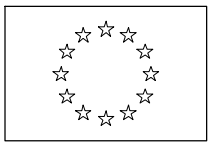

EUROPEAN COORDINATOR'S FIRST ANNUAL REPORT

Georg Wilhelm Adamowitsch

PROJECT OF EUROPEAN INTEREST

"Connection to offshore wind power in Northern Europe (North Sea – Baltic Sea)"

September 2007- September 2008

Brussels

24.9.2008

The points of view expressed in this report are those of the European Coordinator and do not represent the official position of the European Commission

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1. INTRODUCTION

The first year of the coordinator's work was dedicated to taking stock of the underlying essential facts. The contacts made and lessons learnt are described in some detail. The coordinator also points out in this report obstacles and shortcomings which hinder the timely implementation of the infrastructure needed for accomplishing the ambitious targets of the European energy policy.

After the information gathering and analysis phase, the coordinator is in the position to propose concrete actions, which are cast into a work programme for the second year. In doing so, quite controversial discussions will take place, where the willingness of cooperation and the acceptance of new solutions are the pre-requisite for progress. In his function of 'facilitator' the coordinator will attempt to promote specific network projects.

The format set is suited mainly for a factual report of the missions and contacts and first conclusions, i.e. presenting the deliverables noted in the work plan. A more in-depth analysis will be presented in a short amount of time by the Commission services separately.

The coordinator wants to thank everyone for the support he received in carrying out his task.

Scope of work:

The coordinator's appointment is based on the 2006 TEN-E Guidelines[1] and the Priority Interconnection Plan[2]. Even more important in his opinion are the presidency conclusions[3] of the Brussels European Council of the 8th and 9th of March 2007, where the European Council agreed to the headline political target on renewable energies, a binding target of 20% by 2020. As a consequence the offshore wind power generation will need to make a major contribution.

Furthermore, the coordinator refers to the letter sent by Commissioner Piebalgs (in September 2007) to ministers of the 27 Member States with the objective to provide support for a wider consultation process.

The project list of 2006 TEN-E guidelines does not fully reflect the large wind power generation capacities planned in the North Sea and Baltic Sea. Part of the task will be to agree with Member States concerned on the appropriate prioritisation of needed links.

A second new element is given by the regional initiative. This implies that the scope will be widened to include Germany, Denmark and Poland being essential to Central West, Nordel[4] and Central Eastern markets. The regional initiative becomes an essential part of the mission.

The updated task description reads:

Connection of offshore wind power in Northern Europe (North Sea – Baltic Sea)

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1 Decision No 1364/2006/EC of the European Parliament and of the Council of 6 September 2006, OJ L262, 22.9.2006, p. 1.

2 COM(2006) 846 final, 10.1.2007.

3 Presidency conclusions are available on http://europa.eu/european-council/index_en.htm

4 Nordel = Association for electricity co-operation in the Nordic countries

In a second step the coordinator suggested the inclusion of Norway. In particular he stressed the importance of including Norway as an economic partner, as a member of Nordel with related grid planning and operation and for its enormous potential in off-shore wind generation. He proposed to formalise the relationship between Norway and the European Union, enabling official discussions concerning the integration of offshore wind energy with the objective that Norway will become an official member of cooperation. This initiative was strongly supported by the Norwegian Minister during his visit on the 14th of March 2008 in Oslo and, afterwards on the 30th of April, by the Commissioner in his letter to the Norwegian Minister, proposing formal cooperation.

The EC-Norway Energy Dialogue meeting held on the 29th of May 2008 in Brussels endorsed this collaboration. In particular, Commissioner Piebalgs proposed that the Energy Cooperation Group deals with this by proposing an action plan and the Norwegian Minister accepted the proposal of installing a joint working group, dealing with development of the offshore wind transmission grid together with the associated onshore transport grid.

2. WORK PROGRAMME AND TIMETABLE

As far as the wind energy project is concerned, the offshore wind power production will put additional pressure on the performance and grid operation of the electricity network in the Baltic and North Sea area. The coordinator emphasized that extensive consultations of Member States in Northern Europe, the corresponding national regulation authorities as well as the Transmission System Operators have to be carried out. "It is clear that offshore wind power generation and transmission need to be addressed simultaneously," said Mr. Adamowitsch in the press conference of the 30th of November 2007 in Brussels.

Programme for 2007/ 2008

In the first year the work of the coordinator is dedicated to information gathering at political level as well as authority and market level, establishing personal contacts and finding suitable platforms for communicating the necessary actions in view of a common European energy policy, including raising awareness and informing the public.

It is also necessary to address and to create the means for a European solution for planning, operation and regulation, in particular concerning cross-border flows and, thereby, replacing patchwork national initiatives. This will enable to formulate a strategy for implementing the needed European grid. The second year will be dedicated to the step by step implementation of this strategy.

Milestones and deliverables

The work programme is structured in quarterly periods. Naturally, this plan is built with sufficient flexibility.

The most important element was to establish contacts with:
- Policy makers in the Member States concerned
- National authorities, especially the national regulators
- Transmission System Operators
- Stakeholders (UCTE[5], ETSO[6], ERGEG[7] etc), interest groups and environmental groups.

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[5] UCTE = Union for the Co-ordination of Transmission of Electricity
[6] ETSO = European Transmission System Operators
[7] ERGEG = European Regulators' Group for electricity and gas

The deliverables include a summary of the planned onshore and offshore wind power generation capacity and an overview of the status of the transmission grid. It includes an overview of the progress achieved in the implementation of the corresponding projects of European interest. This overview is complemented by the obstacles faced in implementation, including market barriers. Towards the end of the first year, first conclusions are presented at political, regulatory, market and technical level.

3. WORKING STRUCTURE

The working structure comprises of visits to the ministers of the Member States concerned and Norway, including detailed discussions at working level. Furthermore, it comprises of establishing contacts with organisations and enabling discussion with experts and skilled staff, as well as discussions in the European Parliament and presentations at Conferences.

In the first year the work of the coordinator was dedicated to information gathering at political and technical level, in particular about:

- the strategies pursued by the national governments for the development of off-shore wind power generation,
- the status of the transmission network including TEN-E projects,
- the planning of needed off-shore and on-shore transmission networks,
- the authorisation procedures and
- the regulation applied.

Political contacts

For this purpose, visits to the ministries responsible for off-shore wind power were considered necessary, including contacts with the regulation authorities and Transmission Network Operators. Until the end of July 2008 the coordinator carried out such consultations at ministerial level in the UK, Finland, The Netherlands, Germany, Norway, Denmark, Poland and Sweden. These consultation meetings revealed important information which is incorporated in this first report.

Technical expertise

Parallel to the EWIS study[8], the TradeWind study[9] is being carried out by a consortium led by the European Wind Energy Association (EWEA). This study outlines how 300 GW of wind power can be integrated into the interconnected European grid by the year 2030. The study aims to draw up recommendations for market regulations and the allocation of interconnector capacities.

A close collaboration has been initiated with experts engaged in the TradeWind and EWIS projects and, furthermore, in the UCTE Transmission Development Plan[10]. The latter activity complements the future network scenarios and power flow simulation to be carried out by TradeWind and EWIS. The objective is to utilise technical data that was obtained under a clearly specified methodology and that is openly available. In particular, this data can be scrutinised by the public.

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[8] Further information on the European Wind Integration Study can be found at http://www.wind-integration.eu

[9] Further information on the Tradewind project can be found at http://www.trade-wind.eu

[10] The first UCTE Transmission Development Plan was published in June 2008 by the UCTE and is available at http://www.ucte.org/media/releases

Specific contacts with TSO's were established in the "First Stakeholder meeting for the Polish-German TEN-Projects" held on the 15th of May 2008 in Berlin.

Additional contacts with TSO's and industry experts were established and working group meetings concerning offshore grid development and wind farm technology were organised

Additional contacts:

On invitation of the Thüringer Staatsregierung the coordinator attended several meetings in Thüringen and obtained a clear view of the planning and permitting procedures concerning the implementation of the TEN-E Project on axis EL.7 'increasing electricity interconnection capacities and possible integration of off-shore wind energy'. It includes the following project(s) of European interest: Halle/Saale (DE) — Schweinfurt (DE). In numerous discussions and interviews the coordinator emphasised the necessity of this link. This case also demonstrates that political issues, in particular the forthcoming election in Thüringen in 2009 can cause severe delays in the planning and authorisation phase. This illustrates that controversial arguments are sometimes made instead of a factual and solution oriented debate about the routing.

It is emphasized that there is a great interest in the work of the European Coordinator in the European Parliament, in particular concerning the needed construction of additional high-voltage transmission infrastructure.

Furthermore, the coordinator took part in conferences and panel discussions, where he presented the position of the European Commission regarding the development of off-shore wind power generation.

4. POTENTIAL OF OFF-SHORE POWER GENERATION

The target to increase the share of renewable energy to 20% in year 2020 translates to about 35 % of electricity generation coming from renewables. It is widely accepted that about 36% of EU renewable electricity will need to be generated by wind in 2020. Across the EU this implies that 13% of the total electricity supply will come from wind.

The figures given in the analysis of the European Wind Association (EWEA) specify the target for offshore generation of at least 35 GW (other sources estimate 60 GW) by 2020, with the next target of 150 GW by 2030.

In conclusion, a lower figure of 20 GW off-shore capacity is the pre-requisite that off-shore wind power will get implemented, a figure of 50 GW is a realistic target for 2020 and the longer-term potential is 100-150 GW. This is summarised in the form of 20 GW as proof of principle, 50 GW as climate protection target and 100 GW as the full potential, in short the **20-50-100 GW Offshore Wind Energy Potential**.

The TradeWind project made three off-shore wind power scenarios available. These scenarios relate to the total off-shore power generation of 18 GW, 51 GW and 120 GW which corresponds sufficiently well to the **20-50-100 GW Offshore Potential** introduced above.

5. ANALYSIS AND FIRST SOLUTIONS

The visits to the ministries showed that considerable off-shore wind generation is planned in some countries, while it has a lower importance in other countries. This information is summarised:

5.1. Resume of off-shore generation (deliverable 1)

Here the facts learnt from the ministerials visits are summarised:

- *The Netherlands*: Off-shore wind energy is considered as very important for The Netherlands. The White Paper Environment and Physical Planning aims for 6000 MW Offshore Wind Energy. Today, two wind farms with 228 MW capacity are in operation. In round 2 (2007-2011) additional 450 MW are planned and for 2011 a total of 700 MW. Round 3 should provide 5300 MW (2012-2020).
- *United Kingdom*: Off-shore wind generation is considered as very important for the UK; plans exist to implement 8 GW up to 30 GW capacity in the period till 2015. Grid access is feasible given the relatively short distance of the off-shore wind farms to the on-shore load centres with a £2-3 Billion investment in new off-shore grid required.
- *Norway*: For the period up to 2020 several wind farms are planned for a capacity of up to 2 GW. However, a substantially larger potential can be released by additional sites further North with excellent wind conditions. Reserve and balancing capacity would be available by hydro power generation in conjunction with on-shore grid extension.
- *Denmark*: In Denmark 409 MW of wind power is installed today and will be upgraded by two more off-shore wind parks with 400 MW capacity until 2012; the total capacity could reach 3 GW.
- *Germany*: The country has plans for installation of 10 GW capacity and on the ambitious side even of more than 20 GW. At least 3 GW will be generated in the Baltic Sea. This wind power – together with the on-shore generation – has to be transported to the load centres in the South of the country. The transmission network needs are clearly stated in the Dena Grid study of 2005[11].
- *Sweden*: The plans for off-shore wind power range from 1 to 5 GW to be installed gradually over time.
- *Finland*: Up to 2.400 MW of offshore wind generation is in principle possible, corresponding to 5-10 % of the Finnish electricity consumption. A strong grid exists in Finland; therefore, grid reinforcements are not a big problem, but the availability of sufficient capacity for daily/ seasonal peaks.
- *Poland:* The plan is to install several hundred MW and increase the capacity slowly according to the grid upgrade.
- *Sweden and Denmark:* Kriegers Flak in the Baltic Sea is an interesting case study on a European scale. The problem is that the wind farms planned will have different subsidies given by the three countries (DE, DK and SE) and also a different regulatory system. The ministers and authorities agreed to share the experience and practice between SE, DK and DE; and to initiate a discussion about the framework for wind farms in Kriegers Flak.

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[11] The final version of the report on the "Integration into the national grid of on-shore and off-shore wind energy generated in Germany by the year 2005" (Dena Grid Study I) was presented to the public in February 2005. Further information on the project is available at http://www.offshore-wind.de/page/index.php?2565

The lack of strategic level planning across Member States – reported in the Off-shore wind energy communication 2008 - was directly observed by the Coordinator during the visits to Member States. The risks resulting from too long permitting procedures and too high technology costs, major factors of the feedback from stakeholders, were communicated to the coordinator.

It can clearly be seen that the off-shore wind generation can be cast into three phases. Phase one is characterised by the progressing installation of wind farms in every country without regional coordination. The corresponding total capacity can reach from 10 to 20 GW. For this situation the on-shore transmission poses minor but manageable problems, as is the case in The Netherlands and UK. Phase two is characterised as the joint effort to comply with the 20% target of renewable energy. The visits have shown that the required power generation needs to reach 40 to 60 GW. Phase three will release the really high potentials – but without a precise timetable – that are reported for the Northern part of the UK (Scotland and Islands) and Norway, which consider the use of floating wind turbines along its coasts where excellent wind conditions exist.

These three phases correspond reasonably well to the three scenarios applied by the TradeWind modelling, which is characterised by 18 GW until 2015, 51 GW until 2020 and 120 GW up to 2030. The corresponding sites are shown in Figure 1 in the Annex together with the installed capacities per country in the corresponding table.

In conclusion, these findings are in full agreement with the **20-50-100 GW Off-shore Wind Energy Potential** as introduced in Section 3.

5.2. Resume of off-shore grid (deliverable 2)

It was observed that the grid planning carried out up until now in the Member States mainly takes into account the direct connection of the wind farms to the on-shore high-voltage transmission network. As the transmission network is operated close to the transmission capacity limit today and the extensions, respectively the construction of new links progress very slowly – if progressing at all – there is the danger that the transmission will get more and more congested and eventually get blocked. This situation may occur in Germany for example.

We witness the gradual installation of Off-shore Wind Energy as described by Phase one above. No major efforts are made at present to optimise the off-shore grid planning for the joint needs of several countries or even the North Sea Region, respectively the Baltic Sea Region.

The in-depth discussions with the competent ministers showed that off-shore wind power in Northern Europe is a European project, not limited to coastal states. Its deployment will require the joint coordinated efforts of the Member States concerned, the corresponding national regulation authorities, TSOs and grid related stakeholders and the wind industry to determine the right incentives and rules for the necessary investments.

The second important conclusion was that for the incorporation of off-shore wind power generation the timely extension of the high-voltage transmission grid on a European level is indispensable. In particular, the implementation of the corresponding TEN-E Projects of European Interest as listed in the 2006 TEN-E guidelines needs to progress.

In conclusion, the proposed Off-shore Grid should accomplish two tasks, namely:

- to enable the direct connection of the offshore wind parks to the transmission network and

- to provide additional capacities for cross-border trading.

5.3. Resume of on-shore grid (deliverable 2)

The requirements to the transmission capacities and the resulting network extension have been extensively studied by several national studies, such as Dena (Germany) with the objective to integrate 10 GW generation capacity until 2015 and EWIS (European Wind Integration Study) which is a common initiative of all TSO's with a time horizon 2008-2015 in phase II.

In the finalised studies, detailed conclusions were presented concerning the investments in the upgrade of the existing network and the construction of additional transmission lines. For the German network, the Dena Grid study I laid down in detail the links that needed to be upgraded, respectively built.

In addition, necessary grid upgrade and extensions within Austria have been described in the Priority Interconnection Plan in 10 January 2007.

The UCTE Transmission Development Plan is a survey of the investments that UCTE TSO's have either approved or are considering. Most of those investments have already been presented in the TSO’s respective regional Transmission Development Plans. Cross-border and internal investments are both important to the European market. The areas of congestion in each Regional Forum are clearly described in the UCTE Transmission Development Plan and are shown in Figure 2a and 2b in the Annex.

Projects of European Interest

The status of the related projects of European Interest was analysed as requested in the TEN-E Guidelines. Details on all projects related to the coordinator’s mission are given in the Annex.

Compared to January 2007, progress has been made in the sub sea links between England and The Netherlands and between Finland and Sweden.

Concerning deliverable 3, the coordinator emphasises the importance of the dialogue with the public:

The discussion in Thüringen revealed that both polical decision makers and TSO's have to strongly improve the dialogue with the public concerning the need of upgrading and extending the transmission grid. Therefore, this example elucidates that the implementation of the European sustainability strategy shows certain contradictions, namely the conflict of interest between the construction of new links and the protection of the environment. In other words, there can be a conflict between global European targets, such as the target to increase the share of renewable energy to 20% in year 2020, and local interest such as nature protection and exercising individual citizen rights. In consequence, the coordinator sees the need for a substantial discussion in order to balance the EU targets as proposed by the Commission, the national targets and the adequate implementation strategies. This dialogue is indeed a pre-requisite for providing the adequate framework and, in particular, the necessary stability for wind farm operators and TSO's concerning planning and investment. In this process the regulators have to be actively included because the profitability of the link, i.e. the return on investment, is determined by the level of the granted grid transmission fees.

The coordinator concludes that these findings support the previous statement that the political debate with the objective to find solutions should be taken up today, because at this stage in the network planning a consensus was reached in principle between

policy, regulation and TSO's. The results of the ongoing and increasingly more accurate load flow simulations can be utilised in due time for optimising the solution on technical and socio-economic indicators. Consequently, in the coordinator's opinion a new discussion about the need of the well justified, published upgrades and additional links is not necessary. Rather, politics and enterprises have to undertake every effort to achieve the timely realisation of these transmission projects. Otherwise accomplishing the binding target to increase the share of renewable energy to 20% by 2020 is at risk.

5.4. Proposed Solution

Development of the off-shore and on-shore grid

It is obvious that the power generated off-shore needs to be transmitted to the load centres, i.e. to the consumers. The higher the off-shore generation capacity becomes, the more powerful in transmission capacity and distance the transmission network has to become. At some point when the low target of 20 GW off-shore capacity is surpassed, the off-shore grid takes a dual function, namely to connect the wind farms to the grid and to facilitate cross-border trading in the region and between regions.

In conclusion, a major task of the European coordinator is to promote the development of the appropriate electricity network in Northern Europe, off-shore and on-shore, where interconnectors between different countries are especially crucial.

Installation of a working group for grid development

The first missions to Member States carried out by the coordinator led to the proposal to install a standing working group called "Off-shore grid development". This working group will provide the inter-regional platform for the technical planning of the future off-shore grid. The tasks of this working group will be to provide detailed information about the status and future needs of the transmission network, together with details concerning implementation. The objective is to collect the information in an open and transparent manner, so that the participating countries can come to a common point of view. This group will collect and assess data from the TSO's and collaborative studies (like Dena Grid study II[12], EWIS or Trade Wind).

As a second task the working group will address the "Weak points in the on-shore grid". This reflects the need that on-shore grid improvements need to be in line with - or even ahead of - the increase of off-shore capacity. Today the community already faces the emergence of new bottlenecks caused by off-shore wind power to be landed. Thereby, a strong and effective cooperation between Transmission System Operators is established in the areas of grid operation and control, network and investment planning and development of technical codes.

Furthermore, experts from off-shore industry and developers report on risks, obstacles and barriers related to off-shore power generation and transmission.

First Meetings held on 30 July 2008 in Brussels (chaired by Mr Adamowitsch)

"Working group for Off-shore/on-shore grid development - 1st meeting" and

"Off-shore Industry expert group - 1st meeting"

There was overall agreement that:

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[12] Dena Grid study II results are expected at the end of 2009. Further information is available at http://www.offshore-wind.de/page/index.php?id=start_offshore_wind&L=1

- the offer from the Norwegian TSO to design future cable connections from Norway to the UCTE area/ UK as a building block of the needed off-shore grid should be accepted and pursued by this group.

- Factual evidence should be forwarded to the governments of Sweden, Denmark and Germany and actions proposed to connect the wind parks at Krieger's Flak with a European vision and not to accept cheap national solutions.

- The group should meet four times a year and should proceed from factual grid planning in the cases of (1) the Norway-Germany-UK connection and (2) Krieger's Flak to solutions at technical and political level and clarify the subsequent actions like regulation and balancing power.

- The meeting with industry experts should also be repeated on a regular basis. The objective would be to start a structural discussion on topics related to planning, investment and construction. It should lead to expert input concerning economic aspects and the industry capacity problem.

6. CONCLUSIONS AND WAY FORWARD

The coordinator communicated the vision that off-shore wind power generation and transmission need to be addressed simultaneously. Without additional infrastructure EU-27 will not meet the 20% target for renewable energy. European-wide coordination and network planning are essential for meeting the challenge of large-scale generation of 'green electricity'.

The visits at ministerial level were concluded by the common agreement that:
1. The coordinator will be supported in his actions to initiate political processes in the adequate regional forum and openness and transparency are essential elements in the future actions.
2. The ministries were indeed very interested to find solutions for the dilemma that global European targets, such as the completion of the internal market or the 20% renewable target need to be reconciled with conflicting views of local, respectively individual perception.

The coordinator carried out extended visits to the ministries of the Member States in the North Sea and Baltic Sea areas and in every country has witnessed a fragmented and un-coordinated national approach – very much in line with the stakeholder feedback presented in the Off-shore wind energy communication 2008. A continuation and upgrade of today's fragmented and un-coordinated national policies will limit the off-shore wind power generation capacity severely (to 10-20 GW). Furthermore, it will require additional and costly investments to employ a regional strategy which is needed for reaching the 20% target; therefore the fragmented national approach will be very costly to consumers and governments and also lead to an unnecessary burden on the environment. The TSO working group will allow combining the 'best practice approach' of the coordinator with the 'integrated approach' proposed in the Communication.

Way Forward

The installation of an "off-shore/ on-shore grid development group" initiated by the coordinator will allow developing 'best practice scenarios' for selected cases, such as Krieger's Flak, and will promote the required grid planning in modular form in an open and transparent manner (action 1). A second engagement is the construction of a new connection between Norway and Germany in such a way that it connects to off-shore wind farms and facilitates cross-border trading, in a first step towards a 'modular concept'. Agreed technical solutions will be shared with the regulators as well as governments concerned (action 2).

The development of off-shore technology will play an essential role for meeting the 2020 RES targets. The SET Plan identifies off-shore wind applications as one of the priorities where Europe needs to accelerate the development and market introduction process by setting-up a European Industrial Initiative. This will imply the reduction of the cost of wind energy and fast and large scale grid integration of off-shore wind applications. The coordinator will address both short term and medium term issues.

The regulator plays a key role in the future, as he in the end determines the cash flow. This view is very much in line with Coordinator Monti's approach for the France - Spain interconnector (see annual report of Mr Monti); he considered among others compensating measures and adequate tariffs granted by the regulator in the case of extra costs. This indicates that the socio-economic welfare should be fully assessed, including congestion and environmental costs when no link can be constructed. Therefore, the role of the regulator in enabling timely implementation of the off-shore grid development and on-shore extension will be addressed. There is a need to initiate a regional discussion about adequate flexibility and harmonised and operable support mechanisms. In consequence, several workshops will be organised to discuss the related issues based on concrete projects (action 3).

As a major obstacle to implementation, a solution has to be found for the problem of shortening the authorisation phase to 5 years. The coordinator will look at the possibility of introducing priority for the implementation of specific energy infrastructure projects. This requires a new look at the existing legislation as well as criteria for prioritisation (action 4). At present obstacles to investments, often put forward by small groups, are based on existing EU environmental legislation as applied in the various countries. The local concerns and the global targets need to be balanced.

The information provided by the coordinator will provide input for the revision of the TEN-E Guidelines (foreseen for 2010) with regard to project specification, regulatory issues and environmental acceptability.

Furthermore, participation in conferences will be continued.

Workplan for the second year

Action 1: Promote Kieger's Flak as 'best practice case' for the integration of off-shore wind farms for three countries.

Milestone1: Get a joint proposal from the TSO's and discuss the consequences for the regulation. The first workshop will be held in the last quarter of 2008. A second workshop will address the follow-up recommendations and put the case to the governments (first quarter 2009). A joint meeting at ministerial level is scheduled for the second quarter of 2009.

Action 2: Promote the development of the off-shore grid in the North Sea in modular form connecting Norway with other markets.

Milestone 2: A first workshop will be organised in the first quarter of 2009 with the objective to present a project. It is important to quantify the requirement for balancing power. In a second workshop scheduled for the second quarter of 2009 the technical points for the operation will be addressed.

Action 3: The role of the regulators is clarified for specific off-shore and on-shore projects (e.g. TEN-E projects in Denmark, Germany and Poland). The coordinator will present his view that the regulator has to allow for a more flexible adaptation of tariffs in the case of rising costs. The regulator should consider environmental concerns together with the actual market situation.

Milestone 3: A workshop will be organised in the first/ second quarter of 2009.

Action 4: Analysis of possible changes to EU legislation for shortening the authorisation process. In view of sustainability there is a need to adapt environmental law to facilitate the realisation of sustainable energy installations and related transmission lines; this includes considerations for adequate and timely integration of the public concerned.

Milestone 4: A short interim report will be put forward in the beginning of 2009.

Figure 1: Offshore wind scenarios and generation

TradeWind offshore wind scenario 2030 H Northern Europe. Projected location of offshore wind farms and offshore capacities per country (GW). Total installed offshore capacity scenario 2030H: 120 GW.

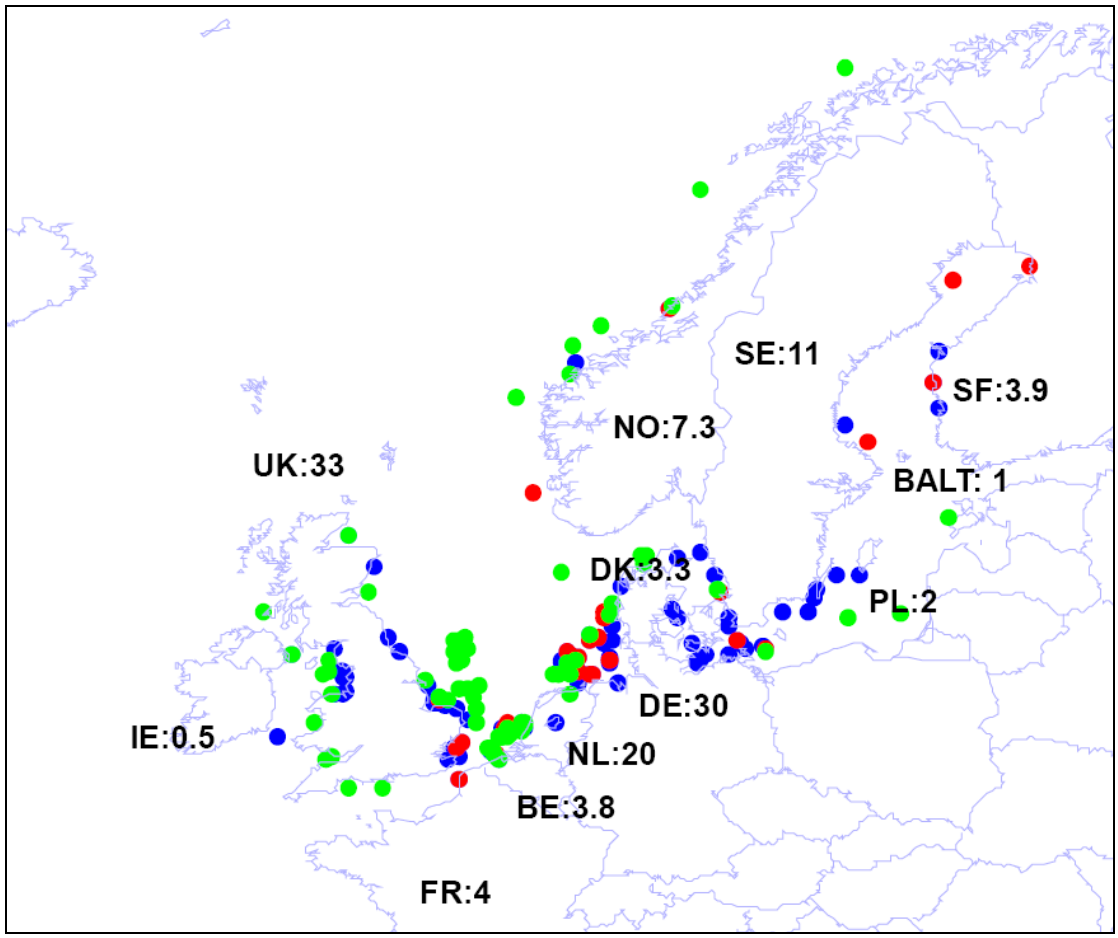


Table 1: TradeWind Scenarios Offshore Wind Power Installed Capacities (GW) for 2015, 2020 and 2030 in Northern Europe.

	2015 M	2020 M	2030 H
Belgium	0.5	1.3	3.8
Denmark	1.0	1.6	3.3
Finland	0.6	1.2	3.9
France	2.0	4.0	4.0
United Kingdom	6.5	20.0	33.0
Germany	3.0	15.0	30.0
Netherlands	2.0	3.5	20.0
Norway	0.1	0.5	7.3
Republic of Ireland	0.3	0.3	0.5
Sweden	1.8	3.8	11.0
Poland	0.0	0.0	2.0
Baltic States	0.0	0.0	1.0
TOTAL N EUROPE (GW)	**18**	**51**	**120**

Figure 2a) Areas of congestion in the Regional Forum – Central West[13].

Figure 2b) Areas of congestion in the Regional Forum – Central East[14]

[13] This map is taken from the first UCTE Transmission Development Plan which was published in June 2008 by the UCTE. The report is available on http://www.ucte.org/media/releases

[14] See footnote 11

Annex 1: List of persons interviewed

Date/Place	Event/ Main contacts	Objective
2007		
06/9, Brussels	**Commissioner A Piebalgs**	Discussion of scope of mission
09/10, Berlin	**Visit of Mr Adamowitsch to Vattenfall Europe in Berlin, Chauseestrasse** Hr Neldner, Techn. Geschäftsführer Vattenfall Europe Transmission Dr J Conrady, Vattenfall Europe AG Dr R Buttgereit, Director of Representation in Brussels	**Policy issues** Mr Adamowitsch presented his view about his work as European coordinator concerning the connection of wind power in Northern Europe **Technical issues** Network planning carried out by Vattenfall with emphasis on related problems in the authorisation procedure
10/10, Brussels	Director General M Ruete Director H Hilbrecht and Mrs K Veum Mr Kerner	Discussion of scope of mission Discussion of work programme Discussion on work plan
5/11, Brussels	Mr Adamowitsch and Mr Kerner Attendance of the "Tagung des VDEW-Lenkungsausschusses EU Binnenmarkt" in the evening	Discussion of the work programme, press conference and planning of missions
28-29/11, London	**Malcom Wicks, Minister of State for Energy at BERR** Gill Campbell, Assistant Director, John Everton Deputy Director Renewables Deployment Team, Peter Gysin Senior Policicy Advisor European Policy **Meeting with Ofgem** (Sir John Mogg, Chairman;) at **9 Millbank London SW1P 3GE** Robert Hull, Director, Transmission **Meeting with National Grid at BERR** (Graeme Steele - Europe & Energy Forecasting Manager; John Greasley - GBSO Offshore Manager)	Discussion of energy policy Regulatory issues Network development
30/11, Brussels	**Visit of Mr Adamowitsch to Commission** **EWEA-European Wind Energy Association** Arthouros Zervos, President; Christian Kjaer, CEO; Loïc	Joint press conference together with Coordinator Mielczarski Establish contacts with EWEA – European

	Blanchard, Senior policy advisor Prof. Mielczarski Commissioner Piebalgs	Wind Energy Association Coordination between the two coordinators concerning DE-PL links Report to the Commissioner
13/12, Helsinki	**Mr Mauri Pekkarinen, the Minister of Trade and Industry, Helsinki** Mr Henri Backman, Senior Adviser Mr. Erkki Eskola, Chief Counsellor, Renewables and Energy Efficiency Division/Energy Department Mr. Arto Rajala, Senior Counsellor, Energy Market Division/Energy Department **Meeting with Energy Market Authority** Ms Asta Sihvonen-Punkka, Director General and Ms Ritva Hirvonen, Head of Unit, Lintulahdenkatu 10, 00500 Helsinki **Meeting with the Finnish TSO Fingrid Plc** Mr Jukka Ruusunen, CEO and Mr Erkki Stam, Manager Market Analyses	Discussion of energy policy Offshore wind generation discussion Regulatory issues Network development
2008		
16/01, Den Haag	**Mrs. Maria J.A. van der Hoeven, Minster of Economic Affairs** Mr Eijkelberg (Min. Econ.Aff., deputy director Energy and Sustainability), Mrs. Y.Peters (Min.Econ.Aff., deputy director Electricity Market), Mrs. Lineke den Ouden (Min. Econ. Aff., Directorate Electricity Market), Mr. Imar Doornbos (Min. Econ. Aff., Directorate Energy & Sustainability) **Meeting with the Regulator (DTe)** Imar Doornbos (Min. Econ. Aff., Directorate Energy & Sustainability), Lineke den Ouden (Min. Econ. Aff., Directorate Electricity Market), * Ben Voorhorst (TenneT), * M. Fransen (DTe), Eppie Pelgrum (TenneT), Robert Spencer **(**DTe) **Meeting with the Dutch TSO TenneT** Same participants	Discussion of energy policy Regulatory issues Network development

28/01, Brussels	**Commissioner A Piebalgs** **MEP Mechtild Rothe** **Discussion with Europacable** *.Dr* Volker Wendt *Consultant to Europacable* Dr Pierre H. Kayoun *EU Spokesperson for Europacable* Hans De Keulenaer *EU Spokesperson for Europacable*	Report of activity Raising awareness in European Parliament Contact with stakeholder
06/02, Berlin	**Vattenfall Transmission** **Gemeinsames Mittagessen - Teilnehmer** Hr. Neldner, Hr. Kranhold, Hr. Adamowitsch, Hr. Kerner Prof. Mielczarski, Hr Schwartz, Dr. Pape (BMWi) Mrs. Meike Wulfers **Gesprächsrunde mit den EU-Koordinatoren** *Same participants plus* Dr. Frank Golletz, Prokurist Wolfgang Bogenrieder, Generalbevollmächtigter Thomas Dockhorn, Leiter RZ Südwest Thomas Schubert, PSW Goldisthal Bernhard Segbers, Genehmigungsmanager Dr. Markus Böckel, Jurist	Discussion of loop flow problem in Germany and Poland Joint action of two European coordinators With participation of staff from German ministry
6-7/02, Erfurt	**Ministerium für Bau & Verkehr des Freistaates Thüringen** Minister Trautvetter (TMBV) Hr. Langlotz (TMBV), Hr. Lange (TMWTA), Hr. Müller(TMWTA), Hr. Adamowitsch (TEN-Koordinator), Dr. Kerner (EU-Kommission, Referat für Politik der transeuropäischen Netze), Hr. Schrader (TMLNU), Hr. Gnauck (E.TE), Hr. Stephan (LVWA), Hr. Gerhardt (LVWA), Hr. Neldner (VE-T), Dr. Golletz (VE-T), Hr. Fischer (VE-T) Hr. Bogenrieder (VE-T) **Site visit in Thüringen** Same participants plus Hr. Meusel, Nationalparks Thüringer Wald Hr. H Worm (CDU) MdL	Visit of ministry in Thüringen Network development (Project of European interest) Discussion of obstacles to construction Staking stock of political aspects Discussion of environmental problems Discussion with the public and environmental groups

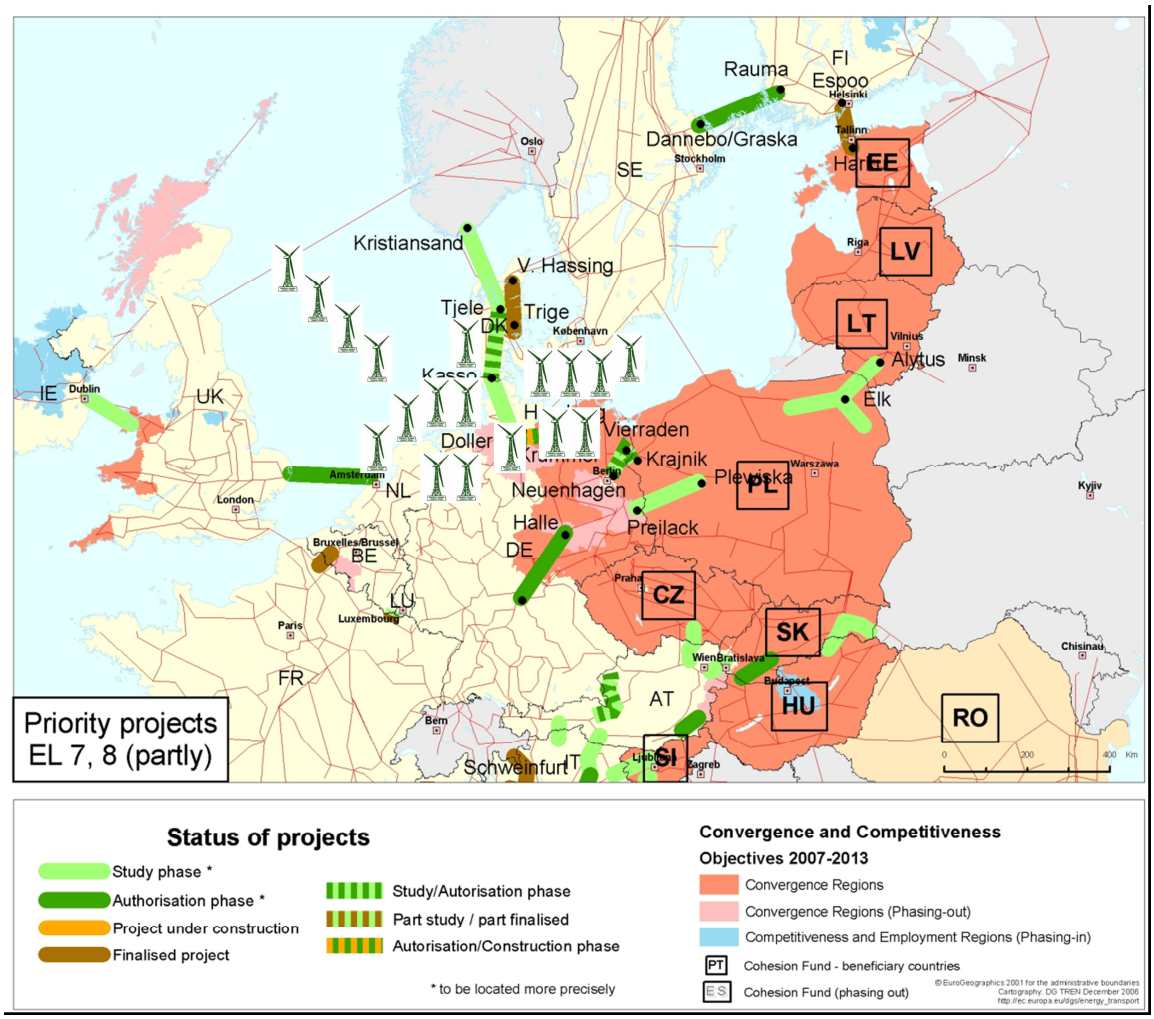
	Informal Discussion at Erfurt airport Claus Peter Müller (Frankfurter Allgemeine Zeitung – Korrespondent Mitteldeutschland) Dietmar Grosser (Thüringer Allgemeine – Stv. Chefredakteur Wirtschaft) Jens Voigt (Freies Wort – Wirtschaftsredaktion)	Adamowitsch answered questions by journalists
20/02, Berlin	Staendiger Ausschuss Offshore Windenergie der Bundesregierung Deutschland Organised by Deutsche Energie-Agentur GmbH (dena)	Discussion of offshore wind energy in Germany
27/02, Brussels	**MEP Werner Langen** **Participation in the Joint Conference by the European Commission and** ERGEG"The Regional Initiatives – Europe's key to energy market integration"	Raising awareness in European Parliament Presentation at Conference **Roundtable Chairman of the panel** 'The new framework – a more coordinated regional approach'
13/03, Oslo	**Minister for Petroleum and Energy, Ms Åslaug Haga** Director General Mr. Sigurd Tveitereid, Deputy Director General Ms. Ann Ingeborg Hjetland, Oil and Gas activities, Advisor Ms. Cecilie Ravn Munkvold, Director General Mr. Agnar Aas with colleagues, Marit Lundteigen Fossdal / Nils Martin Espegren / Torodd Jensen / Tor Arnt Johnsen, Pål Tore Svendsen / Gunnar Hognestad / Katrin Lervik Additional meetings included in-depth discussions with the Norwegian Energy department * Regulator * Grid operator * Power producer In addition, the following persons took part in the discussions: Sigurd Tveitereid OED Katrin Lervik OED Ove Flataker OED Alexandra Bech Gjørv StatoilHydro Agnar Aas NVE Oluf Ulseth Statkraft	Discussion of energy policy Regulatory Issues Network development Wind generation, operation and balancing

	Håkon Egeland Statkraft From Statnett: Odd Håkon Hoelsæter, President & CEO Gunnar G. Løvås, Executive Vice President Carsten Dovland, Head of Project Development Kjartan Hauglum, Project Manager Offshore Grid	
31/03, Brussels	**J Laitenberger, European Commission Spokesperson** **European Wind Energy Conference and Exhibition**	Raising awareness in the Commission Presentation and Participation in the European Wind Energy Conference and Exhibition
04/04, Copenhagen	**Connie Hedegaard, the Danish Minister for Climate and Energy** Vicedirector Anne Hojer Simonsen, * Sune Thorvildsen, Anders Højgaard Kristensen <u>Additional meeting</u> enabling in-depth discussions with the Danish Grid Operator Energinet/ DK Peter JØRGENSEN, Vicepresident, Director of Planning, Peder Andreasen, Adm. Director	Discussion of energy policy Regulatory issues Network development
07/04, Gdansk 08/04, Warsaw	**International Conference Offshore wind energy development on the Baltic Sea – chances and opportunities** Held on 7 – 8 April 2008 in Holiday Inn Hotel in Gdansk **Polish Government:** **Deputy Prime Minister Waldemar Pawlak,** Minister of Economy and Secretary of State, Chief of Political Cabinet of the Prime Minister S•awomir Nowak and Zbigniew Kamienski, director general in the Energy Ministry (and staff)	Presentation and Participation in the International Conference Offshore wind energy development on the Baltic Sea – chances and opportunities", Discussion of energy policy
17/04, Stockholm	**Maud Olofsson, Minister for Enterprise and Energy** Deputy director Lars Andersson, ***** Political Adviser Anders Nyberg, Secretariat for EU and International Coordination Daniel Badman <u>Additional meetings</u> enabling in-depth discussions with the - Swedish Grid Operator Svenska Kraftnät Michael Odenberg (Director General), Sture Larsson (Technical director), Representatives of Swedenergy	Discussion of energy policy Regulatory issues

	Matthias Rapp, Bo Kaellstrand, The Energy Markets Inspectorate (Energimarknadsinspektionen) Fredrik Dahlqvist, responsible for wind power, Remy Kolessar, Head of Unit	Network development
15/05, Berlin	**First Stakeholder meeting for the Polish-German TEN-Projects** Georg Adamowitsch, Wladyslaw Mielczarski, Wolfgang Kerner, Jean-Claude Schwartz, Moneim Eltohami, Metz Dieter, Lagoda Waldemar, Andrea Korr, Markus Gartner, Tomasz Kowalak, Robert Guzik, Stefania Kasprzyk, Magdalena Wasiluk-Hassa, Jerzy Dudzik, Cezary Szwed, Wolfgang Neldner, Stefan Dohler, Hans-Peter Erbring, Frank Berger, Kranhold Michael, Wilfried Fischer, Rudiger Reinisch	Open and transparent discussion of high-voltage grid issues concerning Poland and Germany with emphasis on policy and regulatory issues & operation and technical issues
22-23/05, Dena	**Visit to the Deutsche Energy-Agentur (Dena) on 22-23 May 2008 and visit at KPMG Deutsche Treuhand-Gesellshaft-Aktiengesellschaft on 23 May.**	Discussion of network development in Germany
11/06, Brussels	**Visit of Adamowitsch to DG TREN** 11:30 - 12:20 with Director General Adjoint Barbaso , HoU Vinois and van Steen 10:30 - 11:15 with Prof. Gretschmann in Council 14:45 - 15:15 with MEP Niebler in EP 15:30 - 16:15 with MEP Turmes in EP 18:00 - 19:00 with Vice-President Verheugen In the Commission	Report on progress of work & Exchange of views with TREN Information about the mission of the coordinator Raising awareness in European Parliament Discussion of energy policy
23-24/06, London	**International Conference RENEWABLE ENERGY GRID INTEGRATION SUMMIT 2008**	Presentation from Mr Adamowitsch
02/07, Berlin	**Staatssekretär Matthias Machnig** 6.1. **(Bundesumweltminister Sigmar Gabriel was not available) and Staff**	Discussion of energy policy in the Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit in Berlin
30/07, Brussels	**Working group for Offshore/onshore grid development - 1st meeting**	Open and transparent discussion of offshore/ onshore grid planning issues & Development of data and analysis delivered to the timely

		implementation of the electricity network connecting offshore renewables.
	Offshore Industry expert group - 1st meeting Georg Adamowitsch, Wolfgang Kerner, Niels Ladefoged, Peter Christensen, Imar Doornbos, Marco Foresti, Olé Graabaek, John Greasley, Kjartan Hauglum, Will Kling Kedar Kolharkar, Sune Korreman, Hervé Mignon, Antje Orths, John Overton, Rudiger Reinish, Christian Shneller Gert Schwazbach, Tilman Schwencke, Bo Normark, Fawaz Al Bitar, Frédéric Dunon, Frans Van Hulle, Annemie Vermeylen, Justin Wilkes, Wilhelm Winter, Svend Jensen Hans Ten Berg, Dorte Jensen, Kaj Lindevig	Experts from offshore industry and developers report on risks, obstacles and barriers related to offshore power generation and transmission.
09/09, Brussels	**Visit to DG TREN** **Meeting with Mr Hilbrecht**	Discussion on the work programme for next year

Annex 2: Map of the projects related to the connection to offshore wind power in Northern Europe (North Sea, Baltic Sea)[15]



[15] The status of projects presented on this map is up to January 2007 (see Priority Interconnection Plan, COM(2006) 846). An update of the projects state of implementation is presented in Annex 3.

Annex 3: Concrete progress of projects of European interest related to North Sea and Baltic Sea area[16]

FINALISED PROJECTS

EL1 2.2 Avelin (FR) – Avelgem (BE) line

The link went into operation in 2005.

EL7 3.2 V. Hassing (DK) – Trige (DK) line

The project is in operation since 2004.

EL7 2.30 Estlink undersea cable link between Finland and Estonia

The project is in operation since December 2006.

PROJECTS UNDER CONSTRUCTION

EL5 2.21 Undersea cable link between England (UK) and the Netherlands

Construction on the link has commenced. The link will be jointly owned and operated by National Grid and TenneT. The line is scheduled to go into operation in 2010.

On the 25th of May 2007 National Grid and TenneT have announced their intention to invest in the BritNed interconnector. The BritNed interconnector regards a new 260km 1,000 megawatt electricity interconnector between the Isle of Grain in the United Kingdom en Maasvlakte in the Netherlands. The construction of the interconnector has commenced during the summer of 2007 – after having received the relevant regulatory exemptions – and is expected to be commissioned by late 2010.

The joint-venture project will increase diversity of supply and provide greater opportunities for BritNed's customers to participate in European electricity markets and it will contribute to security of supply in both energy markets. BritNed will be a non-socialized interconnector, which means all investment will be covered by National Grid and TenneT through the joint venture contract and will be separated from their regulated businesses. All of BritNed's capacity will be available for BritNed customers via a combination of 'implicit' auctions (marketcoupling), facilitated by the APX Group (former Amsterdam Power Exchange), and short term 'explicit' auctions.

EL7 2.15 Fenno-Skan subsea link between Finland and Sweden

The permitting procedure has been completed in spring 2008 and contractors selected with competitive bidding. Yet, the construction is delayed by one year because the cable suppliers face problems to deliver the cable according to the original time schedule. In consequence, this submarine cable is scheduled to go into operation at the end of 2011.

EL7 3.48 Hamburg/Krümmel (DE) – Schwerin (DE)

Sections of the link are still in the extended authorisation phase. The line is included in the German Energy line extension Law proposed to the Parliament in 2008.

EL7 3.49 Halle/Saale (DE) – Schweinfurt (DE)

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[16] Status up to September 2008 based on TSOs consultation and the UCTE Transmission Development Grid published in June 2008.

The line consists of three sections. Section 1 is under construction (70 km) and is scheduled to go into operation by the end of 2008. Section 2 and 3 are in the authorisation phase. The complete link is expected to go into operation in 2010.

Section 1 "Lauchstaedt – Vieselbach": Approval of Plan finished, construction started.

Section 2 "Vieselbach – Altenfeld": Pegional Planning Procedure finished.

Section 3 "Altenfeld – Redwitz": Massive public attacks (lack of acceptance)

PROJECTS IN THE PLANNING/PERMITTING PHASE

EL1 2.1 Moulaine - Aubange

The link is completed on the Belgian side. On the French side, the permitting procedure is now ongoing on this part of the project of 13 to 16 km length. The line is scheduled to go into operation in 2010.

Studies are being carried out into further increasing this interconnection capacity.

EL6 1.1 Undersea cable link between Ireland and Wales (UK)

The link is in the study phase. The tendering phase is nearing completion and planning application submissions are being prepared. It is expected that planning applications and licence applications shall be submitted in both Ireland and Wales (UK) in quarter 3 2008 and that the tendering process shall be complete by the end of 2008. Subject to the outcome of the tendering process and to the planning application and permitting process, the line is scheduled to go into operation in 2012/2013.

EL7 2.22 Kassö (DK) – Hamburg/Dollern (DE) line

The link was upgraded to 950 MW direction north and 1500 MW direction south by February 2007.

There are ongoing planning activities concerning higher transport capacity e.g. with a new interconnector Kassö - Audorf. The main problems encountered are the high population density in the area of the project and the difficulty to plan for a very large amount of windpower to be transmitted between both countries. A letter of intent between EON Netz and Energinet.dk has been signed on upgrading to 1500 MW direction north and 2000 MW direction south by 2012 and, furthermore to study upgrading to 2500 MW in both directions by 2017. The first part of this interconnection (Hamburg/Nord – Dollern) is scheduled to enter into operation in 2010. Upgrading the existing cross border lines until 2011 will increase transport capacity by approx. 500 MW.

EL7 3.2 Kasso (DK) – Revsing (DK) – Tjele (DK) line

The first part of the project (Kassø – Revsing) is in the authorisation phase; its second part (Endrup-Idomlund) is in the study phase. The obstacles are due to the dependence on other projects (e.g. Kasso-Hamburg/Dollern, Skagerrak IV) and wind power allocation, the difficult acceptance of land owners, and the restructuring of relevant authorities. The first part of the line is scheduled to go into operation in 2009 and the second part in 2015. A “technical report on the future expansion and undergrounding of the electricity transmission grid” was given to the Danish politicians in April 2008.

EL7 4.26 Skagerrak 4 (DK) – Norway undersea cable

This new interconnector will expand the existing 1.000 MW capacity between Norway and Denmark with approx. 600 MW. The study phase was completed in 2007. Upgrading with 600 MW has been decided in Statnett and Energinet.dk boards of

directors. It is expected that the project will be in the licensing-phase until 2011 and possibly in operation 2014.

EL8 2.28 Neuenhagen (DE) – Uckermark/Vierraden (DE) – Krajnik (PL) line (including the upgrading of the Polish grid)

The main arguments raised during the public consultation are the concern pertaining to the environmental protection, the routing through a natural reserve, the deterioration of the landscape and the fear of Electromagnetic fields. A solution could be based on the outcome from the bilateral Polish German study, on a fair and transparent dialogue with all the relevant local interest groups, improved understanding of European needs for common market and coordination with local authorities.

The project is scheduled to go into operation beginning of 2010 (section Uckermark) and after 2015 (section Krajnik-Vierraden and upgrading of the Polish grid).

EL8 2.32 New interconnection between Germany and Poland (including upgrading of the Polish grid according to connection as in the Vierraden (DE) – Krajnik (PL) project)

The link is in the study phase and is schedule to go into operation after 2015.