MVV Consulting

Implementation of TEN-E projects (2004-2006) Evaluation and Analysis

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Abbreviations, units

Bcm	Billion cubic meter (10^9 m³)
Bcm/y	Billion cubic meter per year
EMF	Electromagnetic fields
IDS (DS)	Interview Data Sheet / Data Sheet
LNG	Liquid Natural Gas
NGO	Non-Governmental Organisation
NIMBY	“Not in my backyard”
NTC	Net Transfer Capacity
MS	Member State
PCI	Project of Common Interest
PIP	Priority Interconnection Plan
PEI	Project of European Interest
TEN (E)	Trans European (Energy) Networks

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Evaluation and Analysis

Executive summary

a. Objective and scope

The project objective is to analyse and evaluate the progress made in the implementation of TEN-E priority projects for electricity and gas networks (according to the 2006 TEN guidelines), comprising projects of European interest as well as LNG terminals, during the period 2004 – 2006. A brief analysis of the implementation progress of projects of common interest is also included.

In total, 286 projects (164 projects for electricity and 122 for gas) are listed in Annex III of the 2006 TEN guidelines as being "of common interest". For the purpose of this study, 42 projects of European interest (PEI), which have a cross-border aspect or have significant impact on cross-border transmission capacity, and 29 priority LNG terminals, which have an essential role in adding gas import capacity, have been reviewed and analysed. In addition, 132 electricity projects of common interest and 89 gas projects of common interest have been briefly reviewed.

b. Progress review of priority projects

In total 32 electricity projects of European interest have been reviewed. 5 projects had been finalised, 1 project is under construction, and 7 are in the authorisation phase, while 14 projects were under study. The balance has project components with different implementation phases. Among the finalised projects is the Fiorano-Robbia line, which connects Switzerland with Italy.

In total 15 gas pipeline sub-projects have been reviewed, which condense to 10 PEI because 5 projects were included as sub-projects into the PEI. One PEI has been put into operation (Libya-Italy (Gela) gas pipeline in 2004), 4 projects are in the construction phase (some with components under authorisation or in study) and 3 projects are in the authorisation phase. 2 projects are under study, with the Yamal – Europe gas pipeline in the early study phase of identification.

In total 38 projects of LNG terminals have been reviewed. Due to the integration of several projects in other projects and due to cancellation of projects, mainly in Italy in both cases, 29 LNG terminal priority projects were left for further analysis. Among these 29 LNG terminal priority projects 2 were put into operation (the extension of the LNG terminal in Barcelona (ES) and the new terminal in Sines (PT)). 10 projects are under construction and 9 are in the authorisation phase. 7 projects are in the study phase, including one project where authorisation has started. The construction of a second LNG terminal in continental Greece has been cancelled due to alternative options.

c. Analysis of implementation obstacles

41% of the electricity PEI show no or minor delays, while 34% show medium delays and 25% of all projects have long delays up to 10 years or longer. The main reasons for delays in the study phase were pending decisions of policy makers and coordination problems between TSOs, local authorities, and other stakeholders. The main arguments which prevented progress with decisions and coordination have been of an environmental nature, followed by technical arguments and the fear of electromagnetic fields. Major arguments against progress in the authorisation phase encompass fear of electromagnetic fields and environmental issues. The deterioration of the landscape view was also raised as a major argument which led to delays.

Overall, all gas pipeline project are being pursued without significant delays. Though the practice of authorisations (environmental, institutional and/or planning permission) and the necessary cross-border coordination partly remain in their infancy and represent formidable local, regional and national obstacles for any new venture, major international TSOs are able to mobilise teams of experts in all fields, especially environment, to deal with all upstream requirements and studies concerning authorisations and environmental protection measures. Experienced European TSOs are capable of dealing with such constraints and manage to take them into account in their overall planning.

The majority of the LNG terminal projects are ongoing, but several are hampered in their execution. In particular, projects in Italy are delayed. Though the Italian authorities decided to resolve all environmental permits through the "Cabina di Regia" process in due time, until February 2007 no decision had been taken for 4 projects. Other projects are delayed due to strong local opposition and opposition from environmental groups.

d. Evaluation of TEN axis developments with regard to electricity and gas PEI and LNG terminals

Impacts were assessed for electricity and gas PEIs. In fact, the impact assessment of electricity PEIs shows that substantial improvements have been effected but also that major problems remain to be resolved. Improvements include:

- Congestions between Portugal, Spain, France, as well as between France and Belgium are being relaxed and regional markets will be more integrated through completion of the projects of the EL3 axis (France – Spain – Portugal) and the EL1 axis (France – Belgium – the Netherlands – Germany).

- The projects along the EL4 axis (Greece – Balkan countries – UCTE System) and the EL9 axis (Mediterranean Member States – Mediterranean Electricity Ring) will achieve synchronisation of neighbouring countries with the UCTE system and constitute elements in closing the Mediterranean ring. Furthermore, the connection between Tunisia and Italy would allow for power imports from Tunisia to Italy, improving security of supply.

- The undersea cables along the EL5 axis (United Kingdom – Continental Europe and Northern Europe), the EL6 axis (Ireland – United Kingdom), and the Estlink and Fennoscan cables of the EL7 link contribute to enhancing transmission capacities, improving competition, and integrating regional power markets.

- Power imports from Scandinavia and transport of wind generated power from Denmark and Northern Germany to load centres in Southern Germany will be facilitated by projects of the EL7 axis (Denmark – Germany – Baltic Ring (including Norway – Sweden – Finland – Denmark – Germany – Poland – Baltic States – Russia).

- Italy's power imports have benefited from projects of the EL2 axis (Borders of Italy with France, Austria, Slovenia and Switzerland), namely the Robbia line and are expected to benefit from the planned connection with Slovenia.

- The Slovak lines and interconnections with Hungary of the EL8 axis (Germany – Poland – Czech Republic – Slovakia – Austria – Hungary – Slovenia) will reduce the notorious congestion of the existing interconnections and contribute to increased trade with Hungary.

Major problems that remain to be resolved in the context of implementing electricity PEI, include:

- The power flow in Austria from the North to the South is highly congested due to lack of transmission capacity. This bottleneck has a huge influence on the transfer capacities of Austria. It is expected that without the commissioning of the St. Peter - Tauern line (3.60) as well as the Südburgenland - Kainachtal line (3.61) of the EL2 axis (Borders of Italy with France, Austria, Slovenia and Switzerland) all planned investments on the Austrian borders with Italy and Slovenia and with the Czech Republic, Slovakia along the EL8 axis (Denmark – Germany – Baltic Ring (including Norway – Sweden – Finland – Denmark – Germany – Poland – Baltic States – Russia), will only have a limited effect.

- The planned interconnection through the Brenner rail tunnel of the EL2 axis would only yield benefits if new transmission lines were built in Italy and to the North, including new connections to Germany. More studies about links in Italy and possibly to Germany are needed.

- Due to the existing loop flows from Germany to Poland and back to Germany via the Czech Republic, any upgrade of the connection between Germany and Poland (as project of the EL8 axis) is not expected to increase net transfer capacity as long as major reinforcement in the Polish grid remains to be effected.

- The capacity of the interconnector between Poland and Lithuania, foreseen under the EL7 axis, can only be exploited if considerable reinforcements in the North-East part of the Polish transmission system are made. Further reinforcement might need to be studied to transfer power from plants in the South of Poland to the North-East.

Concerning gas network PEIs, many new projects are ongoing, have been studied and developed to meet strong demand growth for natural gas in Europe. The evaluation of the NG1 axis shows that almost 50% of the future gas demand increase in the region will be met by the Nord Stream Gas project to be developed by Gazprom and its German partners. Other PEIs in the region are delayed as less attractive alternatives, such as the second EuroPol –Yamal pipeline. The net result will be an even greater dependency for Northern Continental Europe on Russia as a reliable and timely gas supplier. However, if the assessment also includes other projects in addition to the PEI such as the Ormen Lange Pipeline and the important LNG developments, at least the UK will have a more balanced diversified import mix. For Northern Continental Europe, the LNG plants in Eemshaven, Rotterdam and possibly Wilhelmshaven will also lessen the dependence on Russian imports, together with the PEI project of expansion of Zeebrugge LNG. The newly announced Sayda –Eynatten pipeline may be ‘the missing link’ in the European pipeline system as it will eventually connect the UK market with the Caspian Sea – Middle East region. Although its planned capacity of 5 Bcm is small in comparison to projects like Ormen Lange and Nord Stream, it will have a strategic impact on the European energy mix in the future.

Along the NG2 axis (Algeria and Libya into Spain and Italy) the main additional capacity will be provided by pipelines (2007 – 2011), an increase of existing pipeline capacity and new LNG plants. Both Spain and Italy have embarked on impressive investment programs to secure the security and diversity of their future gas imports from across the Mediterranean Sea, complemented by a wide array of LNG plants spread out over their countries. This goes hand–in–hand with a strong growth of gas consumption.

Along the NG3 axis (gas from Caspian Sea - Middle East) the origin of the additional gas will be from the Caspian Sea Region. Austria, Italy, Greece and Turkey have embarked on impressive investment programs to secure the security and diversity of their future gas imports from the Caspian Sea region and the Middle East, complemented with a wide array of LNG plants in Italy and storage plants in

Austria. This goes hand– in–hand with a very strong growth of gas consumption. Additional transport capacities are:

- the Nabucco pipeline
- the ITG pipeline
- the IGI pipeline
- the TAG pipeline's capacity increase (same entry point as the Nabucco pipeline).

Whereas in northern and continental Europe new pipeline projects cater for extra imports, in the Mediterranean countries, primarily LNG and pipeline projects are expected to meet future demand. The main developments related to LNG terminals (NG4) are in southwest European countries, namely Italy and Spain. The only other priority development outside those countries is in Belgium and France. Due to the impressive growth in LNG plants, between 2005 and 2020 Europe will see a near doubling of the LNG market share to almost 20%.

e. Evaluation of authorization procedures

In all permission procedures in western and southern Europe, the EIA is of primary importance. These assessments are rather time consuming; they are the main reason for delays in obtaining an authorization for a project. Yet in all European countries there are completely different procedural laws. This is due to national legislation habits. These different national habits and their translation into practice are mainly responsible for different durations in permission procedures. All in all, approval procedures de facto last much longer than is legally provided for. Certainly, this is partly due to the skills of the authority staff, which does not seem to measure up to the requirements. But of crucial importance is the fact that legal regulations do not provide for a significant acceleration. This is the reason for the delays observed in Germany and Austria. Similar types of delay could also be observed in the so far existing Italian legislation, but a new practice in Italy as a result of the well known barriers accelerates the permission procedure. Agreements between the authorities and concerned parties and NGOs precede the formal authorisation phase according to the existent laws and delays are expected to be reduced to a remarkable extent.

In contrast to procedures in Western and Southern Europe, authorization practice in northern European countries (Denmark, Finland, Estonia, Sweden, Great Britain, Ireland) is much more pragmatically oriented in spite of a basically similar situation (problems of environmental protection: landscape, overhead lines versus underground cables, electromagnetic fields, etc.). Existing environmental problems are thoroughly discussed in the context of the EIA, but at the same time, practical considerations emphasizing national interests are included. Thus, in Denmark, there may be a "call-in" by the minister in charge, because of national interests. As a result, objections by citizens or NGOs may be rejected, and the project application may be approved by the minister.

The French, Belgian, Spanish and Portuguese procedures are to be seen as individual cases; related problems are not comparable to the structural problems in central European MS. For example, delays in the implementation of the project "Sentmenat (Spain) – Becano (Spain) – Baixas (France)" are due to the fact that so far no agreement about the cross point between France and Spain has been reached. A political agreement was strived for, but will depend on the outcome of the presidential elections in France in 2007. Anyhow, it was considered whether it would not be reasonable to appoint a coordinator for this project according to the TEN-E guidelines 2006. If these problems in "Roman" countries are compared with the problems identified in Germany, Austria, and Italy, it can be seen that the actual problems in the implementation of projects of European interest rather lie in the area of administrative practice.

f. Conclusions

Historically, the interconnections in Western Europe have been designed to maintain the security of operation of the interconnected power systems, but not to transfer power flows for trading in energy. With the development of trading activities the focus came more on congested cross-border interconnections than on congestions of lines and nodes in an intermeshed network. The cases of the loop flows between Germany, Poland, and the Czech Republic along the El7 and El8 axes as well as the lack of transit capacity inside Austria (EL8) demonstrate that the focus should be on the network as a whole. The location of new power plants is also an important aspect of capacities in networks. The high but intermittent wind generation in Denmark and Northern Germany demonstrates how the location of the plant determines the need for lines to transit the power to the load centres, to enable trade, but also to secure system stability.

As the intermeshed network comes into more focus, the allocation mechanisms of transmission capacity should also take into consideration congested lines or nodes rather than looking only at the cross-border points. The example of the internal North-South congestion inside Austria clearly demonstrates that benefits of a line-enforcement will occur not only within Austria but also for all neighbouring countries.

Due to the strong demand growth for natural gas in Europe, and increasing depletion of older gas fields in countries such as Holland, the UK, etc. (except the recent discoveries in Norway), Europe's gas supply will become more dependent on Russia, the Caspian Sea region and the Middle East. Whereas in Northern and Continental Europe new pipelines will enable imports, in the Mediterranean countries both LNG and pipelines will fill the gap. LNG allows a much greater diversification of supply sources and transport routes. However, in the field of underground gas storage the overall European component is still missing. With overall European demand growing continuously, it is to be expected that by 2015 underground storage shortages will expand. A cross-border European solution might have to supplement traditional national market-based approaches from the past.

The key requirement for success of any type of new gas project remains the cooperation between producers and importers in a liberalized but well regulated and transparent market. Most countries need to further reduce regulatory risks and make further efforts to harmonize the legal/regulatory framework to foster much needed (cross-border) project investments in the future.

In most of the Member States there are considerable delays with permission procedures. This is due to national regulations but also to an observable time-consuming practice in each Member State. There is no legal priority for those European projects. As a consequence there is no legal obligation to speed up the procedure or to shorten the time limits and reduce the juridical procedures in the case of a Project of European Interest. Therefore, the EC should consider the possibility of decreeing that Member States should have to issue regulations to accelerate permission procedures as far as PEIs are concerned. The regulations of the EC treaty regarding the domestic market (art. 14) and regarding the Trans-European Networks (art. 154) could serve as a respective legal basis. The best approach to accelerate PEIs is to impose a Directive concerning authorization procedures. The long procedures should then be made uniform and reduced.

Implementation of TEN-E projects (2004-2006)

Evaluation and Analysis

1. Introduction

1.1. Background

The European Union's policy concerning Trans-European Networks is based on four pillars:

- The Treaty on European Union,
- The legal basis for TEN, articles 154-156, EC Treaty,
- The regulation on TEN financial support,
- The European Commission's guidelines for TEN-Energy, identifying axes for priority projects and Projects of Common European Interest.

The European Commission guidelines for TEN-Energy were adopted in 1996 comprising a list of energy Projects of Common Interest (PCI). The list was revised in 1997 and 1999. Revised guidelines came into force in June 2003, aiming to promote the development of the internal market for electricity and gas supplies. In particular, these guidelines set out priority projects, which have been identified as the most important for security of supply or for the competitive operation of the internal energy market.

With the last enlargement wave the 2003 guidelines needed to be updated to accommodate the ten new member sates and nations outside the EU's new borders. The recent guidelines were published in the Official Journal of the European Union on 22.09.2006 L 262. Priority projects shall be selected if they meet one or more of the following criteria:

- they have a significant impact on increasing competition in the internal market;
- they strengthen security of energy supply in the EU;
- they result in an increase in the use of renewable energies.

A number of projects on the axes for priority projects which are of cross-border nature or which have significant impact on cross-border transmission capacity are declared to be projects of European interest (PEI).

When a project declared to be of European interest encounters significant delays or implementation difficulties, it was decided that a European coordinator should be appointed "at the request of the Member States concerned".

1.2. Objectives and approach

1.2.1. Objective and scope of work

The objective of the study is to review the progress made in the implementation of TEN electricity and gas projects during the period 2004 – 2006 and to analyse the reasons for delays, concerning legal, planning, operational and organisational as well as financial barriers. The study focuses on the in-depth analysis of the implementation of the Projects of European Interest (PEI) and the priority projects for Liquefied Natural Gas and underground gas storage as specified in the revised TEN-E guidelines 2006. The scope of works covers the following task areas:

1. Stock-taking of the implementation of the TEN-E projects during 2004 – 2006.
2. In depth analysis of the implementation of the Projects of European Interest and the priority projects for Liquefied Natural Gas and underground gas storage as specified in the revised TEN-E guidelines 2006.
3. Analysis of the reasons for delay concerning legal, planning, operational and organisational as well as financial barriers to the construction of these projects of highest priority.
4. Proposing appropriate measures for accelerating the implementation of these projects of highest priority.

1.2.2. Project definition and reference

The assessment focuses on the period from 2004 to 2006. For this period most projects have been numbered according to Annex III of the 2003 TEN-E guidelines[1] (Annex III 2003). A revised project list with numbering was introduced with Annex III of the 2006 TEN-E guidelines[2] (Annex III 2006). In this assessment all projects are numbered in compliance with Annex III 2006. Reference is always made to project numbers.

In total, 286 projects (164 projects for electricity and 122 for gas) are listed in Annex III 2006 as being "of common interest". For the purpose of this study, 42 projects of European interest (PEI), which have a cross-border aspect or have significant impact on cross-border transmission capacity, and 29 priority LNG terminals, which have an essential role in adding gas import capacity, have been reviewed and analysed. These projects include projects without being listed in Annex III 2006 (because they are old or new projects), and these projects also include two or more single projects of Annex III 2006 as subprojects. Therefore, the number of the remaining projects in the Annex III 2006 list balances to 219.

In addition to the review and analysis of the 42 PEI and 29 priority LNG terminals 132 electricity projects of common interest and 89 gas projects of common interest have been briefly reviewed. The total number of 221 deviates from the balance of the Annex III 2006 numbering (219), because the reviewed gas projects include two projects without Annex III 2006 numbering.

1.2.3. Data collection and sources of information

In a first approach information and data regarding the progress of project implementation was collected by telephone interviews. In a second and third step information was validated by selected face-to-face interviews and by additional information provided by DG TREN and by Member States' up-dated reporting of project implementation status.

Data have been collected according to technical, planning, financial and organisational as well as legal aspects which are relevant for the analysis of implementation progress and which could provide information about possible barriers to timely implementation. The data have been collected for each project and resulted in a broad number of project related data sheets (IDS and DS), which are attached

[1] DECISION No 1229/2003/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2003, laying down a series of guidelines for trans-European energy networks and repealing Decision No 1254/96/EC;

[2] DECISION No 1364/2006/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 September 2006, laying down guidelines for trans-European energy networks and repealing Decision 96/391/EC and Decision No 1229/2003/EC

in Annex I for electricity PEIs and in Annex II for gas priority projects, respectively for PCIs in Annex III and Annex IV.

Main sources of information have been the pertinent transmission system operators and selected studies provided by DG TREN, in particular:

- Report from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions on the implementation of the guidelines for trans-European energy networks in the period 2002-2004 pursuant to Article 11 of Decision 1229/2003/EC. COM(2006) 443 final.

- Commission staff working document - Report from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions on the implementation of the guidelines for trans-European networks in the period 2002-2004 pursuant to Article 11 of Decision 1229/2003/EC. SEC(2006) 1059.

- Bureau van Dijk Management Consultants Brussels, MID-TERM EVALUATION OF THE TEN-E PROGRAMME 2000-2006, Final Report, Release of July 6, 2004.

- KEMA Consulting (Bonn, Germany), Analysis of the network capacities and possible congestion of the electricity transmission networks within the accession countries, June 2005 (Version 1.3).

- CESI spa, IIT, ME, RAMBØLL A/S, TEN-ENERGY - Invest, October 2005.

In addition, a variety of publicly available information sources have been tapped, including information of associations such as UCTE and internet publications and data.

1.2.4. Structure of the study

This study is divided into 4 main sections:

1. The implementation status and the progress of priority projects (electricity and gas pipeline PEI and LNG terminals) and of projects of common interest are reviewed in the first section (chapters 2 and 3). For priority projects the review is done by TEN axis and describes the key figures as well as the main issues relevant for the implementation progress. The status of projects of common interest is presented in a brief overview.

2. The reasons for delays of priority projects, concerning legal, planning, operational and organisational as well as financial barriers, are analysed in chapter 4.

3. The relevance of priority projects and their contribution to improving the networks along the TEN axes are evaluated in chapter 5.

4. Conclusions concerning project coordination and authorisation acceleration are presented in chapter 6.

2. Review of priority project progress

2.1. Methodological approach

Primary information about the status of project implementation is based on project data sheets which had been prepared as a result of a data collection process (cf. chapter 1.2.3). The data sheet information has been compared with and up-dated with DG TREN reporting on the Priority Interconnection Plan[3] (PIP) and latest available information from the Member States about project implementation.

The assessment of the status and progress in the implementation of priority projects makes use of these information sources to the best extent possible in order to draw a realistic picture of the situation as prevailing by end of the year 2006. Figures and other data have been assessed between the information sources in order to consolidate data for the total or for components of a project. In particular, the length of a project transmission line and their costs have been assessed and have been adapted to a reasonable relation. Consequently, for some projects figures and other data deviate from data displayed in the PIP or given by MS, because the information displayed differs mainly in project components and related lengths and costs.

The focus is on the status of the implementation process which is divided into five main phases:

1. F a project is finalised and in operation
2. C a project is under construction, including construction start up until completion of construction works
3. A a project is in its authorisation phase, which comprises environmental impact assessments, construction permits, planning approvals etc.
4. S a project is in its study phase, which comprises early project identification, feasibility studies, final design etc.
5. D a project is deleted, i.e. a project is cancelled or abandoned.

The status of projects with essential components in different implementation phases can be shown as a combination of different phases.

The progress in implementation of priority projects is reviewed by priority axis. Key figures and technical information about each project are given in a table for each axis, while particulars are discussed in the text.

[3] COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT, Priority Interconnection Plan, {SEC(2006) zzzz}

2.2. Overview

2.2.1. Electricity PEI

In total 32 electricity projects of European interest have been reviewed. An overview is given in Table 1. The Fiorano-Robbia line was completed in 2005 and is no longer listed in Annex III 2006.

5 projects had been finalised, 1 project is under construction and 7 are in the authorisation phase, while 14 are under study. The balance has components with different implementation phases. Details are shown in Figure 1.

Figure 1: Electricity PEI –progress in implementation

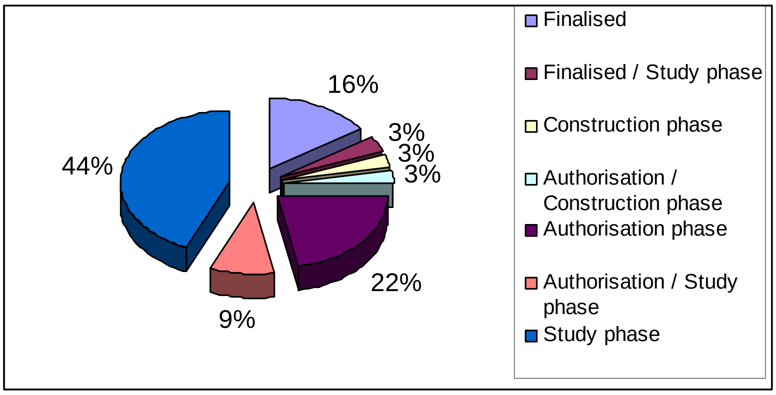

Table 1: PEI projects in the electricity sector[4]

Total No.	Running No.	Axis	2006 Annex III	Project Name	Countries involved	Status
1	1	EL1	2.2	Avelin (FR) - Avelgem (BE) line	FR BE	F
2	2	EL1	2.1	Moulaine (FR) - Aubange (BE) line	FR BE	F/S
3	3	EL2	2.16	Lienz (AT) - Cordignano (IT) line	AT IT	S
4	4	EL2	2.35	New interconnection between Italy and Slovenia	IT SI	S
5	5	EL2	2.36	Udine Ovest (IT) - Okroglo (SI) line	IT SI	S
6	6	EL2	3.8	S. Fiorano (IT) - Nave (IT) - Gorlago (IT) line	IT	F
7	7	EL2	3.9	Venezia Nord (IT) - Cordignano (IT) line	IT	A
8	8	EL2	3.60	St. Peter (AT) - Tauern (AT) line	AT	A/S
9	9	EL2	3.61	Südburgenland (AT) - Kainachtal (AT) line	AT	A
10	10	EL2	2.18	Austria-Italy (Thaur-Brixen) interconnection through the Brenner rail tunnel	AT IT	S
11	11	EL2	*)	S. Fiorano (IT) - Robbia (CH) line	IT CH	F
12	12	EL3	2.10	Sentmenat (ES) - Bescanó (ES) - Baixas (FR) line	ES FR	A

[4] The total no. corresponds to the numbering in the PIP while the running no. counts the projects in the sector.

Total No.	Running No.	Axis	2006 Annex III	Project Name	Countries involved	Status
13	13	EL3	2.14	Valdigem (PT) - Douro Internacional (PT) - Aldeadávila (ES) line and "Douro Internacional" facilities	PT ES	S
14	14	EL4	4.9	Philippi (GR) - Hamitabad (TR) line	GR TR	C
15	15	EL5	2.21	Undersea cable to link England (UK) and the Netherlands	UK NL	A
16	16	EL6	1.1	Undersea cable to link Ireland and Wales (UK)	IE UK	S
17	17	EL7	2.22	Kassø (DK) - Hamburg/Dollern (DE) line	DK DE	S/C/A
18	18	EL7	3.48	Hamburg/Krümmel (DE) - Schwerin (DE) line	DE	A/C
19	19	EL7	3.2	Kassø (DK) - Revsing (DK) - Tjele (DK) line	DK	A/S
20	20	EL7	3.2	Vester Hassing (DK) - Trige (DK) line	DK	F
21	21	EL7	4.26	Submarine cable Skagerrak 4 between Denmark and Norway	DK NO	S
22	22	EL7	2.29	Poland - Lithuania link, including necessary reinforcement of the Polish electricity network and the Poland - Germany profile in order to enable participation in the internal energy market	PL LT	S
23	23	EL7	2.30	Submarine cable Finland - Estonia (Estlink)	FI EE	F
24	24	EL7	2.15	Fennoscan submarine cable between Finland and Sweden	FI SE	A
25	25	EL7	3.49	Halle/Saale (DE) - Schweinfurt (DE)	DE	A
26	26	EL8	2.28	Neuenhagen (DE) - Vierraden (DE) - Krajnik (PL) line	DE PL	A/S
27	27	EL8	2.33	Dürnrohr (AT) - Slavětíce (CZ) line	AT CZ	S
28	28	EL8	2.32	New interconnection between Germany and Poland	DE PL	S
29	29	EL8	2.26 / 3.75 / 3.76	Vel'ký Kapušany (SK) - Lemešany (SK) - Moldava (SK) - Sajóivánka (HU)	SK HU	S
30	30	EL8	3.77	Gabčíkovo (SK) - Vel'ký Ďur (SK)	SK SK	A
31	31	EL8	2.27	Stupava (SK) - South-East Vienna (AT) line	SK AT	S
32	32	EL9	4.25	Electricity connection to link Tunisia and Italy	IT TN	S

*) 4.3 Annex III 2003

2.2.2. Gas pipeline PEI

The 10 gas pipeline projects of European interest are composed of different sub-projects. In total 15 gas pipeline sub-projects have been reviewed, which condense to 10 PEI due to the inclusion of sub-projects into the PEI. An overview of the PEI and their composition is given in Table 2.

One PEI has been put into operation (Libya - Italy (Gela) gas pipeline in 2004), 4 projects are in the construction phase (some with components under authorisation or in study) and 3 projects are in the authorisation phase. 2 projects are under study, though the Yamal – Europe gas pipeline is in the early study phase of identification. Details are displayed in Figure 2.

Figure 2: Gas pipeline PEI – progress in implementation

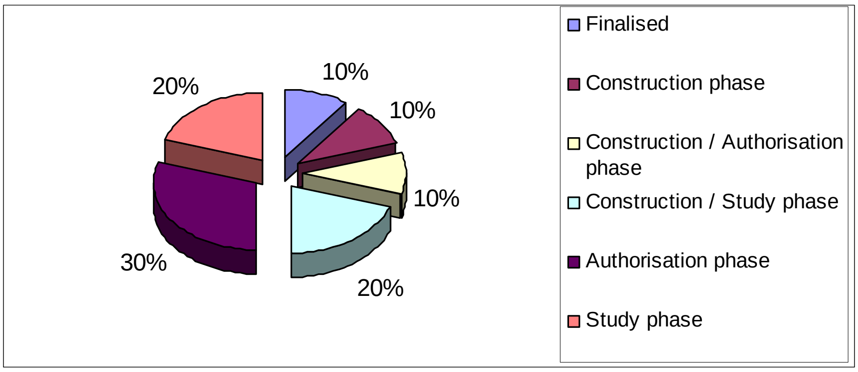

Table 2: Gas pipeline PEI[5]

Total No.	Running No.	Axis	2006 Annex III	Project Name	Countries involved	Status
33	1	NG1	9.3	North European gas pipeline	DE RU	C/S/A
34	2	NG1	9.16	Yamal - Europe gas pipeline	PL BY, DE	S
35	3	NG1	7.24	Natural gas pipeline linking Denmark, Germany and Sweden	DE SE	A
36	4	NG1	7.17	Increase in transmission capacity on the Germany – Belgium - United Kingdom axis	DE BE, UK	S/C
37	5	NG2	9.33	Algeria - Tunisia - Italy gas pipeline	DZ IT	C
38	6	NG2	9.34	Algeria - Italy gas pipeline, via Sardinia and Corsica, with a branch to France (GALSI)	DZ IT	S
39	7	NG2	9.6	Medgaz gas pipeline (Algeria - Spain - France - Continental Europe)	DZ ES	A
40	8	NG3	7.12 / 9.22	Turkey - Greece - Italy gas pipeline	GR IT TR	C/A
41	9	NG3	9.21	Turkey - Austria gas pipeline	AT TR	A
42	10	NG6	9.20	Libya-Italy (Gela) gas pipeline	LY IT	F

2.2.3. LNG terminal priority projects

In total 38 projects of LNG terminals have been reviewed (Table 3). In Italy the overall situation of the LNG projects is rather complex, and 8 projects have been included in other projects or have been completely cancelled (cf. Table 4). These 8 projects are no longer active and have not been counted as

[5] The total no. corresponds to the numbering in the PIP while the running no. counts the projects in the sector.

priority projects as shown by the numbering in Table 3. In addition, two projects became subprojects of the new LNG terminal in Italy (Sicily) project (8.15), thus leaving 29 LNG terminal priority projects active as shown in Table 3.

Among these 29 LNG terminal priority projects 2 were put in operation[6] (the extension of the LNG terminal in Barcelona (ES) and the new terminal in Sines (PT)). 10 projects are under construction and 9 are in the authorisation phase. 7 projects are in the study phase, including one project where authorisation has started. The construction of a second LNG terminal in continental Greece has been cancelled due to alternative options.

Figure 3: LNG terminals –progress in implementation

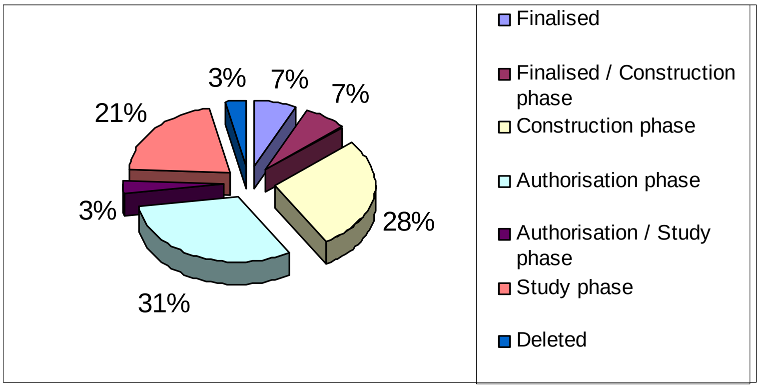

Table 3: LNG terminal priority projects[7]

Total No.	Running No.	Axis	2006 Annex III	Project Name	Countries involved	Status
43	1	NG4	6.2	LNG in Santa Cruz de Tenerife, Canary Island (ES)	ES	A
44	2	NG4	6.3	LNG in Las Palmas de Gran Canaria (ES)	ES	A
45	3	NG4	6.4	LNG in Madeira (PT)	PT	S
46	4	NG4	6.11	LNG on the island of Cyprus, Vasilikos Energy Centre	CY	S
47	5	NG4	6.13	LNG on the island of Crete (GR)	GR	S
48	6	NG4	8.1	LNG at Le Verdon-sur-Mer (FR, new terminal) and pipeline to Lussagnet (FR) storage	FR	S
49	7	NG4	8.2	LNG at Fos-sur-Mer (FR)	FR	C
50	8	NG4	8.3	LNG at Huelva II (ES), extending existing terminal	ES	C
51	9	NG4	8.4	LNG at Cartagena II (ES)	ES	C
52	10	NG4	8.4	LNG at Cartagena III (ES)	ES	A
53	11	NG4	8.5	LNG at Galicia (ES), new terminal (Mugardos/El Ferrol)	ES	C

[6] The PIP counts 6 projects which have been completed. As 4 of these projects contain extension phases, these 4 project are not finalised in total and have been assigned a different status in this study.
[7] The total no. corresponds to the numbering in the PIP while the running no. counts the priority projects in the sector. Projects which have been deleted or are included in another project do not display any numbering.

Total No.	Running No.	Axis	2006 Annex III	Project Name	Countries involved	Status
54	12	NG4	8.6	LNG at Bilbao (ES), new terminal (+extension)	ES	F / C
55	13	NG4	8.7	LNG in the Valencia Region (ES), new terminal	ES	F / C
56	14	NG4	8.8	LNG in Barcelona (ES), extending existing terminal	ES	F
57	15	NG4	8.9	LNG in Sines (PT), new terminal	PT	F
58	16	NG4	8.10	LNG at Revithoussa II (EL), extending existing terminal	GR	C
59	17	NG4	8.11	LNG on the North Adriatic Coast (IT) (at Monfalcone)	IT	A
60	18	NG4	8.11	LNG on the North Adriatic coast (IT) (at Muggia)	IT	A
61	19	NG4	8.12	LNG offshore in the North Adriatic Sea (IT) (Rovigo)	IT	C
62	20	NG4	8.13	LNG terminal on the South Adriatic Coast (IT)	IT	A/S
63	21	NG4	8.13	LNG at Brindisi (IT)	IT	C
64	22	NG4	8.14	LNG at Taranto (IT)	IT	A
65	23	NG4	8.15	LNG at Gioia Tauro (IT)	IT	S
66	24	NG4	8.15	New LNG in Italy (Sicily) (Porto Empedocle)	IT	A
67	25	NG4	8.16	LNG at Livorno (IT), offshore	IT	A
68	26	NG4	8.16	LNG at Rosignano (IT)	IT	A
69	27	NG4	8.17	LNG at Zeebrugge (BE) / Dudzele (second phase of capacity extension	BE	C
70	28	NG4	8.19	Construction of a second LNG terminal in continental Greece	GR	D
71	29	NG4	n.a.	Polish LNG Project	PL	S

Table 4: Deleted LNG terminal projects

Deleted projects			Included in / transferred to	
Axis	Annex III 2006	Project Name	Project Name / Reason	Annex III 2006
NG4	8.14	LNG terminal on the Ionian Coast	Gaia Tauro LNG	8.15
NG4	8.14	LNG terminal at Corigliano Calabro	Gaia Tauro LNG	8.15
NG4	8.15	LNG terminal on the Tyrrhenian Coast	Rosignano LNG	8.16
NG4	8.15	LNG terminal at Montalto di Castro	Deleted by decision of the Italian Government for environmental reasons under the pressure of local opposition	n.a.
NG4	8.15	LNG terminal Tyrrhenian (Lamezia Terme)	Gaia Tauro LNG	8.15
NG4	8.15	LNG terminal Tyrrhenian (S. Ferdinando)	Gaia Tauro LNG	8.15
NG4	8.16	LNG on the Ligurian Coast	Deleted. No recent project exists nor is planned on the Ligurian coast; The only existing LNG	n.a.

Deleted projects			Included in / transferred to	
Axis	**Annex III 2006**	**Project Name**	**Project Name / Reason**	**Annex III 2006**
			terminal is at Panigaglia commissioned in 1971 to import LNG from Libya with a capacity of 3.5 Bcm/y. It has been adapted for importing Algerian LNG in 1997 with a contract closing in 2015.	
NG4	8.16	LNG terminal at Vado Ligure	Deleted. ENEL dropped the project since they preferred to participate for 50% in the Brindisi LNG terminal (8.13) with BG.	n.a.

2.3. Review of electricity networks

2.3.1. EL1: France – Belgium – Netherlands – Germany

Objective: Electricity network reinforcement in order to resolve congestion in electricity flow through the Benelux States.

Table 5: Key figures of axis EL1 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
1	2.2	Avelin (FR) - Avelgem (BE) line	FR BE	43	1000-1500	22	1,02	F	2005
2	2.1	Moulaine (FR) - Aubange (BE) line	FR BE	25 *)	400	17 (FR)	0,50	F/S	2010 -2015

*) The FR section to be completed some 14,5 to 17,5 km

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

The project has been in operation since 26 November 2005, involving installation of the second circuit on the towers of an existing line in Belgium (since 1974) and reinforcement of an existing line in France. The solution assumes very low impact for the environment, low costs and short construction time.

The study phase in both countries started in 2002. Although the line crossed a river, wildlife reserves and two regions no problems were reported in Belgium. In France the reinforcement of an existing line has avoided potential problems. ELIA considers that the support of the EC for official procedures has eased the formalities.

EL1 Project 2.1 Moulaine (FR) – Aubange (BE) line

For the Belgian part, the project has been ready to operate since 1991. The line has been built with two circuits on 400 kV to the border. Although the line crossed a river, wildlife reserve and two regions, no problems were reported in Belgium. Its extension (14,5 to 17,5 km) in France is in the study phase to determine the best option for the route. Operation is scheduled for 2010-2015.

In France, the initial project in 1991 was for 2 400 kV lines but was cancelled by a court order in 1993 because of a legal flaw. The project has been frozen giving priority to the line Avelin-Avelgem (PEI 2.2). Strong public opposition was raised due to the route being too close to urban and rural area with complaints about EMF. A realization seems to have become possible only since, in a conversation between the Belgian and the French ministers (end of September 2006), a new solution was developed: the addition of a 225 kV circuit to an existing line.

2.3.2. EL2: Borders of Italy with France, Austria, Slovenia and Switzerland

Objective: Increasing electricity interconnection capacities.

Table 6: Key figures of axis EL2 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
3	2.16	Lienz (AT) - Cordignano (IT) line	AT IT	154	1.800	140	0,40	S	2015
4	2.35	New interconnection between Italy and Slovenia	IT SI	50	500	40	-	S	2009
5	2.36	Udine Ovest (IT) - Okroglo (SI) line	IT SI	80-120	800	min. 50	0,50	S	2010/ 2011
6	3.8	S. Fiorano (IT) - Nave (IT) - Gorlago (IT) line	IT	10	800	10	-	F	2003
7	3.9	Venezia Nord (IT) - Cordignano (IT) line	IT	75	1.500	25 #)	-	A	2011
8	3.60	St. Peter (AT) - Tauern (AT) line	AT	486	1.800	380	0,84	A/S	2009 2011
9	3.61	Südburgenland (AT) - Kainachtal (AT) line	AT	98	1.800	153	-	A	2009
10	2.18	Austria-Italy (Thaur-Brixen) interconnection through the Brenner rail tunnel	AT IT	57-65	1000-1500	160-300	0,96	S	2020
11	*)	S. Fiorano (IT) - Robbia (CH) line	IT CH	90	1.400	77	0,29	F	2005

*) 4.3 Annex III 2003
#) one additional circuit

EL2 Project 2.16 Lienz (AT) - Cordignano (IT) line

In both countries the project is in its study phase and shall be in operation in 2015. The project is significantly delayed due to local opposition. The line traverses both agricultural and tourist nature reserves and local communities are against it. The main fear is of electromagnetic fields.

In Austria permission of the local authorities is required. But the local authorities have little experience in dealing with projects of this size and it is difficult to get a decision. There are political implications and people are afraid. All potential delays at the beginning of the permission procedure have to be reckoned with. The TSO predicts a duration of 10 years, which – according to the legal procedures (cf. Annex V) – seems to be quite realistic.

In Italy the line is included in the national Law no. 443/2001 concerning strategic infrastructures in Italy (so called "Legge Obiettivo"), introducing a simplified procedure.

EL2 Project 2.35 New interconnection between Italy and Slovenia

Though operation is scheduled for 2009, the implementation of this project is still uncertain and by end of 2006 a pre-feasibility study is underway. A new interconnection attached to a railway interconnection had been considered. However, since this corridor is very near to the Redipuglia / Divaca interconnection and would increase load flow difficulties from Redipuglia to the IT grid, the Udine Ovest (IT) – Okroglo (SI) (2.36) line fits much better to IT and SI grid conditions.

With a line linked to the railway a phase shifter and internal grid enforcement to the Udine sub-station might be needed, but it would solve the problem on the SI side with Divaca as the only connecting substation with no redundancy. Up until the end of 2006, the project has not been coordinated with the Slovenian TSO.

EL2 Project 2.36 Udine Ovest (IT) – Okroglo (SI) line

The project is in its study phase and shall be in operation by 2010/2011. The study started with 5 routes, the result shall be 3 variants indicating the "optimum" variant. The main difficulty consists in reaching an agreement between the Region Friuli, Venezia Giulia and the Slovenian side about the cross points between Italy and Slovenia. The study phase shows that it will be difficult to define an easily acceptable corridor (especially as SI has devoted 35% of its area to the Natura 2000 programme of the EU). For IT the best route would be in the north, otherwise a village would be affected. For SI the best would be in the centre of the border, otherwise a road would be affected.

On the SI side a pre-condition to making use of the interconnector is the completion of the Berecevo-Krsko line and the interconnection to Hungary. The grid on the IT side needs enhancement in order to use the potential capacity of the interconnection.

A commercial problem might arise because 440 MVA are assigned for SI whereas the actual load flow is expected at 1000 MW.

EL2 Project 3.8 S. Fiorano (IT) – Nave (IT) – Gorlago (IT) line

The line has been in operation since 2003. The section Fiorano – Nave had bottlenecks in mountain areas with only one conductor per phase. In 2003 the plan was to increase the capacity by reconstructing the line. This plan was cancelled because the installation of a real-time monitoring system for the section Fiorano - Nave permitted an improvement in capacity.

The section Nave -Gorlago was rebuilt on a 10 km section to circumvent an archaeological site which was welcomed by all stakeholders and did not create any obstacles.

EL2 Project 3.9 Venezia Nord (IT) - Cordignano (IT) line

This project was halted in the authorisation phase. It is a densely populated area and local authorities opposed the project with the argument of fear of EMF. Following the results of the environmental impact study the Ministry of Environment stopped the authorisation process in 2003.

The mitigating alternative is a new route which does not link Venezia Nord with the Cordignano substation but to a new substation on the line to Cordignano. Therefore, the project should be renamed "Area Venezia – Area Treviso". A feasibility study could start in 2007, operation is scheduled for 2011.

EL2 Project 3.60 St. Peter (AT) - Tauern (AT) line

The project is divided into two sections:

<u>Section 1: St.Peter – Salzach "Neu" (substation)</u>

This section is in the authorisation phase. The main objection from the public was fear of electro-magnetic fields (EMF). Other objections comprise deterioration of the landscape, environmental protection, in particular of forest birds and a rare bug which needs dead wood. Even if authorization is given by January 2007, it is unlikely that the construction process could start at that time. There is still the option of an appeal to the "Umweltsenat" (an overview of the Austrian procedures is given in Annex V). A start of construction in 2007 cannot be reckoned with. Rather, from the present perspective, construction in the worst case will not start before 2009 .

Section 2: Salzach (“Neu”) – Tauern (substation)

This section is in its study phase. Public objections are expected, encompassing the “not in my backyard” (NIMBY) argument, deterioration of the landscape, and environmental issues. A start of the authorization phase can, at the earliest, be reckoned with by the end of 2006, more realistically in the course of 2007, since the study phase will presumably only be completed by the end of 2006. This means that an authorization cannot be expected before 2009, if usual delays are considered. And such a time estimate has not yet taken into account that the permission procedure has to be performed in 2 federal states. In addition, the authorities responsible for the EIA and the decision for the permit are not used to dealing with the multitude of public opinions, expert opinions, legal and political aspects which are linked to large infrastructure projects. If a certain period for appealing to the "Umweltsenat" is added, a start of the construction process is not realistic before 2011.

EL2 Project 3.61 Südburgenland (AT) – Kainachtal (AT) line

The project is in its authorisation phase. The need for the line was identified in 1980, a route was defined in 1983, and in 1985 feasibility studies were prepared which led to completion of detailed studies for the route in 1990. Since then, the project was stalled due to the many concerns of the local communities involved - fear of EMF and landscape deterioration - and was taken up again in 2000. In addition, the authorities responsible for the EIA and the decision for the permit are not used to dealing with the multitude of public opinions, expert opinions, legal and political aspects which are linked to large infrastructure projects.

Although an authorization has existed since March 2005, it has not been possible so far to start the construction process, due to an appeal to the "Umweltsenat". Since a de facto duration of almost 2 years for the appeal has to be reckoned with, a non-appealable decision cannot be expected before March 2007.

EL2 Project 2.18 Austria - Italy (Thaur-Brixen) interconnection through the Brenner rail tunnel

The project is in its study phase. The project uses the railway tunnel as a transport corridor for electricity, which produces environmental benefits. A gas-insulated line is expected to be the best technical solution but this is an innovative technology.

Any progress in the electricity connection depends upon progress in the railway project and good coordination between the two projects in terms of planning and implementation. But coordination between the railway side and the power side is not sufficient in order to exploit the synergy of the project. Intervention from a higher level is needed to facilitate cooperation and coordination between the railway and the power sides.

EL2 Project 4.3 S. Fiorano (IT) - Robbia (CH) line

The completion of works started in 2004, and the line came into operation in 01/2005. The sub-station Robbia was commissioned in 11/2005.

The project had been planned since the early 1980s and construction works started in 1995. ENEL stopped the project in 1997 due to uncertain property and trade rights connected with the upcoming liberalization of the Italian power market. At that time the CH side had already established the foundations for the towers.

Only in 2001 did the IT side take up the project again with studies on the technical and environmental feasibility. The authorisation procedure was complicated due to requests of local authorities to change the routes and for environmental compensation. Eventually a memorandum of understanding was concluded with the local authorities to change the routes and for environmental compensation such as dismantling of existing overhead lines in the area affected by this new project.

Extraordinary ice and wind loads in the high Alpine areas of the 42 km stretch (2000 meters) made construction difficult. Due to the long winter there was a short period for realization with difficult access to the site. As solutions special towers with special foundation containments were designed. Works were carried out in several lots in parallel with high manpower turnover. The extensive use of helicopters eased access.

2.3.3. EL3: France – Spain – Portugal

Objective: increasing electricity interconnection capacities between these countries and for the Iberian Peninsula and grid development in island regions.

Table 7: Key figures of axis EL3 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
12	2.10	Sentmenat (ES) - Bescanó (ES) - Baixas (FR) line	ES FR	264	1.200	145	0,61	A	2009
13	2.14	Valdigem (PT) - Douro Internacional (PT) - Aldeadávila (ES) line and "Douro Internacional" facilities	PT ES	45	n.a.	70	1,81	S	2009

EL3 Project 2.10 Sentmenat (ES) – Bescanó (ES) – Baixas (FR) line

In both countries the project is in its authorisation phase.

In Spain the project is implemented in 3 sections and strong public opposition has been noted on the middle section Bescano Sta. Loggia, and a public consultation has to be redone. On the Spanish side operation is expected for 2009 if there is an agreement on the cross point at the French border.

In France by end of 2006 the project was in a standby position. Since 2004 several options of the border crossing have been considered:

- One of these new routes consisted in partially rebuilding the existing EHV line Baixas-Vic in France until a point located in the French Pyrenees side and building a new EHV line from this point until the border between France and Spain. This new project has been rejected by the local population including the main local political personalities.

- Another option consists in totally rebuilding the existing EHV line Baixas Vic in France. However, this option is not acceptable on the Spanish side.

Both the Spanish and French governments asked the European Commission to nominate a European coordinator in order to find a consensual solution to this essential link. His action, supported by both

French and Spanish TSOs and governments, will probably be a key issue for the project. An agreement on a cross point between Spain and France is expected only after the French presidential elections in 2007.

EL3 Project 2.14 Valdigem (PT) - Douro Internacional (PT) – Aldeadávila (ES) line and "Douro Internacional" facilities

The project is in an early study phase, and completion is planned in 2009. The study phase is at its early stages and an appraisal of the environmental impact of the lines is on-going. To date there is no indication of problems as in Portugal public opposition, if any, is not yet as strong and structured as in other EU countries and the lines of the project are in rural areas with very low population density.

2.3.4. EL4: Greece – Balkan countries – UCTE System

Objective: development of an electricity infrastructure to connect Greece to the UCTE System and to enable the development of the South Eastern Europe electricity market.

Table 8: Key figures of axis EL4 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
14	4.9	Philippi (GR) - Hamitabad (TR) line	GR TR	250	n.a.	70	0,55	C	2008

EL4 Project 4.9 Philippi (GR) - Hamitabad (TR) line

By the end of 2006 the line was under construction and should be in operation in early 2008, but the substation in Nea Santa (GR) will only be completed in early 2010. As the line in Turkey from Hamitabad to Babaeski already exists, the section of the project is actually from Babaeski (TR) to Philippi (GR), comprising the Philippi (GR) - Nea Santa (GR) – Babaeski (TR) line and new HVC in Nea Santa (GR).

The line has been declared a national priority and this helped to save 6 months in the authorization procedure. However, the land expropriation for the substation caused a delay, as the price could not be easily settled.

2.3.5. EL5: United Kingdom – Continental Europe and Northern Europe

Objective: establishing/increasing electricity interconnection capacities and possible integration of offshore wind energy.

Table 9: Key figures of axis EL5 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
15	2.21	Undersea cable to link England (UK) and the Netherlands	UK NL	250	1000-1320	400-500	7,98	A	2010

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

By end of 2006 the link was in the authorisation phase. If the necessary permits arrive by autumn 2007 the project could be operational in 2010.

The project is awaiting environmental permits and exemption from article 6 in EU regulations on third party access.

In the UK, this project has reached a stage shortly before the EIA. Dutch regulations impose a long procedure, authorisations are given from Ministry level and are decided in Parliament, individual citizens have a relatively large influence on the process. After a 7-year study phase, the permission phase (the environmental impact assessment) shall be finished in March 2007 by a national publication. A suit may be filed against this authorization. But nevertheless, the authorization can be executed immediately. Then, after a tender procedure, the winner of this procedure will apply for construction authorization, which he will obtain, too. Thereafter, the construction process can immediately begin, which is expected for 2007.

2.3.6. EL6: Ireland – United Kingdom

Objective: increasing electricity interconnection capacities and possible integration of offshore wind energy.

Table 10: Key figures of axis EL6 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
16	1.1	Undersea cable to link Ireland and Wales (UK)	IE UK	150-250	500	520	2,96	S	2012

EL6 Project 1.1 Undersea cable to link Ireland and Wales (UK)

By end of 2006 the project was still in its study phase, which started in 1999, awaiting a pending decision of the Irish Government about the ownership. For a long time the Irish Government and the

Regulator were considering how to involve a private company to own/operate the line for competition reasons. The situation has changed with the establishment of Eirgrid as an independent TSO. A definite Government decision about the ownership (private or Eirgrid) and the routing was expected still in 2006. For both countries, there are two options for routing of the interconnection. According to the UK side the project has to be studied anew after the decision taken by the Irish Government.

Normally, undersea cables do not require consent or planning permission. Problems could arise onshore when announcing the installation of connecting equipment to the grids on both sides for which the usual procedures have to be followed. Streamlined planning procedures resulting from specific provision for electricity interconnectors defined by the Irish Government, and the strong involvement of the Irish Commission for Energy Regulation have facilitated the progress of the project. The line is scheduled to go into operation in 2012.

2.3.7. EL7: Denmark – Germany – Baltic Ring (including Norway – Sweden – Finland – Denmark – Germany – Poland – Baltic States – Russia)

Objective: Increasing electricity interconnection capacities and possible integration of offshore wind energy.

Table 11: Key figures of axis EL7 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
17	2.22	Kassø (DK) - Hamburg/Dollern (DE) line	DK DE	215	700	100-200	0,15	S/C/A	2012
18	3.48	Hamburg/Krümmel (DE) - Schwerin (DE) line	DE	75	1.800	50	-	A/C	2007
19	3.2	Kassø (DK) - Revsing (DK) - Tjele (DK) line	DK	155	2000 - 2500	160	-	A/S	2015
20	3.2	Vester Hassing (DK) - Trige (DK) line	DK	114	900	120	-	F	2004
21	4.26	Submarine cable Skagerrak 4 between Denmark and Norway	DK NO	225	600	260	-	S	2012
22	2.29	Poland - Lithuania link, including necessary reinforcement of the Polish electricity network and the Poland - Germany profile in order to enable participation in the internal energy market	PL LT	154 (Elk - Alytus)	1.000	270 *)	0,15	S	2013 - 2015
23	2.30	Submarine cable Finland - Estonia (Estlink)	FI EE	105	250	110	0,67	F	2006
24	2.15	Fennoscan submarine cable between Finland and Sweden	FI SE	300	800	250	0,55	A	2010
25	3.49	Halle/Saale (DE) - Schweinfurt (DE)	DE	210	2.400	210	-	A	2009

*) including back-to-back station, total costs including grid extensions needed in PL/LT might add up to 684m€

EL7 Project 2.22 Kassø (DK) – Hamburg/Dollern (DE) line

By end of 2006 the Danish section and the Audorf - Hamburg/Nord section were still in their study phase, the 380kV reinforcement of the Wilster - Dollern section was under construction, and the section Hamburg/Nord - Dollern was in the authorisation process (construction planned 2010). Operation is scheduled for 2012.

The line has encountered the problems of a densely populated area and many different landowners. Fear of EMF has been expressed and local opposition against overhead lines is trying to impose underground cables. A mitigation measure could be to replace existing 220kV lines with the new line. The main problem is to foresee the very large amount of wind power to be transmitted between Germany and Denmark. The time schedule for grid reinforcement and extension depends on dynamics of wind farm installation onshore and offshore with connection to the grid in Schleswig-Holstein.

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

By end of 2006, the first 20km after Krümmel were under construction, the other section was in its authorisation phase. In the best case the line will be completed by the end of 2007.

The “Planfeststellungsverfahren” has started and is expected to be completed by mid 2007 (best case), if no further legal obstacles are raised (for the German authorisation procedure cf. Annex V). Public consultations including a variety of stakeholders and stakeholder arguments, which are very local and have no perception of any supraregional or even European perspective and related benefits, are time consuming and pose the risk of delays. During public consultation the main arguments against the line are the routing, “not-in-my-backyard”, fear of EMF, deterioration of the landscape view.

EL7 Project 3.2 Kassø (DK) - Revsing (DK) - Tjele (DK) line

The first section Endrum - Idomlund is in the study phase and the second section Kassø - Revsing is in the authorization phase. Since one important purpose of the project is to transmit wind power electricity, the final parameters of the line also depend on other projects (e.g. Kassø-Hamburg/Dollern (2.22), Skagerrak IV (4.26)). The first part of the line is scheduled to go into operation in 2009 and the second part in 2015.

Major problems are acceptance from land owners and the restructuring of relevant authorities. The authorization of the application is expected in 2007, after completion of the EIA (details on the Danish authorisation procedures are given in Annex V). Should local authorities raise objections, the Minister of Environment will reject them by means of a "call-in".

The progress of the procedure is favoured by a new law on reforming the administration, which decrees that by 1/1/2007, existing "environmental units" will be partly integrated. Due to this reform, the transmission system operator 'Energinet' hopes for further acceleration of the authorization process.

EL7 Project 3.2 Vester Hassing (DK) -Trige (DK) line

The line has been in operation since 2004. An authorization was issued in 2001. This project had been controversial for a long time. Among other things, the controversy was about an underground cable being preferable to an overhead line. The procedure took 12 years from the first application to the authorization by the minister. The controversy could only be settled when the Minister of Energy, in view of national interests, made use of his right for a "call-in"(cf. Annex V for the Danish procedures).

EL7 Project 4.26 Submarine cable Skagerrak 4 between Denmark and Norway

The project is still in its study phase, which was expected to be completed end of 2006. It shall be in operation in 2012. The transmission system operator 'Energinet' does not see severe problems; above all since no environmental impact assessment is necessary for undersea cables. With respect to the expansion of the energy market the project is prioritized in the Nordel Master Plan which could facilitate its progress. A problem is to estimate the socio-economic benefits for both countries.

EL7 Project 2.29 Poland – Lithuania link, including necessary reinforcement of the Polish electricity network and the Poland - Germany profile in order to enable participation in the internal energy market

By the end of 2006 the project was in its study phase which is expected to be completed in 2007. Operation is envisaged for 2013 (LT) and 2015 (PL), respectively.

The interconnection idea between PL and LT has a long history. In the 1990s there were talks at company level. Since then, the scope of the project has changed. Due to different sites for the interlinks and due to environmental issues (nature reserve) lines had to be two times longer than planned, expropriation of land required amendments to the law, and there was uncertainty about synchronisation areas.

Technically, the project will require a back to back station (on the Lithuanian side). Further, the PL – LT connection is not limited to the cross-border connection, but will need upgrades in the north – eastern part of the Polish transmission system in comparison with previously planned solutions:

- second circuit 400 kV line Elk – Ostrołęka
- second circuit 400 kV Ostrołęka – Olsztyn Matki
- second circuit 400 kV line Ostrołęka - Miłosna
- 400 kV busbars and couple transformers 400/220 kV in Elk and Ostrołęka 220/110 kV substations

Since 2000 there has been good coordination with regular talks at higher ministerial level. By 2006 the LT and PL ministries were willing to proceed, and a decision was expected still by end of 2006. The main obstacles in Poland are environmental and authorisation processes concerning the route of the lines (cross-border line, as well as the necessary accompanying internal lines and reinforcements). On the LT side there were no special problems during the study phase: the route of the line was even preliminarily agreed with 80-90% of the landowners in the years 2001/2002.

The main problems appear to have been overcome with further studies of the Polish grid stability and security, by using the route of an existing line. Land expropriation in PL has started. Since PSE has created a “good climate”, no major problems are expected regarding expropriation.

EL7 Project 2.30 Submarine cable Finland – Estonia (Estlink)

The link has been in operation since 4 December 2006. The project has very strong governmental support, both in Finland and Estonia. Especially in Estonia the good coordination process with the authorities was a success factor for a fast permit process.

This line was approved at the beginning of 2005 already. Neither the Finnish nor the Estonian side identified problems regarding the environment, protection of the landscape, or with respect to abutters or the general public.

EL7 Project 2.15 Fennoscan submarine cable between Finland and Sweden

The link is in its authorisation phase, authorization is expected in 2007.

The cable location is parallel to an existing cable. This has made the process easy on the Finnish side. In the view of 'Fingrid', regarding the authorization there is no problem with the EIA but a problem with obtaining the so-called "cross border connection permit" by the Finnish Ministry of Trade and Industry, since such a permit will affect energy supply via Russia. Lawsuits against this authorization, though possible, are very unlikely. All in all, however, no problems have been identified on the Finnish side. For 'Fingrid' it was of great importance that the project was contained in the TEN-E guidelines 2006.

On the Swedish side there are still issues pending. The EIA will be completed in November 2006. Problems are only mentioned with respect to obtaining permission referring to water rights. Permissions applied for will be granted according to schedule. Generally, good cooperation between 'Fingrid' and the Swedish transmission system operator 'Svenska Kraftnat' is emphasized. It is said to have been important for a quick authorization.

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

The line is in authorisation phase and operation is scheduled for 2009.

Public consultations with a variety of stakeholders and stakeholder arguments, which are very local and have no perception of any supraregional or even European perspective and related benefits, are time consuming and cause delays. Main arguments against the line are the routing, “not-in-my-backyard”, fear of EMF, and the deterioration of the landscape view. Special concerns relate to the deterioration of the idyllic scenery of the Thüringer Wald and associated negative impacts on tourism.

For all three sections (i) Halle – Erfurt, (ii) Erfurt – Altenfeld, (iv) Altenfeld – Redwitz applications for permission will, in all probability, be submitted in the context of the "Planfeststellungsverfahren" still in 2006. For all three sections, German permission procedures will have to be performed (cf. Annex V). But it is imaginable and even likely that the durations of the individual procedures will differ greatly. A non-appealable "Planfeststellung" cannot be counted on before 2008 (with potential lawsuits not yet having been considered).

2.3.8. EL8: Germany – Poland – Czech Republic – Slovakia – Austria – Hungary – Slovenia

Objective: increasing electricity interconnection capacities.

Table 12: Key figures of axis EL8 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
26	2.28	Neuenhagen (DE) - Vierraden (DE) - Krajnik (PL) line	DE PL	125	n.a.	130	-	A/S	after 2010
27	2.33	Dürnrohr (AT) - Slavetíce (CZ) line	AT CZ	96	900	50	-	S	2009
28	2.32	New interconnection between Germany and Poland	DE PL	65 *)	n.a.	39 *)	-	S	after 2010
29	2.26 / 3.75 / 3.76	Vel'ký Kapušany (SK) - Lemešany (SK) - Moldava (SK) - Sajóivánka (HU)	SK HU	165	1.385	140	-	S	2017
30	3.77	Gabčíkovo (SK) - Vel'ký Ďur (SK)	SK SK	93	1.385	51	-	A	2011
31	2.27	Stupava (SK) - South-East Vienna (AT) line	SK AT	53	1.800	62	-	S	2015

*) PL side

EL8 Project 2.28 Neuenhagen (DE) – Vierraden (DE) – Krajnik (PL) line

The project is in its study phase on the Polish section. The section in Germany is in the authorisation phase.

On the PL side the internal grid is not prepared to take up load flows according to a capacity which would be established with the Vierraden-Krajnik interconnector. In the long-term, the situation might change with a reinforced PL grid and the erection of a nuclear plant, which is envisaged after 2020 by PL. There have been several recent developments in the DE power sector (wind farms, DENA study) and on the PL side (wind farms in the north) which gave little planning security for a PL-DE coordinated approach. Now, this seems to have been settled and coordinated approaches on the UCTE level as well as bilateral are in preparation.

Vattenfall as TSO is projecting the "Uckermarkleitung" between Bertikow (substation 125 km north of Berlin, near to Vierraden and the PL border) and Neuenhagen on the basis of the EEG and the DENA study, but has no programming for an extension to Krajnik in PL. Though the Vierraden – Krajnik link was originally built as a 400kV line which is currently operated at 220 kV in a small section, it is very doubtful, if the cost linked with the interconnector could be retrieved by the line access price, if the TSO projected a Bertikow – Vierraden – Krajnik extension. Most likely, a cost covering access price would not be approved by the German regulator as the price would be too high to be justified in comparison to other network access prices.

On the German side, the spatial planning procedure for the "Uckermarkleitung" was started in mid-October 2006. It will be completed by the end of 2007. Legal problems in this phase are not expected. Legal problems will begin with the start of the "Planfeststellungsverfahren", which will probably take place at the beginning of 2008. During public consultations the main arguments against the line are the routing, “not-in-my-backyard”, fear of EMF, and deterioration of the landscape view. With the execution of this "Planfeststellungsverfahren", procedural problems will have to be reckoned with (cf. also Annex V). Since, according to current plans, the HV line will run along the Polish border but will not transgress it, the transmission system operator will only face problems according to German legislation in the context of the execution of the "Planfeststellungsverfahren". But under present interpretation of the legal framework the interconnection with PL can only be established if DE land owners voluntarily grant permission to the transmission company for access to their land .

The “Uckermarkleitung” shall be in operation by 2009, while the Vierraden-Krajnik section is expected to be finalized after 2010.

EL8 Project 2.33 Dürnrohr (AT) - Slavětíce (CZ) line

The line is in its study phase. Operation is expected for 2008 (CZ) and 2009 (AT), respectively. Though the circuit will be added to an existing line between the Czech Republic and Austria, in Austria the line route crosses a public protected area and fear of electromagnetic fields (EMF) has been expressed.

EL8 Project 2.32 New interconnection between Germany and Poland

The interconnection is still in its study phase. A 2004 (pre)feasibility study for the line Plewiska (PL) - Preilack (DE) shows that this interconnection would not increase transmission capacity. Only an increased loop flow between DE-PL-CZ would happen, which would require follow-up investments in order to enforce the Polish grid. Therefore, there is a need for further studies on other interconnection locations and the project name “New interconnection between Poland and Germany” provides a broad umbrella for a variety of possible interconnection projects.

The overall situation might change with the commissioning of new wind parks in PL and the erection of a new nuclear plant in PL near the border. This would require the reinforcement of the internal PL grid and might change the flow patterns between the grids of DE, PL, and CZ. But with this new situation the Vierraden – Krajnik interconnector (PEI no. 2.28) is likely to become attractive, which as a result could make another “new” interconnector obsolete. Further progress of the project will be determined by the results of a bilateral Polish-German study, inputs from UCTE, UPS and IPS, and possible reinforcements of the Polish grid which are also associated with the EL7 2.29 project. Subject to the results of the studies, the interconnector is expected to go into operation after 2010 only.

EL8 Project 2.26/3.75/3.76 Vel’ký Kapušany (SK) - Lemešany (SK) - Moldava (SK) - Sajóivánka (HU)

The project is divided into 3 sections: 1. Veľký Kapušany (SK) - Lemešany (SK), 2. Lemešany (SK) - Moldava (SK), and 3. Moldava (SK) - Sajóivánka (HU). The two Slovakian sections are in their authorisation phase and are expected to go into operation at the latest by 2017, but the interconnection between SK and Hungary is still in its study phase, and operation is expected in 2011.

The routing Moldava (SK) - Sajóivánka (HU) causes problems on the Hungarian side, as it would cross landscape and forest protection areas and developed sylvicultures. Permissions from the environmental authorities on Hungarian territory would be difficult and problematic. The interconnection between Moldava (SK) - Sajóivánka (HU) is not considered feasible. Few possibilities for the routing remain due to environmental problems (many environmentally protected areas) on both sides. HU prefers the interconnection Rimavská Sobota (SK) - Sajóivánka (HU) instead of Moldava (SK) - Sajóivánka (HU). Agreement on a new routing is envisaged for 2007.

EL8 Project 3.77 Gabčíkovo (SK) – Vel'ký Ďur (SK)

The line is in its authorisation phase and shall be in operation in 2011. No information has been received about possible problems.

EL8 Project 2.27 Stupava (SK) - South-East Vienna (AT)

The link is in its study phase. Negotiations about a 400 kV interconnection between Slovakia and Austria (Stupava - Vienna) started in 1990. The line should have been commenced before CENTREL integration with UCTE and it was planned that the line would be connected to a Vienna-South station that would have permitted a direct commercial co-operation of the Slovak transmission system with UCTE system even in case of asynchronous operation. But in 1995 the works were stopped in Austria, due to the Mochovce NPP (Nuclear Power Plant) completion and the Bohunice V-1 NPP. In 2002 it was agreed that the project shall continue at the level of a joint expert group.

Currently, on the Slovak side the 400 kV cross-border connections Stupava - Vienna Southeast is a priority in the development of the Slovak transmission system. For the Austrian side it is more important to strengthen the Austrian grid from north to south by completing other transmission line projects, particularly the construction of the 400 kV line Vienna Southeast – Kainachtal.

Further obstacles are the high number of lines in the Vienna region, a river that has to be crossed with a bridge, which is protected, local opposition due to fear of EMF, and wildlife in the area (in particular birds). Changing the route in Austria will mitigate these problems, but the issue of crossing the river remains. Operation is expected in 2015.

2.3.9. EL9: Mediterranean Member States – Mediterranean Electricity Ring

Objective: increasing electricity interconnection capacities between Mediterranean Member States and Morocco – Algeria – Tunisia – Libya – Egypt – Near-East countries – Turkey.

Table 13: Key figures of axis EL9 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Capacity Increase (MVA)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
32	4.25	Electricity connection to link Tunisia and Italy	IT TN	200	0 or 500	195-400	-	S	2015

EL9 Project 4.25 Electricity connection to link Tunisia and Italy

The link is in its study phase, operation is expected in 2015. The undersea cable might pass a marine park. It is not clear if this could cause difficulties. From the local population no real obstacles are expected.

The coordination of such a large project with Tunisia is unknown and could bear a risk for the timely completion of the project. Further investments in the HV grid in the Sicily and Calabria regions are needed, and the financial returns in view of the development of electricity prices in Tunisia are not clear. Operation is expected in 2015.

2.4. Review of gas pipelines

2.4.1. NG1: United Kingdom — northern continental Europe, including the Netherlands, Belgium, Denmark, Sweden and Germany — Poland — Lithuania — Latvia — Estonia — Finland — Russia

Objective: Gas pipelines to connect some of the main sources of gas supply in Europe, improve network interoperability, and increase security of supply, including natural gas pipelines via the offshore route from Russia to the EU and the onshore route from Russia to Poland and Germany, new pipeline building and network capacity increases in and between Germany, Denmark, and Sweden, and in and between Poland, the Czech Republic, Slovakia, Germany, and Austria.

Table 14: Key figures of axis NG1 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Operational additional capacity Bm3/a or Bm3	Diameter (inch) / Pressure (bar)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
33	9.3	North European gas pipeline	DE RU	2117	55	48/200	5.000	-	C/S/A	2013
34	9.16	Yamal - Europe gas pipeline	PL BY, DE	700	43	n.a.	1.500	0,9	S	2010
35	7.24	Natural gas pipeline linking Denmark, Germany and Sweden	DE SE	200 (offshore)	3	28 / 150	300	1,7	A	2010
36	7.17	Increase in transmission capacity on the Germany – Belgium - United Kingdom axis	DE BE, UK	170	n.a.	1000-1200/85	250	0,4	S/C	2010

NG 1 Project 9.3 North European gas pipeline (NEGP)

This important project is in the study phase with operation of the first pipeline with initial capacity of 27,5 Bcm/y planned for 2010. A second pipe, which is scheduled to be in operation by 2013, will double initial capacity, reaching a total of 55 Bcm/y. The preparation for the authorisation phase is progressing to fulfil Espoo and HELCOM obligations. National authorities have been involved.

The project, which will transport a significant part of Europe's increasing demand for additional gas imports, is being developed by a venture created in 2005 between Gazprom/EON-Ruhrgas/BASF AG. The project is designed to connect other European countries and regions in the north and west.

The onshore Russian section (917 km) for connecting the NEGP to the Russian gas transmission system is under construction and financed by Gazprom. The study includes a compression station at Lubmin, Germany and two onshore connections to the south (Czech Republic) and to the west (Bunde near the Dutch border).

So far, the main problem is objections from Sweden fearing a threat to the environment in the Baltic Sea and to a lesser extent from other countries, one of them evoking unexploded mines. Russia has agreed to observe environmental requirements and co-operate with ecological associations during construction.

The North European Gas Pipeline (NEGP) is a fundamentally new route for Russian gas exports to Europe. Targeting Germany, Great Britain, the Netherlands, France and Denmark, NEGP is of great significance for meeting Europe's soaring gas demand.

Back in December 2000 the European Commission resolved to award the NEGP Project with TEN (Trans European Networks) status. With no transiting countries along its route, which excludes any potential political risks, NEGP will directly link the United Gas Transmission System (UGTS) of Russia with the European gas network and will ensure utmost reliable gas deliveries to West European consumers. Additionally, NEGP will play a special role in providing abundant gas supply to the Kaliningrad region.

In Germany: the NEGP would need to be connected to the networks of E-ON Ruhrgas and Wingas, but the newly required 850 km of corresponding major pipeline connections are in their study phase (both Eon Ruhrgas and Wingas, contrary to Gazprom NEGP, have not been cooperative in providing information).

NG1 Project 9.16 Yamal Europe (II) gas pipeline

The interview of Europol GAZ/Wingas leads to the conclusion that the project only exists as a remote possibility and there has been no action to start the project. Nevertheless, EuRoPol Gas S.A. is under contractual obligation to double the existing pipe line capacity by 2010, subject to an intergovernmental decision. If the 2010 deadline is to be met, implementation should be launched immediately. In the absence of a decision by the respective government the project is at a standstill. The intended capacity is 43 Bcm/y. It appears that presently Europolgaz plans no import volume increase through Poland by doubling the Yamal existing pipeline, though they are bound by treaty to do so before 2010.

Alternatively, Wingas plans to purchase 9 Bcm/y via the future North European Gas Pipeline (project 9.3) over a 25-year period in addition to its current delivery volumes from Russia.

NG1 Project 7.24 Natural gas pipeline linking Denmark, Germany and Sweden

This project developed by EON Sweden is in the authorisation phase. Its operation is scheduled for 2010. After two technical feasibility studies, two financial analyses, pipe route and seabed surveys, technical issues, and one Environmental Impact Assessment (EIA) the prerequisites for the authorisation phase have been met.

Two financial problems have not been resolved but the stakeholders decided to go ahead assuming an acceptable profitability of the project, with remaining unknown factors:

- Will the market be able to absorb the new capacity?
- The highly versatile gas market price makes it difficult to appraise the profitability of the project.
- They are looking for a favourable loan.

The project was initially planned to be in operation in October 2004. The total construction phase is expected to be 3 years. The decision to construct depends on the decision of Germany and so far, no forecast can be given.

Authorisation phases are completed for Denmark and Sweden. The procedure has been rather slow due to the fact that this was the first pipeline project for the authorities. Nevertheless, German authorisation is still pending and takes much more time. Denmark and Sweden have only one official interlocutor for the whole authorisation procedure when in Germany TSOs have to obtain authorisations from the counterparts of the project such as fishing authorities, army etc.).

NG1 Project 7.17 Increase in transmission capacity on the Germany - Belgium - United Kingdom axis

The content of the project has deeply changed: a new route crossing the Netherlands has been preferred to the initial route in the name of the project: through Belgium, from Eynatten at the German Border to Opdijk.

The project doubling the pipe inside Belgium (existing VTN1 complemented by VTN2) then becomes a national project for internal distribution (listed in the Projects of Common Interest, reference 7.27) offering only a possible tiny reinforcement of existing transport between Germany and the UK through Zeebrugge and through the existing Interconnector pipeline crossing the Channel.

The BBL company (Gasunie, Fluxys, EON-Ruhrgas) is building (and self financing) the new BBL pipeline crossing the channel from Balgzand (NL) to Bacton (UK) 7.17-b.

The other new GWWL being built by Gasunie, will connect this BBL line to the German gas network GWWL (including NEGP) near Delftzijl in the northeast of the Netherlands.

More details are given in the data sheets (Annex II) which are referenced as follows:

New pipe crossing the channel from the Netherlands to Bacton UK (BBL)	NG1	7.17-b
Pipe crossing Belgium from Eynatten to Opdijk (VTN2) +Compressor station Zelzate	NG4	7.27
Pipe crossing the Netherlands from west to northeast towards Germany (GWWL)	NG	7.17-a

2.4.2. NG2: Algeria — Spain — Italy — France — northern continental Europe:

Objective: construction of new natural gas pipelines from Algeria to Spain, France and Italy, and increasing network capacities in and between Spain, France and Italy.

Table 15: Key figures of axis NG2 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Operational additional capacity Bm3/a or Bm3	Diameter (inch) / Pressure (bar)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
37	9.33	Algeria - Tunisia - Italy gas pipeline	DZ IT	780	6,5	20-26 / n.a.	290	-	C	2008 - 2012
38	9.34	Algeria - Italy gas pipeline, via Sardinia and Corsica, with a branch to France (GALSI)	DZ IT	1.570	8-10	24/200; 42/75; 28/150	1.380	-	S	2011
39	9.6	Medgaz gas pipeline (Algeria - Spain - France - Continental Europe)	DZ ES	200 (under sea)	8	24-48 / 80	630-800	2,0	A	2009

NG2 Project 9.33 Algeria Tunisia Italy gas pipeline (Trans Tunisian Pipeline Company / Transmed)

The project Algeria Tunisia gas pipeline is about a capacity increase of the existing pipelines due to a sanction decided by the Italian Antitrust Authority for abuse of dominant position in early 2006.

An increase of 3,2 Bcm/y from 1/04/2008 and an additional increase of 3,3 Bcm/y from 1/10/2008 was decided. Total increased capacity will be 6,5 Bcm/y on 1/10/2008. Hence, total capacity will be 33,5 Bcm from 2009.

The project is scheduled for completion in two phases. The first one will allow an increase in gas transport by upgrading the existing compression stations, while the second will begin with the operation of the 8 new turbo compression trains.

Complement on the TAG pipeline (parent to 9.33 PEI)

The TAG pipeline was not included in the list of PEI projects. Nevertheless, in view of its strategic importance not only for Italy but also for Austria and the extra volumes of 6.5 Bcm/y that it will bring to the Austrian and Italian markets the pipeline has to be considered as equally important. Moreover, especially since it is linked to the Trans Tunisia Pipeline Capacity increase project, which definitely is a priority project and which was included under 9.33.[8]

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[8] In view of the overall complexity two supplementary IDS have been created (under the parent 9.33 IDS number, cf. Annex II):

1. one IDS that gives the full justification why ENI owning 89% of the TAG TSO (in which OMV holds the remaining 11%) has decided to implement this very important capacity increase
2. one separate IDS that gives the full Technical Data thereof, as the modification works will be executed in Austria.

NG2 Project 9.34 Algeria - Italy gas pipeline via Sardinia and Corsica with a branch to France (GALSI pipeline)

Financing by the GALSI Company grouping Sonatrach, Edison, Enekpower, EOS Energia SFIRS Spa (Progemisa and Wintershall).

The feasibility study has been completed and the basic engineering is presently progressing with a forecast for the completion of the basic engineering for 2007. The final investment decision is planned for July 2008. The interviewee did not mention a date for initial operation but with a construction estimated (contractor) at 2 to 3 years, the operation 01.12.2010.

The authorisation phase has not started but the attached interview data sheet describes the components of the authorisation procedure.

NG2 Project 9.6 Medgaz pipeline (Algeria – Spain – France – Continental Europe)

The project is in its construction phase, initial operation in 2009. The study phase completed in 2004 included an exhaustive marine survey, geological hazards, seafloor morphology. The authorisation phases in Algeria and Spain are expected to be concluded by end of 2006. No problems or obstacles have been reported.

The first IDS explains that ENI has been subjected to a ruling by the Italian Competition Authority in 2004 and that in order to resolve this issue ENI had agreed to important import capacity increases over the following 4 years, subject to certain Italian market developments. This has also motivated their decision to increase the capacity of the TTPC pipeline by 6,5 Bcm by 1/10/2008). Hence, the TAG pipeline will reach a total capacity of 33,5 Bcm from 2009 onwards.
The second IDS explains HOW this is done in Austria itself; by building 380 km of extra pipelines and adding two additional compressor stations.

2.4.3. NG3: Caspian Sea countries — Middle East — EU:

Objective: New natural gas pipeline networks to the European Union from new sources, including the Turkey — Greece, Greece — Italy, Turkey — Austria, and Greece — Slovenia — Austria (via the western Balkans) natural gas pipelines.

Table 16: Key figures of axis NG3 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Operational additional capacity Bm3/a or Bm3	Diameter (inch) / Pressure (bar)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
40	7.12	Turkey - Greece - Italy gas pipeline (branch: Greece - Italy gas pipeline)	GR IT	802	8	36 / 80 (on-shore), 32 / 150 (off-shore)	966	8,1	A	2011
	9.22	Turkey - Greece - Italy gas pipeline (branch Greece - Turkey gas pipeline)	GR TR	285 km Turkey - Greece & 330 km Greece	11 (with 8 in transit to Italy)	36/42" onshore / 80 onshore	71,3 (GR part)	4,6	C	2007
41	9.21	Turkey - Austria gas pipeline	AT TR	3.300	31	56 / 90	4.600	1,7/4,8	A	2011

NG3 Project 7.12 Turkey – Greece - Italy gas pipeline (branch Greece – Italy gas pipeline) (other name: IGI = Interconnected Greece Italy)

The pipe Greece -Italy is planned to be in operation for 2008 – beginning 2011. The feasibility study is declared on its way. The contractor thinks that the date for the operation of 2011 above is more likely. In the coming months a reconnaissance survey (RMS) will be contracted for defining the route.

Financial total of support from TEN-E has been shared on a 50/50% basis which could be a source of problems in future for the next financing support. This is the first time that Greece is dealing with an offshore pipeline and presence of archaeological sites along the route is possible. The unpredictable high price of steel might pose a price risk.

NG3 Project 9.22 Turkey – Greece - Italy gas pipeline (branch Greece – Turkey gas pipeline)

The Greek section of this project is completed and ready for operation. The Turkish section is in the construction phase and will be completed in March 2007, but a delay of 2 to 3 months has been announced.

Various problems arising from the difficult political relations between Turkey and Greece have been solved thanks to the support of the Ministries of Foreign Affairs of both countries. The region where the pipe crosses the border is an environmentally protected area. Guarantees have to be given that no change in the biotope of the region will be noticed after construction. Crossing the border in the middle of the Evros – Meric river, a politically acceptable solution had to be found.

NG3 Project 9.21 Turkey – Austria Gas pipeline

The pipeline is in the authorisation phase and is forecasted to be in operation in 2010/2011. It shall transport resources in the Caspian Sea countries to the European Union (Nabucco pipeline). The pipeline has a total length of 3.300 km (AT 46 km, BG 329 km, HU 388 km and TR 1999 km).[9] For Bulgaria a consortium has been formed between Bulgargaz and OMV Gas International (AT) (leader of the Consortium).

The total of number of authorisations required reaches 20 to 30 authorities. Public consultation in Hungary is planned during the engineering phase in 2008. There is one meeting between partners per month and permanent contact between the actors. No problems or obstacles have been reported by end of 2006 by any of the actors.

2.4.4. NG6: Mediterranean Member States — East Mediterranean Gas Ring:

Objective: establishing and increasing natural gas pipeline capacities between the Mediterranean Member States and Libya — Egypt — Jordan — Syria — Turkey.

Table 17: Key figures of axis NG6 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Length (km)	Operational additional capacity Bm3/a or Bm3	Diameter (inch) / Pressure (bar)	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
42	9.20	Libya - Italy (Gela) gas pipeline	LY IT	600	8-10	32 / n.a.	1.400	-	F	2004

NG6 Project 9.20 Libya - Italy (Gela) new submarine gas pipeline

The gas pipeline from Libyan resources to Italy (Greenstream) is part of the Western Libyan Gas Project and has been in operation since 2004. The components include a compressor station on the Libyan coast, the underwater pipeline and the reception terminal at Gela in Sicily.

Punctual construction has been a challenge due to the nature of the seabed and numerous cable crossing. There is no further development, even upstream in Libya (production capacity), concerning an extension of the existing export capacity from Libya to Italy.

[9] Five IDS are attached for this project in Annex II from the five countries crossed by the pipeline have been carried out, respectively Botas in Turkey, Transgaz in Romania, TSO MOL Hungarian Oil and Gas Plc for Hungary and OMV Gas International GmbH for Austria.

2.5. Review of LNG terminals

2.5.1. NG4: Liquefied natural gas (LNG) terminals in Belgium, France, Spain, Portugal, Italy, Greece, Cyprus and Poland

Objective: diversifying sources of supply and entry points, including the LNG terminals' connections with the transmission grid.

Table 18: Key figures of axis NG4 projects

Running no.	Annex III (2006)	Project Name	Countries Involved	Operational additional capacity Bm3/a or Bm3	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
43	6.2	LNG in Santa Cruz de Tenerife, Canary Island (ES)	ES	1		0,8	A	2011
44	6.3	LNG in Las Palmas de Gran Canaria (ES)	ES	1	152	-	A	2011
45	6.4	LNG in Madeira (PT)	PT	0,064	80	-	S	2010
46	6.11	LNG on the island of Cyprus, Vasilikos Energy Centre	CY	n.a.	670	-	S	2010
47	6.13	LNG on the island of Crete (GR)	GR	n.a.		0,13	S	n.a.
48	8.1	LNG at Le Verdon-sur-Mer (FR, new terminal) and pipeline to Lussagnet (FR) storage	FR	6 / 9	400		S	2011
49	8.2	LNG at Fos-sur-Mer (FR)	FR	8,25	400		C	2007
50	8.3	LNG at Huelva II (ES), extending existing terminal	ES	n.a.	124		C	2009
51	8.4	LNG at Cartagena II (ES)	ES	n.a.	79		C	2008
52	8.4	LNG at Cartagena III (ES)	ES	n.a.	60		A	2010
53	8.5	LNG at Galicia (ES), new terminal (Mugardos/El Ferrol)	ES	8	416		C	2007
54	8.6	LNG at Bilbao (ES), new terminal (+extension)	ES	n.a.	1st 280 2nd 200		F / C	2003 2009 - 2011
55	8.7	LNG in the Valencia Region (ES), new terminal	ES	n.a.	1st 340 2nd 110		F / C	2006 2009
56	8.8	LNG in Barcelona (ES), extending existing terminal	ES	n.a.	72		F	2005
57	8.9	LNG in Sines (PT), new terminal	PT	n.a.	265	0,93	F	2003
58	8.10	LNG at Revithoussa II (EL), extending existing terminal	GR	3,4	48	0,75	C	2007
59	8.11	LNG on the North Adriatic Coast (IT) (at Monfalcone)	IT	8	580		A	2008

Running no.	Annex III (2006)	Project Name	Countries Involved	Operational additional capacity Bm3/a or Bm3	Estimated Costs (M€)	TEN-E support (M€)	Status	In operation year (2006)
60	8.11	LNG on the North Adriatic coast (IT) (at Muggia)	IT	8	600		A	after 2010
61	8.12	LNG offshore in the North Adriatic Sea (IT) (Rovigo)	IT	n.a.	700-1000		C	2008
62	8.13	LNG terminal on the South Adriatic Coast (IT)	IT	n.a.	330		A/S	2006
63	8.13	LNG at Brindisi (IT)	IT	n.a.	500		C	2010
64	8.14	LNG at Taranto (IT)	IT	4 - 8	600		A	2009
65	8.15	LNG at Gioia Tauro (IT)	IT	12	640		S	2010
66	8.15	New LNG in Italy (Sicily) (Porto Empedocle)	IT	8	500		A	2010
67	8.16	LNG at Livorno (IT), offshore	IT	n.a.	250		A	n.a.
68	8.16	LNG at Rosignano (IT)	IT	8	650	1,4	A	2011
69	8.17	LNG at Zeebrugge (BE) / Dudzele (second phase of capacity extension)	BE	4,5	165		C	2007
70	8.19	Construction of a second LNG terminal in continental Greece	GR	n.a.	n.a.		D	n.a.
71	n.a.	Polish LNG Project	PL	n.a.	400		S	2011

NG4 Project 6.2 LNG terminal in Santa Cruz de Tenerife (ES)

This project for a new terminal presented by Endesa has been in discussion at political level since several years. Precise studies have not yet started. If a political consensus is reached the project could not be started before 2010/2011.

NG4 Project 6.3 LNG terminal in Palma de Gran Canaria (ES)

This project of a new terminal presented by Endesa has been in discussion at political level since several years. Precise studies have not yet started. If a political consensus is reached the project could not be started before 2010/2011.

NG4 Project 6.4 LNG terminal in Madeira (PT)

This project for a new terminal is in the early study phase. The idea of importing natural gas to Madeira island started in 2002 and a political decision to go ahead with the project was made in mid-2004. Initial operation is planned for July 2010.

The project developed by the Regional Government of Madeira (RGM) has been entrusted to the local electricity company EEM (Empresa de Electricidade da Madeira), 100% owned by the RGM. The project will mainly feed the Victoria power plant presently fired by heavy fuel-oil. Problems could occur as this project introduces a new technology to Madeira and exposes innovative aspects of a small facility installed on an island peripheral to the EU.

NG4 Project 6.11 LNG terminal in Cyprus, Vasilikos Energy Centre, (CY)

This project for a new terminal is in the design study phase, i.e. at the beginning of the phase and the initial operation is forecasted for 2010. The study phase started in early 2006 and was concluded in August. The front end engineering is expected to start in September 2006 and concluded end of 2006.

The study of this project has been authorised by the Cyprus Council of Ministers and no other authorisations have been requested so far.

NG4 Project 6.13 LNG terminal on Crete (GR)

This project for a new terminal was in the study phase but has been frozen for the moment till a decision has been made. The project designed for feeding electricity generation on Crete was an alternative to the diesel light oil presently used.

NG4 Project 8.1 LNG terminal at Le Verdon-sur-Mer (new terminal) and pipe line to Lussagnet storage (FR)

This project for a new terminal initiated by ELF before market deregulation was abandoned after the merging of ELF TOTAL for confidential reasons. The study phase started by ELF TOTAL in early 2000 concerned hydraulic and sediment studies.

From August 2006 the project has been reinitiated by a Dutch company "4gas" with a location at the mouth of La Gironde (Bordeaux) with initial operation forecasted in 2011. Contacts of "4gas" for an option agreement with the port of Bordeaux have been positive.

NG4 Project 8.2 LNG terminal at Fos-sur-Mer (extension) (FR)

This GDF project for a new terminal in Fos-Cavaou is in the construction phase and the initial operation is forecasted for December 2007. This project is not an extension of the existing GDF terminal located nearby at Fos-sur-Mer. The study phase started in early 2003 and the construction phase started in October 2004.

Problems mentioned:

a) the terminal is classified in Seveso category which makes the regulations more stringent.

b) seismic evaluation imposed by French authorities has led to adaptation of the project during implementation hence the delay.

NG4 Project 8.3 LNG terminal Huelva II, extending existing terminal (ES)

This ENAGAS project for an extension of the existing storage capacity of the terminal adding two new tanks of 150.000 m^3 will be completed respectively in 2006 for the fourth tank and for the fifth tank in 2009. Total capacity: with the 4^{th} tank: 460.000 m^3

NG4 Project 8.4 LNG terminal Cartagena II (ES)

This project is completed and is an extension of the existing terminal in operation since 1997. In 2000 a new dock for methane tankers was completed. In 2002 a new LNG storage of 105.000 m^3 was added to the existing 55.000 m^3 and vaporisation capacity increased to 600.000 (n) m^3 in 2003. In July 2005 a third storage capacity of 127.000 m^3 was commissioned. In October 2006, the emission capacity will reach 1.200.000 (n)m^3/h.

NG4 Project 8.4 LNG terminal Cartagena III, extending existing terminal (ES)

This project is an extension of the existing terminal adding a fourth tank of 150.000 m³ and the storage capacity will then reach 587.000 m³ and export capacity 1.350.000 Nm³/h in 2008. In 2002 a new LNG storage of 105.000 m³ was added to the existing 55.000 m³ and the vaporisation capacity increased to 600.000 (n) m³ in 2003.

NG4 Project 8.5 LNG terminal Galicia (new terminal) (ES)

This project developed by Reganosa is in the construction phase and concerns an additional storage capacity of 2 tanks of 150.000 m³ and the initial operation is forecasted for February 2007. It comprises also connecting pipelines.

NG4 Project 8.6 LNG terminal Bilbao (new terminal) (ES)

This project developed by Bahia de Bizkaia Gas Company is in the construction phase and concerns an additional storage capacity of 2 tanks of 150.000 m³. The initial operation is forecasted for February 2008 for the first tank and 2010 for the second. The existing LNG terminal has been in operation since August 2003.

The authorisation phase for the two additional tanks is progressing without noticeable problems.

NG4 Project 8.7 LNG terminal Valencia region (new terminal/Sagunto) (ES)

This project for a new terminal developed by SAGGAS has been in operation since April 2006 in its initial design. The second phase concerning an increase in regasification (to 750.000 Nm³/h) and 2 additional tanks of 150.000 m³ is scheduled to be in operation in 2009.

No major problems occurred during the study of the initial project and for the extension most of the studies were made including this second phase. All required permits and authorisations were given on time, although it was necessary to put pressure on some authorities.

NG4 Project 8.8 LNG terminal in Barcelona (extension) (ES)

This project is an extension of the existing terminal (initially with 2 tanks of 80.000 m³). Two new tanks (150.000 m³ each) have been put into operation since 2005 increasing the storage capacity to 460.000 m³ in operation in 2007. By 2011 the total storage capacity will be extended to 990.000 Nm³ with a send out capacity of 1.800.000 m³/h.

NG4 Project 8.9 LNG in Sines (new terminal), (PT)

This project for a new terminal developed by REN Atlantico has been in operation since October 2003 and no extension is foreseen for the moment.

NG4 Project 8.10 LNG terminal Revithoussa II (GR)

This DEPA project is the extension of an existing terminal and is in the construction phase. Operation is expected by end of 2007.

Delays occurred due to bureaucracy, and a one-year delay due to the Government.

NG4 Project 8.11 LNG terminal on the North Adriatic Coast

Other names are "Monfalcone" or "Golfo de Trieste". This project for a new terminal was developed by Endesa. Authorisation was given by a decree of the Italian Government "Cabina di Regia" on 30/08/2006 (cf. chapter 2.5.2). Before that special authorisation of the Government, opposition from local authorising institutions as well as from local environmental groups blocked the project.

NG4 Project 8.11 LNG terminal on North Adriatic coast (at Muggia)

Other name is "Zaule TS". This ENEL project for a new terminal is at the end of the authorisation phase. Authorisation (Italy) was given by a decree of the Italian Government "Cabina di Regia" on 30/08/2006 (cf. chapter 2.5.2). A delay of several months is reported due to local opposition on the Slovenian side.

NG4 Project 8.12 LNG offshore in the North Adriatic Sea (Rovigo)

This EDISON SpA offshore project for a new terminal is in the construction phase, operation is scheduled for the 2nd half of 2008. The Ravenna project was in the study phase in 2004 but has been continued under the name Rovigo LNG.

Financial support was given by the Italian Government but the EC considers this support as an infringement procedure (Directive 92/43/CE) and Edison considers this a major risk which in the worst case could stop the whole project.

Permits were difficult to obtain or issued late. During the construction phase local opposition was a major problem and a minor party in the Province Parliament (2 to 3% of the seats) delayed the permits.

The (floating) facility will be assembled in Algeciras (Spain) and towed to the site. A problem was to find a yard large enough for the construction.

NG4 Project 8.13 LNG terminal on the South Adriatic coast

Though this project is listed as a priority project and the authorisation phase will have started, further information has not been reported.

NG4 Project 8.13 LNG terminal at Brindisi

This project for a new terminal was developed by BG Group and is in the construction phase and the commercial operation is scheduled in the 4th quarter of 2009. The study phase and authorisation phase are concluded. EPC (Engineering, Procurement and Construction) contract awarded end 2004. Works on-site started mid 2005.

NG4 Project 8.14 LNG terminal at Taranto

This project for a new terminal was developed by LINEA GROUP. Authorisation was given through the decree of the Italian Government "Cabina di Regia" on 30/08/2006, (cf. chapter 2.5.2). The decision to construct is expected for the first half of 2007.

NG4 Project 8.15 New LNG terminal in Italy (Sicily) (IT)

Other names are "Priolo" or "Augusta". This project developed by a joint venture of ERG & Shell Energy Europe BV concerns a new terminal, which is in the authorisation phase and initial operation is scheduled in 2010. One feasibility study completed in 2004, Front End Engineering and Design (FEED) was completed in August 2006.

Authorisation was given through the decree of the Italian Government “Cabina di Regia” on 30/08/2006 (cf. chapter 2.5.2).

NG4 Project 8.15 LNG terminal Gioia Tauro (IT)

This project for a new terminal developed by Crossgas is in a nearly completed study phase and initial operation is scheduled in 2010.

Technical studies are almost completed with safety study and Environmental Impact Assessment. Authorisation was given through the decree of the Italian Government “Cabina di Regia” on 30/08/2006 (cf. chapter 2.5.2).

NG4 Project 8.15 New LNG terminal in Italy (Sicily) (IT)

Other name is “Porto Empedocle”. This project developed by ENEL for a new terminal is in the authorisation phase and initial operation is scheduled in 2010. One feasibility study was completed in 2004, Front End Engineering and Design (FEED) was completed in August 2006.

Authorisation was given through the decree of the Italian Government “Cabina di Regia” on 30/08/2006 (cf. chapter 2.5.2).

NG4 Project 8.16 LNG terminal at Livorno (offshore)

This project for an new offshore terminal was developed by Endesa and the authorisation phase is concluded. The technical solution consists in the conversion of an existing LNG carrier of 137.000 m^3 and a floating LNG handling facility located at approximately 20 km offshore the city of Livorno and an undersea pipeline to the Tuscany network.

NG4 Project 8.16 LNG terminal at Rosignano

This project for a new terminal was developed by Edison and the authorisation phase by the Italian Government is concluded. Engineering design will continue until the 4th quarter of 2007 followed by the construction phase. Operation is scheduled in the first half 2011.

NG4 Project 8.17 LNG terminal Zeebrugge/Dudzele (extension)

This project developed by Fluxys for a capacity extension of the existing terminal is in the construction phase and scheduled for operation at the end of 2007. The authorisation phase was concluded in 2004 without noticeable problems.

NG4 Project 8.19 Construction of a second LNG terminal in Greece

DEPA National Greek TSO declares and has confirmed that this project for a second terminal does not exist in continental Greece.

NG4 - no reference - LNG project in Poland

This project for a new terminal developed by PGNiG is in the feasibility study phase for technical and economic appraisal for importing LNG to Poland for 2 reasons:

for responding to the increasing demand of the country for doubling the present demand in order to reach 24,4 Bcm/y in 2015,

for diversifying the sources to avoid importing more than 70 % of the consumption from one country (presently Russian imports cover 2/3 of Polish demand).

Provisional capacity ranging from 3 to 5 Bcm/y.

At this phase, no further information has been given (total estimated cost, financial support, technical data, milestones etc.).

2.5.2. Particulars of Italian LNG terminals in implementation

Since the overall situation of the LNG projects in Italy is rather complex, and even more confusion was created by giving different names for some of the projects by the various actors involved, the situation of LNG in Italy requires clarification.

- 7 projects «authorised» on 30/08/2006 under the procedure "Cabina di Regia" (abbreviated CR in Table 19 below) created by the Council of Ministers of the Italian Government.

- 3 projects authorised before the decree of 30/08/2006 (labelled FA=formerly authorised in Table 19 below).

The "Cabina di Regia" (co-ordination committee) is a structure by which Prime Minister Prodi, Minister of Economic Development Bersani and Minister of Environment Pecoraro Scanio, as well as Undersecretary Letta (coordinating the group) analyze the energy needs of Italy, start to develop a national energy policy and coordinate central and local authorities on this matter.

In the first meeting, on 30th August 2006, attended also by Minister of Infrastructures Di Pietro, the main concerns regarded increasing natural gas demand (that could go over 90 Bcm/y in 2008, reaching 101 billion in 2010 and 108 billion in 2015) and the need for more imports, especially through new routes. Particular attention has therefore been given to re-gasification terminals. The outcome was to support the construction of at least 3-4 re-gasification terminals by 2010 and an additional one or two terminals before 2015, and to decide on the authorisation of the projects proposed so far. In order to achieve this, the "Cabina di Regia" has decided to give priority to these authorisation procedures, guaranteeing involvement of all the stakeholders and release of assessment of environmental impact for each project within 90 days. The procedure and the decisions of the meeting were appreciated both by the most important environmental organisations (WWF and Legambiente) and by the major market players.

In Italy so far only one re-gasification terminal works (Panigaglia, owned by Eni), and the sole Porto Levante offshore terminal by Edison, ExxonMobil and Qatar Petroleum is undergoing construction works. The Brindisi terminal, a project presented by British Gas, has been authorised, but remains still under question, as it faces strong local opposition. One more is authorised but faces delays due to local opposition and other uncertainties (Livorno offshore, proposed by Endesa, Amga and Olt Energy). Other projects still have to complete the authorisation phase. Among those, some have already started processes to gain EU priority status and collect local consensus, including the Rosignano project, carried out by Edison.

No other formal session of the "Cabina di Regia" has occurred, but recently Minister Bersani called for another meeting of the committee, as an important means to reaching the objective of building necessary energy infrastructures.

Table 19: Italian LNG projects under implementation

Axis	Ref.	Names of terminals	Authorisation	IDS	Developed by:
NG4	8.11	LNG terminal on the North Adriatic Coast *Monfalcone also called "Golfo di Trieste"*	CR	1/1	Endesa (IT)
NG4	8.11	LNG terminal at Muggia *Also called Zaule TS by the Italian Government*	CR	1/1	Enel
NG4	8.12	LNG offshore in the North Adriatic Sea *Rovigo*	FA	1/1	Edison SpA (IT)/Qatar Petroleum/Exxon
NG4	8.13	LNG terminal at Brindisi	FA	1/1	BG Group (IT)
NG4	8.14	LNG terminal at Taranto	CR	1/1	Linea Group (IT)
NG4	8.15	LNG terminal at Gioia Tauro	CR	1/1	Crossgas (IT)
NG4	8.15	New LNG terminal in Italy (Sicily) *Porto Empedocle*	CR	1/1	ENEL
NG4	8.15	New LNG terminal in Italy (Sicily) *Priolo OR Augusta for Italian Government*	CR	1/1	Erg & Shell Energy Europe
NG4	8.16	LNG terminal at Livorno (offshore)	FA	1/1	Endesa (IT)
NG4	8.16	LNG terminal at Rosignano Solvay	CR	1/1	Edison SpA (IT)/ BP(UK)

In italic other names used by the Italian gas actors

3. Review of status of projects of common interest

3.1. Methodological approach

Like the review of priority projects the primary information about the status of PCI implementation is based on project data sheets which had been prepared as result of a data collection process (cf. chapter 1.2.3). In addition, information available from the internet has been used. The assessment of the status and progress in the implementation of PCIs makes use of these information sources to the best extent possible in order to draw a realistic picture of the situation as prevailing by the end of the year 2006.

The focus is on the status of the implementation process which is divided into five main phases:

1. F a project is finalised and in operation
2. C a project is under construction, including construction start up until completion of construction works
3. A a project is in its authorisation phase, which comprises environmental impact assessments, construction permits, planning approvals etc.
4. S a project is in its study phase, which comprises early project identification, feasibility studies, final design etc.
5. D a project is deleted, i.e. a project is cancelled or abandoned.

The status of projects with essential components in different implementation phases can be shown as a combination of different phases.

3.2. Overview of electricity PCI

The review covered 132 electricity PCIs (cf. also 1.2.2). For 38 of these projects information obtained in the course of this study was not sufficient to derive conclusions on the project progress, but for 94 projects (71%) the project progress could be analysed (data sheets are attached in Annex III).

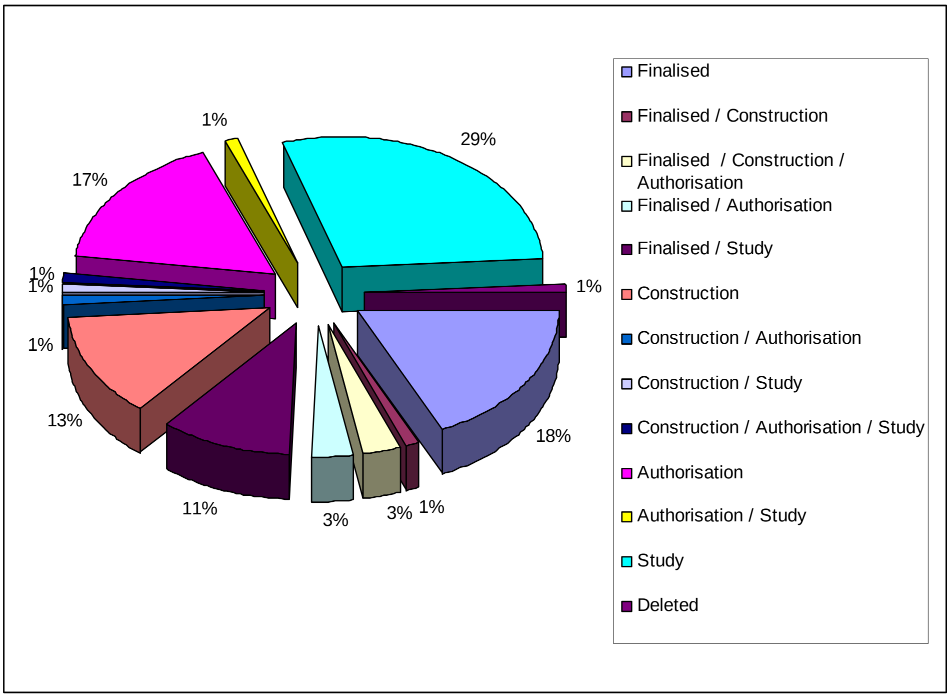
Within the set of the 94 projects, for which the implementation progress could be stated, in total 34 (36%) projects or components within these projects could be finalised. An overview on finalised or partly finalised projects is given in Table 20 (an extended list is given in Annex IX). 15 projects or components were under construction, 17 projects or components in their authorisation phase, while 27 projects were in their study phase. A more detailed overview of the project progress and the composition of phases is given in Figure 4.

Table 20: Finalised or partly finalised electricity PCIs

Running No.	Annex III 2006	Project name	Status	In operation year
1	2.5	Vigy (FR) - Uchtelfangen (DE) line	F	2002
2	2.6	La Praz (FR) phase transformer	F	2002
3	2.7	Further increase of capacity through existing interconnection between France and Italy	F	2004
4	2.23	Reinforcement of the connections between Denmark and Sweden	F	2006
5	3.14	Rizziconi (IT) - Feroleto (IT) - Laino (IT) line	F	2005
6	3.25	New connections in Andalucia (ES)	F	1997 - 2002
7	3.28	Picotee (PT) - Pocinho (PT) line (upgrading)	F	2004
8	3.31	Sines (PT) - Ferreira do Alentejo (PT) I line (upgrading)	F	2005
9	3.33	Pereiros (PT) - Zêzere (PT) - Santarém (PT) lines and Zêzere facilities	F	2004
10	3.34	Batalha (PT) - Rio Maior (PT) I and II lines (upgradings)	F	2003
11	3.35	Carrapatelo (PT) - Mourisca (PT) line (upgrading)	F	2005
12	3.41	Tynagh (IE) - Cashla (IE) line	F	2003
13	3.57	Implementation of reactive power compensation equipment (NL)	F	2004
14	3.59	Upgrading of 380 kV grid of Belgium to increase import capacity	F	2005
15	3.67	Tarnów (PL) - Krosno (PL)	F	2005
16	4.4	Kardia (EL) – Elbasan (AL) line	F	2002
17	4.12	Submarine cable between southern Spain and Morocco (strengthening of existing connection)	F	1997 - 2003
18	3.20	New connections on the Galicia (ES) - Centro (ES) axis	F/A	2000 - 2010
19	3.39	Connection of the regions of Evia (EL), Lakonia (EL) and Thrace (EL)	F/A	2006 - 2008
20	3.43	Connections in the northeast and west of Spain, in particular to connect to the network windpower generation capacities	F/A	1996 - 2008
21	2.12	Sines (PT) - Alqueva (PT) - Balboa (ES) line	F/C	2004 / 2005
22	3.18	New connections on the northern axis of Spain	F/C/A	2003 - 2008
23	3.19	New connections on the Mediterranean axis of Spain	F/C/A	1998 - 2007

Running No.	Annex III 2006	Project name	Status	In operation year
24	3.80	Improving Tartu (EE) power supply	F/C/A	2014
25	2.9	New trans-Pyrenees interconnection between France and Spain	F/S	1998 - 2011
26	2.24	New interconnection between Slovenia and Hungary: Cirkovce (SI) – Hévíz (HU)	F/S	2010
27	3.11	New connections on the east-west axis of Italy	F/S	1995 - 2020
28	3.15	New connections on the north-south axis of Italy	F/S	1998 - 2010
29	3.21	New connections on the Centro (ES) - Aragón (ES) axis	F/S	2001 - 2009
30	4.1	New interconnection Italy - Switzerland	F/S	1996 - 2010
31	4.6	Mostar (Bosnia-Herzegovina) substation and connecting lines	F/S	2003 - 2010
32	4.7	Ernestinovo (Croatia) substation and connecting lines	F/S	2003 - 2010
33	4.13	Connections for the Baltic Electricity Ring: Germany - Poland - Russia - Estonia - Latvia - Lithuania - Sweden - Finland - Denmark – Belarus	F/S	2004 - 2010
34	4.15	New connections between North Sweden and North Norway	F/S	2004 - 2015

Figure 4: Electricity PCI - progress in implementation



3.3. Overview of gas PCI

The review covered 89 gas network PCIs (cf. also 1.2.2). For 18 of these projects information obtained in the course of this study was not sufficient to derive conclusions on the project progress, but for 71 projects (80%) the project progress could be analysed (data sheets are attached in Annex IV).

Within the set of the 71 projects, for which the implementation progress could be stated, in total 20 (28%) projects or components within these projects could be finalised. An overview of finalised or partly finalised projects is provided in Table 21 (an extended list is given in Annex IX).

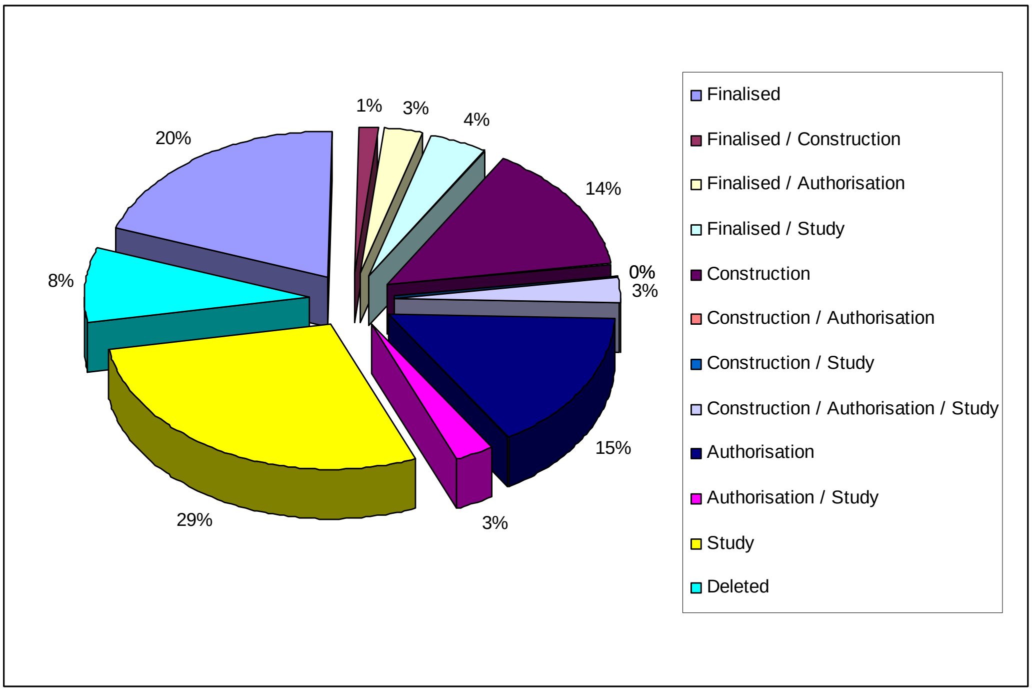
Table 21: Finalised or partly finalised gas network PCIs

Running No.	Annex III 2006	Project name	Status	In operation year
1	6.1	Developing gas network from Belfast towards the north-west region of Northern Ireland (UK) and, if appropriate, to the western coast of Ireland	F	2004
2	7.1	Additional gas interconnection pipeline between Ireland and Scotland	F	2002
3	7.2	North-south interconnection, including Dublin - Belfast pipeline	F	2006
4	7.6	Increasing transport capacity of gas pipelines supplying Portugal through southern Spain and Galicia and Asturias through Portugal	F	1998
5	7.10	Bad Leonfelden (AT) – Linz (AT) pipeline	F	2003
6	8.25	Storage in Centre region (FR), developing water table (Treated as a group: Chemery, Cere-la-Ronde, Soings-en-Sologne)	F	n.a.
7	9.7	Increasing transport capacity of the Algeria – Morocco - Spain (up to Córdoba) pipeline	F	2004
8	9.8	Córdoba (ES) - Ciudad Real (ES) pipeline	F	2005
9	9.9	Ciudad Real (ES) - Madrid (ES) pipeline	F	2005
10	9.19	Increasing transport capacity of the STEGAL gas pipeline for transport of additional gas from the Czech-German border and from the Polish-German border through Germany to other Member States	F	2006
11	9.24	St Zagora (BG) - Ihtiman (BG) gas pipeline	F	n.a.
12	9.28	Increasing transport capacity of the TENP gas pipeline running from the Netherlands through Germany to Italy	F	2006
13	9.29	Taisnieres (FR) - Oltingue (CH) gas pipeline	F	2003
14	-	Gas pipeline from the Danish gas field Tyra West (DK North Sea) to F/3 platform (NL North Sea) and further to NOGAT pipeline to NL	F	2004
15	7.4	Lussagnet (FR) - Bilbao (ES) pipeline	F/A	2005-2008
16	7.16	Gas transport corridor between Austria and Turkey through Hungary, Romania and Bulgaria - (Nabucco)	F/A	1996 - 2011
17	9.36	Gas pipeline from Norway to the United Kingdom	F/C	2006 - 2007
18	8.35	Developing underground gas storage facilities in Italy	F/S	2006 - n.a.
19	9.15	Increasing transport capacity from Russian resources to the European Union, via Belarus and Poland	F/S	1999 - 2010
20	9.23	Increasing transport capacity from Russian resources to Greece and other Balkan countries, via Ukraine, Moldavia, Romania and Bulgaria	F/S	1996 - 2010

12 projects or components were under construction, 13 projects or components in their authorisation phase, while 20 projects were in their study phase and 6 projects were abandoned. A more detailed overview of the project progress and the composition of phases is shown in Figure 5.

The list of PCIs includes two projects which coincide in major parts with projects of European interest: (i) the project on *Increasing transport capacity from Russian resources to the European Union, via Belarus and Poland* (PCI 9.15) is specified as PEI 9.16, the *Yamal - Europe gas pipeline*, and (ii) the project on the *Gas transport corridor between Austria and Turkey through Hungary, Romania and Bulgaria - (Nabucco)* (PCI 7.16) is the same project as PEI 9.21, the *Turkey - Austria gas pipeline*. This means that in principle the total number of 89 PCI projects could be reduced by 2. In addition, 12 out of the 20 projects in the study phase are in a very early stage and are reported to be "mothballed", which likely means that these projects are abandoned.

Figure 5: Gas network PCI – progress in implementation



4. Analysis of implementation obstacles

4.1. Analysis of electricity PEI

4.1.1. Methodological approach

As in the assessment of the implementation status primary information about the progress in project implementation is based on project data sheets which had been prepared as result of a data collection process (cf. chapter 1.2.3). The data sheet information has been compared with and up-dated with DG TREN reporting on the Priority Interconnection Plan and latest available information from the Member States about project implementation.

Project progress is evaluated by delays against planned completion dates of the study, authorisation, and construction phase (as defined in chapter 2.1), and respective reasons for the delays. Since an exact measurement of delays by comparing planning dates with actual dates is not feasible due to data problems, delays are grouped by best guess into

- "**no or minor**" (less than one year),
- "**medium**" (more than one year, commonly less than 10 years), and
- "**long**" (commonly more than 10 years).

In the course of the progress evaluation it turned out that the main reasons can be broken down into

- CO "**coordination"** problems, which comprise decisions of policy makers as well as coordination problems between TSOs, local authorities, and other stakeholders
- PRO "**procedural"** problems, which encompass legislative backgrounds as well as procedural aspects mainly in the authorisation phase (local opposition raised during the authorisation phase constitutes a "legal" reason, because this is a procedural aspect).

The main arguments which have been put forward causing coordination or procedural problems consist of

- EMF fear of electro-magnetic fields
- ENV conflict with environmental issues (nature parks, wildlife, rare species)
- VIEW deterioration of landscape
- T technical problems (unsynchronised areas, loop-flows, non-sufficient grid capacity).

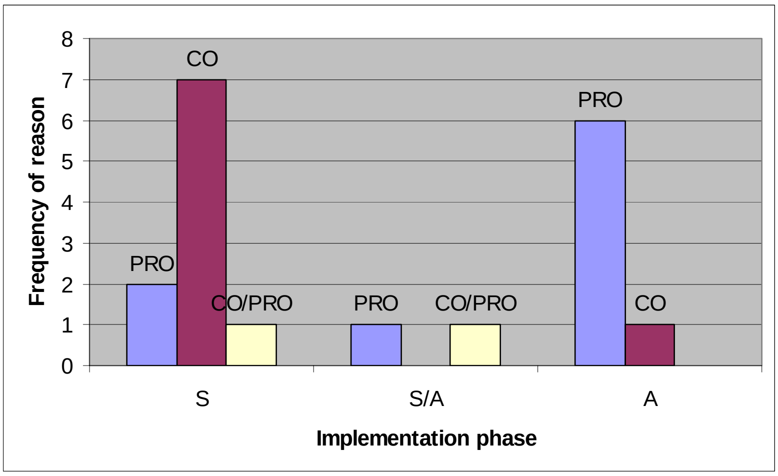
4.1.2. Reasons and arguments of delays

In total, for 13 projects (41%) no or minor delays have been reported. While 11 projects (34%) show medium delays, 25% of all projects (8) have long delays up to 10 years or longer (cf. also Table 22). For example, the design of the Moulaine (FR) - Aubange (BE) line (2.2) started in 1991, but the section in France was cancelled by a court order in 1993 because of a legal flaw, and was only later taken up again and still in its study phase. Another strongly delayed project is the Poland – Lithuania link (2.29). Since the 1990s there have been talks at company level, but the project is still in its study phase.

Procedural problems as well as coordination problems are nearly equally distributed as reasons causing delays. Coordination reasons prevailed in the study phase, while procedural problems determined delays in the authorisation phase (cf. Figure 6).

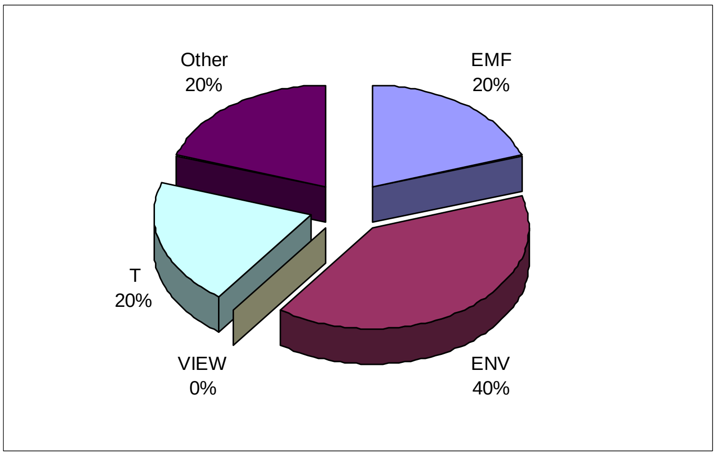
The main reasons for delays in the study phase were pending decisions of policy makers and coordination problems between TSOs, local authorities, and other stakeholders. The main arguments which prevented progress with decisions and coordination have been of an environmental nature, followed by technical arguments and by fear of electromagnetic fields (cf. Figure 7).

Figure 6: Reasons for delays by implementation phase



Not surprisingly, delays in the authorisation phase have mainly been caused by procedural reasons. Major arguments against progress in the authorisation phase encompass fear of electromagnetic fields and environmental issues (Figure 8). The deterioration of the landscape view was also raised as a major argument which led to delays.

Figure 7: Arguments of coordination reasons



Overall, reported delays occurred in the study and authorisation phases. They have been mainly due to environmental reasons and fear of electromagnetic fields. Delays caused by coordination reasons can be solved – in principle – by improved coordination and decision making. But delays due to procedural reasons are caused by legal backgrounds and procedural issues, which strongly depend on national authorisation requirements. Therefore, authorisation procedures for electricity PEI have been analysed in more detail in the following chapter.

Figure 8: Arguments of procedural reasons

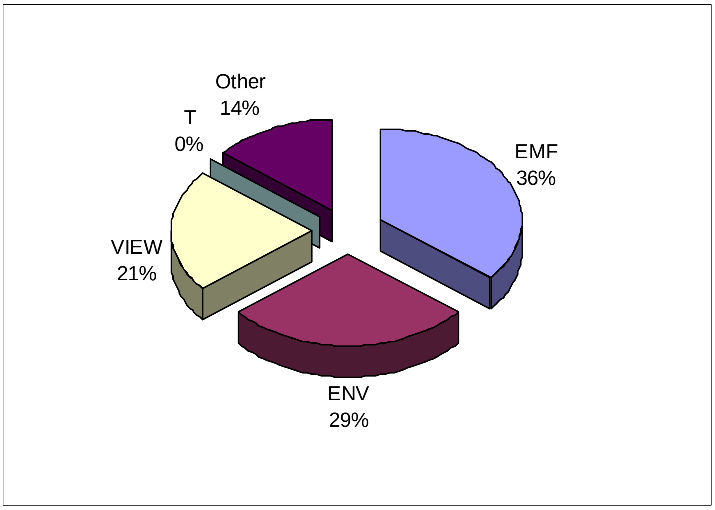


Table 22: Delays in electricity PEI

Running no.	Annex III (2006)	Project Name	Delay: no or minor	Delay: medium	Delay: long	Phase	Reason
1	2.2	Avelin (FR) - Avelgem (BE) line	x				n.a.
2	2.1	Moulaine (FR) - Aubange (BE) line			FR	S	In France the initial project was cancelled by a court order in 1993 because of a legal flaw . The project has been frozen giving priority to the line Avelin-Avelgem (PEI 2.2). Strong public opposition was raised due to the route being too close to urban and rural area with complaints about EMF.
3	2.16	Lienz (AT) - Cordignano (IT) line			x	A	The line traverses both agricultural and tourist nature reserves and the local communities are against it. Main fear is of electromagnetic fields. All potential delays in the beginning of the permission procedure have to be reckoned with.
4	2.35	New interconnection between Italy and Slovenia		x		S	Due to local opposition the cross border point in coordination with the Friuli region and Slovenia is not identified. Implementation is still uncertain and by the end of 2006 a pre-feasibility study was underway.
5	2.36	Udine Ovest (IT) - Okroglo (SI) line		x		S	The main difficulty consists in reaching an agreement between the Region Friuli, Venezia Giulia and the Slovenian side about the cross points between Italy and Slovenia (especially as SI has devoted 35% of its area to the Natura 2000 programme of the EU).
6	3.8	S. Fiorano (IT) - Nave (IT) - Gorlago (IT) line	x				n.a.
7	3.9	Venezia Nord (IT) - Cordignano (IT) line			x	A	It is a densely populated area, and local authorities opposed the project with the argument of fear of EMF. Due to results of the environmental impact study the Ministry of Environment stopped the authorisation process in 2003.
8	3.60	St. Peter (AT) - Tauern (AT) line		x		A	Main objection from the public was fear of electro-magnetic fields (EMF), other objections comprise deterioration of the landscape, environmental protection in particular of forest birds and a rare bug which needs dead wood. The permission procedure is to be performed in 2 federal states. Authorities responsible for the EIA are not used to dealing with the multitude of public opinions, expert opinions, legal and political aspects which are linked to large infrastructure projects.

Running no.	Annex III (2006)	Project Name	Delay			Phase	Reason
			no or minor	medium	long		
9	3.61	Südburgenland (AT) - Kainachtal (AT) line			x	S/A	The project was stalled due to the many concerns of local communities involved - fear of EMF and landscape deterioration. Although an authorization has existed since March 2005, it has not been possible so far to start the construction process, due to an appeal to the "Umweltsenat".
10	2.18	Austria-Italy (Thaur-Brixen) interconnection through the Brenner rail tunnel	x			S	Coordination between the railway side and the power side is not sufficient to exploit the synergy of the project.
11	*)	S. Fiorano (IT) - Robbia (CH) line			x	S/A	ENEL stopped the project in 1997 due to uncertain property and trade rights connected with the upcoming liberalization of the Italian power market. The authorisation procedure was complicated due to requests of local authorities to change the routes and for environmental compensation.
12	2.10	Sentmenat (ES) - Bescanó (ES) - Baixas (FR) line		x		S	Since 2004 several options for the border crossing have been considered. Both the Spanish and French governments, asked the European Commission to nominate a European coordinator in order to find a consensual solution.
13	2.14	Valdigem (PT) - Douro Internacional (PT) - Aldeadávila (ES) line and "Douro Internacional" facilities	x				n.a.
14	4.9	Philippi (GR) - Hamitabad (TR) line	x			A	The line has been declared as a national priority and this helped save 6 months in the authorization procedure.
15	2.21	Undersea cable to link England (UK) and the Netherlands		x		A	Dutch regulations impose a long procedure, authorisations are given from ministry level and are decided in Parliament, individual citizens have a relatively large influence on the process.
16	1.1	Undersea cable to link Ireland and Wales (UK)		x		S	By end of 2006 the project was still in its study phase, which started in 1999, awaiting a decision of the Irish Government about the ownership.
17	2.22	Kassø (DK) - Hamburg/Dollern (DE) line	x			A	The line is encountering problems of a densely populated area and many different landowners. Fear of EMF has been expressed and local opposition against overhead lines is trying to impose underground cables.

Running no.	Annex III (2006)	Project Name	Delay			Phase	Reason
			no or minor	medium	long		
18	3.48	Hamburg/Krümmel (DE) - Schwerin (DE) line	x			A	The "Planfeststellungsverfahren" has started and is expected to be completed by mid 2007 (best case), if no further legal obstacles are raised. During public consultation main arguments against the line are the routing, "not-in-my-backyard", fear of EMF, deterioration of landscape view.
19	3.2	Kassø (DK) - Revsing (DK) - Tjele (DK) line		x		A	Major problems are acceptance from landowners and the restructuring of relevant authorities. The authorization of the application is expected in 2007 after completion of the EIA.
20	3.2	Vester Hassing (DK) - Trige (DK) line			x	A	Among other things, the controversy was about an underground cable being preferable to an overhead line. The procedure took 12 years from the first application to the authorization by the minister.
21	4.26	Submarine cable Skagerrak 4 between Denmark and Norway	x				n.a.
22	2.29	Poland - Lithuania link, including necessary reinforcement of the Polish electricity network and the Poland - Germany profile in order to enable participation in the internal energy market			x	S	The interconnection idea between PL and LT has a long history. In the 1990s there were talks at company level. Since then, the scope of the project has changed. Due to different sites for the interlinks and due to environmental issues (nature reserve) lines had to be two times longer than planned, expropriation of land required amendments to the law, and there was uncertainty about synchronisation areas.
23	2.30	Submarine cable Finland - Estonia (Estlink)	x				n.a.
24	2.15	Fennoscan submarine cable between Finland and Sweden	x				n.a.
25	3.49	Halle/Saale (DE) - Schweinfurt (DE)		x		A	German permission procedures will have to be performed with risks of delays. Main arguments against the line are the routing, "not-in-my-backyard", fear of EMF, and the deterioration of landscape views. Special concerns relate to the deterioration of the idyllic scenery of the Thüringer Wald and associated negative impacts on tourism.

Running no.	Annex III (2006)	Project Name	Delay			Phase	Reason
			no or minor	medium	long		
26	2.28	Neuenhagen (DE) - Vierraden (DE) - Krajnik (PL) line		x		S	On the PL side the internal grid is not prepared to take up load flows. It is doubtful, if a cost covering access price would be approved by the German regulator as the price would be too high to be justified in comparison to other network access prices. Under the DE legal framework the interconnection with PL can only be established if DE land owners voluntarily grant permission for access to their land to the transmission company.
27	2.33	Dürnrohr (AT) - Slavětíce (CZ) line		x			Though the circuit will be added to an existing line between Czech Republic and Austria, in Austria the line route crosses a public protected area and fear of electromagnetic fields (EMF) has been expressed.
28	2.32	New interconnection between Germany and Poland	x			S	A 2004 (pre)feasibility study for the line Plewiska (PL) - Preilack (DE) shows that this interconnection would not increase transmission capacity. The overall situation might change with the commissioning of new wind parks in PL and the erection of a new nuclear plant in PL near the border. This would require the reinforcement of the internal PL grid and might change the flow patterns between the grids of DE, PL, and CZ.
29	2.26 / 3.75 / 3.76	Vel'ký Kapušany (SK) - Lemešany (SK) - Moldava (SK) - Sajóivánka (HU)		x		S	The routing Moldava (SK) - Sajóivánka (HU) causes problems on the Hungarian side, as it would cross landscape and forest protection areas and developed sylvicultures. Permissions from the environmental authorities on the Hungarian territory would be difficult and problematic. The interconnection between Moldava (SK) - Sajóivánka (HU) is not seen to be feasible.
30	3.77	Gabčíkovo (SK) - Vel'ký Ďur (SK)	x				n.a.
31	2.27	Stupava (SK) - South-East Vienna (AT) line			x	S	The line should have been commenced before CENTREL integration with UCTE. But in 1995 the works were stopped in Austria due to the Mochovce NPP (Nuclear Power Plant) completion and the Bohunice V-1 NPP. In 2002 it was agreed that the project shall continue at the level of a joint expert group.
32	4.25	Electricity connection to link Tunisia and Italy	x				n.a.

*) 4.3 Annex III 2003

4.2. Analysis of gas pipeline PEI

Overall, all gas pipeline projects are being pursued, there are no reports of significant delays. One pipeline has already been completed (Libya - Italy (Gela) gas pipeline), while two are under construction (Algeria - Tunisia - Italy gas pipeline and the Greece - Turkey branch of the Turkey - Greece - Italy gas pipeline). The majority of the projects are expected to be completed within the next 4 years.

In the last decades the technology has developed so fast that projects, which were technically impossible in the past – especially offshore - have become accepted practice in cross border trade. The enormous escalation of energy prices in the last years underpins the feasibility of multi billion Euro projects, both national and across borders. Projects like the Greenstream pipeline, the Galsi pipeline and the Medgaz pipeline are enormous technological challenges, which can only be met thanks to the tremendous progress made by offshore pipeline technology both in terms of laying techniques and improvements of the quality of steel alloys in the last decades.

The practice of authorisations (environmental, institutional and/or planning permission) and the necessary cross border coordination partly remains in its infancy and represent formidable local, regional and national obstacles for any new venture. Many TSOs are confronted with unforeseen delays as appeals are launched against them, even after their initial authorisation "to go ahead" had been legally granted. The Council of European Energy Regulators has concluded that 'even if all goes to plan', an average of about 3 years is needed to get all authorisations in place in most countries, with notable excesses in certain countries and in environmentally sensitive areas. In fact, environmental legislation has become a tool for concerned parties, including national governments, to oppose implementation of projects. This is not only a result of NIMBY attitudes, but reflect a lack of proper coordination mechanisms upstream of large projects, especially cross (multiple) border ventures like the Nord Stream Project. A number of TSOs consulted for this survey, apparently did not come to terms in a timely manner with the present authorisation requirements, including articles 8, 9, and 10 of applicable EU guidelines 2006-08-02[10], related ESPOO[11] and UCLOS Conventions[12] (***). Future new regulation or requirement in this area would appear to need prior awareness campaigns.

But major international TSOs are able to mobilise teams of experts in all fields, especially environment, to cope with all upstream requirements and studies concerning authorisations and environmental protections measures. **Experienced European TSOs are capable of dealing with such constraints** together with their counterparts and manage to take them into account in their overall planning. The re-routing of the BBL pipeline, due to environmental concerns, is a good example thereof.

On the NG3 axis, many of the TSOs in this region lack the experience and hence the familiarity with complex European authorisation procedures and in fact prefer to delegate all cross border coordination efforts and requirements to the respective consortia leader. This is particularly the case for the Nabucco project, where the Turkish, Romanian and Bulgarian operators have expressed their concern during the survey. Therefore, it will be crucial to have the legal framework harmonized either via ratification of the Energy Community Treaty by all five countries (which will then have the obligation to implement the "acquis communautaire" within one year from the coming into effect of the Treaty) or via implementation of Article 22 of the Directive including related provisions in the legal framework of the Energy Laws of the countries. With the accession of Romania and Bulgaria to the

[10] Guidelines for Trans-European energy networks, Decision No 1364/2006/EC of the European Parliament and the Council of 6th of September 2006.
[11] ESPOO (EIA) Convention1991; convention on environmental impact assessment in a trans-boundary context.
[12] UNCLOS United Nations Convention on the Law of the Sea; 10/12/1982

European Union as of 1st January, 2007 only Turkey will remain to implement Article 22 of the Directive and related provisions. The Nabucco consortium has applied or intends to apply for about 22 exemptions.

4.3. Analysis of LNG terminal priority projects

As explained in chapter 2.2.3, in total 38 projects for LNG terminals have been reviewed. Due to cancellation of 8 projects and integration of two projects as subprojects of the new LNG terminal in Italy (Sicily) project, 29 LNG terminal priority projects remained for further investigation. The 8 projects were deleted mainly due to integration into other projects, and also the deletion of a second LNG terminal in continental Greece from the remaining 29 LNG projects has been done due to alternative options.

Though the majority of the remaining 28 active LNG terminal projects are ongoing, several are hampered in their execution:

- In Greece, the LNG terminal on the island of Crete (6.13) was in the study phase but has been frozen for the moment till a decision is made. The extension of the terminal at Revithousa II is reported to be delayed by one year due to bureaucracy and problems in the procurement of SCVs.

- In Spain, it is reported that the authorisation authority took a long time for the Cartagena II and III LNG terminals (8.4). But though some of the operators/promoters complain about the complex and lengthy authorisation processes, it appears that the mandatory National Energy Plan over the period 2002-2011 is being implemented. In 2005 an update of the plan was made by the "Comision National de la Energia" within the Ministry of Energy, Tourism and Commerce. It appears that direct intervention of the Federal Government in Spain to establish priorities has also resulted in a speedier authorisation process.

- In Italy, 8 projects are delayed. Though the Italian Government and all regional governments involved decided at their meeting of the "Cabina di Regia " on 30/08/06 that all environmental authorisations need to be resolved for Gioia Tauro, Zaule TS (also called Muggia), Golfo di Trieste (also called Monfalcone), Taranto, Porto Empedocle, Augusta, Rosignano, until February 2007 no decision was taken for 4 projects: Gioia Tauro (8.15), Taranto (8.14), Porto Empedocle (8.15), and Rosignano (8.16).

  Although the LNG at Livorno (8.16) had already received the required authorizations before the "Cabina di Regia" process started in 2006, it is nevertheless facing delays due to remaining strong local opposition.

  The LNG on the North Adriatic Coast (8.11) at Monfalcone has faced delays since the beginning of the authorisation phase, as the project meets opposition from local authorising institutions as well as from local environmental groups.

  The LNG on the North Adriatic coast (8.11) at Muggia faces severe problems. Trieste's city council in charge of Monfalcone has said no to the Endesa and Gas Natural LNG terminal projects. The vote was against their environmental compatibility, seconded by a similar position taken by the city council of Muggia. Though the projects were approved by the "Cabina di Regia" procedure in August 2006, these votes were made in February 2007.

  Though the LNG offshore terminal in the North Adriatic Sea (8.12) at Rovigo had a delay due to issuing the permits, the delay could be compensated by respective adaptations of the construction phase so that an overall delay of the project could be avoided. The communication between the Italian Government and the European Commission on an infringement procedure is considered by the company Edison as a problem which (in the worst case) might stop the whole project.

5. Evaluation of TEN axis developments

5.1. Evaluation of electricity PEI

5.1.1. Methodological approach

Electricity TEN axis developments are evaluated by the respective project's contribution: are there improvements or are there problems remaining?

The main indicator is the achieved increase of net transfer capacity (NTC) through the TEN project in relation to the existing power flows. The power flows between countries have mainly been assessed on the basis of UCTE data (System Adequacy Retrospect 2005) and Nordel data (Annual Report 2005). The source for NTC data are figures published by ETSO[13]. The net additional capacity of the PEIs is usually given as the n-1 additional transfer capacity of a project[14].

The occurrence of trans-border congestions is another indicator of the likely impact of a project adding additional transfer capacity and thus reducing congestions. Country values for current trans-border congestions were taken from the UCTE System Adequacy Retrospect 2005[15]. More details about the impact of electricity PEI are contained in Annex VI.

5.1.2. European power exchanges

The figures of total electricity imports and exports demonstrate the magnitude and the relevance of power trade in the EU. Figure 9 and Figure 11 illustrate the power exchanges in the countries of the UCTE and NORDEL control areas. Germany and Italy were the main electricity importers in the EU, with 48187 GWh and 46426 GWh, respectively (2004 figures). They were followed, to a lesser extent, by the Netherlands (21405 GWh), Austria (16629 GWh), Sweden (15646 GWh) and Belgium (14567 GWh). In total volumes, France was the biggest exporter of electricity with 68588 GWh in 2004, followed by Germany (50808 GWh) and the Czech Republic (25493 GWh).

In contrast to the total export and import volumes the balance between exports and imports determines a country's provision of electricity to the EU market. About a third of the EU Member States were net exporters. France was the EU's largest net exporter with 62040 GWh, almost four times as much as the Czech Republic in second place (15717 GWh). Poland came third (Source of import and export figures: Eurostat).

[13] It should be noted that NTC values are not static and can change by seasons and over the years. Further, NTC values do not necessarily provide a figure for possible commercial power transfer, as they might include loop flows in an intermeshed network. As published ETSO data provide NTC values between countries but only partially for a country as a whole, the figures for the import capacity as percent of the installed generation capacity are taken from information given by DG TREN which is based on summer 2006 NTC values.

[14] In principle, the figures of the net additional capacity of a project cannot be simply added to the NTC value of the concerned countries, as the new projects most likely will cause NTC different from simple algebra and would need to be calculated anew for the intermeshed network as a whole. However, in order to assess impact of a project the net additional capacity is directly compared with the existing NTC value for sake of simplicity.

[15] A further source for assessing the impact on transfer capacities on the EL7 and EL8 axis has been a study, which has been prepared by Kema Consulting for DG-TREN (Analysis of the network capacities and possible congestion of the electricity transmission networks within the accession countries, June 2005 (Version 1.3)).

5.1.3. EL1: France – Belgium – Netherlands – Germany

The Netherlands and Belgium are net importers of electricity. France has excess cheap nuclear generation capacity, and Belgium regularly imports from France for economic reasons but also because local generation capacity is not adequate (cf. Figure 9). Also Germany and the Netherlands import large amounts of energy from France causing transit flows through the Belgium grid. In case of high wind power production in Northern Germany a significant part of the power would pass via the Netherlands, Belgium and France back to the load centres in Southern Germany, as the German grid itself is unable to carry these power flows. These flows add to the usual German exports to the Netherlands. Overall, the transit flows from France as well as the occasionally high wind flows are leading to severe congestions in sections of the interconnections between France-Belgium-Netherlands and Germany.

The installation of a second circuit on the Aveline (FR) - Avelgem (BE) line (2.2) improved system stability and increased the NTC between France and Belgium by some 50%. The planned enforcement of the Moulaine (FR) - Aubange (BE) line (2.1) with a second circuit, will add to increased system stability and is expected to increase the transfer capacity by another 10 to 15%.

Improvements

- The enforcement of both lines improves overall security of supply for Belgium and the Netherlands, and it enables more trade in the regional power market of France, Belgium and the Netherlands, which have been created by coupling APX and Powernext.

5.1.4. EL2: Borders of Italy with France, Austria, Slovenia and Switzerland

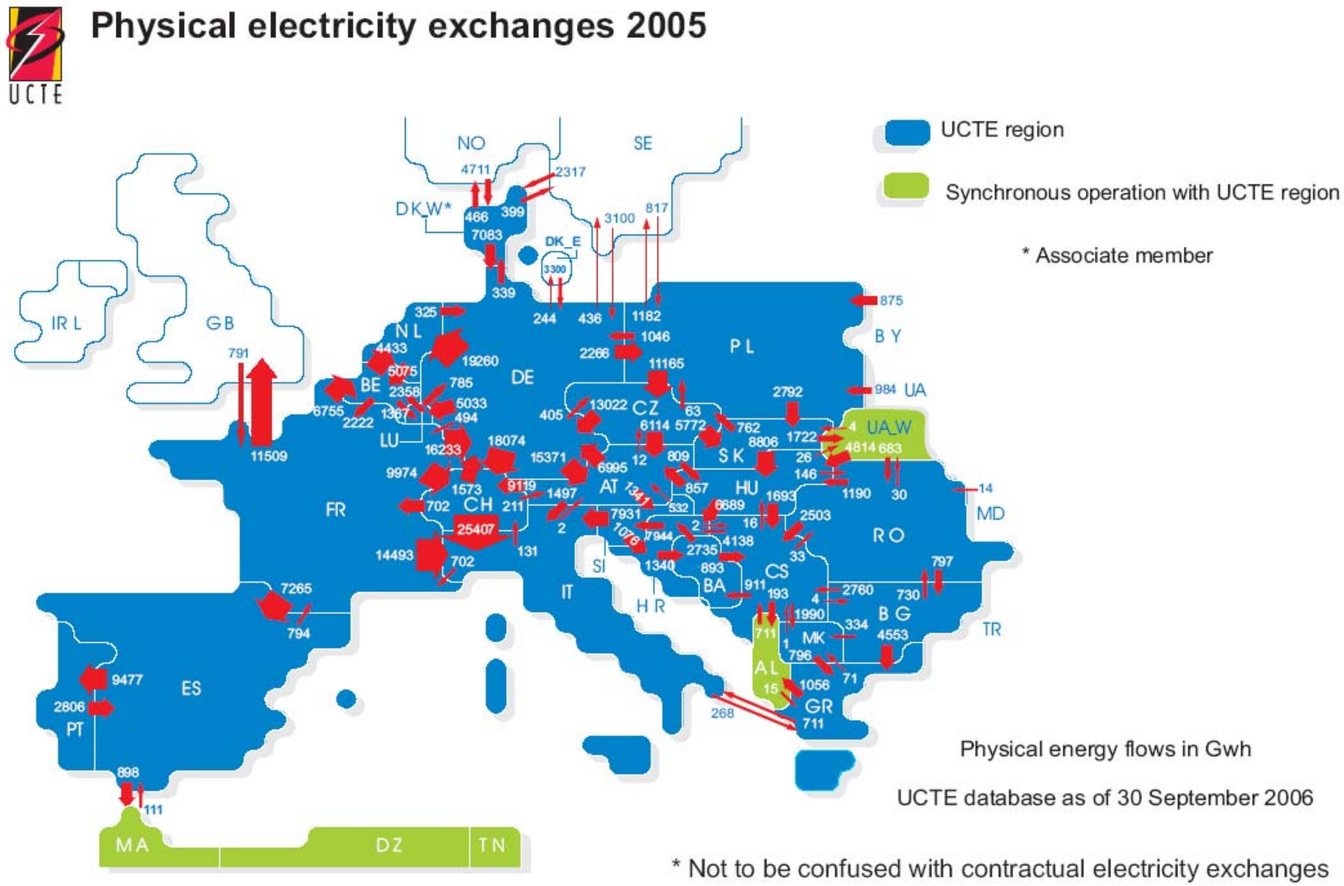
Italy is the main importer of the region and the main power exchange directions are from France and Switzerland to Italy (cf. Figure 9).

Until the completion of the Robbia (CH) - S. Fiorano (IT) line in conjunction with its extension by the S. Fiorano (IT) - Nave (IT) - Gorlago the high Italian demand for low-cost Swiss hydro-power caused severe trans-border congestions and severe congestions in Italy to transfer power received from Switzerland to the load centres.

Partly due to growing load centres in Styria, and partly due to decommissioning of generation plants in the south, the general power flow within Austria is from the generation plants in the North, including some 1000MW wind park in planning, and imports from the Czech Republic to the south of Austria. The power flow from the north to the south in Austria is highly congested due to lack of transmission capacity. Only congestion management measures (e.g. reduction of the production in the north and increase of production in the south requested by TSO) guaranteed a safe operation of the grid.

This bottleneck has a huge influence on the transfer capacities of Austria. It is expected that without commissioning of the St. Peter - Tauern line (3.60) as well as the Südburgenland - Kainachtal line (3.61) all planned investments on the Austrian borders with the Czech Republic, Slovakia, Italy and Slovenia will only have a limited effect. Slovenia is an important transit country for Italian imports from Hungary and Slovenia itself, as well as for potential imports from the Balkan countries. Presently, the interconnection between Slovenia and Italy suffers from congestions in the Italian grid as well as from lack of interconnection capacity.

Figure 9: UCTE – Power exchanges



Source: UCTE

Improvements

- The Robbia (CH) - S. Fiorano (IT) line (4.3) line in conjunction with its extension by the S. Fiorano (IT) - Nave (IT) - Gorlago (IT) line (3.8) nearly doubled the interconnection capacity between Switzerland and Italy and congestions have been much reduced. Both lines improved system stability and import opportunities for Italy. Nowadays, more than 50% of Italian power imports from Switzerland are provided by the Robbia line.

- Both the Udine Ovest (IT) - Okroglo (SI) line (2.36) in conjunction with the project of the Venezia Nord (IT) - Cordignano (IT) line (3.9) would increase the interconnection capacity between Italy and Slovenia nearly four times, and would contribute to more security of supply for Italy through improved system stability and through an increase of import opportunities transiting Slovenia.

Problems

- The St. Peter - Tauern line as well as the Südburgenland - Kainachtal line would improve system stability not only in Austria but also enable more power provision to the growth centres in southern Austria. Further, by enabling transits, these lines are a prerequisite for any marketing of Czech and Slovak power via Austria to Italy. However, the construction of these lines has not started yet, causing severe congestions in the Austrian grid and hindering any transits through Austria.

- Though the Lienz – Cordignano line (2.16) would increase the transfer capacity between Italy and Austria by some 1500MVA, which is more than 7 times compared to the present NTC, this line would only yield potential benefits of potential power imports of Italy from the Czech Republic or Slovakia if the internal grids of Austria and Italy as well as the interconnectors with the Czech Republic and Slovakia would be enhanced accordingly. In view of lacking transit capacity in Austria and the increased import capacity by the Robbia line, and in view of the difficulties of authorisation in Italy, this line should be considered with a low priority.

- The planned interconnection through the Brenner rail tunnel (Thaur-Brixen) (2.18) would increase the interconnection capacity between Austria and Italy by some 1500MVA, which is more than 7 times compared to the present NTC. However, in order to bring the power from the Brenner interconnector to load centres in Italy, a new transmission line would need to be built in Italy. In addition, to provide sufficient power to utilise the Brenner interconnector, it would need to be extended through a new connection from Austria to Germany. In conclusion, the Brenner interconnector is not a stand alone project, and more studies about links in Italy and possibly to Germany are needed.

5.1.5. EL3: France – Spain – Portugal

France and Spain are net exporters of power, while Portugal is a net importer. The main power flows are from France to Spain and from Spain to Portugal (cf. Figure 9). Interconnections from France to Spain are congested to more than 50% in summer periods. The current capacity of existing interconnectors accounts for about 4% of installed generation capacity of Spain, which is far from the Barcelona criterion of an interconnection level of about 10%. The interconnections from Spain to Portugal are also congested to 50% and more in some periods of the year. Portugal's interconnection capacity is with 8% below the Barcelona criterion also.

Improvements

- The Sentmenat (ES) - Bescano (ES) - Baixas (FR) line (2.10) will double the exchange capacity between France and Spain, which will considerably contribute to the achievement of the Barcelona criterion. The line will enable more French power exports to Spain's load centres and thus will contribute to security of supply and economic growth in Spain.

- The Valdigem (PT) - Douro Internacional (PT) - Aldeadavila (ES) line and the installation of the Douro Internacional facilities (2.14) would increase interconnection capacity by some 40%, i.e. that the Barcelona criterion will likely be met for Portugal. Further, the line would be an important link to improve power trade and, therefore, will contribute to the creation of the regional electricity market (MIBEL) on the Iberian Peninsula.

5.1.6. EL4: Greece – Balkan countries – UCTE System

The EL4 axis concerns the UCTE South and UCTE North control blocks and Turkey, whose UCTE membership is under preparation. At present, there are two interconnections between Bulgaria and Turkey, but none between Greece and Turkey.

Improvements

- The Philippi (GR) - Hamitabad (TR) line (4.9) will constitute the second interconnection between UCTE areas and Turkey. The main impact is facilitation of possible TR synchronisation with the UCTE area. In addition, the line will allow for power exchange between Turkey and Greece as well as to take in possible wind power in Greece. In a broader context, the line is another element in closing the Mediterranean ring (cf. Figure 2).

5.1.7. EL5: United Kingdom – Continental Europe and Northern Europe

At present, Great Britain interconnects with the UCTE area by only one DC cable from France. The interconnection capacity of the United Kingdom is far below the Barcelona criterion. As net importers Great Britain as well as the Netherlands receive power from France (the Netherlands via Belgium) and the Netherlands from Germany (cf. Figure 9). At present, power exchanges through the French link are very much a function of the price differential between the United Kingdom and Continental Europe.

Improvements

- The undersea cable link between England (UK) and the Netherlands (NL) (2.21) – called BritNed - will improve the import capacity of the United Kingdom by around a quarter of its present import capacity. The cable link is expected to carry power in both directions, driven by differences in hour-by-hour prices between the power markets in Great Britain and the Netherlands, which are caused by the different patterns of electricity consumption in the two markets. Thus BritNed improves trading opportunities and competition in both markets.

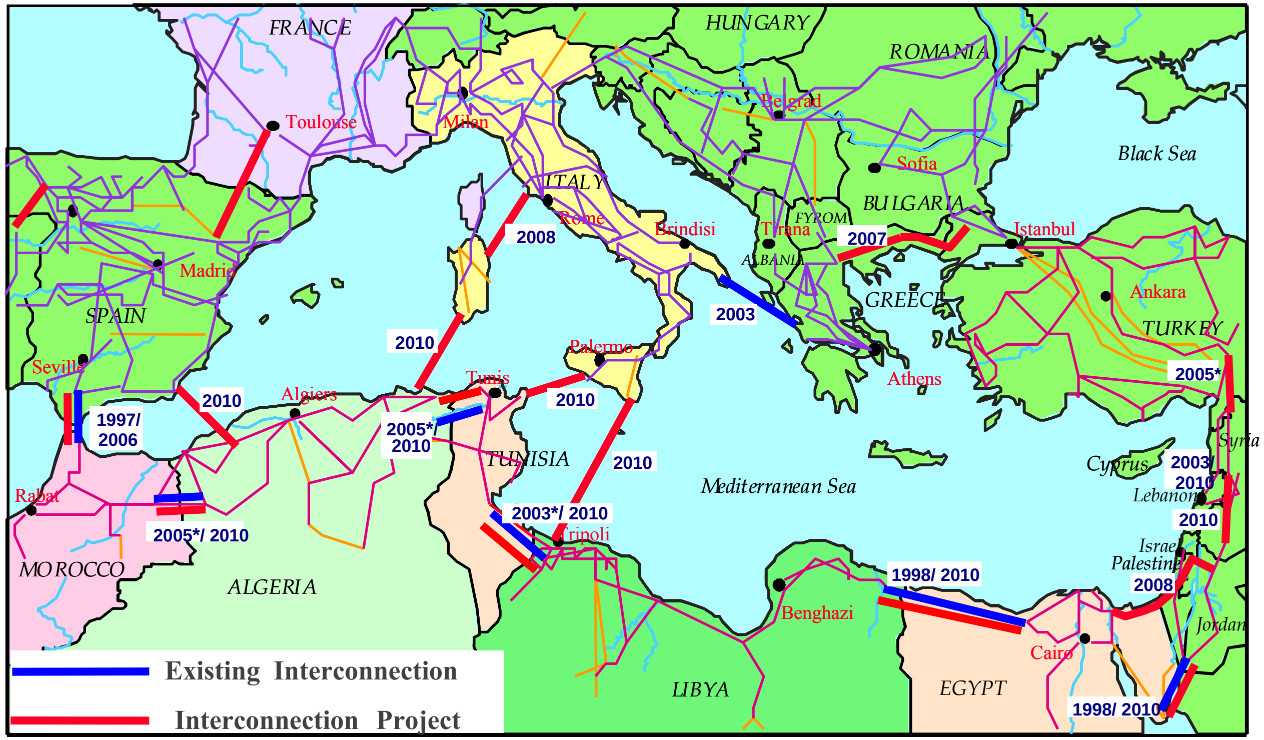
5.1.8. EL6: Ireland – United Kingdom

At present, a 500 MW DC cable connects Great Britain with Northern Ireland (Moyle Interconnector), which is interconnected with Ireland by a double circuit 220 kV line. Ireland is a net importer of power, i.e. power flows from the United Kingdom (Northern Ireland) to the Republic of Ireland.

Improvements

- The undersea cable link between Ireland (IE) and Wales (UK) (1.1), named East West Interconnector, would double the present interconnection capacity of Ireland, adding more than 8 percentage points to the Irish interconnection capacity, i.e. that Ireland would meet the Barcelona criterion. The East-West Interconnector would increase security of supply and would improve competition in the Irish market and would contribute to the creation of the new market place named AIME, which integrates the power markets of the Republic of Ireland and Northern Ireland. Furthermore, as Ireland and Wales have big potentials of renewable resources, the interconnector enhances also the chances to tap and market these renewable potentials.

Figure 10: The Mediterranean Electrical Ring



* Construction completed but not in operation yet

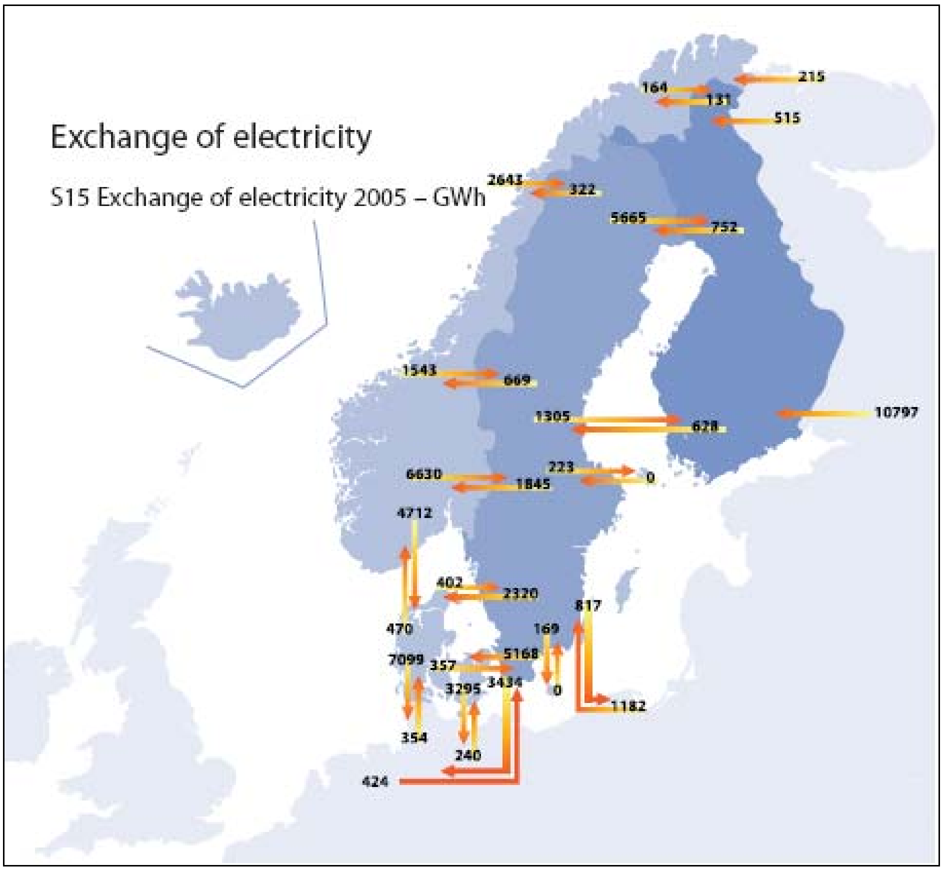
Source: OME, 2006

Source: Figure provided by OBSERVATOIRE MEDITERRANEEN DE L'ENERGIE

5.1.9. EL7: Denmark–Germany–Baltic Ring (including Norway–Sweden–Finland–Denmark–Germany–Poland–Baltic States–Russia)

The axis EL7 concerns the electrical systems of NORDEL, UCTE, and IPS/UPS (Baltic countries). These systems are not synchronised and any interconnection technically requires a DC line or a back-to-back station. Within Scandinavia, due to the large hydro capacity of Norway the main power flow is from west to east (cf. Figure 3), while the main power flow from Scandinavia to the UCTE countries along axis EL7 and within these countries the power exchange direction is from north to south (cf. Figure 9), while the Baltic countries have been connected to NORDEL since only very recently through the Estlink cable[16].

Figure 11: NORDEL –Power exchanges



Source: Nordpool

In particular, the main power exchange directions are from Denmark and Sweden to Germany and from Poland to Germany via the Czech Republic. As generating units in Germany are close to the Poland and due to the weakness of the transmission network in western Poland, there are - opposite to the commercial flows - net power flows from Germany to Poland, constituting partly a loop flow from Germany to Poland, and back from Poland to Germany transiting the Czech Republic.

[16] A case study is presented in Annex VII: Impact assessment of new power transmission lines in the Nordic countries and connexions to Germany from the North – Axis EL7.

Occasionally extremely high load flows occur from north to south in Germany (strong feed-in of wind energy in northern/eastern - Germany, load drain in Switzerland/Italy/France). These current problems in conjunction with planned large wind power projects in Northern Germany require additional transmission capacities. Furthermore, wind power generated in Northern Germany might add another flow into the German-Polish-Czech loop flow, as increased north-south flows in Germany partially follow the route through Poland and the Czech Republic.

Improvements

- The Estlink undersea cable link between Finland and Estonia (2.30) corresponds to some 15% of the installed generation capacity of Estonia,. Estlink opens access for all Baltic countries to the Nordel network and the Nordpool market system, allowing for exports of excess power in the Baltic countries. In addition, Estlink contributes to the full integration of the Baltic electricity market and is an important element of the Baltic ring (cf. Figure 4).

- The Fennoscan project (2.15) linking Finland and Sweden is prioritised in the Nordel Master Plan. It will increase the net transfer capacity by some 50% in each direction, resulting in less congestion and number of hours with market division. Risks of shortage of energy will be reduced in the Nordic power system. In addition, the Fennoscan project is another important link in the Baltic ring (cf. Figure 4).

- The Skagerrak 4 project (4.26) linking Norway and Denmark is prioritised in the Nordel Master Plan. In view of the demand the present transmission capacity is limited. The additional capacity of Skagerrak 4 would increase the net transfer capacity by 60% and is expected to reduce the occurrence of bottlenecks and thus would increase competition in the Nordic power market, would save costs relating to trade in reserve power and ancillary services, and would increase the security of supply.

- The Kassø (DK) - Hamburg/Dollern (DE) line (2.22) and Kassø (DK) - Revsing (DK) - Tjele (DK) line in conjunction with the Vester Hassing (DK) -Trige (DK) line (3.2) will reduce the severe trans-border congestions between Germany and Denmark, by nearly doubling the transfer capacity. As wind power generation in the area is high, and additional large wind parks are planned in Denmark and Northern Germany, the lines will bring more wind power to the market and will alleviate system balance of the intermittent loads. Furthermore, the lines will improve the interconnection of Nordpool and EEX market places also in conjunction with Skagerrak 4 after completion.

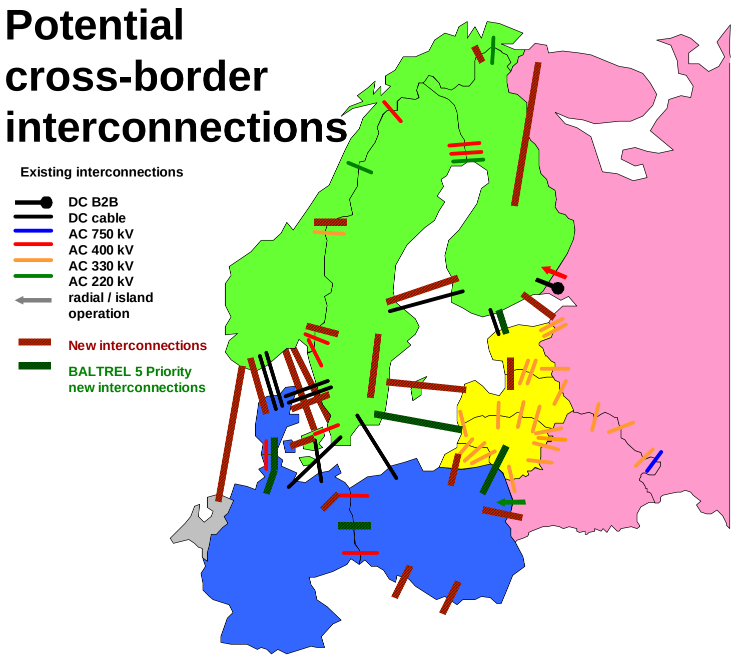
- The Hamburg/Krümmel (DE) - Schwerin (DE) line (3.48) and the Halle / Saale (DE) - Schweinfurt (DE) line (3.49) will increase the capacity for the north-south power flow in Germany considerably in conjunction with the Neuenhagen – Vierraden part of the Neuenhagen (DE) - Vierraden (DE) - Krajnik (PL) line (2.28), which is allocated to the EL8 axis. The lines are a substantial improvement in transiting German wind power and imports from Denmark further south to the load centres in Germany, as well as a substantial improvement in system stability by better handling the intermittent load of wind power. In conjunction with the connection with Denmark, the lines will increase the supply and number of suppliers on the EEX market and will improve the market for wind power.

Problems

- The connection of Poland and Lithuania, including the upgrading of the Polish electricity network and the PL-DE section as necessary to allow participation in the internal energy market (2.29) is one of the priority connections of BALTREL (Figure 4). The interconnector would become a second link besides the Estlink to suppliers outside the UPS/IPS. In principle, the project could contribute to substituting one third of the decommissioned nuclear capacity in Lithuania, after decommissioning of the Ignalina nuclear plant in 2009.

However, the total capacity of 1000 MW of the interconnector can only be exploited if considerable reinforcements in the North-East part of the Polish transmission system are made. Further reinforcement might be needed, in order to possibly transfer power from plants in the south of Poland to the northeast. It also questionable and needs to be further studied, if reinforcements in the Polish North-West transmission grid would allow west-east flows from Germany via the Vierraden (DE) – Krajnik (PL) (2.28) link to Lithuania.

Figure 12: Priority cross-border connections of BALTREL



Source: BALTREL

5.1.10. EL8: Germany – Poland – Czech Republic – Slovakia – Austria – Hungary – Slovenia

The Czech Republic, Poland, and Slovakia are the main net exporters in the region, while Austria became a net importer. As Figure 9 shows, the main net energy flows are from north to south: from Poland via the Czech Republic to Germany, and from the Czech Republic to Austria and Slovakia, followed by flows from Slovakia to Hungary.

As explained under axis EL7, on top of the Polish power exports to Germany via the Czech Republic there are loop flows from Germany via Poland and the Czech Republic back to Germany. In addition, also power generated in the south of Poland might flow through the Czech Republic and Germany back to western Poland.

With the synchronisation of the CENTREL control areas with the UCTE blocks, Austria became a country in the centre of the interconnected UCTE network, instead of a country on the outskirts. In conjunction with the opening of the electricity markets this has led to highly increased (transit) flows over the Austrian transmission network. The general power flow within Austria is from the generation plants in the North, including some 1000MW wind park in planning, and imports from the Czech Republic to the South of AT. A proper east-west connection is in place, while the north-south connections are at the margin of their capacity and constitute a severe bottleneck. The small north-south transmission capacity in Austria has a huge limiting impact on any planned increases of transfer capacities from the Czech Republic and Hungary to Austria, and from Austria to Slovenia and Italy.

Improvements

- The Vel'ký Kapušany (SK) - Lemešany (SK) - Moldava (SK) - Sajóivánka (HU) line (2.26, 3.75, 3.76) would be a third connection to Hungary. The line would double the present net transfer capacity, and would diminish the notorious congestion of the existing interconnectors. Thus, the line would add considerably to Slovak power trade with Hungary.

- The Gabcíkovo (SK) - Vel'ký Dur (SK) (3.77) line would enforce the Slovak transmission grid by directly linking the NPP Mochovce to one of the interconnections with Hungary and a connection to AT, which could possibly be enhanced with the Stupava (SK) - South-East Vienna (AT) (2.27) project. Thus, the Gabcíkovo - Vel'ký Dur line will improve the Slovak system stability and will contribute to more trade capacity with Hungary by reducing congestions in the Slovak transmission grid.

Problems

- As stated in the impact assessment of the EL7 axis, the Neuenhagen – Vierraden part of the Neuenhagen (DE) - Vierraden (DE) - Krajnik (PL) line (2.28) will increase the capacity for the north-south power flow considerably and will allow wind power to be brought to the load centres in Southern Germany. But on the background of the already existing loop flows between Germany, Poland, and the Czech Republic the upgrade of the Vierraden - Krajnik link is not expected to increase any transfer capacity between Germany and Poland, as long as there are no substantial reinforcements in the Polish network itself.

- Though the degree of congestion at the interconnection from the Czech Republic to Austria is not completely clear, the upgrade of the Dürnrohr (AT) - Slavetice (CZ) line (2.33) is expected to have only a very limited effect on increasing the useable transfer capacity, before the Südburgenland - Kainachtal line (EL2 axis) is not commissioned enabling increased north-south transits. However, the upgrade of the line could contribute to low cost power imports from the Czech Republic during the summers when the CHP plants in the northern part of Austria are not really cost-effective.

- The projected Stupava (SK) - South-East Vienna (AT) (2.27) line is also affected by the congested north-south transfer within Austria. Any increase in power imports from Slovakia or the Czech Republic via Slovakia is very much limited, as long as power flows cannot transit Austria to the southern border to be exported to Italy, directly or via Slovenia.

5.1.11. EL9: Mediterranean Member States – Mediterranean Electricity Ring

The axis EL9 concerns the electrical systems of UCTE, the South-Western Mediterranean Block (SWMB) of the Maghreb countries, which is synchronised with UCTE, and the South-Eastern Mediterranean Block (SEMB) and the Turkish Block. In the context of the connection between Tunisia and Italy, Italy is the main importer of the region, and currently the main power exchange directions are in the north of Italy.

Improvements

- The electricity connection between Tunisia and Italy (4.25) would establish a first link in the south of Italy, adding more than 1 percentage point to Italian import capacity, thus improving security of supply. Tunisia could generate power in combined-cycle plants, using gas as a comparatively cheap fuel. The interconnection would enable the marketing of low-cost Tunisian power in Italy. But further investments on the HV grid in the Sicily and Calabria regions are needed, in order to bring possible Tunisian exports to the load centres around Rome. In a broader context, the electricity connection between Tunisia and Italy would constitute another element in closing the Mediterranean ring (cf. Figure 2).

5.2. Evaluation of gas network priority projects

5.2.1. Methodological approach

The impact of the gas pipeline projects is evaluated through the demand side increases as forecasted by the various professional associations active in this field of gas energy in Europe. Each project aims at increasing gas capacity resulting in extra m³ of gas to be delivered into the overall European gas networks to meet forecasted demand for the next decade(s) by ways of:

- installing a new pipeline or doubling an existing one (or installing boosters, extra compressor power possibly with associated debottlenecking)
- building or extending an LNG plant (increase in storage capacity, together with an associated increase in emission capacity)
- building or extending a storage plant (increase in storage capacity, together with an associated increase in emission capacity).

However, quantification of the specific impact of each of these projects on the national and European distribution networks (i.e. where does the gas actually flow inside the axis) is very difficult, due to the complexity of the European gas network.

Whereas the impact of “transmission projects“ is purely on the transport of gas from producing countries to the EU consuming countries, the impact of “underground storage” on the regional/national/international distribution systems is fundamentally different and increases the complexity considerably.

The project impacts may be assessed in terms of:

– increasing the strategic reserve for responding to international shortages of gas, such as commercial trouble, strikes, severe weather conditions, etc.

– smoothing of the local input against demands (peak shaving); permitting better efficiency of international transport and optimization of network capacity (including those storage volumes effectively made available).

– permitting planned outages for maintenance of the transmission system.

– for large underground storage capacities, permitting optimisation of contracts from different gas suppliers; mainly for commercial reasons in response to tariff differences both on intake and redistribution.

Only very sophisticated computer simulations can attempt to indicate the punctual impact of any such transmission and/or storage improvement on the Trans-European Network system. To overcome this complexity, many TSO are in possession of powerful computer simulation programmes and effectively use them during operation and feasibility evaluation of investment projects.

Considering national networks´ response to daily and/or yearly peak gas demand (possibly influenced by the smoothing capacity of underground storages), the problem becomes even more complex, as compared to average gas flows.

The impact of a new major priority investment such as pipelines, LNG plant, and/or storage is also felt in improved availability and reliability of supply. However, this consideration is governed by commercial and, therefore, confidential agreements.

As a detailed evaluation of project impacts on gas networks is beyond the scope of this study, the assessment will be limited to summarising the impacts of additional volumes (per year) generated in the various axes. The evaluation will also consider the impact of new projects not included in the present list of projects of European interest, but having an impact on the total supply and demand equation.

The possible demand scenario for natural gas in Europe can best be defined by looking at the present situation, say the known demand in 2005, the short term 2010-2013 demand and the medium term 2015-2025 demand. At present 90% of total Western European gas demand is taken up by the following countries: UK, Germany, Italy, France, Netherlands, Spain and Belgium. In 2005 their total demand was around 450 Bcm. The other Western European countries such as Austria, Greece had in total a demand of around 50 Bcm. The grand total was 500 Bcm. In the short term 2010-2013, estimated demand will rise to respectively 520 Bcm / 100 Bcm, and a grand total of 620 Bcm. In the medium term 2015-2025, the rise is expected to level off at respectively 560 Bcm / 120 Bcm, and a grand total of 680 Bcm.

5.2.2. NG1: UK - Northern Continental Europe - Russia – Scandinavia

a. Overview

In the NG1 area, the main additional capacity will be provided by pipelines (2007 – 2015). The additional gas through current PEI originates almost entirely from Russia's Gazprom. However, if the significant new projects in the NG1 sector, which are not included in the PEI list, are also considered, supply origin becomes far more diversified. Additional PEI transport capacities comprise:

- The new (Baltic) NEGP pipeline, also called Nord Stream.
- The increase in capacity of the EuRoPol Gas pipeline in Poland (connected with the existing Yamal pipeline from Russia).
- The new pipeline planned to link Denmark, Germany and Sweden.
- The new GWWL pipeline through Holland and the new BBL pipeline connecting Holland to the UK.
- The increase of transit capacity from East to West in Belgium.

To complete the overall supply side picture, the Norwegian Ormen Lange project bringing extra gas to the UK (with a connection to North West Europe already provided for), the new LNG projects in the UK, Holland and Germany need to be considered and "last but not least" the pipeline, which RWE announced on 6th February 2007 to be built through Germany connecting the Czech Republic with Belgium's Eynatten import station. The latter project can be seen as the 'missing link' as it will connect via the Nabucco pipeline the Caspian Sea-Middle East to the UK. Its strategic impact for the European energy mix cannot be underestimated.

b. Transmission projects

Nord Stream Project

Additional transport capacity of the NEGP Nord Stream, coming on-stream by the end of 2010, will be 27,5 Bcm/y. By 2013 a second parallel pipeline is planned to come on-stream which will then add up to a total export capacity of 55 Bcm as compared to the expected total gas demand rise of about 90 to 120 Bcm for the NG1 sector as a whole. Accordingly, the Nord Stream line alone will amount to nearly half of the increasing demand. The ongoing new projects in Northern Continental Europe, connected to the planned Nord Stream pipeline, would only have a rather small "receiving" import capacity compared to the above 27,5 to 55 Bcm export capacity, on top of the full design capacity of the present EuroPol Gas pipeline of 32,3 Bcm/y. By 2009 the EuRoPol Gas pipeline capacity should be doubled by a parallel line. Receiving large new quantities of gas in northern Europe will require major and timely investments, especially in Germany.

In Germany, the Nord Stream would need to be connected to the networks of E-ON Ruhrgas and Wingas, but the newly required 850 km of corresponding major pipeline connections and compressor stations are still in the study phase. By November 2006, the required German onshore pipeline connections projects and inland transmission projects should enter into their authorisation phase. Given the long duration of the authorisation procedures in Germany, it is questionable whether Nord Stream will come on-stream by 2010. (At this point, both E-ON Ruhrgas and Wingas, contrary to Gazprom, have not been cooperative in providing any information).

In view of the enormous impact that can be expected from largely increased gas imports in this region, the Nord Stream project may delay other planned projects, in particular the doubling of the EuRoPol Gas pipeline and the Denmark-Germany-Sweden interconnection. Indeed the Yamal 2 pipeline will need not only to cross Belarus and Poland (second EuRoPol Gas pipeline), but will require an enormous capital investment within those countries and even more so upstream in Russia. The sales of that extra gas, mainly within Germany (and eventually in Belgium, Holland and the UK), should generate the cash flow to justify such an extra investment and risk taking. The essence of the Nord Stream Gas project is to bring the gas from the supplier directly to the core market. In the present political environment, this makes good economic sense for the Nord Stream investors, comprising Gazprom as exporter and the German gas companies as importers. Moreover, since the Nord Stream line has an optional branch-off into Sweden, it influences feasibility scenarios for investors of the Denmark - Germany - Sweden Interconnection (investors include subsidiaries of companies involved in the Nord Stream venture).

Therefore, national authorities in Poland, Sweden and the Baltic countries are most concerned and might influence their future cooperation in matters relating to the authorisation process for the Nord Stream pipeline crossing through the Baltic Sea, starting with the environmental impact assessment due to start in November 2006 to fulfil ESPOO and HELCOM trans-boundary obligations.

EuRoPol Gas pipeline in Poland (connected with the Russian Yamal pipeline)

The building of a second parallel pipeline to the existing EuRoPol Gas pipeline, which requires an intergovernmental agreement between Russia and Poland, appears to be in jeopardy as a result of the Nord Stream project having been given priority by Gazprom and its German partners BASF and E-ON.

New pipeline planned to link Denmark, Germany and Sweden

This project also appears in jeopardy and is encountering serious delays. Its originally planned start-up date of October 2004 required an investment decision by late 2001 by all partners, two of which are the German E-ON and Verbundnetz Gas. The emergence of the Nord Stream project, in which E-ON is a key partner, appears to have altered the original context and objectives.

New GWWL pipeline through Holland and the new BBL pipeline connecting Holland to the UK

For Holland and the UK: the building of GWWL (48") pipeline and BBL (32") and their compressor stations are well underway for start-up respectively by end 2007 and by end 2006. In the Netherlands an open season was held to further increase significantly north – south transport capacity to be compatible with future developments.

Increase of transit capacity from East to West Belgium

The increase of transit capacity from East to West Belgium will be realised by 2010 and will result in near doubling of east – west transmission capacity. By adding extra compressors in 2005 and 2006 at Zeebrugge, the capacity of the Interconnector pipeline in reverse flow (i.e. towards the UK) will be more than doubled and, if in 2007 the operating pressure is fully boosted, the line will reach a capacity in reverse flow of 25,5 Bcm/year.

Ormen Lange Pipeline

This 1200 km pipeline (42/44") will bring 20 Bcm/year of Norwegian gas to the UK. Start-up is planned for October 2007. Ormen Lange will be able to meet up to 20% of Britain's gas demand – for up to 40 years.

The midway tie-in Sleipner riser platform will enable delivery of Ormen Lange gas to the European continent, enabling quality adjustment of the gas to be supplied to the UK and improving reliability through the use of other gas from the Norwegian Continental Shelf. This will provide operational flexibility in routing gas to different markets and facilitate pressure control for optimal energy consumption. The connection to Sleipner will also allow independent operation of the northern and southern pipeline.

Sayda-Eynatten Pipeline

"Last but not least" the pipeline that RWE announced on 6th February 2007, to be built through Germany, connecting the Czech Republic with Belgium's Eynatten import station, can be seen as the 'missing link' connecting the Caspian Sea-Middle East with the UK via the Nabucco pipeline. Its strategic impact for the European energy mix in the long term future should not be underestimated!

The gas pipeline will begin in Sayda on the Czech border and will pass through Werne (Germany). It is to be connected to the Belgian system at Eynatten in the Aachen area. The pipeline would form a direct link between the Czech and the German gas transport grids of RWE Energy. The planned pipeline offers optimum conditions for purchasing additional volumes of gas from Russia, but also from the Near East, the Middle East and Egypt. The pipeline would enable gas from different sources to be supplied to Germany, Great Britain and the Benelux countries. RWE wants to invest around €1 billion in this link. It is scheduled to come on-stream in autumn 2011 and should transport an annual volume of 5 Bcm of gas.

c. Related LNG developments

In the region, LNG facilities exist at Zeebrugge in Belgium and Grain in the UK. There are LNG terminals in Wilhelmshafen (EON), Eemshaven (Conco/Esseut) and Rotterdam (Gasunie + 4gas). The Zeebrugge LNG transmission capacity has been extended to 9 Bcm per year and storage capacity to

380.000 m³. The Grain LNG facilities in the UK will be extended by 2008 to reach 13 Bcm/y in transmission capacity, and its storage capacity will reach 770.000 m³.

New LNG plant constructions are going on in the UK at Dragon with 6 Bcm/year by fourth quarter 2007 and at South Hook with 10,5 Bcm/year by the winter of 2007/2008. Feasibility studies are ongoing for a new LNG plant in the Netherlands at Eemshaven by ConocoPhillips & Essent. In Rotterdam the 4GAS company received permits at the end of 2006 to build the Lion Gas Terminal with a planned capacity of 9 Bcm/year by 2010.

In Germany studies are being led by EON for an LNG terminal in Wilhelmshaven with a planned capacity of 10 Bcm by 2010. There are also initial studies going on in Poland by PGNiG concerning a new LNG plant to come on-stream by 2011.

d. Conclusions

The evaluation shows that almost 50% of the future gas demand increase in the region will be met by the Nord Stream Gas project to be developed by Gazprom and its German partners. The latter also operate the largest volume of underground storage in Europe. Other PEIs in the region are delayed as less attractive alternatives, for example the second EuroPol –Yamal pipeline. In fact, other priority projects in this region either cater for this new input or are sidelined as less attractive alternatives, like the second EuroPol –Yamal pipeline. The net result will be an even greater dependency of Northern Continental Europe on Russia as a reliable and timely gas supplier.

However, if the assessment also includes other projects additional to the PEI such as the Ormen Lange Pipeline (20 Bcm/year to the UK) and the important LNG developments, such as the expansion of Isle of Grain LNG by 8,6 Bcm, Dragon LNG with 6 Bcm/year (and 6 Bcm/year expansion possible), South Hook 10,5 Bcm/year (and 10,5 Bcm/year expansion possible) at least the UK will have a more balanced diversified import mix; with an increase of 45,1 Bcm/year to 61,6 Bcm/year from other sources, which may cover the biggest part of the UK gas demand increase of 50 to 70 Bcm/year by 2015. If one also takes into consideration the above mentioned increase in capacity of the Interconnector (Zeebrugge - Bacton) in reverse flow of 25,5 Bcm/year for additional import of Russian gas, then it appears that the UK needs should be adequately met by a very diversified import mix.

For Northern Continental Europe, the LNG plants in Eemshaven, Rotterdam and possibly Wilhelmshaven will also reduce dependence on Russian imports, together with the PEI project of expansion of Zeebrugge LNG to 9 Bcm/year, which has already been implemented.

The newly announced Sayda – Eynatten pipeline, which RWE intends to build across Germany, may be 'the missing link‘ in the European pipeline system as it will eventually connect the UK market with the Caspian Sea – Middle East region. Although its planned capacity of 5 Bcm is small in comparison to the above listed projects, such as Ormen Lange and Nord Stream, it will have a strategic impact on the European energy mix in the future.

5.2.3. NG2: Gas Pipelines from Algeria and Libya into Spain and Italy

a. Overview

In the NG2 area the main additional capacity will be provided by pipelines (2007 – 2011), an increase of existing pipelines capacity and new LNG plants. The additional transport capacities are:

- Capacity increase of the TTPC/Transmed Pipeline

- The recently planned Galsi pipeline Algeria to Italy (going through Sardinia)
- The Medgaz pipe line Algeria Spain
- The Greenstream line from Libya to Italy
- New LNG plants in Spain and Italy and capacity increases of existing ones.

b. Transmission projects

Capacity increase of the TTPC/Transmed Pipeline

Connecting Algeria to Italy through Tunisian territory will result in a capacity increase by means of boosting total installed compressor power from the present level of 27 Bcm/y to 30,2 Bcm/y by 1/10/2008 and to 33,5 Bcm/y by 1/4/2009. Therefore, total capacity will reach 33.5 Bcm/y from 2009 onwards that is a total increase of 24%.

Galsi pipeline Algeria to Italy (going through Sardinia)

The recently planned Galsi line is to have a designed capacity of 8 - 10 Bcm/y by the year 2011, accounting for nearly 10% of future gas demand in Italy, which will reach around 95 Bcm by 2011; making Italy the third biggest market in Europe. Extra volumes from both the TTPC capacity increase and the new Galsi line (6,5 Bcm +10 Bcm) will be nearly 18% of the total.

Medgaz pipe line Algeria Spain

Completion of the Medgaz line is planned in 2007/2009, providing an additional yearly capacity of 8 Bcm to the Spanish gas market, that is almost 30% of the 27,6 Bcm Spanish gas consumption in 2004 but only 20% of 2009 consumption of a total of 40 Bcm (rising to 50 Bcm by 2011).

Greenstream line from Libya to Italy

This existing pipeline has an annual capacity of 8 Bcm/y as of late 2004. (This pipe was laid from August 2003 till end February 2004 at an average speed of nearly 3 km per day, which was a record at the time. One year later, the Ormen Lange pipeline in the North Sea was laid at an average speed of 4 km per day (just to indicate at what speed technology evolves).

c. Related LNG developments in Spain and Italy

Spain

The new Medgaz pipe to Spain will reach Spanish territory at Almeria in the southeast. From there the gas will be transported and linked to the Spanish gas network near Albacete. A West East Transversal Axis Pipeline will be required to complete the network.

The Medgaz pipeline project is not directly related to specific new LNG developments in the region. The many new LNG projects in Spain are in response to the strongly increasing gas demand (17% annually), partially used to generate electricity (to comply with the Kyoto Protocol). The following LNG capacity increases are planned in Spain from 2002 to 2011:

- Barcelona: additional 600 000 m^3/h
- Huelva: additional 1 000 000 m^3/h
- Cartagena: additional 900 000 m^3/h (only this plant is close to Almeria; i.e. 200km)
- Bilbao: additional 1 200 000 m^3/h

- Sagunto: additional 750 000 m³/h
- Ferrol: additional 800 000 m³/h
- Gran Canaria: additional 210 000 m³/h
- Tenerife: additional 210 000 m³/h

The LNG projects will result in an additional 65 Bcm import capacity per year by 2011, making LNG by far the most important component of future Spanish total gas imports.

Italy

Like Spain, Italy is facing a strong gas consumption increase, which it is also attempting to resolve through additional import pipeline capacity and 10 new LNG plants. Italy's total gas demand is expected to increase from 86 Bcm in 2005 to almost 100 Bcm in 2015. Presently, Italy had only one existing LNG plant in Panigaglia (3,7 Bcm/y). Capacity increases will result from the following new plants:

- LNG at Monfalcone (8 Bcm/y)
- LNG terminal at Muggia (8 Bcm/y)
- LNG offshore Rovigo (offshore)(8 Bcm)
- LNG terminal at Brindisi (8 Bcm/y)
- LNG terminal at Taranto (8 Bcm/y)
- LNG terminal at Gioia Tauro (12 Bcm/y)
- LNG terminal in Porto Empedocle (Sicily) (8 Bcm/y)
- LNG terminal in Priolo (Sicily)(8 Bcm/y)
- LNG terminal at Livorno (offshore) (4 Bcm/y)
- LNG terminal at Rosignano Solvay (8 Bcm/y)

The total capacity increase will be 80 Bcm/y by 2010 (cf. chapter 5.2.5).

d. Related gas storage developments in Spain and Italy

There are no important priority gas storage projects in this region at present. However, already a substantial storage potential exists in Italy (12,8 Bcm). In Spain there is less than 4 Bcm of gas storage presently available .The mandatory planning 2002-2011 foresees an extra 5 Bcm, adding up to a total of 9 Bcm, which is still relatively small compared to the size of the Spanish gas market. However, in Spain seasonal variations in demand are relatively insignificant.

e. Conclusions

Both Spain and Italy have embarked on impressive investment programs to ensure the security and diversity of their future gas import from across the Mediterranean Sea, complemented by a wide array of LNG plants spread out over their countries. This goes hand – in – hand with a strong growth of gas consumption.

5.2.4. NG3: Gas Pipelines from Caspian Sea - Middle East

a. Overview

In the NG 3 area the main additional capacity will be provided by pipelines (in 2007 – 2020). The origin of the additional gas will be from the Caspian Region, which has 33.530 Bcm of natural gas reserves. Additional transport capacities are:

- the Nabucco pipeline
- the ITG pipeline

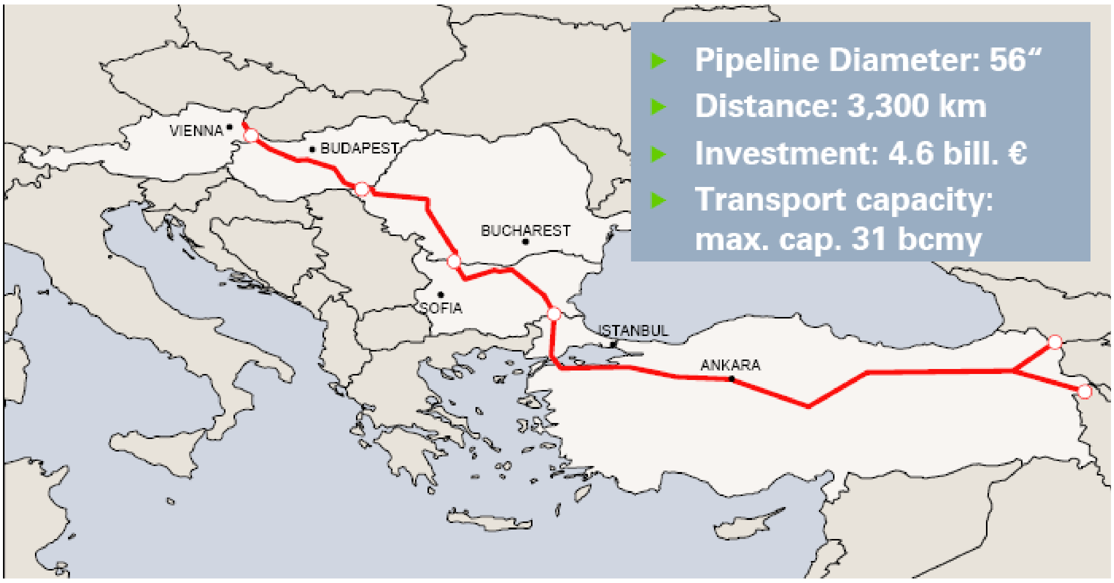
- the IGI pipeline
- the TAG pipeline's capacity increase (same entry point as the Nabucco pipeline)

b. Transmission projects

The Nabucco pipeline

The Nabucco Pipeline will be connected near Erzurum with the Tabriz (Iran) - Erzurum pipeline, and with the South Caucasus Pipeline, connecting the Nabucco Pipeline with the planned Trans-Caspian Gas Pipeline. Once completed, it will allow transportation of natural gas from producers in the Middle East and Caspian region such as Iran, Azerbaijan and Turkmenistan, to Western Europe and to the countries along its path. The western end of the pipeline will deliver gas in Baumgarten, a major natural gas hub in Austria, in an area where gas storage plants already exist.

Figure 13: Nabucco pipeline



The Nabucco line will provide an additional planned capacity of 8 Bcm/y year of Caspian Region gas to Austria via Turkey, Bulgaria, Hungary by 2010/2011, with construction due to start in 2008. By 2020 total transport capacity should reach 31 Bcm/y with 16 Bcm/y arriving in Austria.

The ITG pipeline

The IGT pipeline, which is presently under construction, will transport Caspian Region gas to Italy via Turkey and Greece by 2011. The delivery volume will reach 12 Bcm/y by 2012, of which 8 Bcm/y will go to the Italian market.

The IGI pipeline:

The IGI pipeline will provide a total of 8-10 Bcm/y gas from the Caspian Region to Italy via Turkey and Greece by 2011. Construction is due to start in 2008.

Increase in capacity of the TAG pipeline in Austria:

Although this pipeline, which transports Russian gas to Austria and Italy, does not belong to this region (and even less to NG1 and NG2), it is mentioned to give a complete picture. Its entry point in

Austria is in Baumgarten, where the future Nabucco line will also enter. By 2009, extra capacity will reach 6,5 Bcm/y, bringing the total to an impressive 33,5 Bcm/y.

c. Related LNG developments

In Greece an LNG plant at Revithousa has existed since 2000 with a storage capacity of 130.000 m³, which is linked to the Greek national gas transport system. Possibilities are being studied to extend the plant by means of building a 400 MW power station.

In Italy the Brindisi LNG plant, developed by British Gas, is expected to start-up at the end of 2009. It is situated about 80 km north of the IGI Pipeline's Otranto landing point.

d. Related Gas Storage developments

OMV of Austria (leader of the Nabucco consortium) has two storage facilities near Baumgarten, which is also the entry point of the future Nabucco pipeline i.e. Schönkirchen with a capacity of 1,6 Bcm and Tallesbrunn with 0,3 Bcm. Some 3 Bcm of storage capacity are located in Hungary. The Romanian storage capacity is 2,3 Bcm.

e. Conclusions

Austria, Italy, Greece and Turkey have embarked on impressive investment programs to ensure the security and diversity of their future gas import from the Caspian Sea region and the Middle East, complemented with a wide array of LNG plants in Italy and storage plants in Austria. This goes hand – in – hand with a very strong growth in gas consumption.

5.2.5. NG4: LNG Terminals

a. Overview

The main developments related to LNG terminals are in southwest European countries, respectively Italy and Spain. The only other PEI development outside those countries is in Belgium and France. As already indicated in the methodological approach (chapter 5.2.1) there are a number of new (non PEI) developments which might have a sizeable impact on the overall future supply. Therefore, these have been added to the evaluation.

b. Belgium

The PEI Zeebrugge LNG project in Belgium will provide an additional capacity of 4,5 Bcm/y after its ongoing extension, adding up to a total of 9 Bcm/y.

c. France

There are two existing sites:

– Montoir de Bretagne (since 1980, with a send out capacity of 1 380 400 Nm³ /h and an annual capacity of 10 Bcm)

– Fos-sur-Mer (since 1972, with a send out capacity of 870 000 Nm³ /h and an annual capacity of 5,5 Bcm/y).

The new PEI development is in Fos Cavaou, implemented by GDF (Gaz de France) with a planned start-up by end 2007 and an annual capacity of 8,25 Bcm/y.

In August 2006 the Port of Bordeaux and the 4Gas company announced their agreement which would allow the development of a new LNG import facility to be located in Le Verdon. The construction of the terminal is proposed for 2008 with start-up in 2011. The project would require an investment of approximately 400 M€.

d. Italy

Between 2002 and 2010 Italy's gas imports are expected to rise by 20 Bcm/y. Total consumption will then reach 92/95 Bcm/y, which makes Italy the third biggest market in Europe. In 2004, Italy had only one LNG terminal at Panigaglia, which has been in operation since 1971 with a send out capacity of 436 000 Nm^3/h, annual capacity of 3,32 Bcm/y and 100 000 m^3 storage capacity. To date a total of 10 new priority LNG projects are planned.

The structure of the Italian gas industry is changing dramatically as a result of the liberalisation of the market. ENI, followed by ENEL and Edison, are the 3 principal companies, but a great number of other players are entering the market. ENI itself is facing a domestic cap on total imports as a result of the Italian Government's anti-trust legislation.

e. Germany

In Germany studies are in progress by EON for an LNG terminal in Wilhelmshaven with a planned capacity of 10 Bcm by 2010.

f. Greece

Revithousa LNG has been in operation since 2000 with a send out capacity of 240 000Nm^3/h, 1,4 Bcm/y and 130 000 m^3 of storage capacity.

g. Netherlands

Feasibility studies are ongoing for a new LNG plant in the Netherlands at Eemshaven by ConocoPhillips & Essent. In Rotterdam the 4gas company received permits at the end of 2006 to build the Lion Gas Terminal with a planned capacity of 9 Bcm/year by 2010.

h. Spain

In Spain the gas demand is expected to double by 2011 as compared to 2004. By that time total installed LNG infrastructure capacity is planned to reach 65 Bcm/y. This will be achieved by building 4 new LNG plants in Sagunto (2006), El Ferrol (2007), Gran Canaria (2007) and Tenerife (2009).

Storage and emission capacity of existing LNG facilities will be increased. The Barcelona LNG terminal will get 5 extra tanks, Cartagena LNG terminal 3 tanks, and Huelva LNG terminal 2 tanks.

For the Bilbao LNG the emission capacity will be increased. The overall result is that total emission capacity will be doubled by 2011, whereas total storage capacity of the LNG plants will nearly triple.

i. United Kingdom

Transmission capacity of the LNG facilities in the UK, operating since 2005, will be extended by 2008 to reach 13 Bcm/y, send out capacity 1 750 000 Nm^3/h. Storage capacity will reach 770 000 m^3.

New LNG plant constructions are going on in the UK at Dragon with 6 Bcm/year by fourth quarter 2007 and at South Hook with 10,5 Bcm/year by the winter of 2007/2008.

Conoco Phillips is in the process of obtaining permission for the Teesside LNG plant which could take until mid 2007. It could be completed by mid 2010 or 2011.

5.2.6. NG5: Underground Storage

a. Overview

There already exists a very substantial storage potential in countries like Austria (2,9 Bcm), Belgium (1,2 Bcm), France (3,5 Bcm), Germany (18 Bcm), Italy (12,8 Bcm),Poland (1,62 Bcm), Holland (4,5 Bcm), Hungary (3,5 Bcm), Slovakia (2,3 Bcm), Spain (3,8 Bcm), Romania (2,3 Bcm) and in the UK (3,5 Bcm). The existing underground storages were developed in the past for reasons of (possibly excessive) strategic support and for security of supply at national level. It can, therefore, be concluded that in NW Europe alone about 37,2 Bcm was available in 2005.

b. North Western Europe (NWE)

Here natural gas makes up a large part of the home heating market; consequently, its consumption fluctuates dramatically from season to season. In Southern Europe this is far less the case, as the industrial use component is far more important.

In NWE around two thirds of the natural gas is consumed in the winter half of the year – in other words, in each winter month twice as much is consumed as in each summer month. Underground gas storage facilities make an important contribution towards balancing out those seasonal fluctuations in NW Europe.

The difference with Southern Europe is also due to the fact that domestic production played and still plays a far more important role in Northwest Europe (France, the Benelux countries, Germany, Denmark and the UK). Indeed NWE was and still is very dependent on North Sea gas. Domestic gas production is of course relatively more flexible. So over the last years in the winter months companies have quite often produced twice the quantity of gas that they produce during summer.

However, in the foreseeable future the volume of natural gas in the North Sea will decline, which means that it will have to be transported from more distant sources. Then it does not really matter whether the gas comes from Russia, the Middle East, or whether it is liquefied natural gas, LNG. Long transportation routes mean less flexibility. In NWE the latter (line pack and LNG stored volumes at the LNG sites) will mostly be useful for actual short term peak shaving.

Hence large underground gas storage facilities will have to close the gaps on the seasonal variations in overall demand in the long term future. More so since overall gas demand continues to rise at an annually estimated 1,8% and especially in NW Europe domestic production, which provided a lot of the swing production (difference between the winter months (October-March) and summer) are themselves in decline.

Recent studies conclude that to cope with the growing swing demand in NW Europe an extra 7,2 Bcm of underground storage would be required, to be increased with reserves for the extra cold winters (once every 50 years, in statistical terms, which would amount to an extra 12,8 Bcm). And finally to be further increased with the strategic reserve requirements. If the latter were put at 5% of non – EU gas import, this would require an additional 13,7 Bcm, bringing the total to 33,7 Bcm for NW Europe alone. Hence by 2030 the NEW underground storage capacity nearly needs to double in size from 2005!

c. Belgium

Apart from the existing underground storage of Fluxys at Loenhout of about 0,6 Bcm at end December 2006, Fluxys is also considering with Gazexport (a subsidiary of Gazprom) an interest in investing in natural gas storage capacity in Poederlee. In bird's-eye view, the Poederlee site is situated at 18 km from Loenhout.

d. The Netherlands

Zuidwending storage project has been under execution since 2006 by Gasunie and Nuon. The first gas injection itself is planned in 2009. The first phase will be completed in 2014 and will result in 0,18 Bcm storage. It might be substantially increased within a possible phase II.

The largest part of swing production in the winter season in NW Europe comes from the Netherlands (in 2003: approximately 63%), in particular from one large gas field in Groningen, which is very well suited to provide flexibility (in 2003 Groningen accounted for 48% of all production swings in NWE). Holland has at present about 4,5 Bcm of storage in operation.

e. Germany

While production swing is concentrated in the Netherlands, most storage facilities are located in Germany. In 2004 the overall WGV in NWE was 37 Bcm, with 19 Bcm located in Germany. Storage capacities were increased by 81% between 1994 and 2004. Wingas, operator of Europe's largest storage at Rehden of 4,2 Bcm, is partner in the Nord Stream pipeline venture with Gazprom and has plans to expand its storage capacity by a further 8 Bcm.

f. France

Gaz de France has developed the know-how to make complementary use of their underground gas storage facilities and their LNG plants within France. (Of course LNG is itself also a method of “storing gas“. Therefore, NG4 and NG5 are in fact overlapping axes.)

Gaz de France stores natural gas in 12 underground sites in France. These facilities represent a capacity of 9 Bcm, in other words almost 25% of France's annual consumption. Gaz de France is developing 2 new storage sites to increase its storage capacity at a time of rising demand for natural gas. Indeed in order to meet growing demand for natural gas and storage thereof, Gaz de France has established a development strategy based around:

- developing a new site at Hauterives and converting the depleted Trois Fontaines gas field (France)
- reinforcing capacity on existing sites, such as Céré-la-Ronde, Germigny-sous-Colomb or Etrez
- exploring new areas with potential storage sites.

Storage and LNG terminal activities enable Gaz de France to adjust gas flows on the system and to diversify its supply sources. With 12 facilities in France, Gaz de France's storage capacity is amongst the highest in Europe. This capacity is available to all suppliers in the market. For its LNG terminal activity, Gaz de France operates 2 LNG terminals at Fos-sur-Mer and Montoir-de-Bretagne.

It is also worthwhile mentioning the recent auction of storage capacity by Gaz de France on 3rd February 2006. Gaz de France organised the first auction of access to storage capacity. Capacity of no less than 400 GWh was auctioned for the year 2006-2007. The auction took place under the supervision of a bailiff via a dedicated Internet platform. Outcome: all the capacity auctioned was sold. It appears that such auctions will become commonplace in Europe in the future.

g. Southern Europe: Italy and Spain

Here the issue is not so much the seasonal demand change that dictates the need for underground storage but rather the strategic reserve requirements. Indeed the operators of such storage facilities need to keep a substantial strategic reserve. For instance in Italy where 10 large underground storage sites are in operation, their total volume of 12,8 Bm^3, would correspond in theory in 2004/2005 to an average consumption of 58 days. However, 40% thereof is earmarked as strategic reserve. Hence only 7,6 Bcm (for only about 35 days) is actually freely available, should indeed all reservoirs be fully loaded - a requirement that applies only in the final days of the month of October.

Other countries specify the number of days of average gas consumption that need to be kept available. Therefore, underground gas storage should be increased in Spain during the following years, since already in 2001 there was only 28,4 days of average consumption storage available, hence falling well below the 35 days minimum required by law (excluding the strategic reserve requirement). Therefore a total of 5 Bcm of extra storage is planned by 2009.

5.3. Evaluation of authorization procedures for electricity PEI

5.3.1. Methodological approach

As analysed in chapter 4.1, besides coordination problems procedural issues are the major obstacle against a timely implementation of electricity projects of European interest, while the implementation of gas and LNG terminal projects is rarely delayed (chapters 4.2 and 4.3). Therefore, the impact of authorisation procedures on electricity projects is evaluated in this study in more detail.

Besides information gained from the data collection (cf. chapter 1.2.3) telephone interviews and direct conversations were conducted with TSOs in the presence of lawyers or representatives of law departments. The latter mainly for countries of central importance for the Trans-European Networks, such as Germany, Austria, and Italy. All interviews focused, among other things, on the issue whether the respective PEI was treated with priority. In almost every case it was not. In addition, the analysis is based on studies of ETSO[17] and "Andersen"[18].

A main issue of the analysis is the question whether there are significant differences among the MS regarding implementation of PEI as well as regarding observable obstacles – for instance differences among MS of central and southern Europe, Nordic countries, countries of Eastern Europe, and the Western European countries of France, Belgium, Spain, and Portugal. This approach will also enable the issue of administrative practice to be put up for debate, which, in turn, will allow the identification of potential levers for removing identified obstacles.

Within the scope of the present analysis, it was not possible to check whether national laws of individual MS are correctly implemented. This can only be done at the respective national level. It was checked, however, whether – irrespective of concrete difficulties in a specific project – there are regional differences in Europe regarding implementation. Such an approach seemed to be promising to show that, in view of such differences among MS it might be the task of the EC to provide basic support for the projects. A description of such differences could possibly also prompt a clearer legal support of the MS in their implementation of the projects. With this approach, a certain focus of the analysis was on permission procedures in the countries Germany, Austria, and Italy. The situation identified was compared above all to the situation in northern MS, where a more pragmatic permission practice was presumed.

Details of PEI objectives of Member States, applicable legal regulations, the legal background of PEI, and a survey of authorisation procedures is given in Annex V.

5.3.2. Structural reasons for delays in authorization procedures

The present analysis was meant to identify and understand reasons for delays. One crucial reason, in our view, is the lack of European-wide or national legal frameworks that would ensure a more efficient performance of permission procedures in the MS. This means that – with regard to the authorisation procedures - there is no legally mandatory framework at European or national level.

In the field of environmental protection, EC directives are highly relevant for a harmonization of environmental standards in the MS. Apart from the Aarhus Convention of the UN, the most important EC directives have been implemented in the MS by individual national laws.

[17] ETSO, Overview of the administrative procedures for constructing 110 kV to 400 kV overhead lines, 2006.
[18] Andersen, Study on environmental, technical and other aspects of authorisation procedures for Trans-European projects in the energy sector, 2002.

But as far as implementation of the Trans-European Networks – Electricity is concerned, a similar European-wide legal framework is lacking. Projects of European interest are subsidized by the European Union. Yet this funding is not sufficient for an implementation of these projects in the MS. It is up to each MS to implement the projects according to its national laws. Such national laws differ greatly in legal quality. Environmental laws transposed into national law are observed precisely in the implementation of the projects. This necessarily leads to delays, in the interest of environmental protection. Objections of stakeholders or NGOs are appropriately taken into account.

The promotion of the Trans-European Networks, on the other hand, which is also laid down in the EU treaty, has so far not been observed in administrative practice, since there are no respective national regulations. Therefore, there is also no way to treat projects of European interest with priority.

Not even in the substantiations to the most modern European acceleration law, the German "Beschleunigungsgesetz"[19], is the fact mentioned that an extension of European networks is also a relevant aspect[20].

Hence, in the context of permission procedures there is usually no balancing of environmental concerns against interests of an extension of the Trans-European Networks – Electricity (and thus of the realization of a European domestic market). Such a balancing of differing interests would, however, be appropriate to the subject.

5.3.3. Differences among European regions

Authorization Procedures in Western and Southern Europe

In all permission procedures, the EIA are of primary importance. These assessments are rather time-consuming; they are the main reason for delays in achieving an authorization for a project. This can be clearly seen from the individual IDS. European directives regarding the field of environmental protection have been transposed into national legislation of individual Member States. Basically, a consistent implementation is found, even if, of course, some Member States have made higher demands regarding implementation than others[21]. Different duration of the authorization procedure is therefore usually not due to the implementation of European directives[22]. An investigation of the quality of the implementation of the directives did not seem to be indicated.

Yet in all European countries there are completely different **procedural laws**. This is due to national legislation *habits*. According to our analysis, it is these different national habits and their translation into practice which is responsible for different durations of the permission procedures. This can be illustrated by the examples of Germany and Austria. Both Member States have a modern legislation as far as the implementation of European directives is concerned. The "all-in-one" principle applies. Applications have to be submitted to one authority only[23], which is then responsible for coordinating the complex permission procedure. Nevertheless, delays in the performance of such procedures are *observable*. The application documents have to be complete. But it is not quite clear what this means in detail. This leaves room for interventions on the part of regional politics at each stage of the permission procedure. There are no clearly defined time limits. Following the successful and legally

[19] of 27/10/2006.
[20] This aspect was mentioned by the minister in charge only when, in November 2006, a major power failure occurred, which was attributed to the hesitating extension of the power network.
[21] e.g. Austria, where, in the transmission system operator's opinion, additional obstacles have been built into the implementation law.
[22] nor is it due to the new directive 2003/35/EC ('Aarhus Convention'), since the latter has hardly been perceived in the MS so far.
[23] or maybe to two national authorities, which will coordinate their work as far as possible.

accomplished EIA and public hearing, which means that a decision by the authority is to be expected, there is no obligatory time limit regarding the decision of the authority.

In Austria, there is a so-called "improvement phase", designed to allow the authorities to urge for changes of an original application, since there is no planning procedure preceding an application. Only after this phase does the processing of the application by the authorities begin. This leads to considerable delays. Equally, there exist some opportunities for interested parties including NGOs to delay the decision by using the given time limits in the interest of delaying the procedure. Finally, in Austria, public stakeholders may always raise new objections, which will then have to be investigated by the authorities. There are no time limits to legally prevent further objections. In that way, a rather long duration of the authorization phase has to be reckoned with. A streamlined execution of the permission procedure exists neither in Germany nor in Austria.

Finally, with regard to Austria where even with an authorization given by the federal state authority, an appeal to the "Umweltsenat" is easily possible[24]. Formally, the duration of such an appeal is 6 months. But in reality, a duration of about 2 years has to be reckoned with. There is no restriction to possibilities of revision.

All in all, approval procedures *de facto* last much longer than is legally provided for. Certainly, this is partly due to the skills of the authority staff, which do not seem to measure up to the requirements. But of crucial importance is the fact that legal regulations do not provide for a significant acceleration. This is the reason for the delays observed in Germany and Austria.

Apart from that, there is a problem with enforcing the laws. This problem has been recognized by stakeholders (e.g. NGOs) and made use of accordingly. In Germany, comparable problems can be observed. It is true that at the end of October 2006 an acceleration law[25] was enacted, with the intention of shortening set time periods and thereby the duration of permission procedures. Whether the intended acceleration of permission procedures will actually take place is questionable, though. One of the major reasons for delays of procedures[26] has not been changed so far. Similar types of delay can also be observed in the so far existing **Italian legislation**[27]. However, at present, **a change in the permission procedure is observable** in Italy.

While a tangible acceleration neither occurred nor was expected under the rule of the so-called 'Legge Obiettivo'[28,29] , nor was the new law of 2004[30] taken into account, TERNA[31] developed a new procedure that takes place outside the legal frame. A so-called "agreement procedure"[32] was performed before TERNA submitted its application for the formal permission procedure[33]. In this "agreement

[24] whereas in Germany, at least after having been approved a project can be realized immediately.
[25] 'Gesetz zur Beschleunigung von Planungsverfahren für Infrastrukturvorhaben', of 27/10/2006 (BTDs 16/3158).
[26] i.e. definition of the beginning of set terms after submission of an application for approval, and of time limits for decision-making by the authority after conclusion of the procedure.
[27] Legge Obiettivo, Legge 239/2004; the different phases (preliminary phase (identifying the route, technical planning), authorisation phase (with EIA, public hearing etc) are as time-consuming as in Germany or Austria: the local opposition influenced the procedure and it was de lege and de facto impossible for the authorities to issue permission.
[28] No 443/2001
[29] as regards the national projects and PEIs mentioned in this law.
[30] Legge Marzano 239/2004.
[31] the Transmission System Operator in Italy
[32] "concertazione"
[33] preliminary phase (feasibility studies to solve technical and environmental problems), authorization phase with EIA approval.

procedure", TERNA discusses, on an informal basis, with both local and regional authorities[34], its project plan and **all** objections that seem to be possible[35], and as a result of these conversations, a **written agreement** with these authorities is laid down. Only then will the application be submitted, and the usual formal procedure, regulated in detail in the 'Legge Obiettivo' and in 'Legge 239/2004', will begin[36]. This "agreement procedure" was first introduced in the project 'S. Fiorano – Robbia' (PEI 4.3, Annex III 2003), and with great success. Execution of the formal procedure regarding 'S. Fiorano – Robbia' had already begun in the 1980s. But realization always failed, due to the resistance of local authorities and regions. Only after introduction of the mentioned "agreement procedure", was a new start possible in 2001, which very rapidly led to an authorization in 2004 and a start-up of this HV line in 2005. The purpose of the "agreement procedure" is to reach agreements regarding the essential aspects of the subsequent permission procedure[37]. Only then will the authorities in charge, in the context of the preliminary phase and the authorization phase, give their opinion and decide on the formal application. The permission procedure will then be performed very rapidly, since the significant problems have already been resolved in the context of the "agreement procedure".

Apparently, there are no complaints or any resistance on the part of the public, the landowners involved, or the competent authorities. Their objections have already been considered in the context of the "agreement procedure". The local authorities involved apparently comply with this written agreement achieved before. Other stakeholders – the NGOs or the public – have also been involved in the agreement process. After the formal procedure has been executed, the legally prescribed "Declaration of Public Utility" will be issued by the authority in charge of giving an authorization. This will complete the procedure. Then, there are no further obstacles to a start of construction.

The special feature of the new procedure according to 'Legge 239/2004' is the fact that with this law, an application for authorization is only to be submitted to **one** authority. This formal modernization of the former law by introduction of the "all-in-one" principle or by setting completely unrealistic and unenforceable time limits[38], however, is not of great relevance as compared to the preceding "agreement procedure", since the main difficulties are on the local level[39].

After introduction of this new regulation, all procedures concerning national projects and projects of European interest have been changed to the mentioned "agreement procedure"[40]. In the view of TERNA, this procedure promises, for the Italian situation, the greatest possible acceleration.

Whether this recently practised permission procedure in Italy including the “agreement procedure”, as described above, can be transferred to other EU Member States seems questionable. But nonetheless, it is, for TERNA and the Italian authorities, a way to deal with the problem of increasing resistance against such projects (which can also be observed in Italy) in a constructive manner. In view of Italy's heavy import of electricity, this is a possibility to solve the increasing problems of power supply by rapid extension of trans-European networks.

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[34] Which later on will also have to agree to the authorization, apart from the ministers of environment and trade, see e.g. art. 26,1 law 239/2004.
[35] e.g. objections concerning environmental problems, problems of the planned route, compensations and payments for landowners and also for local authorities.
[36] which, regarding environmental protection, shows no particularities in comparison to other procedures oriented by European law: "According to the grid plan approved by the minister of environment, the preliminary phase with environmental feasibility studies starts, followed by the authorization phase including the information of all concerned parties to express their opinion and including the public hearing of all concerned parties to express their opinion".
[37] Including payments to landowners and local authorities and mitigation measures etc.
[38] "The authorization process has to be concluded within 6 months."
[39] environmental problems, problems regarding the route, etc.
[40] This holds, in particular, for the procedures "Venezia Norte – Cordignano" (PEI 3.9), "S. Fiorano – Nave Gorlago" (PEI 3.8), "Udine – Okrolog" (PEI 2.36), "Lienz – Cordignano (PEI 2.16).

Authorization Practice in Northern European Countries (Denmark, Finland, Estonia, Sweden, Great Britain, Ireland)

In contrast to the above-mentioned facts, authorization practice in Northern European countries is much more pragmatically oriented, in spite of a basically similar situation (problems of environment protection: landscape, overhead lines versus underground cable, electromagnetic fields, etc.). Existing environmental problems are thoroughly discussed in the context of the EIA, but at the same time, practical considerations emphasizing the national interests are included. Thus, in **Denmark**, there may be a "call-in" by the minister in charge, because of national interests. As a result, objections by citizens or NGOs may be rejected, and the project application may be approved by the minister.

Asked about problems regarding the approval of undersea links between **Finland** and **Estonia** (PEI 2.30) and between **Finland** and **Sweden**, these three countries did not report any problems. This may be due to the fact that permission procedures for submarine cables are generally simpler. But it is much more likely that administrative and legal problems do not occur because in the run-up to these procedures informal coordination discussions take place. Interview partners mentioned this fact repeatedly, and it may be one of the reasons for the shorter duration of approval procedures. Such a practice cannot be derived from legal regulations.

A similar practice was also identified in permission procedures regarding undersea cables between the **UK** and the **Netherlands** (No. 2.21) as well as between **Ireland** and **Wales** (No. 1.1). The project for an undersea cable between **Ireland** and **Wales** has only reached a study stage so far. But the new Irish "Strategic Infrastructure Act" of 16/07/2006 will considerably simplify a respective permission procedure. If the project is classified as one of "strategic interest", a simplified procedure on the basis of the environmental impact statement will take place. National interests (which may also include European interests) will then gain in relevance. In our view, this aspect is of far-reaching future importance, since with a law of this type, national and also European interests can be recognized and realized. The new Irish law may thus serve as a model for other MS. If a certain strategic interest is identified in a project, the latter will be of higher priority, without environmental aspects being neglected.

Similar tendencies are identified in the permission procedures for the undersea cable between the Netherlands and the UK (No. 2.21).

On the **English** side, persons in charge primarily mention technical problems that had to be solved, while the EIA, in their view, was performed within the usual time frame. On the **Dutch** side, a "final decision of the Parliament" as the conclusion of the formal permission procedure is to be reckoned with by the beginning of 2007. Since such a decision can be executed immediately, construction can begin after a tender procedure taking another 6 months. All this confirms that both the English and the Dutch side perform their procedures according to the regulations and with the usual EIA but nevertheless in a very pragmatic way. Balancing the environmental point of view against that of an appropriate security of energy supply seems to be important, although there is no respective regulation. For transmission system operators and authorities, both public hearings and the intended acceleration of the procedure are of equal importance.

Authorization practice in France, Belgium, Spain and Portugal

In contrast to the above-discussed projects, the French, Belgian, Spanish and Portuguese PEIs (numbers 2.1, 2.2, 2.10, 2.13, and 2.14) are to be seen as individual cases; related problems are not comparable to the structural problems in central European MS.

The project "Valdigem (Portugal) – Douro Internacional (Portugal)" (PEI No. 2.13) is still in its study stage. As to the permission procedure, there is, at present, no indication of future legal or administrative problems.

Delays in the implementation of the project "Sentmenat (Spain) – Becano (Spain) – Baixas (France)" (PEI No. 2.10) are due to the fact that so far no agreement about the cross point between France and Spain has been reached. A political agreement is strived for, but will depend on the outcome of the presidential elections in France in 2007. Anyhow, it should be considered whether it would not be reasonable to appoint a coordinator for this project, according to the TEN-E guidelines 2006.

The project "Moulaine (France) – Aubange (Belgium)" (PEI No. 2.1) is still in its study phase. A political agreement reached in September 2006 about a reinforcement of the existing line will, after start-up of the project "Avelin – Avelgem" (PEI No. 2.2), considerably reduce the environmental problem.

The solution agreed upon will reduce the impact on the environment and the landscape. Therefore, a much easier authorization procedure can be reckoned with. If these problems in "Romance" countries are compared with the problems identified in Germany, Austria, and Italy, it can be seen that the actual problems in the implementation of projects of European interest rather lie in the area of administrative practice.

Eastern European Countries and Greece

No information could be collected about the approval practice in the Eastern European countries. Project No. 2.26/ 3.75/3.76 (Veli´ké Kapušany (SK) – Lemešany (SK) – Moldava (SK) – Sajóivánka(HU) is still in its study phase. As to project No. 3.77 (Gabcíkovo (SK)- Vel'ký Dur(SK), neither the IDS nor the information of the Andersen study suggest any regular permission procedure.

Concerning the interconnection line between Poland and Lithuania, no information could be obtained from the Polish side. At the moment no delays are to be expected[41].

The project "Philippi (Greece) – Hamitabad (Turkey)", on the other hand, is already under construction. The authorization phase did not pose any problems as far as the permission procedure of the Greek side is concerned. It has to be emphasized that in Greece there is a 5-year plan, which is produced at the level of the 'Hellenic Transmission System Operator' (HTSO). Insofar, projects of European interest are taken into account.

[41] See also Annex V concerning the authorisation procedure in Lithuania.

6. Conclusions and recommendations

6.1. Electricity networks coordination

Historically, the interconnections of the UCTE area have been designed to maintain the security of operation of the interconnected power systems, but not to transfer power flows for trading in energy. On the contrary, Nordel's objective is oriented to create and maintain the conditions for an efficient and harmonised Nordic electricity market, without regard for national borders.

The impact of the different approaches is seen in particular with the focus on congested cross-border interconnections rather than on congestions of lines and nodes in an intermeshed network. The cases of the loop flows between Germany, Poland, and the Czech Republic along the El7 and El8 axis as well as the lack of transit capacity within Austria (EL.8) demonstrate that the focus should be on the network as a whole.

The location of new power plants is also an important aspect in network capacities. The case of the Poland - Lithuania interconnection (EL7) shows that at present Lithuania could export excess power from Ignalina to Poland, but the situation will be reversed after the decommissioning of Ignalina in 2009. The high but intermittent wind generation in Denmark and Northern Germany is another example of how the location of a plant determines the need for lines to transit the power to the load centres, to enable trade, but also to secure system stability.

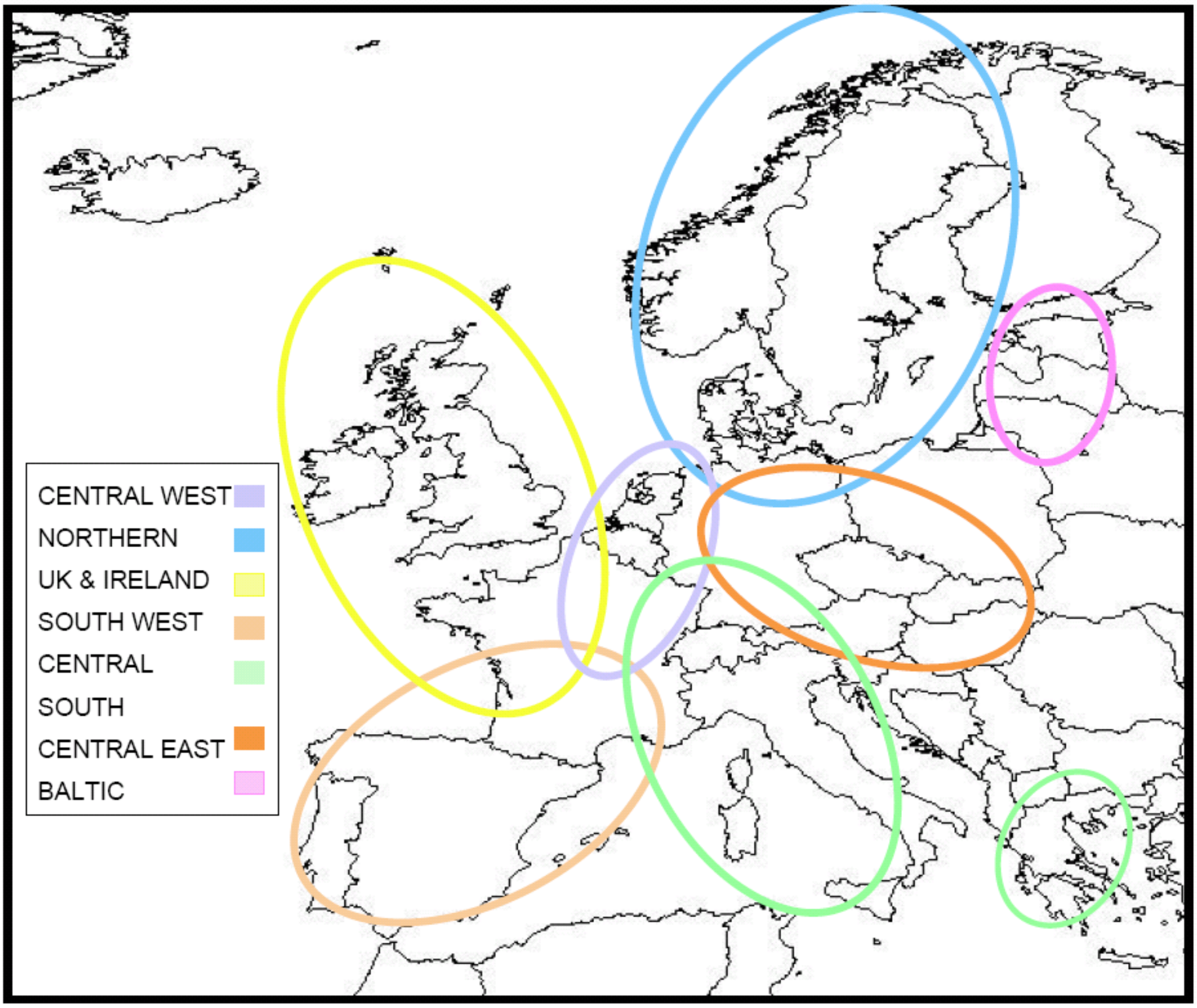
As the intermeshed network comes into more focus, the focus of the allocation mechanisms of congested cross-border connections should also be changed to take into consideration allocation principles of congested lines or nodes rather than looking only at the cross-border points. The example of the internal north-south congestion of axis EL8 shows clearly that benefits of a line-enforcement will occur not only within Austria but also for all neighbouring countries.

In its "Position Paper on Roles and Responsibilities of TSO and other actors in Cross-Border Network Investment" (2006), ETSO argues for approaches on how to improve investment for cross-border connections by better coordination between TSO and regulators. Regulators also need to agree on cost-allocation, to develop and apply incentive regulation for new infrastructure and remuneration methodologies for intra-country transmission investment that increase interconnection capacity.

ERGEG follows a very market oriented approach with its initiative for Regional Energy Markets projects (REM). The objective is "to identify barriers to further progress towards competitive electricity markets, and develop options for overcoming these barriers". The initiative is bringing together the network, the regulation and the incentive aspects as pointed out above, with the creation and integration of market places. Possible regional market areas are indicated in the figure below. These possible market areas are already partially coinciding with present TEN E axes: the EL7 axis matches with the Northern and Baltic areas, the EL8 axis matches with the Central East area, and the South West area overlaps with the EL3 axis.

As ERGEG states, "the initiative will bring together all of the relevant parties, regulators, market participants, consumers, Member States, the European Commission and other stakeholders and will identify which parties are best placed to act in each case". In order to improve the value of TEN E projects and to improve their benefits in the creation of a single market, it should be considered to coordinate and develop TEN E projects jointly with the ERGEG initiative.

Figure 14: Regional Electricity Market Initiative



Source: ERGEC

6.2. Gas network coordination

Due to the strong demand growth for natural gas in Europe, and increasing depletion of the older gas fields in countries such as Holland, the UK, etc. (except the recent discoveries in Norway), Europe's gas supply will become even more dependent on Russia, the Caspian Sea region and the Middle East. Therefore, many new projects are being studied and developed.

Whereas in Northern and Continental Europe projects are essentially new pipelines catering for imports, in the Mediterranean countries both LNG and pipelines will fill the gap. Due to impressive growth in LNG plants, Europe will see a near doubling of the LNG market share to almost 20%.in 2005-20.

LNG allows a much greater diversification of supply sources and transport routes. However, many of the LNG projects struggle with cumbersome and lengthy authorization processes at local, national and European level. The survey shows that in the field of underground gas storage the overall European component is still missing. With overall European demand growing continuously (with strong seasonal variations), it is to be expected that by 2015 underground storage shortages will expand, starting in Belgium, France and Spain. In fact, a cross-border European solution might have to supplement traditional national market-based approaches from the past.

The key requirement for success of any type of new gas project remains the cooperation between producers and importers in a liberalized but well regulated and transparent market. Most countries need to further reduce regulatory risks and make additional efforts to harmonize the legal/regulatory framework to foster much needed (cross border) project investments in the future.

6.3. Acceleration of authorisation procedures

In most of the Member States there are considerable delays with permission procedures. This is due to national regulations but also to an observable time-consuming practice in each Member State. Especially in Germany and Austria permission procedures take a seemingly inappropriate length of time. There exists no legal obligation to consider a certain time limit. Objections may be induced in the procedure which prolongs the given time period.

In Italy the same legislative structure as in Germany and Austria exist, which caused considerable delays in some projects in the past. A new practice in Italy as a result of the well-known barriers accelerates the permission procedure. Agreements between the authorities and concerned parties and NGO precede the formal authorisation phase according to the existing laws. Thus, the delays have been reduced to a remarkable extent.

In Northern European countries permission procedures are performed significantly more rapidly, while for Eastern and Western European countries no respective information is available.

One of the reasons for the delay is the fact that there are no national plans regarding the energy security plans and regarding the European importance of a project. Existing plans have not passed the national parliament. Therefore, the Projects of European Interest of the TEN –E guidelines 2006 may not be taken into consideration by the Authorities. There is no legal priority for those European projects. As a consequence there is no legal obligation to speed up the procedure or to shorten the time limits and reduce the juridical procedures in the case of a Project of European Interest. It is recommended to consider whether the European Union should not recommend to its Member States the establishment of such national plans with respect to the implementation of the PEIs. Possibly, MS should be obliged to produce national supply plans and integrate the PEIs into these plans. This could ensure a prioritized treatment of PEIs.

Each MS should do its best to make the PEIs a national priority. Therefore, the EC should consider the possibility of decreeing that Member States should have to issue regulations to accelerate permission procedures as far as PEIs are concerned. The regulations of the EC treaty regarding the domestic market (art. 14) and regarding the trans-European networks (art. 154) could serve as a respective legal basis. The best approach to accelerate PEIs is to impose a Directive concerning authorization procedures. The long procedures should be reduced and made uniform (e.g.: a gap of 7 years appears in electricity projects 2.26/3.75/3.76 between the completion of the same project on both sides of a border, creating a financial loss for the part of the project completed on one side of the border and paid but staying idle until the completion of the part on the other side of the border).