Power Grid Interconnection in Northern Europe

Overview

Integration of national electricity systems through adequate infrastructure of interconnections would allow combining hydro, thermal and nuclear generating capacities at the best advantage to strengthen security of supply and contribute to general higher level of competition in the industry.

Liberalizing of electricity markets is on the top agenda of all EU/EEA countries. Reforming into a competitive privately owned industry contributes more effective everyday life of large industrial, small private companies and each separate household. Current synchronized work of TSO coordinated by ENTSO-E in Europe with established wholesale and retail electricity markets emerged new potential possibilities for power interconnections' investments.

Therefore effective integration and liberation of electricity systems would provide decline for price electricity, security of supply, significant environmental and social benefits. It also enables new profit-making opportunities through grid interconnections between electricity markets.

Liberalization of Norwegian electricity market is represented by a complex of market reforms in order to reach competitive public ownership mode (Magnus and Midtun 2000). Norway is the country representing one of the oldest and most well-known regional Nordic electricity markets and relies on rather stable, largely hydro-based system of generation (Meeus and Belmans, 2007). Germany liberalized its market in 1998 in compliance with EU Directive 96/92/EC. But still it experiences market concentration and state interventions for environmental reasons (Mugele et al.2005). The German electricity generation comprises of stations that are thermal plants that use fossil fuel or uranium as a feedstock. Coal currently dominates the German market for electricity generation, accounting for over 40 percent of total generating capacity (Neeser 2010, 2). Taking into consideration different cost structure of power generation systems is a key determining factor that encourages the exchange of electricity between Norway and Germany. These differential cost structures form the basis for profitable electricity trade due to substantial price differential for electricity (Bye and Johnsen, 1995).

Methods

In this research paper using primary and secondary data for cost benefit analysis of the power interconnection project. Constructed model focuses on a business opportunity present for a transmission line in two regions that have different prices of electricity. During day time electricity prices in Germany (thermo) are much higher than those in Norway (hydro) while during night the opposite is true.

To calculate expected profitability of future electricity undersea cable price difference model will be used with calculations based on hourly electricity prices from NordPoolSpot and EEX for period of 2005-2011. Accounting for associated risks included a situation of under-utilisation of distribution capacity, congestion within individual national grids, events that

could have an enormous impact on the revenues and the life of the project such as technical maintenance, unpredicted errors, and three-hours of complete interchange of electricity flow exchange. Further I plan to analyze price effects and other economic and environmental effects of the future power interconnection project.

Expected results

Analysis should result in numerical calculations of profitability of the interconnection cable constructed for cross-border power transfers between areas of different prices and generation sources. Additional focus on modeling effects of increased transmission capacity on the electricity prices in the two markets. Discussion of economic and environmental benefits will be in the final part of the paper.

Based on this type of analysis I will review investment alternatives with focus on HVDC technology for initiating new interconnection projects of energy transmission between countries. As dramatic increase in electricity demand is forecasted in Northeast Asia region substitution of coal for hydroelectricity is a question of high importance in the energy arena. Substitution of coal powered electricity generating facilities by renewable energy source such as hydroelectricity; nuclear power as result reducing emissions of carbon dioxide in Northeast will facilitate region in compliance of Kyoto Protocol commitment. Basic principles of this research are applicable for investing in new transmission opportunities between eastern Russia and Northeast Asia as hydroelectric resources of eastern Russia are very large in contrast to the other countries of Northeast Asia (Streets, 2002).

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