and onshore grids (ENTSO-E, 2014a). Norway's participation in this initiative was seen as crucial (given the large scale of renewable resources) in the EU Commission's second strategic energy review from 2008 (European Commission, 2008a).

The work of NSCOGI has been organized through different working groups; on grid configuration and integration; market and regulatory issues; and planning and authorization – respectively. Representatives from the Norwegian TSO, Statnett, and the regulator, NVE, have participated in these working groups. Since the MoPE's point of view is that the development of offshore infrastructure could be relevant in a long-term perspective, the main role taken by the Ministry in relation to NSCOGI is to observe and follow the European development and work on the issues (MoPE, interview).

5. Summarizing assessment: Drivers and barriers for a meshed North Sea Offshore Grid

Given the report's Norwegian perspective, and building on the assessment of policy processes and regulatory procedures, at the EU and national level in Norway – including Norway's approach towards Europe, we will now discuss what factors emerge as the main drivers and barriers for realizing a meshed grid in the North Sea.

At the EU level there is an overall drive towards establishing common infrastructure for electricity distribution across borders. The North Sea is a prioritized area, and the EU Commission has over time demonstrated a sustained willingness to develop measures for a common energy infrastructure. However, as we have seen there are currently no concrete measures concerning a meshed grid. Moreover, the common infrastructure concerns the whole energy system, not only renewable energy or electricity but also and often more focussed on natural gas. The ENTSO-E cooperation and the EU processes on coordinating the different national infrastructure plans and projects, are still in a relatively early phase. The recent proposals concerning a European Energy Union could eventually contribute to change the framework and organization of these processes, and provide stronger political leverage to a common European infrastructure policy. Although a meshed grid is still not a concrete part of the EU PCI list, the Commission is clearly oriented in this direction – and will probably continue to ask the ENTSO-E to follow up. Hence, it stands out as an important task for the Norwegian government and authorities, including the MoPE, NVE and Statnett, to follow these processes closely, and reflect upon how to best promote Norwegian energy political and economic interests in this regard.

At the Norwegian level, there is currently no clear commitment towards a North Sea Grid or related development projects. Off-shore wind power development could constitute a 'proxy', and the regulatory framework for licensing such installations are now in place. This framework would also pertain to an off-shore meshed grid. What is still lacking are economic incentives to alleviate the necessary investments and contribute to a long-term perspective for potential investors.

However, from a Norwegian perspective, the processes related to implementing the interconnector projects towards the UK and Germany – planned to be in place within 2020, can be considered as eventual steppingstones towards a common infrastructure. Additional impetus to these projects, as well as eventual future additional interconnector projects, could also stem from the supposed surplus of renewable power to be produced in the Nordic region in coming decades – also as a product of the Norwegian-Swedish joint certificate system. In addition to this, the political ambition of 'electrifying' the petroleum production on the Norwegian Continental Shelf as a consequence of climate policy commitments, can also constitute stepping-stones towards a North Sea grid – both in terms of infrastructure and technology.

In addition to the overall political signals, strategies and eventual economic incentives, and procedures for a common European grid planning (ENTSO-E TYNDP), a challenge persists as to how to coordinate the different national permitting and licensing processes. The TEN-E guideline provides a framework for coordinating procedures in the case of PCI. However, offshore grid development will many cases also imply a need for upgrading or expanding the national grid *on-shore*. In that case, a challenge on the coordination between different licensing processes might occur. Moreover, the grid development is dependent on the development of enough production off-shore, thus demanding coordination between production and grid development which does not necessarily originate in the same country.

Closely related to the permit process is the question of public acceptance of grid development both onshore and off-shore. Although offshore construction normally has less visual impact and thus less sources for conflict, there are unresolved issues concerning environmental consequences that can raise some public concern such as land fall points. Moreover, the necessary upgrading and expansion of the onshore grid will have to deal with issues concerning social acceptance. Since contestation of the legitimacy of developing the grid seems to correlate with the local benefits it can bring (Qvenild and Wold, 2014), the acceptance of grid development related to export of power can prove difficult (Haug & Ruud, 2012).

6. Discussion: Harmonization of what, and how?

Energy security is an increasingly important driver in the EU energy cooperation, as mentioned under section 2. However, the national perspectives and interests related to security of supply do not necessarily correspond with a common European, or EU-based understanding. This discrepancy is still underpinning the way the EU energy policy is organized.

An important dimension in the energy policy development at the EU level is the inherent tension between the different concerns and interests related to security of supply, the internal market, and the environment – and particularly climate-change mitigation. Different visions and interests are crisscrossing the EU institutions – between the Commission and the other EU institutions (European Parliament and the Union Council), where the Member States are to decide on the proposals from the Commission, and between the different Member States (Ruud et al., 2011b). A major aspect limiting the Commission's efforts for more standardized energy policy measures, is the fundamental sovereignty the EU Member States still have regarding the composition of their energy mix (ibid.). This situation implies quite different, and frequently divergent, national interests. The EU Commission's latest efforts of formulating a stronger common energy policy framework through an Energy Union (c.f. European Commission, 2015a) must be understood in light of this situation, as well as how we can interpret the future outcomes of this latest effort.

The general potential for harmonizing different national policy instruments must, therefore, also be considered in relation to the political interests nationally. A general observation is that the EU Commission in most cases, not least in the energy policy area, is a stronger protagonist for common, standardized policy instruments than the different Member State governments (Lafferty & Ruud, 2008; Eikeland, 2012). Furthermore, this standardization is historically very much linked to the overall goal of establishing an internal energy market (Eikeland, 2012).

6.1. Political mandates

Regulatory and policy-related factors must also be understood within a political and institutional context, and according to what decision-making systems are being involved in the development and management of the different harmonization efforts.

The axis between the national TSO's, Statnett within the Norwegian context, and ENTSO-E, has already been referred to several times in this report. In sum, given a Norwegian context, Statnett stands out as the organization currently best positioned to understand and follow up the ongoing processes within the EU with relevance for market development and harmonization, as well as further infrastructure development.
At the same time, the Norwegian energy regulator, NVE, does also participate in international energy cooperation – both within the EU framework, NSCOGI and IEA – and also has a planning and analysis capability for understanding the international context. This capability could be more strongly mobilized in order to prepare a Norwegian energy planning with a stronger international outlook. However, it is not yet decided what role Norway will have within the framework of the European energy regulator, ACER. Given the prospect of increased delegated authority to ACER concerning the further development of a common, European energy policy framework (c.f. European Commission, 2015a), the eventual non-admittance of Norway into ACER can become a more critical issue.

Norway is considered to be an important partner for the EU in energy related questions, and there is a so-called energy policy dialogue with regular meetings between the Norwegian Minister of Petroleum and Energy, and the EU Energy Commissioner (see for example MoPE, 2013). Exports of Norwegian natural gas and hydropower are important contributions to the European energy system. Given the role of the MoPE in international relations and the overall political priorities, both in Norway and for Norway towards the EU, it could be of importance to find ways of broadening this energy dialogue in order to include more emphasis of innovative measures – like a meshed North Sea grid. This could also be beneficial for Norway and provide the country with a more future-oriented, progressive position vis-à-vis the further development of the European energy system. This could in a longer term perspective also turn out to be socio-economic profitable for Norway.

Norway also has strong bilateral ties with important North Sea countries, such as the UK and Germany. The contacts with Germany have in recent years also included a focus on hydrobalancing from Norway to Germany. In 2010 German researchers conducted a study on the issue of measures to ensure 100 % renewable electricity provision in Germany by 2050 (c.f. SRU, 2011). One measure proposed was imports of capacity from the Norwegian hydropower system as a way of backing up the increased share of intermittent renewable energy production in Germany (SRU 2011). The report was commissioned from the German Advisory Council on the Environment (SRU), the German government's advisory body on environmental policy development. The Norwegian research centre CEDREN followed up on this research agenda in 2011-12, strategically informed by the German considerations, with a specific multi-disciplinary scoping of the potential for using Norwegian hydropower for large-scale electricity balancing needs (Solvang et al. 2015). Hence, in addition a more innovation-oriented energy policy dialogue could also build on the strong contributions from Norwegian R&D institutions within the framework of EU-funded, European research cooperation (Energi 21, 2014). This cooperation also includes many bilateral contacts and activities directly between Norway and other North Sea countries.

In sum, in addition to the more well-established linkages between Norwegian energy authorities and the European institutions, one could consider to engage in a broadened, energy policy dialogue which can involve more sectors and institutions – in Norway, in the EU, as well as other North Sea countries.

6.2. Coordination of national planning and permitting processes

The process of permitting – or granting licenses to energy production and distribution installations is today a nationally based process rooted in national laws such as the Norwegian Energy Law (onshore energy installations) or the Maritime Energy Law (offshore installations). In Norway environmental impact assessments are, in line with EU directives and the practice in other EU countries, a compulsory part of the

licensing process. In Norway, decision-making related to the licensing is following a principle of balancing concerns and interests (environmental, economic and other societal), stemming from both national and local levels. The perspective is not only national (except from climate change concerns), but also to a large degree case-to-case specific. The EIA procedures contribute to reinforce this by focusing on local implications of the project on biodiversity, landscape and recreation values.

Since the decision-making process is also based on balancing of national concerns and interests with national security of supply being one of the most important concerns, it seems challenging to fully coordinate or harmonize this system across national jurisdictions. Being nationally based, the permit process also safeguards important contextual and local factors that otherwise could be ignored and consequently reduce societal acceptance. Because of the local implications of larger infrastructure projects which are planned within a perspective of benefiting the whole national society, it is important is to contribute to a local understanding and anchoring. An eventual harmonization of permitting procedures must therefore take into due account the need for ensuring local acceptance and involvement in the planned infrastructure projects. Although a harmonized permit process is difficult to achieve, a larger international infrastructure project, it is possible to coordinate the processes as already attempted by EU. The clearest example is the PCI guidelines including suggestions how to streamline the EIA processes (see section 2.2). In addition the EU has several Directives that must be implemented nationally such as the EIA Directive that gives a somewhat more coordinated legal framework.

The PCI guidelines will ensure a timeframe within which the nations involved in a project will have to follow and ensure more coordinated national processes. Whether this will actually change the current permit practice and lead to a more coordinated permit process across countries remain to be seen. When questioning Statnett and NVE about the impact of PCI in harmonizing the regulatory framework given a Norwegian perspective, they both responded that it is too early to see the impact (Interviews NVE; Statnett). NVE emphasizes that there are few of the currently agreed-upon EU PCIs that are combining connection to offshore wind power and interconnectors within the same project (NVE, interview). Moreover, the possibility for more coordinated processes between different national authorities is also present, as one single responsible authority in each country (one-stop agency) could mean more defined roles and responsibilities and thus facilitate cooperation between the respective countries' national authorities.

Giving projects a PCI "stamp" could therefore help coordinate the permitting processes concerning larger infrastructure projects. However, today's system only assesses the part of the infrastructure that is crossing the border – that is for example only the interconnector. As explained, an offshore grid would also require onshore grid development that is currently not a part of the PCI system. However, although the EU regulation 347/2013 only applies to the granting of permits, public participation in, and the regulatory treatment of projects of common interest (PCI), member states may nevertheless apply the same or similar rules to other projects which do not have the status of projects of common interest. As for the regulatory incentives, the Member States may apply the same or similar rules to projects of common interest falling under the category of electricity storage (c.f. European Union, 2013). Starting a permitting process should therefore consider all necessary parts of the project and could consider to extend the PCI "stamp" to necessary grid development onshore, as well as off-shore wind power development (ibid.). Instead of harmonizing the whole permitting process, a more realistic approach could be to coordinate national processes on a project-based level with the help of the PCI system. The Norwegian TSO, Statnett, considers that implementation of a common PCI regulation a positive initiative, as they see harmonization of the regulatory and policy framework as a prerequisite to develop a meshed grid (Statnett, interview). NVE takes a somewhat more case-to-case based perspective – based on their historical experience – by comparing the regulatory challenges of a meshed grid with those of the bilateral interconnectors, believing that solutions will be found on a project-specific basis (NVE, interview).

As indicated above, there can also be coordination challenges at the national level, since plans and project licenses for a meshed grid infrastructure would affect different societal sectors and interests, and stakeholders. Hence, harmonization of, for example, different national grid development plans can constitute an even greater challenge. However, some degree of harmonization of grid development planning is already occurring at a European level through ENTSO-E in which Statnett participates. The ENTSO-E TYNDP plans have thus far not included plans for a meshed offshore North Sea grid because it is considered to be too immature within the 10 year framework (Adamowitsch, 2011; Meeus et al., 2012). ENTSO-E has stated that plans concerning a meshed offshore grid must be discussed and decided within NSCOGI: Hence, such plans must build on prior national political clarification and support. Unfortunately the national points of view, discussions and progress made in this forum are difficult to find or access for the public. Hence, we can not employ data in the present analysis.

The national debate on an off-shore grid is more or less non-existent in Norway, and it seems like both Statnett and Norwegian politicians want to wait and see what the rest of Europe will do before engaging in concrete processes. At the same time, even such overall plans need to be anchored both at the national political level, as well as being in concordance with the socio-political acceptance. However, current research provides us with few answers as to what the social acceptance, and thus political legitimacy of a North Sea offshore grid is. What we know, however, is that research on infrastructure underpinning the idea of a North Sea offshore grid has found that one important argument used by opponents is the perceived likelihood of increased electricity prices (Midttun et al. 2012).

6.3. Harmonization of economic measures

In Norway the development of harmonized economic policy instruments on renewable energy production are already implemented through the common renewable certificate market with Sweden, the only example of such a joint mechanism under the RES Directive. To support offshore infrastructure development it could be possible to extend this market to the countries involved in the North Sea initiative to coordinate and develop the most cost effective off shore technologies and concrete projects. The use of flexibility mechanisms such as common el certificate markets and joint projects is also recommended by THINK and the EU Commissioner Adamowitch to better facilitate a regional harmonization of the (economical) regulatory framework (Adamowitsch, 2011; Meeus et al., 2012). The use of joint project might ensure better cooperation between investors and stakeholders when the projects costs (and benefits) are nationally fragmented (ibid.). However, other and stronger economic incentives than the current electricity certificate market must be established in order to actually realize viable off-shore energy projects, eventually via a development and demonstration phase.

Related to the promotion of more renewable energy production, there is a challenge with the lack of coordination between the phase-in of new production and the construction of grids. Although the ongoing follow-up of the Commission's requirement of unbundling ownership and company interests related to production and distribution, there is a coordination challenge in the planning and permitting process which has to be solved by the national licensing authorities. This challenge is considered to be the second largest cause for delay by ENTSO-E (ENTSOE-E, 2014 b). This challenge gets even more complex in a multinational context where national strategies for off-shore wind and grid development should be coordinated. The different national strategies is according to the Commission one of the main reasons the grid development ends up " with point-to- point and suboptimal solutions" (European Commission, 2010a). In order to facilitate for the development of off-shore wind farms, ideally the TSO (or offshore grid developer) should start the planning of related grids, in advance of the final licensing of the actual wind energy projects. This, however, requires that the authorities support the TSO in making anticipatory investments under uncertainty with possible benefits in the future (Meeus et al., 2012).

Concerning the electricity market this has in the Northern countries existed for nearly three decades within the NordPool framework. There is an ongoing process of linking different electricity markets in Europe into a coupled, integrated electricity wholesale market as part of an intended progress on common market development in Europe. This can be seen line with efforts undertaken since the 1980's (Eikeland, 2012: 12). However, in spite of the development towards a common European market structure and a stronger framework for common project development at a European level, there can still be differences between the national principal and political approaches to such joint projects. For example, from a Norwegian point of view one often stresses the importance of the socio-economic rationale in relation to interconnector projects. This perspective is, furthermore, anchored within a national framework for assessment, and not within a European perspective. The major perspective is the consideration of socio-economic profitability given a national (and project-based) perspective. The lack of socio-economic profitability is mentioned as the main reason when meshed grid is considered not to be a realistic alternative by Norwegian authorities (Interviews Statnett; NVE; MoPE). Technical solutions with less investment costs, such as interconnectors and onshore wind power are therefore preferred alternatives (Statnett, interview). Statnett also mentions the cost of the tariff (which in Norway has to be paid by the energy developer for a production line – typically the radial to onshore grid installations) as a possible motive for wanting a meshed grid, since the cost will then be socialized among all customers of the grid and not the energy producers (ibid.).

A North Sea grid has been seen as a means to electrify petroleum installations, a way to create new business opportunities through development of floating wind installations as well as providing the North European market with balancing power from Norwegian hydropower (Midttun et al., 2012: 25-26). However, high costs, extensive technological hurdles and a perceived competitive challenge to Norway's prioritized gas exports have decreased the interest from Norwegian actors (ibid.). Moreover, a challenge is related to the distribution of costs and benefits, as potential benefits that might outweigh the average increase of power prices, will be owned by the operators of storage facilities and interconnectors – mainly local authorities and the state (ibid). Similarly, the possibility of increased electricity prices has also been viewed negatively by local communities, as mentioned above, and has also been used as an argument against other energy forms that will underpin the idea of a North Sea grid, such as offshore wind (see Heidenreich 2014). Midttun et al. Therefore, there will be a need for developing a convincing scheme that appeases power consumers (Midttun et al. 2012, p. 26).

7. Conclusion

Given current policy signals and the existing EU and national policy strategies in Norway, a meshed North Sea grid stands out as more of a vision than a concrete option in near future. This situation does not exclude, however, that several measures can be taken in order to specify this vision more gradually, or in an incremental manner. Seen from Norway, the processes related to implementing the interconnector projects towards the UK and Germany – planned to be in place within 2020, can be considered as such steppingstones. Additional impetus to these projects, as well as eventual future additional interconnector projects, could also stem from the supposed surplus of renewable power to be produced in Norway in coming decades – both due to more effective energy usage and new production stimulated by the Norwegian-Swedish green certificate system. In addition to this, the political ambition of 'electrifying' the petroleum production on the Norwegian Continental Shelf can also constitute stepping-stones towards a North Sea grid – both in terms of infrastructure and technology.

The EU level and EU policy processes have a substantial influence on what will be considered as required and/or profitable for further infrastructure and grid development in Europe. As reflected upon in this report, while Statnett is involved in the ongoing technically oriented work within the ENTSO-E, whereas at the

political level the Ministry of Petroleum and Energy seems to be less active vis-à-vis the political dimensions of the EU infrastructure policy development. Given the up-coming establishment of a European Energy Union, such activity will, however, be increasingly important. Without a pro-active role, such as the one Norway undertook in relation to the development of European market mechanisms for natural gas (c.f. Austvik & Claes, 2011), the country risks to be sidelined when important strategic decision pertaining to energy development in the North Sea emerges in the future.

The more 'trans-national' (that is, multilateral, direct cooperation between European states) NSCOGI process does not seem to trigger any high expectations by Norwegian authorities and stakeholders, at this point of time. However, as a more bilateral approach, there seems to be more dynamic axes between Norway and some of the neighboring North Seas countries; such as Germany and the UK in relation to the ongoing interconnector projects, and the demand for Norwegian balancing power from these countries. The NordPool market area and its coupling with the North-West Europe Market area is also a possible driving-force – where national authorities with the TSO's in front cooperate quite substantially.

However, a critical barrier to a more active Norwegian approach to a meshed North Sea grid is the lack of a broader perspective than the project-specific considerations undertaken in relation to each, separate interconnector project. Secondly, there is a very concentrated focus on socio-economic perspectives when considering these concrete projects – and very limited attention related to long-term effects, and more cross-sectoral effects; such as innovation, and new industrial possibilities for Norwegian companies. Coordinated action on common projects in a regional perspective will however require political backing from all the nations involved. It is no question that the economically "safest" way to eventually obtain a meshed grid is the step-by-step approach taken by Statnett and national politicians. However, Norway's technologically advanced offshore knowledge could give Norway a comparative advantage and environmentally a label as a front-runner, provided that there will be a political willingness and concrete initiatives.

As far as the potential for more harmonized policy approaches and measures is concerned, a number of interesting features emerge: In terms of market-related efforts, Norway is already at the forefront of European countries by having implemented major EU requirements in advance of the current implementation of the EU internal energy market. In addition, Norway is considered to be an important energy policy partner for the EU. In particular, the EU Commission pointed explicitly at Norway in its second strategic energy review, and emphasized Norway's participation in a North Sea grid project as crucial – not least given the country's availability of many renewable energy resources (European Commission, 2008). However, Norwegian authorities have not been very eager at following up this invitation, and none political initiatives to substantiate a cooperation on off-shore energy development in the North Sea has thus far been taken – at least not officially. The most active institution from the Norwegian shores has been the TSO Statnett which is also an important and active member of the ENTSO-E. One of Statnett's directors, Ms. Bente Hagem, has been particularly and centrally involved in developing the ENTSO-E's work on European market integration, and the coupling of the different European market areas, now being the Vice Chair person of the Board of the ENTSO-E.

Furthermore, Norway has nearly five years of experience with a common renewable energy certificate system with Sweden. Although this scheme is not sufficient to ensure substantial investments in offshore energy development, the experiences from such a bilateral cooperation indicates that it would be politically possible to establish a similar scheme concerning the North Sea.

Finally, an area where harmonization between different national systems and regulations could be more challenging, and where there to date is limited experience, is the process of licensing energy infrastructure projects. An eventual harmonization of different national permitting and licensing procedures is possible, and is also to a certain extent required by the EU Commission for PCI projects. However, different national local

settings for social acceptance have a clear significance for the outcome of such processes. This is not to say that such harmonization cannot prevail, only that this is an important dimension of cross-border infrastructure projects which needs to be addressed to a larger extent – and an important area for further bilateral and EU-level development.

As a North Sea grid will include several technologies and uses that will have consequences on both the national and local level, it could be relevant with a broader debate that internalizes these developments both across technologies and levels of society. In addition to the challenges national stakeholders and local communities often perceive, for example the fear of higher electricity prices, there are also potential advantages with an offshore grid – such as the reduced need for other onshore grid upgradings – which could figure more prominently in the communication with stakeholders and concerned inhabitants. The ongoing process of developing a new white paper on Norwegian energy policy represents a potential forum for expressing such views.[4] Moreover, more deliberative public engagement exercises at the national level have traditionally been restricted to policy-focused issues with professional stakeholder representatives and groups (Pidgeon 2014). Hence, the identification of means for a more effective dialogue between the local and national levels, leading to a more robust and acceptable policy implementation, could be further investigated.

7.1. Recommendations

From a Norwegian perspective, a meshed North Sea grid is still more of a possible vision than a concrete project. We have in this report identified a number of challenges, but also possibilities, in order to get from a vision to more concrete action and policy measures. In order to finalize this endeavor, we will put forward a number of recommendations aiming at further policy development and social scientific research. We believe further policy measures for the development of a meshed grid should be formulated based on research and documented knowledge.

For further policy development from Norway

- A more proactive policy dialogue between Norway and the EU, also with regard to the establishment of the Energy Union, to be coordinated by the Ministry of Petroleum and Energy.
- Further develop and improved the Norwegian participation in European and EU-based networks; including the cooperation within the ENTSO-E and towards the EU Commission and ACER.
- Specific focus on the development of network codes and other relevant technical standards within the EU, and particularly through the ENTSO-E.
- In cooperation with both national stakeholders and other North Sea countries, formulate a broader perspective for energy infrastructure development in the North Sea area, emphasizing innovation, industrial development and employment as positive side-effects.
- Clearly build on knowledge from and experience with research cooperation between North Sea countries.
- Prepare for more harmonized policy measures: Be aware of and further develop established planning systems, policy instruments, procedures and policy practice in relation to NordPool, European market integration, and the Swedish-Norwegian green certificate system.
- Identify measures for cooperation, exchange of experience and eventual harmonization of national planning and permitting systems.
- Be aware and identify ways of accommodating different dimensions of social acceptance; both at the national, socio-political level – and locally – related to specific communities and the concrete (visible) consequences of interconnector projects and landfall points.

[4] The inputs can be found at the governments web page https://www.regjeringen.no/nb/tema/energi/fornybar-energi/Energimeldingen/Skriftlige-innspill/id2010109/

For further research

- Conduct research on the different processes and procedures related to infrastructure development within the EU, including closer scrutiny of Norway's access points and potential for stronger influence. This should include a specific focus on the comitology procedures employed in the definition of network cods.
- Comparative research on the experiences with cross-border energy projects, and the management of these within different national political systems: Experiences with coordination across national contexts, as well as between different sectors and stakeholders nationally.
- Conduct research on the harmonization potential for different policy instruments across the North Sea countries, in order to identify which measures can be politically acceptable for harmonization, and at which stage
- Conduct research on different stakeholders (the public, NGOs, policymakers etc) attitudes towards the concept of a North Sea offshore grid on a national level. Here, not only attitudes towards a North Sea offshore grid per se should be studied, but also related developments such as offshore wind, balancing power from hydropower etc, acknowledging that these developments are interlinked. These studies should also aim to include the local public affected by such developments in national policy discussions and policy formation.
- Conduct research on social acceptance towards meshed grid solutions – including eventual consequences for on-shore grids. Here, both local communities affected by landfall points and maritime users should be included. How the affected parties perceive public engagement and how planning tools, such as maritime spatial planning, facilitates the process or not should be included in the studies.

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