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MEMO

Our ref. ECIBPEN/4NT/0364475/000/02

Project STUDY ON THE BENEFITS OF ADDITIONAL ELECTRICITY INTERCONNECTIONS BETWEEN IBERIAN PENINSULA AND REST OF EUROPE

Date 2016/01/13

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SUBJECT Additional comments – Final Report

Tractebel thanks RTE for their comments and we took them into consideration for the revision of this report, when appropriate. In addition to the report, Tractebel would like to give additional details on three specific points:

1. Assumptions used in this study for the cost of fuel and the cost of CO2 emissions in 2030 are the ones used by ENTSO-E in the TYNDP. However, the efficiencies of power plants are not detailed in the TYNDP. For the TYNDP 2016, only ranges are given for these efficiencies. According to assumptions publicly available for the TYNDP 2016, merit order of lignite and gas are in the same range: if we consider CO2 emissions of 101.2 t/TJ for lignite and 56.1 t/TJ for gas (default IPCC values), the range of cost generation from lignite goes from 68.7 €/MWh (efficiency of 46%) to 105.3 €/MWh (efficiency of 30%) while the range of cost generation from gas goes from 68.9 €/MWh (efficiency of 60%) to 165.4 €/MWh (efficiency of 25%). The efficiency merit order of gas and lignite is thus not obvious: absolute costs are in the same range. Therefore, the power flow from German lignite plants to Spain can be very sensitive to the assumption made on the efficiency of lignite and gas plants, as well as the substitution effect between gas and lignite generation when the interconnection capacity of Spain increases. However, this phenomenon has a negligible impact on the SEW (because absolute costs are very close) and, thus, on the NPV computation.

2. Load curtailment can occur, but only in extreme scenarios with a very small probability of occurrence. Indeed, the LOLE is very low, less than 2 hours/year, and is observed only in the reference scenario (corresponding to the TYNDP2014 case without Britib). This number of 2 hours/year must be compared to the adequacy criterion required by Belgian and French laws: these countries require a LOLE lower than 3 hours/year. This number of 2 hours/year can thus be seen as an acceptable level of risk for European countries. Such a number seems therefore very realistic. Loss of load occurs in Spain, mainly in Fall/Winter (e.g. December), for situations with a low wind generation, no solar and many failures of thermal units. LOLE is computed with the same model as the one used for market simulation, i.e. no detailed representation of internal grids. Because the LOLE is very low, the probability to observe no load shedding during a simulation of one year is very high. Therefore, numerous simulations are needed to observe load shedding and to estimate the LOLE with a sufficient statistical accuracy. This phenomenon is clearly shown in the ELIA report "Étude relative à la sécurité d'approvisionnement pour la Belgique – Besoin de reserve stratégique pour l'hiver 2016-2017" in figure 70 (page 61): even if the LOLE is 6 hours/year, 80% of 1-year simulations do not reveal any loss of load. It is thus very likely to see no loss of load on only a few runs.

3. The assumption used by Tractebel for the Transmission Reliability Margin (TRM) seems in line with what is done in the TYNDP: no dependency of the TRM on the exchange capacity seems to be considered. Tractebel agrees that the TRM could evolve in the future, but the evaluation of the TRM is complex, with no standardized approach. According to the document "Procedures for cross-border transmission capacity assessments" of ETSO (October 2001), the TRM must cover "unintended deviations due to power-frequency (secondary) control and frequency (primary) control, needs for common reserve and emergency exchanges". It is stated that the assumption that the load-frequency control margin "is independent of the volume of programmed exchanges seems to be reasonable because these deviations are rather dependent on the 'quality' of the spinning reserve acting for load frequency control in each control area considered". In other words, it is not especially the increase of the transfer capacity that could lead to an increase of the TRM, but more a degradation of the quality of the spinning reserve (and the size of the largest unit can also impact the TRM). This phenomenon is difficult to quantify and, to the best of TE's knowledge, no prospective public study currently exist on the future evolution of TRM. Nevertheless, a heuristic formula used by some TSOs (e.g. Amprion) states that the TRM should be the product of the square-root of the number of interconnections by 100 MW ($TRM=\sqrt{n}\times 100$ MW where n is the number of interconnections). The application of this formula would lead to a TRM of 280 MW for Transmission Scenario 0, 350 MW for Transmission Scenario 1, 390 MW for Transmission Scenario 2 and 420 MW for Transmission Scenario 3. The increase is very low compared to the increase of the TTC.