

Meeting Minutes

Black Sea Regional Transmission Planning Project Working Group Meeting Lviv, Ukraine December 3-4, 2008



Black Sea Working Group Members in front of Lviv City Hall

The Black Sea Regional Transmission Planning Project Working Group meeting was conducted in Lviv, Ukraine from December 3-4, 2008. The objectives of the meeting were to:

- Exchange information on recent TSO developments in the region;
- Review and update the existing steady state network for 2010 and the draft summer peak network model for 2010;
- Examine the initial dynamic model on a country by country basis and identify areas where there are inconsistencies that require modification
- Review the responses to the transmission planning criteria submitted by working group members as a first step toward determining if harmonizing criteria throughout the Black Sea electrical system is desirable;
- Identify the information requirements of working group members in preparation for a workshop on financial and economic evaluation of transmission projects; and
- Agree to next steps for the project

The following TSOs and related organizations participated in the meeting: Electro Power System Operator, JSC (Armenia); Energy Institute of Armenia; ESO-EAD (Bulgaria); GSE (Georgia); Moldelectrica (Moldova); Transelectrica (Romania); System Operator – United Power System (SO-UPS) (Russia); Turkish Electricity Transmission Corporation (TEIAS); Ukrenergo (Ukraine); Electricity Coordination Center (EKC); and the United States Energy Association. (see attached participant list)

Following welcoming remarks and a review of the agenda, representatives from each of the participating TSOs provided an update on current and planned projects, including the status of new transmission lines and generation stations.

TSO Updates

UCTE TSOs in Bulgaria and Romania and the TSO in Turkey reported that strong demand for licenses for wind power projects are driving changes to their networks. To date, Bulgaria has received applications for 4,000 MW of wind power to connect primarily to the 110 kV grid. Romania, which has established incentives for wind power in the form of relatively high feed-in tariffs and a green certificate program, has received nearly 14,000 MW of applications. Turkey has received 5,400 MW of applications, of which 4,000 MW has already been approved by EMRA, the Turkish regulatory authority.

Working group members from these countries expressed concern on the effect of these projects on the stability of the grid, since most projects are concentrated in relatively compact areas adjacent to the Black Sea. They also expressed concern over the uncertainty the growing number of small wind power projects applying for connection to the 110 kV grid poses for the planning and modeling process. This is consistent with initial concerns expressed in a recent survey on uncertainties prepared by the Energy Institute of Croatia based on responses provided by the SECI transmission planning project participants. Romania and Bulgaria have gone as far as establishing a joint working group to identify best options for integrating large scale wind projects on the high voltage network.

The TSOs from the IPS/UPS reported on their network developments, each discussing ambitious national plans to build new generation and transmission elements on their systems. Dan Preotescu, the BSTP technical coordinator, remarked that the current international financial crisis will likely have a significant impact on the ability to develop these projects. He asked the working group members to be cautious and realistic about what they include in the national steady state and dynamic models. He advised that they include only those network elements in the model for which capital is likely to be mobilized.

Moldova and Ukraine reported they are in discussions/negotiations about establishing a new synchronous control block within UCTE. Dan Preotescu reported that funds for this interconnection study have already been approved by the EC. An engineer from Transelectrica will serve as the project manager and will soon establish the working groups to conduct the study.

UCTE-TEIAS Synchronous Interconnection Study

Gul Okan of TEIAS gave a presentation on preparations for TEIAS' synchronous connection with UCTE. She reported that the working groups involved in the interconnection studies have concluded that interconnection is feasible. The three interconnections from Turkey to UCTE members satisfy UCTE technical requirements and provide ample capacity for exchange. However, frequency control problems must be resolved and system protection at the Turkish-UCTE interface is necessary. The studies on frequency controls are underway and are expected

to be concluded in 2009. Isolated tests will be performed throughout 2009, leading to a trial parallel operation as soon as late 2009.

Ukrenergo questioned how TEIAS' will comply with the UCTE reserve margin requirements. Dan Preotescu noted that during the trial period TEIAS will not be required to observe the margin requirements. However, after this period TEIAS will be required to have the same 2-3 percent spinning reserve margin as all other UCTE members.

UCTE-IPS/UPS Interconnection Study

Dan Preotescu provided an overview of the UCTE-IPS/UPS study on the synchronous coupling of the two systems. The study concludes:

- System coupling is feasible after implementing several technical requirements and the resolution of legal issues
- Resolution of these issues will be a long term process, therefore synchronous coupling should be considered long term
- To create the world's largest electricity market platform, greater use of direct connections should be considered

It should be noted that this last point is particularly germane to the BSTP in that the scope of Phase II of the project emphasizes the importance of identifying DC interconnection points that will improve capacity for greater east-west trade and exchange.

Report on Creation of European Network of Transmission System Operators for Electricity

Dan Preotescu gave a brief presentation on a proposal to create a new association of TSOs in Europe that will merge UCTE with ETSO. The new association, to be called the European Network of Transmission System Operators for Electricity (ENTSO-E), has the objective of strengthening cooperation related to grid development with the aim of enhancing European market development, contributing to sustainability and ensuring reliability. As such, it will combine the reliability related functions of UCTE with the market functions of ETSO. Its membership is expected to include both UCTE and non-UCTE European TSOs.

Update of 2010 Steady State Model

Predrag Miksa of EKC led a discussion on the status of the current steady state model for 2010. He noted that the original model created in Phase I of the project assumed parallel operation of the entire Black Sea electrical system. As a result of decisions taken in the last working group meeting, the model now has a UCTE zone and an IPS/UPS zone connected by two swing buses. This is a more realistic depiction of the Black Sea electrical system.

Splitting the model into two zones has created discrepancies in the exchange amounts between countries. As a result, each country must revise its proposed exchange amounts and send the new data to EKC. EKC will send a new table with proposed exchanges between the countries by December 30. The TSOs will review and comment on what is proposed by January 15, 2009.

To ensure accuracy of the model, EKC reviewed the interconnection lines in each country to determine if they will be active by 2010. Decisions on whether to activate the lines in the model were taken based on their likelihood of being in operation by the end of 2010.

Country by Country Review of the Dynamic National Models

Predrag Miksa of EKC reported on the status of the development of the national dynamic models. The purpose of the dynamic model is to identify solutions to stability problems. The model includes all plants greater than 50 MW that are connected to the 110 kV or higher lines and will address the first 100 seconds following a system disturbance.

The following models have been created: Armenia, Bulgaria, Georgia, Moldova, Romania, Turkey and Ukraine. EKC noted that the Georgian colleagues provided a copy of the Azerbaijan steady state model and as a result, EKC was able to create an Azerbaijan dynamic mode. EKC noted that these models are operational and will be distributed following the meeting. The Russian system has not been completed due to its complexity. At this time, only a portion of the Northern Caucasus system has been modeled.

The dynamic models were developed based on input from the steady state model and data supplied by the TSOs. For those generation plants not contained in the PSS/E library, EKC used manufacturers data found on the internet to create and test each unit one-by-one to ensure their accuracy of response to incidents. Azerbaijan and Ukraine have mixed systems, which incorporate both western and Soviet technologies. For the western technologies, the library of PSS/E was used. For the Soviets units in these and other IPS/UPS systems, EKC relied on manufacturer's data found on the internet to construct the models of each unit. The Romanian and Bulgarian systems have been refurbished using mostly western equipment, which is contained in the PSS/E library. These models are 95% complete.

The national models have not been integrated yet. As a result, the model has not been tested because the Russian model is incomplete. Over the next couple of weeks, EKC will integrate the national models. At that time the first draft of the regional dynamic model will be operational. Then, it will be distributed to the national TSOs for fine tuning and corrections. As a result of relying on manufacturer's data for the units in the IPS/UPS zone, EKC emphasized that some unit data is missing and other data needs to be verified.

EKC requires the use of the Graphical Module Builder (GMB) from Siemens/PTI to most accurately complete the dynamic model of the IPS/UPS networks. Once the GMB based model is created and distributed, the national TSOs will have access to the GMB library through a file created by EKC. Then, they will be able to change the parameters of the units in the GMB file, but they will not be able to create new units without purchasing themselves, the GMB from Siemens/PTI.

With regard to the current draft model, EKC will prepare a questionnaire for the data that is missing or that needs to be fine tuned. EKC will send the questionnaire to Transelectrica, which in its role as project coordinator, will distribute the questionnaire next Friday, December 30, 2008 to the TSOs. The answers to the questionnaire should be sent to EKC by January 15, 2009. Then, EKC will use the corrected and new data to merge the national models into a single

operational draft regional model by January 15. This model will eventually be upgraded when the results of a GMB based model are available.

Results of Survey on TSO Transmission Planning Criteria

Because the two electrical systems in the Black Sea network employ different operational principles, project participants assumed it will be difficult to rank and prioritize candidate projects, because it was also assumed they employed vastly different planning criteria, as well.. In the Tbilisi meeting of the working group, TEIAS volunteered to prepare and distribute a survey identify commonalities and differences in their planning criteria.

Based on the survey responses, Gul Okan of TEIAS presented the findings of a brief report assessing the commonalities and differences in planning practices among the Black Sea TSOs. The principle findings are as follows:

- Black Sea TSOs are responsible for network planning and development plans that must be submitted to national authorities, with the exception of the Russian TSO¹;
- The Black Sea TSOs commonly use one and five year planning horizons, with the exception of the Russian TSO;
- Transmission planning criteria are published in the national grid code, with the exception of Russia;
- All TSOs apply N-1 security planning criteria;
- Most Black Sea TSOs apply some type of economic criteria for planning purposes. Most have not calculated the cost of unsupplied load;
- Planning uncertainties such as new power plant size and location, generator engagement, load prediction and country power balance, are taken into account through multi-scenario analysis;
- National transmission investments are generally planned based on technical requirements and the economic evaluation of technical solutions. Market oriented transmission investments and those investments needed to support regional objectives are not addressed by planning criteria. They generally depend on the national grid codes of each country;

The survey results confirm that planning criteria are consistent throughout the Black Sea electrical system. This enables the Black Sea TSOs to proceed with the development of common planning data; scenarios; analyses and comparison of candidate projects with an understanding that they can be employed with consistency throughout the region. The survey also reveals the need to reinforce the use of financial and economic analysis of candidate projects in a regional context, and to better incorporate market conditions in the planning process.

Discussion on Transmission Economics Workshop

The working group members agreed that economic and financial analysis is a subject in which they are increasingly interested. The working group suggested the following general agenda:

¹ The Russian TSO, System Operator – United Power System, is not responsible for transmission planning. This task falls to the Federal Network Company and its subsidiary regional companies.

Day One: Multilateral Development Bank to discuss the project cycle and the economic and financial evaluation criteria they apply to transmission projects on a national and regional basis

Day Two: Presentation of basic engineering economics, including calculations for internal rate of return; net present value; and project payback periods.

Workshop participation will be limited to engineers currently participating in the Working Group and will be conducted on the margins of a working group meeting.

USEA will submit a draft agenda for review to the Working Group by January 15. Members are requested to provide comments by the end of January. Based on this agenda, USEA and Transelectrica will identify workshop presenters.

Conclusions and Next Steps

Members considered the possibility of conducting a joint SECI and Black Sea meeting. It was agreed that a joint meeting with SECI could be conducted if there was sufficient rationale for doing so. However, as the next SECI meeting is scheduled to be conducted in early 2008, and there is no need for a BSTP meeting at that time, participants suggested that a late spring meeting may be the best time to conduct such a meeting. The specific dates for the next meeting will be determined early in 2009.

The following deadlines were established for project participants:

Steady State Model for 2010 Update

- 30 Dec – EKC will distribute a table with proposed exchange amounts between countries
- 15 Jan – TSOs will review, revise and send their comments

Dynamic Model Construction

- 12 Dec – EKC will send questionnaire for missing data and data clarification to Transelectrica
- 30 Dec – TSOs will submit requested data to EKC
- 15 Jan – EKC will merge national models into regional dynamic model and distribute to TSOs

Transmission Project Financial and Economics Workshop

- 15 Jan – USEA distributes draft agenda submitted TSOs for comment
- 31 Jan – TSOs submit comments on agenda to USEA