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European Coordinator

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PROJECT OF EUROPEAN INTEREST

POLAND – LITHUANIA LINK

**including reinforcement of the Polish electricity network
and the Poland-Germany profile**

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This report only represents the opinion of the European Coordinator
and does not prejudice the official position of the Commission.
The content of this report is accurate as of 23 September 2008.

Executive Summary

After 15 years of discussions on the power link between Poland and Lithuania the project is moving ahead. In February 2008 the Lithuanian and the Polish Transmission System Operators entered the agreement to construct this power link. The first step has been the establishment of a joint venture company, LitPol Link, which will prepare the investment plan for the cross border connection. LitPol Link started its operation on the 19th of May 2008 and the company intends to complete the investment plan before the middle of 2009, allowing for the beginning of the line construction in 2010.

Cross border network projects require the active role of the coordinator at first as a mediator to bring the government bodies and power companies together and to convince them that the development of power network infrastructure is beneficial for both member states, as well as for the transmission system operators. The second stage, when the investment plan is under preparation, requires the coordinator to be involved in professional advising.

The visible progress in the collaboration between East German and Polish operators has also been noted. The cooperation between the German (VET) and the Polish (PSE-Operator) TSOs gains its momentum. The TSOs, being stimulated by both coordinators (*Mielczarski & Adamowitsch*), have developed close collaboration in the unification of operational procedures and training of control centres' staff. The operators have established a working group for the exchange of power system models and the network data. The conferences which are held twice a year with the attendance of government and regulatory bodies have become a forum for discussion of challenges and measures to develop the intersystem connections.

The crucial element of the success, in infrastructure development, is the active involvement of the coordinator in all processes relating to the construction of cross border interconnections starting from a role as a mediator between government bodies to supporting and advisory roles for the parties which are preparing investment studies.

1. INTERNATIONAL POWER CONNECTIONS

1.1. Position of the European Commission

The need for a strengthened policy to facilitate the completion of priority infrastructure projects was underlined by the EU Heads of State and Government at Hampton Court in October 2005. Previously, at the Barcelona European Council in 2002, it was also agreed to increase minimum interconnection levels between Member States to 10%. Today a significant number of Member States have still not achieved this target¹. The European Council of March 2006 called for the adoption of a Priority Interconnection Plan (the Plan), as part of the Strategic European Energy Review (SEER)². The European Council of June 2006 asked to give full support to external energy infrastructure projects aimed at enhancing security of supplies.

¹ Communication from the Commission to the Council and the European Parliament : Priority Interconnection Plan, January 2007, COM (2006) 846 final

² TEN-E guidelines 1364/2006, Annex III 2.28; 2.29; 2.32 and 3.62 to 3.71

Under the TEN-E Guidelines, the Commission decided to designate European coordinators, in agreement with the Member States concerned and after consultation of the European Parliament. The coordinators should promote the European dimension of the project and initiate a cross border dialogue between promoters, the public and the private sector as well as local and regional authorities and the local population. The coordinator will help to coordinate the national procedures (including environmental procedures) and will submit a report on the progress of the project or projects and on any difficulties or obstacles which are likely to result in a significant delay.

The coordinator, prof. W. Mielczarski, was nominated by the European Commission on the 12th of September 2007 for power links between Germany, Poland and Lithuania.

1.2. Priority projects

There are three projects of European Interest in the area supervised by W. Mielczarski. They include:

- 1 New connection between Poland and Lithuania (line between Elk and Alytus), including the upgrading of the Polish and Lithuanian electricity networks
- 2 Enhancement of the existing lines between Vierraden (DE) - Krajnik (PL)
- 3 New power interconnection between Germany and Poland

The main problems identified by the Commission in relation to a new power connection between Poland and Lithuania include³:

- Coordination and commitment of both Poland and Lithuania
- Uncertainty due to different synchronized areas
- Stability of Polish grid
- Natural protected area crossed
- Expropriations requires law amendments in PL
- Uncertainty about synchronisation areas

The main issues related to the existing interconnection between Germany and Poland and indicated by the Commission⁴ are as follows:

- Feasibility study on strengthening the Polish grid
- Studies and results of PL - DE bilateral WG study
- Additional PL internal grid upgrading necessary
- Legal frame on DE side : prevents relevant expropriations for the interconnection with PL
- Local opposition: route, fear of Electro-Magnetic Fields, deterioration of landscape view
- Time consuming public consultation

The challenges to develop a new connection between Germany and Poland are listed below:

- Increased loop flow between DE-PL-CZ, which will cause follow-up investments and require additional studies
- Additional PL internal grid upgrading necessary
- Agreement PL - DE required

³ As above

⁴ As above

1.3 Power systems and interconnections

After the designation on the 12th of September 2007, the coordinator started his duties from the identification of ongoing activities in three countries in relation to main projects listed as the European priority projects.

1.3.1 Poland – Lithuania

The idea to connect the Polish and Lithuanian power systems emerged in 1992 just after the separation of both countries from the former central planning economies. However, at that time the Polish power system was split from the Eastern European power systems in which the most significant role was played by the Russian power system, while the Lithuanian power system was and still is an element of the Baltic power systems synchronously operating with the power systems of Russia, Belarus, Ukraine and other former SU republics. The Polish power system after some technical upgrades was synchronized with the UCTE system in 1996.

The discussion on a new power connection between Poland and Lithuania has been carried out for 15 years with little progress. More activities were observed in 2006 and 2007 when the PSE SA (Polish Power Grid) – currently the PGE S. A. (Polish Energy Group) started discussions with Lietuvos Energija on the construction of the power link and the common investment in a new Ignalina nuclear power plant.

The organization and legal structures of both companies were complicated. The PSE S.A was a parent company, until 31 December 2006, for PSE-Operator, the Polish Transmission System Operator, which was completely unbundled (including ownership unbundling) from 1 January 2007. Lietuvos-Energija (LE) was designated as the TSO for the Lithuanian power system; however, discussions were carried out in Lithuania if the LE should be a part of the national investor, a new company, which the Lithuanian government was to establish for the investment in generating assets. In 2008, Lietuvos Energija became a subsidiary of a new company the LEO (Lithuanian Electricity Organisation).

In July 2007, the three prime ministers from the Baltic States in their announcement asked European Union for support in their efforts to connect all three Baltic States' power systems, which still operate synchronously with the Russian power system, to the UCTE systems.

The talks between the PSE/PGE and the LE were broken at the beginning of October 2007, leading to some tensions between Poland and Lithuania. The main element of the disagreement was the proposal to tie up directly the development of the power interconnection with the construction of a new Ignalina power plant in which the PGE's share was planned on a level of about 1000-1200MW, when the total capacity was to account for 3200MW. The LE recognized two projects as separate deals, while the PGE wanted to tie up both projects. Firm positions of both companies did not bring any progress in negotiations after the beginning of October 2007.

PSE-Operator was not involved in the discussion between the PGE and the LE on the construction of the power link; however, contacts between PSE-Operator and the LE existed within the UCTE study on possible interconnections of the UCTE and other Eastern European power systems including the Baltic States.

Despite many years of discussions little has been done to prepare an adequate feasibility study, accepted by both TSOs. The initial studies carried out by Lietuvos Energija and the PGE SA in 2007 estimate the cost of a transmission line between Ełk and Alytus, including a back-to-back inverter station, to 230 million Euros. The cost of network

upgrade in Lithuania roughly amounts to 90 million Euros, while the enhancement of the Polish transmission grid can cost about 600 million Euro. The costs estimated should be verified by detailed simulation while preparing the investment plan for power link project.

Due to the information received from Lietuvos Energija, Lithuania is going to finance its share in the power link using the Ignalina decommissioning funds, while PSE-Operator is to receive a total amount of 214 million Euros from the structural funds for the enhancement of the internal power network allowing for the adequate operation of the cross border link with Lithuania.

1.3.2 Germany-Poland

The relations between the Eastern German TSO (*Vattenfall Europe Transmission - VET*) and PSE-Operator have always existed on the operational level. The relations between both operators have begun more vigorous after January 2008 when at the end of January the circular flow of power from wind farms caused serious problems overloading transmission lines in Poland. The other factor stimulating close collaboration was an initiative of two coordinators (*Adamowitsch and Mielczarski*) to organize a conference to discuss problems with operation of power systems and enhancement of power interconnections.

2. COORDINATOR & HIS ACTIVITIES

2.1 Power Link: Poland-Lithuania

After identification of the ongoing activities, the coordinator worked out the proposal of the power link development as a joint venture of both TSOs: Lietuvos Energija and PSE-Operator with the possible involvement of commercial entities – Appendix 1. The proposal was circulated to all parties and after several talks with the Lithuanian Minister of Economy, Mr Navickas, the Polish Minister of Economy and Deputy Prime Minister Mr Pawlak, as well as discussions with management of both TSOs and the advisers to the Polish President, both operators decided to enter the agreement on development of the power interconnection between Poland and Lithuania.

The agreement between PSE-Operator and Lietuvos Energija was signed on the 12th February 2008 in Warsaw in the presence of presidents: Mr. Adamkus and Mr. Kaczynski. The agreement has led to the establishment of a new joint venture company LitPol Link as a subsidiary of both operators having equal amount (50/50) of shares. The main aim of LitPol Link is the preparation of the investment study for the power link between Poland and Lithuania.

This study should allow for the decision on the construction of the power line between both countries. The realistic deadline for the completion of this investment study is the middle of 2009. The timetable for the power line construction should be coordinated with the plans for a new Ignalina power plant. The decision on the Ignalina construction is expected at the beginning of 2009. The completion of the investment study will be followed the line construction starting at the beginning of 2010.

The company (LitPol Link) initiated its formal operation on the 19th May 2008. LitPol Link is based in Warsaw and governed by the Polish law. Shareholders (PSE-Operator and Lietuvos Energija) have equal amount of shares, which implies that all decisions must be reached by consensus.

2.2 Interconnections Germany-Poland

The initiative of both coordinators (*Adamowitsch and Mielczarski*) has resulted in the first meeting in Berlin on the 5th of February 2008 with the representatives of Ministry of Economy and Technology and the Transmission System Operator (VET). This meeting indicated a need for a wider conference including the presence of both network operators as well as representatives of governments (ministry of economies) and energy regulatory authorities.

Following the request of the coordinators, the VET and PSE-Operator organized a conference on the 15th of May 2008 in Berlin with the attendance of representatives from both governments. The conference has allowed for the presentation of the positions of all parties as well as the identification of problems to overcome in order to enhance the existing power connections and construct new ones.

The conference has also revealed improving collaboration between both TSOs on the operational level despite some differences relating to technical measures to handle uncontrolled power flows from wind farms. The conference has shown that both governments and energy regulatory authorities should have taken more active roles in supporting the development of international power connections. Two most important issues identified include: (a) clear positions of energy regulatory authorities on transferring the network investment costs into transmission charges; (b) the setting a reasonable rate of return from the network investment. The discussions have also emphasized a need for changes in legislation allowing for easier access to the private properties when constructing power lines and rationalization of consultation processes with local authorities and environmental organizations. Some conclusions from the conference are presented in Appendix 2.

The next conference is planned on the 24th of October 2008 in Warsaw. It is also planned to organize another conference at the end of 2008 inviting other countries from the region. It could be the first step to the development of a regional electricity market.

3. DEVELOPMENT OF CROSS BORDER POWER LINKS – MAIN CHALLENGES

There are several critical issues which have an impact on the development of network infrastructure, in particular cross border power links. These issues are discussed below.

3.1 General framework

The most important, in particular at the first stage, is the political support from both governments and visible support of European Commission. The support of Ministries of Economies, which usually deal with energy in most the EU countries, allows for bringing parties, which will invest in the cross border connection, to the common table and encourage them to start activities leading to the construction of tie lines. In Poland, the transmission system operator is owned in 100% by the state. In Lithuania and Germany, transmission system operators are not owned directly by the state; however, the government has a significant impact on the position of transmission system operators.

The construction of cross border connection requires enhancement of internal power systems and the cost of such enhancement is sometimes larger than the cost of a cross border connection. State governments must be convinced that both cross border interconnections and the enhancement of internal power systems are not only elements of the common European energy policy but also they can be beneficial for their countries.

The Polish government decided to allocate about 200 million Euro from the regional development funds for the power network enhancement in the Northern part of Poland necessary for the adequate operation of the power link between Poland and Lithuania. Despite that the funds directed account for only 1/3 of the total expenses required, any support of governments is very important for cross border connections.

The decisive role in the infrastructure development is the position of energy regulatory authorities. Assuming that the regulatory policy is a part of the national energy policy, which should be in conformity with the European energy policy, the regulatory bodies should support the development of the infrastructure by transferring costs of such investment into transmission charges. It is also important that regulatory bodies should determine a reasonable rate of return from the network investment. If it does not happen, network operators will restrain from investment, not having guarantees that their expenses will be covered by income from transmission charges. When a rate of return is unknown financial institutions have reservation to provide loans for network investment due to a large regulatory risk.

3.2 Regulations

The adequate legislation relating to the infrastructure development can facilitate the construction of cross border connections. The most difficult problems signalled by network operators include the access to land to install supporting towers for power lines. The lengthy process of obtaining permissions and a need for consultation with many local authorities as well as with environmental organizations mean that the construction of power lines is a time consuming process.

The access to land is especially important in countries such as Poland with disperse land ownership. Each owner of a land has to agree with the line construction on his land and accept the financial compensation. The complicated legal regulations and possibilities to appeal several times cause that discussions with the land owners can take years. The initial evaluation of the power link between Poland and Lithuania and the enhancement of the internal Polish system indicate a need for dealing with 50-80 land owners per one km of the power line.

3.3 Technical

Technical problems are relatively easy to overcome when constructing network infrastructure. New methods to arrange wires in overhead lines result in a low level of electromagnetic radiation. Decreasing costs of power cables indicate that in some areas overhead power lines can be replaced by cables.

The power connections between Germany and Poland do not require specific equipment because both power systems operate synchronously as a part of the UCTE system. On the other hand, the interconnection between Poland and Lithuania should be equipped with a special electronic device called a back-to-back station, which is able to change alternating current (ac) into direct current (dc) and again dc into ac. Such equipment allows for the connection of two power systems which do not operate synchronously. It is planned that the line between Ek and Alytus will be built as a double circuit three phase ac line. In Alytus, alternating currents having the frequency of the UCTE system, will be transferred into direct currents and again to alternating currents with the frequency of the Baltic state power systems. However, the back-to-back station increases the cost of network construction. It is estimated that such a station costs over 1,2-1,5 million Euros per 10MW of line capacity.

3.4 Environmental

The power connection between Poland and Lithuania (*E•k – Alytus*) crosses environmentally sensitive areas. There are vast areas of lakes, forests and Natura 2000 clusters. In the past, there have been numerous protests of environmental organizations against road construction in these areas.

It is also expected that the construction of the power link between Poland and Lithuania will require lengthy negotiations with environmental organizations. It may delay the line construction, leading to the change of an optimal route and perhaps the use of underground cables in some sections, what will result in higher costs of the line construction. An adequate legal regulation, which is currently discussed in Poland, when shaped in a form of the law, can help in sorting out access to the land and environmental issues.

4 ROLE OF THE COORDINATOR

The results achieved to date indicate that the coordinator can move ahead infrastructure projects which have been sticking for many years. This requires a very active approach on various levels.

At the first stage the coordinator plays a role of a negotiator convincing government bodies and power companies that they should start collaborating on the development of network infrastructure and cross border connections. He should also indicate that such power connections can be beneficial for all parties.

The important role of the coordinator is to identify difficulties, obstacles and countermeasures, so the involvement of the coordinator in ongoing processes is a key to the progress. Also professional expertise in system operation and power flow simulation, allows for effective support of cross border line projects.

5 FURTHER DEVELOPMENT

5.1 Lithuania - Poland

When the investment plan for the power link is ready in the middle of 2009, both operators (Lietuvos Energija and PSE-Operator) will make the decision on the construction of the power link. There are two major options regarding the line construction: (a) power link will be constructed by a joint venture company specifically established for such a purpose; (b) power link construction and enhancement of both transmission systems will be carried out separately in both countries. Any option undertaken can lead to the same technical results; however, a joint venture company dedicated to the power link construction seems to be the most practical option.

The other decision that should be made in 2009, when the investment plan is ready, is the financing option. The power link can be constructed using only the resources of both network operators or TSOs can invite the commercial entities to provide funds for investment. The latter may require the exemption of a part of power link capacity from the TPA rules in accordance with Regulation 1228, in particular, when investing commercial parties intend to carry out cross border electricity trade.

The involvement of financial institutions in the power link investment will not require the exemption from TPA; however, the energy regulatory authorities should set up the reasonable rate of return allowing for the acceptable, for financing institutions, a pay back period.

The use of the Ignalina decommissioning funds to support at least a part of expenses burden on the Lithuanian operator is under discussion. Such funds exploitation will require a more flexible scheme of the fund transfer than the existing scheme used by the EBRD.

Both TSOs (Lietuvos Energija and PSE-Operator) are involved in the study on the expansion of the UCTE system and possible connections of the Baltic States power systems to the UCTE. Large electricity flows between the Baltic and the Russian power systems cause technical difficulties in the interconnection of the Baltic States to the UCTE systems. Independently on the UCTE study results and the future decisions on the configuration of the Baltic State systems and their interconnections, the power link between Poland and Lithuania can be constructed, because the installation of the back-to-back will allow for both asynchronous and synchronous operation modes.

5.2 Germany-Poland

The Polish transmission system operator has undertaken the discussion with the companies constructing new roads between Poznań and Berlin on the use of road corridors for the transmission line allocation. Such a line between Berlin and Poznań, if constructed, will allow for the transmission of about 1000MW between both countries.

The key element for the development of cross border connections between Germany and Poland is the ownership of the transmission networks in Germany as well as the decision on the structure of the German transmission operator. The establishment of one TSO in Germany would facilitate the line construction not only between Poland and Germany but also between the four German transmission systems, where the existing weak connections limit the amount of the electricity transmitted.

Appendix 1

The development of the international power connections can be carried out in three main ways:

- Construction of a power link by operators and auctioning of all line capacity in accordance with the TPA rules
- Development of an interconnection by commercial entities with the exemption of line capacity from the TPA rules
- Joint venture of network operators and commercial entities allowing for partial exemption from the TPA rules for limited time – Fig. A1.

Each of the approaches listed above has some advantages and disadvantages. The construction of a cross border line by network operators provides all capacity for auctioning and the TPA. However, it can cause a temporary increase in transmission charges not always acceptable by customers. The second approach involves the funds of commercial entities not resulting in the increase of transmission charges but it does not allow for the full implementation of the TPA rules as commercial entities are ready to invest when at least a part of the line is exempted from the TPA rules.

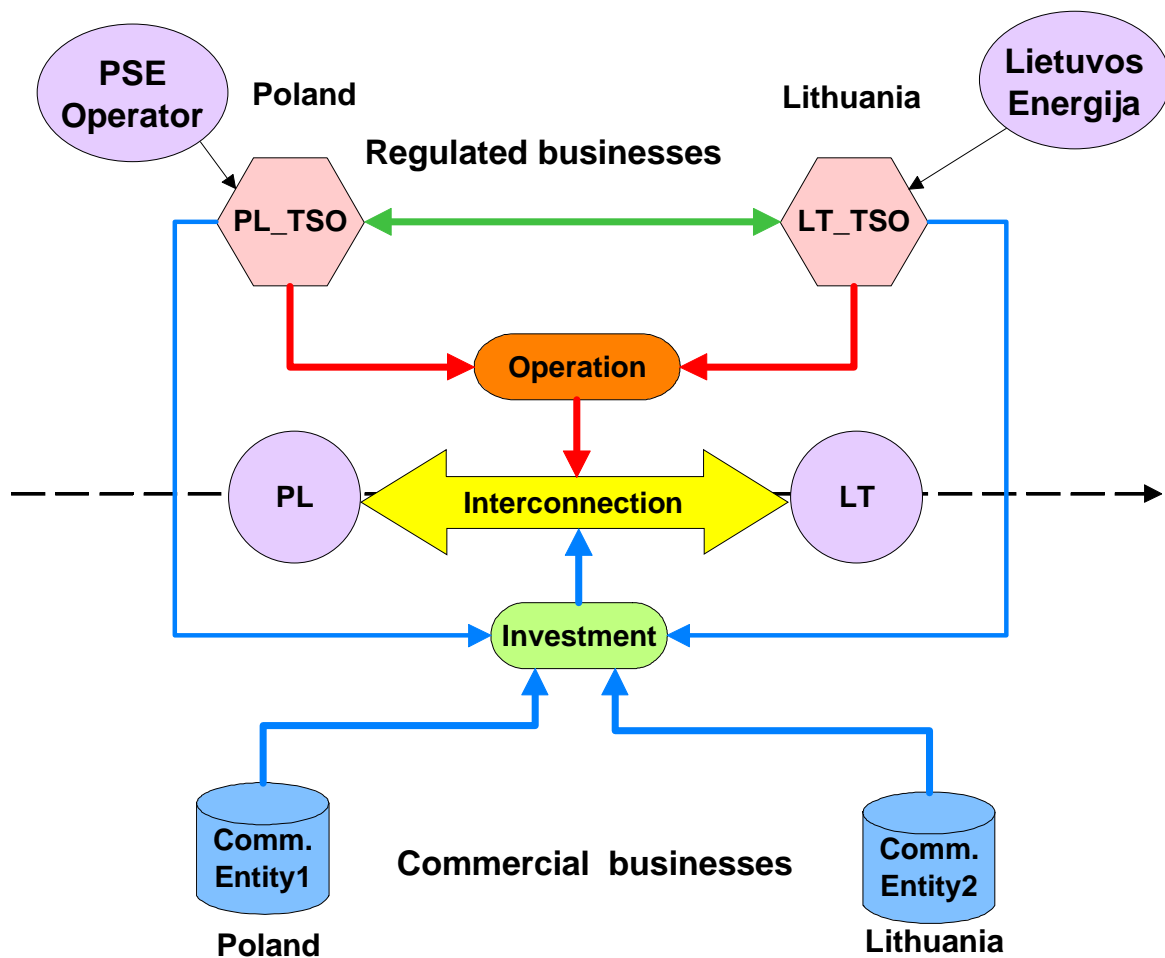


Figure A1. Possible development of international connections by Transmission Systems Operators with the involvement of commercial entities.

The third approach allows for auctioning a part of line capacity while commercial investors can obtain the return from electricity price arbitrage having a part of line capacity exempted from the TPA rules for a given period of time. In such a scheme it is possible that auctioning does not cover all TSO's costs as a part of a line is used for security purposes – Fig. A2.

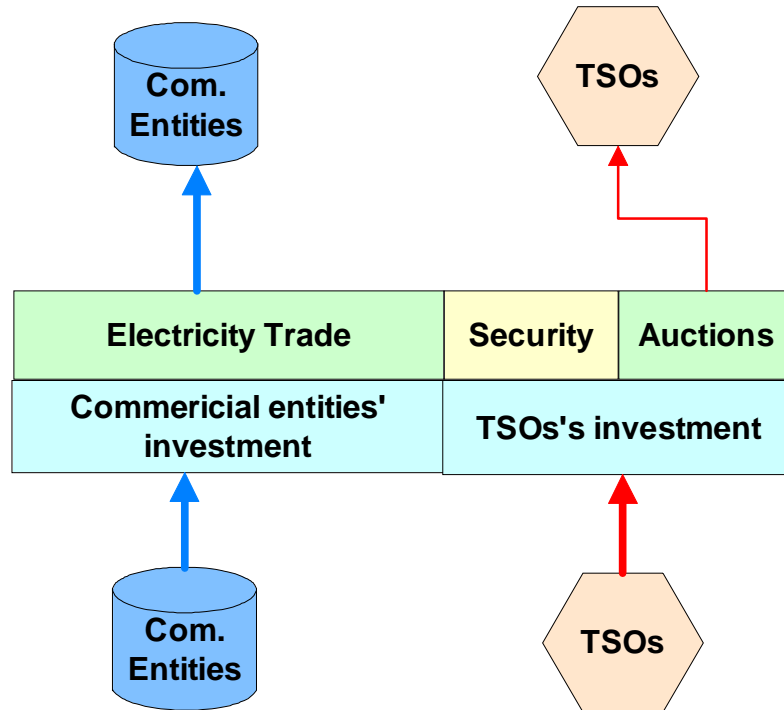


Fig. A2. Possible return from network investment

Appendix 2

Technical and economic aspects of the German-Poland cross border connections

The meeting organized by the coordinators: Adamowitsch and Mielczarski on 15th May 2008 in Berlin gathering two TSOs (Vattenfall Transmission Europe and PSE-Operator) and representatives of the German and Polish governments (Ministry of Economy and Energy Regulators) has revealed two main aspects. The first one is very positive. Two TSOs have started close collaboration on the unification of operational procedures and training of control centers' staff. The second aspect is that the meeting in Berlin showed that the development of cross border lines is a very complex problem and is not limited to the enhancement of cross border connections between Germany and Poland.

The complexity of the German-Poland power exchange includes the following issues:

- **Insufficient progress in the reunification of German power systems.** The transmission system owned by VET is the former DDR power system with relatively weak connections not only to Poland but also to other parts of Germany. The current power connections inside German power systems allow only for a limited energy exchange. There are four TSOs in Germany and any network development requires commitments from all network operators.
- **A lack of coordination of generation and network development in Germany.** The ambitious program to develop wind farms in Germany is not adequately coordinated with the development of power networks. The VET system is not able (from the physical point of view) to accommodate entire wind energy, so the construction of wind farms should be coordinated with the power network enhancement inside the VET system and neighbouring networks.
- **Insufficient development of the Polish power system.** The two power connections between Poland and Germany do not provide capacities for reasonable import or export of electric energy between these countries. Insufficient internal power connections inside the Polish power system limit technical capacity to transfer energy from Germany to the load centers in the central and southern parts of Poland, as the western and northern parts of Poland have relatively small energy demand.
- **Circular flow of electricity from North to South.** A lack of adequate power interconnections in the German power systems causes the flow of the electricity, in particular from wind farms, from the VET system to the Polish system by the power connection near Szczecin and flow out of the Polish system to the Czech system and the German system by the power connections in the south part of Poland. Such a circular flow results in overloading of the Polish transmission lines which may cause the protection system activated (tripping) and the disconnection of the Polish and the German power systems. The circular flow which increases every year threatens not only the stability of the VET and PSE systems but also it may result in the black-out or islanding of the Western Europe power systems. Such a threat was clearly indicated by both TSOs in Berlin on the 15th of May 2008.
- **Unclear position of energy regulators.** The network investment requires the covering of investment costs by the transmission charges. If such investments are to happen, the TSOs should know how investment costs will be recovered by transmission charges approved by regulatory bodies.