ELECTRICITY AND GAS INTERCONNECTIONS IN FRANCE

GENERAL OVERVIEW

France is now extensively connected with neighbouring countries, both as regards gas and electricity. A number of interconnection projects have been implemented over recent years (Baixas Santa-Llogaia with Spain in 2015, entry capacities to the gas network from Switzerland in 2018). while three electrical interconnection projects are under construction (Savoie-Piémont with Italy, ElecLink and IFA2 with Great Britain), and the Biscay Gulf project with Spain was approved in 2017. In spite of a significant decrease in the net balance of exchanges in 2016 and 2017, France remains an electrical exporter and has a diversified gas supply.

As the European Union is in the process of adopting a new legislative package entitled "Clean Energy for all Europeans", the completion of the single European market is in line with the implementation of the third legislative package adopted in 2009. The integration process that started more than twenty years ago with the initial directives opening up to competition has enabled a pan-european market to be built, which will provide greater efficiency in the management of supply systems for gas and electricity. The CRE was a pioneer in implementing the domestic energy market. For example, it organised the first electricity market coupling with Belgium and The Netherlands in 2007 and has driven the development of the Flow Based method since 2015 with Germany and the Benelux countries (CWE region). France was one of the first continental European countries to implement entry-exit zones for its gas market. Today, it remains fully involved, with its fellow regulators, in drafting and implementing European rules.

1. The development of gas and electricity interconnections has continued since 2016

With regard to electricity, the commissioning of the Baixas Santa-Llogaia interconnection in 2015 and of the Arkale phase-shifting transformer in June 2017 have almost doubled the exchange capacities with Spain. The commercial exchange capacities between France and its neighbours (excluding Belgium and Germany[1]) which amounted to 8.4 GW on export and 4.9 GW on import before the commissioning of the Baixas Santa-Llogaia line, reached 9.8 GW on export and 6.2 GW on import in 2017.

Three additional interconnection projects are currently under construction:

- The Savoie-Piémont project, which represents an increase in capacities of 1,200 MW with Italy, should be commissioned in 2019.
- Work on the ElecLink project, approved by the CRE in 2014, started in February 2017: this project will increase exchange capacities with Great Britain by 1,000 MW.
- Lastly, the CRE approved the IFA2 project in February 2017, which also plans to increase interconnection capacities by 1,000 MW with Great Britain and for which construction started in January 2018.

The CRE furthermore concluded an agreement with the Spanish regulator in September 2017 on the cross-border allocation of the Biscay gulf interconnection costs. This 2,000 MW project connecting the Gironde to the Spanish Basque region via the Atlantic Ocean has received significant financial support from Europe. Projects of reinforcements of the existing interconnections with Switzerland, Belgium and Germany are currently also under study.

The French gas network is currently well integrated into the European network: by the end of 2017, France had 3,585 GWh/d of entry capacity and 658 GWh/d of exit capacity, i.e. about twice as much as in 2005. The 100 GWh/d entry capacity from Switzerland at the Oltingue IP, approved in 2014 by the CRE, was commissioned in June 2018.

The merger of the *PEG Nord* and TRS zones, requiring completion of the Val de Saône (strengthening of the Burgundy artery) and Gascogne-Midi projects will be implemented on 1st November 2018.

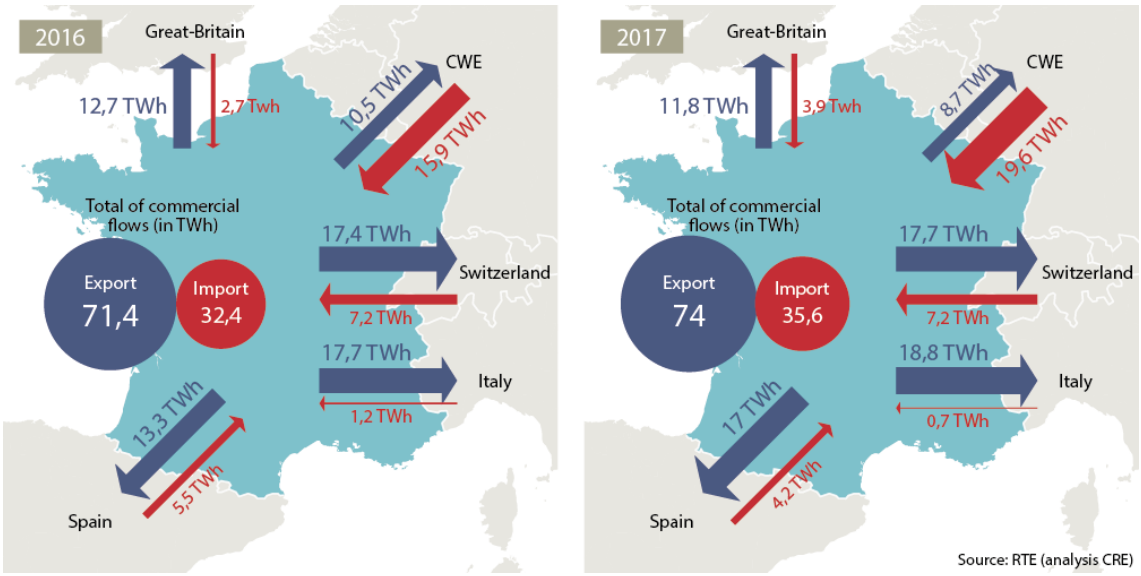
2. Overview of the use of interconnections

2.1. Electricity interconnections

The balance of electricity exchanges for France underwent a strong decline in 2016 and 2017 (ending up at around 39 TWh, see the maps below) without at the same time reaching the 2009 level. (24.6 TWh). This change was due both to a decrease in exports (from 91 TWh in 2015 to 74 TWh in 2017) and a slight increase in imports (of the order of 30 TWh in 2015, and 35 TWh in 2017). France however maintains a net positive export balance with all neighbouring countries with the exception of the CWE (*Central West Europe*) region.

[1] From the implementation of the *Flow Based* system in May 2015, the exchange capacities in the CWE (*Central Western Europe*) region are no longer determined ex-ante by border (France-Belgium on the one hand and France-Germany on the other), but for all exchanges in the region, taking into account the interdependence of flows between borders

Figure 1 – Electricity commercial flows at the French borders in 2016 and 2017



This result is linked to the tensions to which the French electrical system was subjected during the winter of 2016/2017. The temporary unavailability of part of the French nuclear plants, combined with temperatures well below the average for the season, adversely affected the price of electricity in France (with a spot price that reached a maximum of €874/MWh on 7 November 2016 at 18:00) and changed the structure of the exchanges usually observed (France was a net importer in December 2016 (-0.1 TWh) and January 2017 (-0.9 TWh), which hadn't happened since 2012).

The spot price spreads between France and neighbouring bidding zones lowered at all borders since 2015, except for Germany (for which the price spread with France went from €7.5/MWh[2] in 2015 to €10.9/MWh in 2017). This trend was particularly marked with Spain (the price spread went from €14.8/MWh to €10.2/MWh in two years), thanks to the commissioning of the new interconnection (the price convergence rate had furthermore significantly increased, going from 13% in 2015 to 25% in 2017).

The results of the implementation of the Flow Based capacity calculation within the CWE region (in May 2015) is more mitigated. Although it resulted in a significant increase in the maximum exchanges between the bidding zones of the region, it appears that the average cross-border exchanges had a tendency to lower relatively to their previous level. Moreover, the terms and conditions of the methodology's implementation (in particular regarding the critical branches) resulted in frequent limitations in the capacity domain offered to the market. The regulators of the CWE region asked the TSOs to apply a number of measures at the start of 2018 in order to improve the situation.

In other regions, in application of the regulations on capacity allocation and congestion management (CACM), the system operators are working on implementing coordinated capacity calculation methodologies. The CRE monitor this process to ensure that these allow effective optimisation of the existing interconnection capacities.

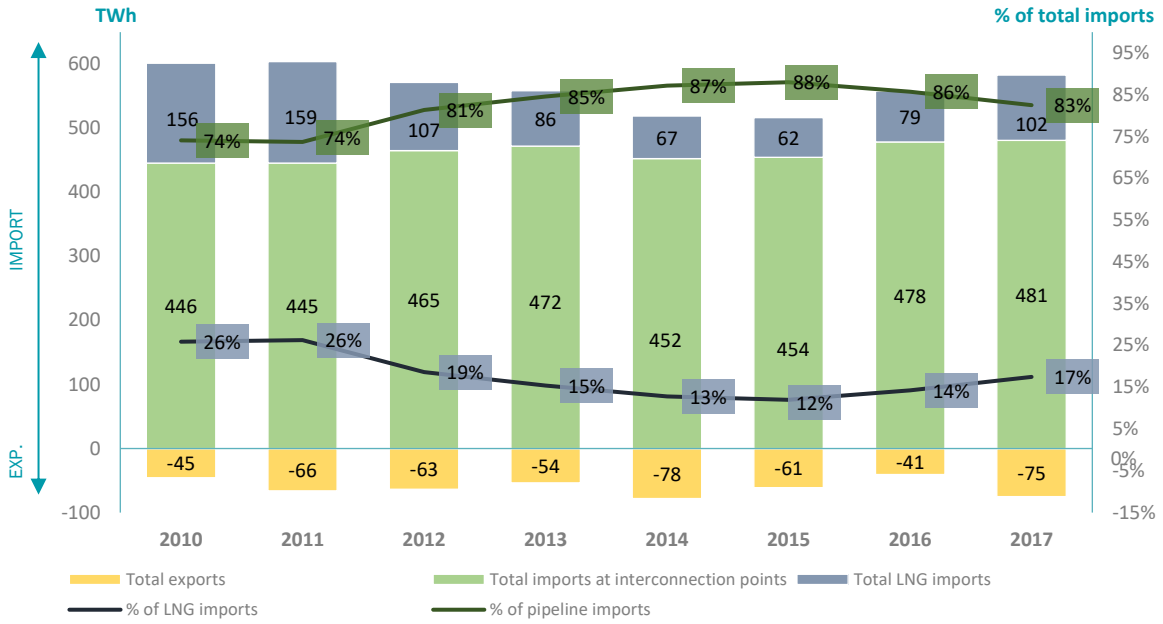
2.2. Gas interconnections

France has a diverse gas supply via four liquefied natural gas terminals, terrestrial interconnection points with Belgium, Germany, Switzerland and Spain, as well as direct access via the Franpipe gas pipeline to the Norwegian production fields located in the North Sea, which represents 33% of total French imports in 2017. The French gas system is therefore one of the most robust in Europe. The natural gas storage reform adopted in March 2018 and the merging of market zones effective on 1st November 2018 all contribute to strengthening the security of supply for France.

In 2017, imports by gas pipeline represented 83% of the supply. LNG deliveries remained at a relatively low level (102 TWh), but are on the increase since 2015, following a lowering of tension in the Asiatic markets which helped redirect flows to Europe. With regard to re-exports, France attained, in 2017, a level near to its historic maximum observed in 2014 with high volumes to Spain (43 TWh).

[2] the price spreads are shown in absolute values

Figure 2 – Gas imports and exports in France (2010-2017)



The European spot prices continued the decrease started in 2015 up to September 2016 before increasing significantly during the winter of 2016/2017, marked both by an increase in raw material prices, an increase in consumption by gas-fired power plants and tensions on the LNG market.

The prices in the *PEG Nord* zone are, generally speaking, strongly correlated with those of the rest of the North-West Europe plate, with an average price spread of € 0.3/MWh in 2016, and € 0.1/MWh in 2017 with the TTF. On the other hand, the TRS was subject to strong price volatility with differences that reached more than €15/MWh relative to the *PEG Nord* zone during winter 2016-2017. The creation of a single market zone for France, made possible by significant investments at the core of the French network (Burgundy artery and Gascogne-Midi gas pipeline) will be effective on 1 November 2018. It will put an end to differences in wholesale prices between the north and south of the country while improving the level of liquidity in the French market.

The subscription rates at the French gas interconnections remain very high, their development being linked to import contracts or long-term subscriptions. The next ten years will however be marked by the end of most of the long-term reservation contracts for these interconnections, since only two contracts will continue after 2029.

3. The implementation of the third package accelerated since 2016

The third legislative package, adopted in 2009, entered its final implementation phase. All the guidelines and network codes were adopted enabling harmonisation of the rules for using interconnections across the European Union. In the electricity sector, after the adoption in 2015 of the CACM regulation on day-ahead and intraday timeframes, 2016 and 2017 saw the adoption of eight regulations, two of which were dedicated to market rules (allocation of long-term capacities and balancing), along with six "technical" regulations dealing with the operational management of the network and grid connections. As far as gas is concerned, the network code on harmonisation of tariff structures has been added to the four texts adopted previously.

The full implementation of these regulations will take several more years, nevertheless the European energy market is now a reality, which organises electricity and gas flows according to relative price levels between countries, thus minimising supply costs at the European level.