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Abstract

Long-term transmission rights promotes competition, fosters investment of new entrants facilitating, in this way, the efficient renewable deployment across the EU member states, and helps the efficient use of interconnectors. However, EU regulations only require long-term transmission rights of up to one-year term. The lack of longer term transmission rights appears to be inconsistent with the twin EU goals of electricity markets integration and ambitious renewable target. Other countries experiences show that longer term transmission rights are viable and proved to be important for promoting investment efficiency and market competition. In addition, longer term financial transmission rights provides information about the need of interconnection investment.

Keywords

Long-term transmission rights; competition; renewable; forward markets

1. Introduction

The EU energy transition and the ambitious renewable targets for reducing emissions will make market integration and cross-border electricity transfers even more important. The Reports of the Expert Group on Interconnection Targets, in particular the first and fourth reports, show that large cross-border transmission investment will be needed to accommodate the deployment of low carbon generation. In liberalized and integrated markets, the investment on green generation must be supported by forward electricity and transmission markets. However, the maximum term of EU cross-border transmission rights is only of one year.

Such short long-term transmission rights interferes with the appropriate working of the forward electricity markets. Forward energy markets cover transactions taking place from about four years up to one month before delivery. In such markets, parties make bilateral deals on standardized products. The negotiated energy prices are denominated per bidding zone which, in most cases, overlap with national borders. If a party wants to hedge prices across bidding zones, long-term cross-zonal transmission rights need to be acquired separately. But, such party can only find hedging tools for one year. Therefore, a party in a EU market wishing to hedge prices of the electricity generated by a new green investment across bidding zones is likely to give up such investment due to lack of hedging options. This lack of long-term transmission rights is inconsistent with the goal of a EU single electricity market and with any ambitious renewable targets. EFET (2018) welcomes the allocation by TSOs of multi-annual products, two-year and three-year forward, since this will provide market participants with better options for long-term cross-border hedging. Notice that the EU regulations do not exclude longer term arrangements, but the terms required on the regulations are one-year or less:

> "Capacity calculation time frames. All TSOs in each capacity calculation region shall ensure that long-term cross-zonal capacity is calculated for each forward capacity allocation and at least on annual and monthly time frames." FCA(2016)
>
> "Long-term capacity calculation for the year and month ahead market time frames should be coordinated by the transmission system operators (hereinafter 'TSOs') at least at regional level to ensure that capacity calculation is reliable and that optimal capacity is made available to the market." ACER (2017)

The purpose of this paper is to explore the benefits and some other issues associated with long-term transmission rights in the EU. We conclude that the requirement of longer term transmission rights needs to be explored. The remainder of the note is organized as follows. Section 2 explores the mechanisms through which long-term transmission rights promote innovative and green investment. Section 3 analyzes the regulations and the risks supported by the Transmission System Operators (TSOs) issuing long-term transmission rights. Section 4 describes other experiences. Section 5 concludes.

2. Long-term transmission rights and innovative and green investment

In September 2020, the EU Commission proposed to raise the 2030 greenhouse gas emission reduction target to at least 55% compared to1990 emissions. In April 2021, a preliminary agreement between the European Parliament and the Commission supported such emission reduction goal. The Renewable Energy Directive 2018/2001/EU sets a new binding renewable target for the EU for 2030 of at least 32% . Although new targets for renewable participation are pending, in the public consultation process that ended in February 2021, all groups indicated a preference for an increased RES target between 37% and 43%. Efficient and cheap

renewable electricity is likely to be available at locations very different from where generation capacity exists nowadays, creating new demands on the transmission system.

Oxera (2003) estimates that around 80% of the benefits of locational price signals result from the long-term effect of plant siting, while only 20% comes from the short-term operational optimization of existing plants. Even though a wide spread of renewable locations might increase congestion on the transmission system and displace existing generators, the overall result is efficient and, under sensible market arrangements, beneficial to all. Since electricity from renewable resources will be unevenly distributed across countries, country markets will have to be reliably linked by cross-border transmission lines. increasing efficient renewable electricity deployment demands more interconnections and their efficient and optimized use.

This will, first, require more interconnections. The networks will have to ensure the efficient integration of renewables. The Expert Group on Interconnection Targets Report (2017) considers that the interconnection levels should be measured based on two formulas. One is the ratio of the nominal transmission capacity to the peak-load, which has to do with demand conditions. The other represents the supply-side as measured by the ratio of the nominal transmission capacity to the installed renewable generation capacity. The Report guidelines to increase interconnection are the following:

- Countries below the threshold of 30% on any of the two formulas should urgently investigate options of further interconnectors and report annually the results of such investigation to the High Level Regional Groups and the Infrastructure Forum.
- Any project, helping the Member States reach the 30% threshold must apply for inclusion in the TYNDP and future PCI lists.
- The countries above the 30% but below 60% thresholds on any of the two formulas are requested to investigate possible projects of further interconnectors regularly. Such projects should consider applying for inclusion in the TYNDP and a future PCI lists.

In second place, it will also require the efficient use of the interconnections. Having a new interconnection infrastructure is necessary for integrating renewable electricity, but it is not sufficient. Long-term transmission rights for cross-border transmission facilitates the efficient integration of renewables across national boundaries. It allows generators and load customers to enter into long-term supply contracts, just as generators and load customers contract with each other in competitive electricity markets. Transmission rights are a natural, an indispensable, complement to electricity contracts across borders. Transmission rights between two pricing zones allow moving electricity across the zones and hedging price risk differences. Notice that long term transmission rights guarantee the difference between the market prices of the exporting and importing country. This is relevant for both generators selling electricity through PPAs and those willing to sell the electricity directly to markets. If a generator in a country B has a PPA with a company from a country A with the commitment to sell a certain quantity of electricity at a fixed price, when the generator cannot export to country A due to congestion, the generator needs to buy electricity in the market of country A and sell its own electricity in market B. Therefore, whatever the price of the PPA, the generator must support the price difference between the two countries. Transmission rights eliminate or at least mitigate such losses. Similar, costs has to support the generator that decides to export the electricity and cannot do it due to lack of interconnection capacity. Moreover, the trading of long-term transmission rights helps to manage the risks of entering into long-term arrangements, as circumstances change and the parties may need to rebalance their portfolio of contracts.

Third, long-term transmission rights promotes efficient investment decisions. Petropoulos and Willems (2020) show, in a simplified model, that network access on a short-term competitive basis distorts investment decisions, as the incumbent preempts the entrant by

investing early, while long-term tradable transmission rights restore investment efficiency by allowing the entrant to invest. These results help to understand the impact of the absence of long-term transmission agreements, as it reduces competition, promotes inefficient investments by the incumbent firms and precludes the new entrants from making efficient investment decisions. While their model locates the incumbent and new entrant in the same country, it can be easily extended to cover the case in which they are in different countries, when the incumbent does not need to buy transmission rights but the entrant has to.

Consider two EU countries, A and B, with limited interconnection. Country A does not have renewable energy and Country B has lots of renewable investment opportunities. Prices on Country A ***(Pa)*** are higher than prices in country B ***(Pb).*** One entrant firm in country B is evaluating an investment on renewable generation to provide electricity to a market in country A. The marginal and average costs of the renewable generation are respectively *M* and *R*, both of them smaller than ***Pa.*** But *R* > *Pb*. The entrant will invest only if exporting electricity to country A is economically viable or, equivalently, if long term transmission rights are available. In country A, an incumbent generator does not have the option to invest in renewables, but he has the option of "*brown electricity investment*" with marginal cost larger than ***Pa.*** T. Notice that the entrant is more efficient in terms of costs and emissions, but its ability to compete depends on the availability of transmission rights.

In this context, the consequences of not having long-term transmission rights are the following. First, the entrant firm from country B has to make its investment decision without knowing with certainty whether it will be able to export to country B. Moreover, if the entrant makes the investment and congestion occurs, the entrant will suffer a loss. Consequently, the entrant does not have the incentive to undertake the investment. In addition, the incumbent will be inclined to undertake the *brown electricity investment* because such decision will increase the market price in country A and, due to the lack of long term transmission rights, competition from country B is deterred.

Long-term transmissions rights guarantee the entrant to be paid the market price in A as soon as his offer price is below ***Pa***. In other words, the new entrant investment decision would be undertaken with the certainty that it would be paid the price of country A even if congestion occurs. Therefore, in such a case, the incumbent and the entrant compete in advance and the more efficient investment will prevail. Since the marginal cost of the new renewable investment in country B is lower than the marginal cost of the new brown investment in country A, the renewable investment will take place.

In a nutshell, as renewable investment costs are unevenly distributed across the EU (think of wind in the North and sun in the South), new interconnexions are needed, and long-term transmissions rights should be available in order to mitigate the long-term risks of efficient and renewable investment. The Florence Forum that designed the Target Model proposed that available forecasted transmission capacity should be sold for the next four years. In fact, it mentioned as indicative percentages the 10% of forecasted transmission capacity for Y+3 (the third next year), 20% for Y+2 and 40% for Y+1. However, transmission rights with a time-frame longer than a year are not available and nor required by the EU regulations.

3. The Regulations and the risks associated to long-term transmission rights

Commission Regulation (EU) 2016/1719 of 26 September 2016 establishes guidelines on forward capacity allocation (the FCA (2016)). Chapter 8 laid down a range of requirements concerning costs and cost recovery of establishing capacity calculation mechanisms, the single allocation platform and particularly rules for ensuring firmness and remuneration of long-term transmission rights. Relevant mandates for this analysis are the following:

- Article 3. This regulation aims promoting effective long-term cross-zonal trade with long-term cross-zonal hedging opportunities for market participants.
- Article 9. All TSOs in each capacity calculation region shall ensure that long-term cross-zonal capacity is calculated for each forward capacity allocation and at least on annual and monthly time frames.
- Article 61(1). The cost of ensuring firmness (including the cost of re-dispatching, countertrading and imbalance associated with compensating market participants) shall be borne by TSOs. Therefore, whichever specific methodology is used for calculating de costs associate with firmness, the mandate is that the whole cost is supported by TSO.
- The FCA Regulation requires that all transmission system operators ('TSOs') jointly develop a methodology for sharing costs incurred to ensure firmness and remuneration and submit it to all regulatory authorities for approval. However, the Regulation (EU) 2019/942 of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators (ACER) requires that all proposals that need the approval of all regulatory authorities must be submitted to ACER for revision and approval. Such approval took place by ACER decision date on December 23, 2020.

The current regulation of guaranteeing firmness may provoke a conflict of interest between TSOs and their customers: TSOs may have poor incentives to increase the term of transmission rights over one year, while generators and consumers are willing to hedge their electricity prices. Customers should ideally be provided with the range of rights that maximizes their economic value, less the cost to the TSO of providing them. The cost to the TSO lies in the higher risk of selling longer term rights. But the customers will seek to avoid paying for any increase in risk to the TSO, and the TSO will seek to minimize risk by reducing the amount and duration of the capacity obligations unless it has assurances from its regulator that it can recover any shortfall. In addition, the cost of ensuring firmness of transmission rights increases with the length of the transmission rights. This is because simulations of the electricity market and the corresponding flows through the network and across borders become more uncertain as the terms increase. Demand evolution, generation changes and climate changes requirements may make difficult for TSO to ensure firmness in long-term contracts when TSO face the costs of firmness failure. Such increasing risks could make TSOs reluctant to increase the long term transmission rights above one year.

However, although TSOs should prepare a proposal on methodology, the final decision on what products to offer and how to allocate the costs corresponds to regulators. ACER (2020) considers that the proposal prepared by TSOs meet the requirements of the FCA Regulation, but provides some amendments. Transmission rights over one year are not included.

- Integrating national energy markets into a single European-wide market. An integrated electricity market allows electricity to move freely across borders and delivers benefits to generators (bigger market), operators (reducing the costs of balancing, reserves and system operation) and citizens (who have access to competitive markets and more secure supply).
- Maximizing the interconnection capacity made available to the market for trading, so that consumers can choose from the cheapest and lowest generating power available across Europe.

ACER, with the relevant stakeholders, should promote a deep-dive on the role of long-term transmission rights over one year on enhancing these routes. Such analysis will allow an efficient trade-off between offering new hedging mechanisms that likely accelerate renewable deployment and the risks of the electrical systems associated with these products.

4. Other experiences

Kristiansen (2004) documents other countries with liberalized markets that offer hedging tools with terms longer than one year. The PJM Regional Transmission Organization and the New York Independent System Operator were among the first US markets that adopted FTRs as an alternative to physical transmission rights. California adopted an FTR scheme in 2000, followed by ERCOT, ISO-New England, and the Midwest ISO (MISO) in early to mid-2000s. FTRs were also introduced in New Zealand. It should be stressed that the USA markets are quite different to those of the EU. In particular, USA lacks a mechanism for automatic market coupling in the intraday and day-ahead markets. However, their experiences for hedging the price risk across different bidding zones are still valuable for the EU.

FTC (2005) encourages FERC to promote instruments that reduce long-term transmission risks in all areas in order to promote competitive wholesale electricity markets. Moreover, FTC defends that efficient generation entry would be more probable by coupling long-term FTR with policies to promote efficient transmission investment. The FERC (2006) Order No. 681 specifies that long-term firm transmission rights must be made available for terms of ten years or longer. However, the order allows for regional flexibility in the approach grid operators take regarding the allocation of long-term firm transmission rights. The FERC's order was implemented differently by each transmission organization. According to NERA (2013) the terms of FTR are as follows:

- PJM: Annual or three-year FTRs.
- New York: Monthly, 6 month, 1-year FTRs. Also, 2-year fixed price FTRs renewable up to 10 years. Longer term FTRs awarded for merchant transmission capacity.
- California: Monthly, 6-month, and 10-year FTRs. Long-term FTRs for merchant investors, for the useful life of the facility up to a 30-year duration.
- Texas/ERCOT: 1-month FTR strips for two off-peak and two-peak segments, up to 2 years out.
- New England: Monthly or yearly FTRs.
- MISO: Seasonal and monthly FTR

FTRs are normally structured as an obligation, meaning that the FTR payment to the FTR holder can be either positive or negative. FTRs are sometimes alternatively configured as "options". An FTR option eliminates the downside risk of the obligation by constraining the economic value of the FTR to zero in scenarios where the obligation would exhibit a negative value. Most regional US organizations only offer the obligation-type FTRs, while a few regions offer both FTR obligations and options. All FTRs are firm, i.e., the FTR holder has a contract for a fixed MW amount; this is not dependent on actual patterns of flow or congestion in a particular hour and is not subject to scaling.

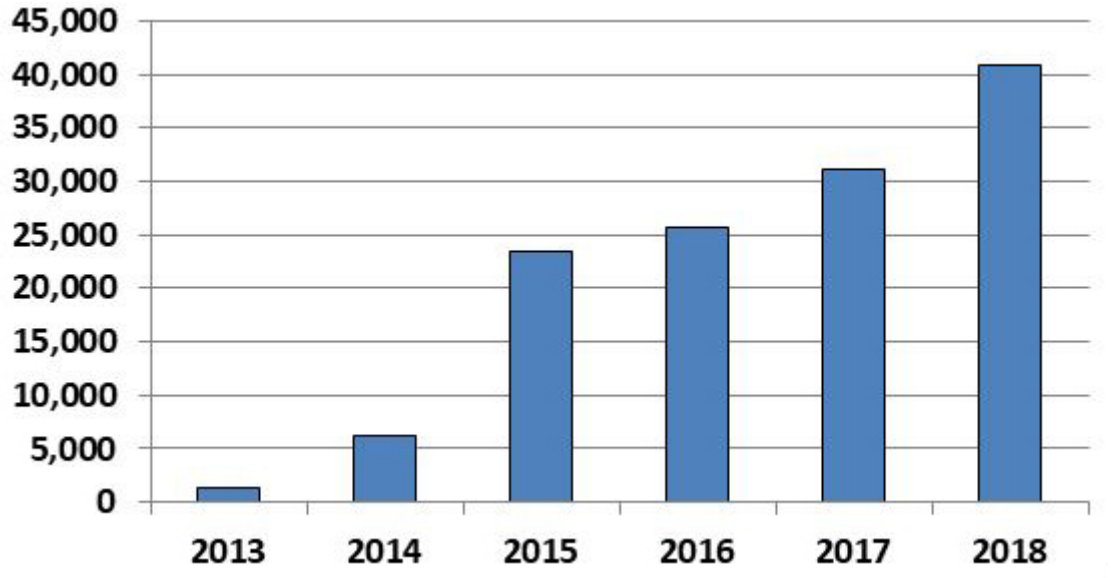
Two relevant remarks in NERA (2013) are worth underscoring. First, the expected revenues from FTRs, the congestion component of nodal price differences across the FTR path are rarely sufficient to justify merchant investment. In other words, the nodal price differentials between two zones do not fully reflect the value of additional transmission investment. Second, the consensus from the experience of FTRs in the US energy industry is that FTRs have worked well as a hedging mechanism for congestion costs, which has facilitated bilateral contracting among market participants.

New Zealand's first auction of financial transmission rights took place on 2013 with the purpose of promoting competition in the retail market for the long-term benefit of consumers. The term of FTRs was progressively increased until it reached 24 months of forward-looking.

Graphic 1 shows the amount of transmission volume covered by FTRs each year since this market was launched in 2013 until 2018.

GRAPHIC 1

Volume of FTRs covered - (GWh)



Source: NZ Electricity Authority
https://www.ea.govt.nz/about-us/media-and-publications/market-commentary/market-insights/financial-transmission-rights-successful-product-for-managing-risk/

The number of participants has increased. Initially FTRs were demanded by generators, large industrial users and retailers. Now traders are increasingly using FTRs to support liquidity in markets. According to the NZ Electricity authority, development of this financial risk management tool is helping the wholesale market mature.

5. Final Remarks

First, the EU does not offer long term transmission rights with terms longer than one year. Although the EU regulations do not explicitly exclude longer terms, they only require up to one-year term.

Second, long-term transmission rights promote competition, facilitate useful renewable deployment across the member states and the efficient use of interconnectors. Therefore, the lack of longer term transmission rights is not consistent with two EU goals: the integration of EU electricity markets and the ambitious target of renewable deployment.

Third, other experiences show that longer term transmission rights are viable and key for promoting efficient investment and market competition. Moreover, long-term financial transmission rights provide information about the demand of transmission services that can be used as an indicator of the needs for new interconnections.

Fourth, costs and risk associated with long-term transmissions rights are mostly supported by transmission system operators. According to EU regulations, transmission system operators are the organizations in charge of calculating the amount of transmission rights for

each term and selling them. In so doing, transmission system operators must use a well-defined regulated methodology to calculate transmission capacity, support all the costs associated with transmission rights and return the benefits from selling transmission rights to the consumers.

To conclude, it seems advisable to offer longer term transmission rights across the EU in order to ensure market integration, competition and efficient renewable deployment. However, longer terms may imply additional risks that should be analyzed, evaluated and properly mitigated. This suggests reviewing the regulations to ensure that risks, costs and benefits are balanced and provide the right incentives to market participants. The contribution of longer term transmission rights to the integration of the EU electricity markets with huge renewable deployments deserves further thoughts.

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