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WHAT PLACE FOR COMPETITION TO DEVELOP THE POWER TRANSMISSION NETWORK?

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I. Overview

Economists debate about competition for the development of transmission network as an alternative to the regulation of transmission network monopoly. Even if the theory eventually seems to conclude that transmission widely remains a natural monopoly, some experiences of competition for transmission investments in the USA, Australia, or Argentine results in contradictory conclusions.

The heterogeneity of the models and the experiences of competitive network development for the independent network expansions question the specific conditions of efficiency of the competitive transmission market for these investments. In this paper, we aim at answer the question: what are the conditions (if they are some) required for the competitive development of these independent transmission expansion investments to be efficient?

II. Method

Experiences of competition for transmission investments must be divided in two groups: on the one hand, transmission investments (so called merchant line in this case) are assumed to be market driven as are the other competitive activities that a price signal coordinates in a nodal energy market; on the other hand the network must stay centralised and transmission ownership remains a monopoly, but the development, ownership and maintenance of new assets is allocated by an ex ante competition similar to "Demsetz (1968) competition" in order to put competitive pressure on the cost of network assets.

For each kind of competition, we analyse the hypotheses on which they ground thanks to a survey of the network revenue and of the network cost structure. Thanks to the same criteria, we also analyse the heterogeneity of the practices of competitive power transmission network investment. Besides we confront the theoretical views to the practical experiences.

III. Results

In part I, we will first show that the feasibility of transmission market is grounded on the network cost structure (that is to say the extent of economies of scale and of lumpiness) and on the difficulty to internalise some remaining externalities in a nodal energy market and in transmission rights. Transmission market is possible as soon as economies of scale and lumpiness in transmission investments are neglected (Bushnell-Stoft (1997) and Hogan (2003)) thanks to a framework of tradable transmission property rights (Hogan (1992)), but leads to inefficient transmission capacity (Pérez-Arriaga et al. (1995), Joskow-Tirole (2005)) otherwise. Besides, FTRs and the energy market do not internalise all the power transmission network externalities (Bushnell-Stoft (1997), Lesieutre-Hiskens (2005), Stoft (2002)). It allows free-riding that may then over- or under-incentivise the merchant line investors.

In part II, we see that a merchant line can be a relevant solution when the conventional network investments in Alternative Current (AC) are technically and economically expensive. The merchant lines are then generally Direct Current (DC) lines. These lines are dispatchable and so make the merchant line investors similar to traders rather than common transmission owners. Besides, economies of scale and lumpiness in transmission investment are relative to the size of the markets connected (Joskow (2005)). It explains for a part the heterogeneity of experiences of merchant lines. Lastly, the difference in nodal prices on both sides of the merchant line must be sustainably high to ensure a sufficient rent to the merchant investor. We see two conditions in which the differences in nodal prices stay sustainably high.

In part III, we show that even if the Argentine experience of Demsetz (1968) competition can put a competitive pressure on the network investment cost (Littlechild (2004)), its transposition seems however difficult in a meshed network: the same reasons of interdependences between the network elements and of continuing activities of upgrading between maintenance and investment (Joskow-Tirole (2005)) also apply on this kind of competitive network development. Nonetheless, Demsetz competition can be interesting for radial network assets, as it is proposed in the last law of French energy orientations (Loi 2005-781).

IV. Conclusion

In brief, transmission market can only be introduced in niches of transmission investments, preferably DC ones under specific requirements about cost structures of investments compared to the size of linked markets and the sustainability of the difference in locational prices on both sides of the merchant line.

Demsetz competition as an alternative to monopoly regulation for transmission infrastructures can only be envisioned for radial assets.

Eventually, in the absence of appropriated property rights and methods to allocate the network cost, the competitive network investments are generally radial and/or create new commercial links between big markets. Competition to develop the network remains limited to where the inefficiencies due to economies of scale, lumpiness and externalities of transmission investments are small enough.

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Short CV of the author

Vincent RIOUS holds a degree (master's level) in engineering from the Ecole Supérieure d'Electricité (Supélec), a leading Engineering school in information technologies and energy and a MSc in Economics, Management of Information and Networks with distinction from University Paris XI. Since October 2004, Vincent Rious has been working as a PhD student under the supervision of Prof. Jean-Michel Glachant (dissertation: "Coordinated power transmission networks investments in an interconnected system") and under a joint agreement between the French TSO RTE, University Paris XI and Supélec. His research interests are in Networks Economics and Market and Regulatory Designs.

The opinions expressed here are the sole responsibility of the author.