

The European Transmission Conundrum – More Outages Suffered and More Investment Required

An Issue Paper by Simon Allen



For transmission to play its part in a fully liberalised market, significant capital investment will be required to increase interconnector capacity and reduce congestion.

Whilst the summer of 2003 will be remembered for its high temperatures, it has not been a good summer for Europe's electricity customers, with outages occurring across the Continent, but most notably across Italy, Denmark, Sweden, and London. Although the reasons for the outages were due to differing factors, some technical and some to human error, there is a common theme that Europe's electricity transmission infrastructure cannot support the workings of an internal electricity market. For transmission to play its part in a fully liberalised market, a significant expansion and rationalisation of the European electricity transmission network is required. With many European utilities facing a cash crunch, from where will the funding come?

The power and gas markets across Europe are moving slowly but gradually towards full liberalisation. By July 2004 all non-domestic customers within the European Union will be able to choose their supplier. By July 2007 the market will be open for all domestic customers as well. Legal unbundling of transmission is required by July 2004 including separation of transmission ownership from system operation and the legal separation of distribution and supply is required by July 2007.

Although this does not mean that vertically integrated companies will be required to dispose of their transmission businesses, independence and transparency is required and could lead to the spinning off of transmission businesses in those countries where they currently fit within a vertically integrated structure (e.g. Austria, France, Germany, Greece, Ireland, Italy and Portugal). For transmission to play its part in a fully liberalised market, several things will need to occur:

- Increase in transmission and interconnector capacity, which will require;
- Capital to finance the necessary expansion in the transmission network, which in return will require;
- Coherent transmission charging with locational signals and co-ordinated congestion management and system operation.

The high/extra high voltage electricity network across the European Union consists of approximately 100,000km of 380/400kV overhead line and another 110,000km of 220-300kV lines. There is also approximately 4,500km of underground cable at these voltages. There has not been a significant increase in new high/extra high voltage lines over recent years, and although many transmission grid owners have made some sizeable investments in increasing the capacity of existing lines, only around 2,500km of new 380/400kV network has been built over the past 5 years. There has also been a net reduction in the 220-300kV networks over this period, due mainly to the replacement or upgrades of network lines at these voltages.

Originally the transmission grid was developed to ensure reliability rather than to support commerce; however, times are changing. Lack of interconnection capacity hampers market integration, limits the scope for consumer benefits from competition and has serious implications with respect to the security of supply.

The European Commission has set a ten percent minimum interconnection capacity between the Member States by 2005. In fact, six Member States already exceed the minimum including Austria, Belgium, Denmark, Finland, Sweden, and the Netherlands. Germany, France, and Greece are very close to meeting the ten percent minimum. Italy and Portugal are expected to reach the target by 2005. Additional interconnection capacity between France and Spain is one of the conditions established by the European Commission for the approval of the acquisition of a majority stake in Hidrocantabrico by EnBW, in which EdF has a sizeable stake. In the case of Ireland and the UK, it is difficult to see how the ten percent target can be met within the planned timeframe because new interconnections would need sub-sea cables and would only proceed if the projects were externally financed.

Increase/(decrease) in network (km) of EHV and HV network 1997-2001				
	380/400kV	%	220-300kV	%
Austria	108	4.2	-	-
Belgium	-	-	121	31.1
Denmark	61	4.5	69	13.7
Finland	105	2.7	(260)	(10.8)
France	122	0.6	33	0.1
Germany	356	1.9	(1,515)	(7.2)
Greece	517	24.0	343	4.4
Ireland	-	-	100	5.9
Italy	171	1.8	(1,338)	(10.2)
Luxembourg	-	-	-	-
Netherlands	50	2.5	-	-
Portugal	62	5.0	292	11.3
Spain	1,354	9.3	583	3.6
Sweden	109	2.4	213	4.6
UK	75	0.7	-	-
Total	2,518	2.5	(1,099)	(1.0)

The European Commission has also revised its list of 'priority' projects that could receive some EU co-financing. These are:

- ✓ France – Belgium – Netherlands – Germany
- ✓ France – Spain – Portugal
- ✓ Greece – Balkan countries – UCTE system
- ✓ Ireland – Northern Ireland – UK
- ✓ UK – continental Europe
- ✓ Denmark – Germany
- ✓ Borders of Italy with France, Austria and Switzerland

The European Commission has identified more than fifty transmission projects that are needed to ensure the reliability and dependability of electricity networks, the functioning of the internal market, and the connection of renewable energy sources. In addition, another thirty projects are needed with the ten accession countries and non-Member States such as Norway and Switzerland to ensure the reliability and dependability of the electricity grids or supply of electricity within the European Community.

Setting minimum interconnection limits and specifying projects of European interest may help achieve a political target; however, new high/ extra high voltage overhead transmission lines not only require capital investment, but also need approval from local communities and authorities. In the past gaining the proper approvals has posed the biggest challenge, a long drawn out process that has taken up to ten years per project.

In these instances, underground cabling can offer a solution because community support is not required. Therefore, underground cabling can speed up the process; however, transmission companies tend to not be in favour. Transmission companies deem overhead lines more reliable than underground cables and are concerned that the incremental maintenance costs cannot be recovered from customers. Transmission companies also worry about the "knock-on effect" that all local communities and authorities will want "their" network put underground.

How much more investment is required?

The net book value of transmission in the EU is about €40 billion. Given the renewed focus on interconnection and new investment in addition to retrofits, it would not be surprising to see this amount rise by €10-20 billion over the next decade, even taking siting challenges into account. This is a large increase in capital allocated to this segment of the power industry.

Standard & Poor's Assessment of European Utilities		
Year	Upgrades	Downgrades
2002	5	14
2001	5	17
2000	3	12
1999	2	17

Utilities were once the paragon of investment safety, but a combination of increased competition in domestic markets, risky overseas investments, and higher debt leverage have led to a series of downgrades by credit agencies which restrict the ability of some vertically integrated utilities to fund transmission investments from traditional sources. Over the last four years, the number of downgrades in the European utilities sector made by Standard & Poor's has exceeded the number of upgrades (see table).

Stand-alone transmission companies have fared somewhat better. Of the seven European power companies with an AA rating from Standard & Poor's, six are stand-alone transmission companies (i.e. Eltra, Elkraft, Fingrid, Red Electrica, Statnett, and Scottish Hydro Transmission). This is a positive development for raising capital, since these companies have a clear focus on transmission, regulated rates, and separation from other potentially volatile segments of the industry. It could also lead to a greater degree of transmission unbundling by the vertically integrated utilities including the spin-off and refinancing of ring-fenced regulated activities.

For the public quoted companies, equity has been unattractive over the last couple of years due to falling share prices and the unavailability of public equity markets for around half of Europe's transmission companies because they are state owned enterprises. Bank financing has also become more difficult to secure due to the high debt levels of many of the leading utilities following the acquisition sprees from 2000-2002. Given the shortage of financial options for utilities, there is likely to be a gap in capital available for transmission investment. So, how will these investments be financed? Not surprisingly, discrete asset projects will tend to use project-financing techniques, while projects involving new assets that are integral to the existing asset base will primarily use corporate finance. In the future, some new sources of capital will be directed at transmission. For example:

- U.S Transmission-only companies, such as Trans-Elect and TransLink, may enter the European market and serve as project developers for new merchant lines, managers and investors;
- Engineering and construction firms, such as Bechtel and ABB, may seek project-related contracts in exchange for their capital commitments; and
- Private Equity investors seeking stable cash flows are showing a greater appetite for the utility sector (e.g., the sale of Iberdrola's HV network to CVC Capital Partners and the bidders for Northumbrian Water were all private equity or venture capital firms).

Congestion management and coherent cross-border charging are two key areas that need to be resolved before the finances required to develop the European transmission network are made available. The effects of congestion, as well as other factors such as market power and fuel mix of power plants, lead to the continuance of price differentials between Member States and regional power markets with prices varying between €20/MWh and €50/MWh.

Congestion is a common phenomenon in the European electricity market, with only seven of the twenty-four interconnectors between two EU Member States seldom or never congested. Although market-based methods, such as auctioning of capacity and market splitting are used on half of the interconnectors, those with the highest economic value, such as the borders of France and Switzerland with Italy and the border of France with Spain, do not have market-based methods in place. This will need to change if the internal market is to develop.

Europe's transmission system operators (ETSO), national electricity regulators (CEER), the industry association (Eurelectric), traders, consumers and the European Commission have been trying to reach agreement on a coherent system for cross border trade for some time and the current charge of €0.5/MWh will soon disappear with a replacement scheme still under debate.

Previous studies have already identified congestion hotspots and the necessary efforts that are needed to reduce congestion across key interconnectors. The costs of congestion are understood; nevertheless, the benefits of new transmission must be similarly embraced. Appropriate long-term locational signals should encourage the development of new interconnection capacity up a level where the marginal costs are set equal to the marginal benefits. Just as too little interconnection capacity is bad, too much would be costly and inefficient.

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