

Capacity calculation and maximization Interconnection Points ENAGAS and REN

This Technical Note is made on the day 29th of June 2015, between REN and Enagas

Regulatory framework

Article 6 of COMMISSION REGULATION (EU) No 984/2013 of 14th October 2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems and supplementing Regulation (EC) No 715/2009 of the European Parliament and of the Council establishes that:

In order to maximise the offer of bundled capacity through the optimization of the technical capacity, transmission system operators shall take the following measures at interconnection points, giving priority to those interconnection points where there is contractual congestion pursuant to point 2.2.3(1) of Annex I to Regulation (EC) No 715/2009: 4 February 2015, the transmission system operators shall establish and apply a joint method, setting out the specific steps to be taken by the respective transmission system operators to achieve the required optimization:

- 1) the joint method shall include an in-depth analysis of the technical capacities, including any discrepancies therein on both sides of an interconnection point, as well as the specific actions and detailed timetable - including possible implications and containing the regulatory approvals required to recover costs and adjust the regulatory regime – necessary to maximize the offer of bundled capacity. Such specific actions shall not be detrimental to the offer of capacity at other relevant points of the concerned systems and points to distribution networks relevant for security of supply to final customers, such as those to storages, LNG terminals and protected customers as defined in Regulation (EU) No 994/2010 of the European Parliament and of the Council (1). This in-depth analysis should take into account assumptions made in the Union-wide ten-year network development plan pursuant to Article 8 of Regulation (EC) No 715/2009, national investment plans, relevant obligations under the applicable national laws and any relevant contractual obligations;*
- 2) the relevant transmission system operators shall apply a dynamic approach to re-calculating technical capacity, where appropriate in conjunction with the dynamic calculation applied for additional capacity on the basis of point 2.2.2(2) of Annex I Regulation (EC) No 715/2009, jointly identifying the appropriate frequency for re-calculation per*

- interconnection point and having regard to the particular specificities thereof;*
- 3) adjacent transmission system operators shall include other transmission system operators specifically affected by the interconnection point in the joint method;*
 - 4) transmission system operators shall have regard to information that network users may provide with regard to expected future flows when re-calculating the technical capacity*

Executive summary

The main aim of the Article 6.4 is to maximize the offer of bundled capacity which is achieved, as a first step, by maximizing the technical capacity in the Interconnection Points.

The present document informs about the current joint method established and applied by REN and Enagás regarding the optimization of the technical firm capacity that leads to the maximisation the offer of bundled capacity at VIP Iberico, which is based on the Interconnection Points of Badajoz/Campo Maior and Tuy/Valença do Minho.

Currently, REN and Enagás calculate, agree, publish and offer capacity at VIP Iberico. The first step towards calculating this capacity is analysis of the technical capacity of IP Badajoz/Campo Maior and IP Tuy/Valença do Minho on both sides.

Therefore, firstly REN and Enagás calculate the maximum technical capacity that can flow from/to its network to/from the adjacent one. Depending on the interconnection, these figures will be calculated commonly by both TSOs by establishing certain conditions in operational settings and hydraulic parameters, or by each TSO independently applying the Lesser Rule method afterwards.

The joint method applied by Enagás and REN takes into consideration a dynamic approach to re-calculating technical capacity whenever is needed, such as in case of critical demand changes, both at wide level and at local level, or in case of commissioning of new pieces of infrastructure that might have an impact on cross-border capacities. Whenever an update of capacities is required, a detailed timetable is set up in line with the regulatory requirements and commercial needs, such as auctions.

1. Calculation of Technical Capacity

This joint method includes an in depth analysis of the technical capacities and takes into consideration the best information provided by network users regarding especially future flows that might affect the capacity figures at the interconnection.

Technical assumptions for the calculation of the technical capacity should be consistent with National Investment Plans and with ENTSOG's Union-wide TYNDP criteria.

Each Transmission System Operator has developed its own methodology for the calculation of the technical capacity, both of single infrastructures or facilities, as well as the wide system capacity that can flow through an Interconnection Point.

The optimization of the technical capacity that can flow through an Interconnection Point in both directions complies with national regulation regarding operation set points, as well as with the national and European planning criteria and process.

This calculation comprises two different stages:

- On one hand, the technical capacity regarding the marginal infrastructures linking the networks at both sides of the interconnection.

Considering an interconnection relying on a pipeline that links two compressor stations, one of each network, there is a single optimization and calculation of the technical capacity of the interconnection. These calculations are commonly performed by both TSOs by setting common hydraulic parameters and by agreeing the same equation of state. The optimization is commonly guaranteed by establishing the operative conditions regarding the inlet or discharge pressure of both compressor stations that ensure the maximum capacity in the pipeline.

If there are not any compressor stations or there is just one compressor station linked to the interconnection at one side of the border, as it is the case of the Interconnections between Portugal and Spain, the variable that is agreed and set up is the pressure at the border. With this premise, the technical capacity is calculated independently by each TSO -by calculating the flow that can be routed through the interconnection at that certain pressure-, and afterwards the technical capacity is maximized by applying the lesser rule to the different values

- And on the other hand the wide system simulation analysis, with the scope of guaranteeing the security and quality of supply of the whole gas system.

In order to maximize the technical capacity several variables should be taken into account, such as:

- Current demand levels –both in the whole system as well as at local level-
- Future demand forecast
- Agreed pressure at the border
- Compressor stations operation
- Capacity already offered at other relevant points of the concerned systems
- ...

Considering all these variables, the first step when calculating the maximum technical capacity in one interconnection point is the agreement on the set of infrastructures that will be the basis of the calculations. Data exchange related to those infrastructures is as well shared, such as length, diameter, elevation of certain positions, etc.

The second step is the identification of the climatic scenarios which define the demand figures impacting in the resultant capacity. The technical capacity should be tested under the most conservative climatic scenario for each direction of the flow with the scope of guaranteeing simultaneously the security of supply of the whole national gas systems as well as the integration of the interconnection in the network. Additional climatic scenarios might be used for the estimation of the technical capacity that might be available in the interconnection under winter, summer or intermediate conditions.

After the agreement on the infrastructures skeleton and climatic demand figures, certain operative conditions related to critical infrastructures or devices of the network should be analysed and set up with the scope of identifying the different boundary conditions that might result in different technical capacity numbers. Once more, the boundary conditions chosen for the maximization of the technical capacity should be conservative with the scope of being able to route the gas through the interconnection without damaging the security of supply standards approved at national level.

Additionally, the simulation parameters, such as hydraulic settings –equation of state, pipelines roughness, efficiency, etc.- should be agreed and commonly used.

Further details of the technical capacity calculation and optimization can be found on Enagás website:

<http://www.enagas.es/stfls/EnagasImport/Ficheros/667/432/NGTS%20-actualizaci%C3%B3n%20dic-13,0.pdf> (NGTS-02)

<http://www.enagas.es/stfls/EnagasImport/Ficheros/912/744/PD%20-actualizaci%C3%B3n%20may-13.pdf> (PD-10)



VIP capacities are the result of the addition of technical capacities of Badajoz/Campo Maior IP and Tuy/Valença do Minho IP. As mentioned previously, whenever an interconnection relies on a pipeline that links two compressor stations, there is a single and common optimization and calculation of the technical capacity of the interconnection, but since there are no Compressor Stations in Portugal, the calculation of the technical capacity will be performed by each TSO, and the maximization will be based on the lesser rule.

1.1. Calculations at the Spanish side

VIP capacities are the result of the addition of technical capacities of Badajoz/Campo Maior IP and Tuy/Valença do Minho IP.

- **Badajoz/Campo Maior IP:**

From the local point of view, the variable that determines the maximum technical capacity in both directions is the saturation of the pipeline linking Almendralejo and Badajoz, which does not rely in the demand figures.

However, these demand figures do affect the wide system simulation, being the peak demand the one that should be considered in the Spanish side when calculating the export capacity, and the average summer climatic case when calculating the import capacity.

From Spain to Portugal: The discharge pressure in Almendralejo CS is set at 80 bar, and the pressure at the border is set in 76 bar.

From Portugal to Spain: The pressure in the border that has been agreed is 55 bar.

- **Tuy/Valença do Minho IP:**

Both from the local and the wide perspective, the technical capacity in Tuy/Valença do Minho is sensible to demand figures, being the peak demand the one that should be considered in the Spanish side when calculating the export capacity, and the average summer climatic case when calculating the import capacity.

The pressure that has been agreed at the border has been 55 bar in both directions.

From Spain to Portugal: For the calculation of the maximum technical capacity, the isolation of the pipeline in Guitiriz valve (I013) is needed, feeding Guitiriz-Tuy pipeline just with Mugardos LNG production. The variables that determine the maximum technical capacity in this case are the nominal capacity of Mugardos LNG terminal and the saturation of the pipeline Guitiriz-Tuy

From Portugal to Spain: With the scope of maximizing the capacity coming from Portugal, the isolation of the same position I013 is once more needed, but in this case, Mugardos LNG terminal should be set with its evacuation oriented just to the direction Guitiriz-Llanera-Zamora.

1.2. Calculations at the Portuguese side

VIP capacities are the result of the addition of technical capacities of Badajoz/Campo Maior IP and Tuy/Valença do Minho IP.

The capacity calculation in the IPs of the Portuguese Natural Gas Transmission System depends on its demand, on the average pressure in the pipeline and its pressure drop, as well as on the operation of NG Power Plants (PP).

- **Badajoz/Campo Maior IP:**

From Spain to Portugal: The capacity was determined taking into account a pressure in Campo Maior / Badajoz of 76 bar and an average summer demand for the Conventional Market. The demand of the NG Power Plants depends on the expected workload for the time of the year, especially Pego PP. The average pressure in the pipeline and its pressure drop is adjusted in order to maximize the inlet capacity.

From Portugal to Spain: The capacity was determined taking into account a pressure in Campo Maior / Badajoz of 55 bar and the peak demand in winter for the Conventional Market. The demand of the NG Power Plants depends on the expected workload for the time of the year. The average pressure in the pipeline and its pressure drop is adjusted in order to maximize the outlet capacity.

- **Tuy/Valença do Minho IP:**

The capacity was determined taking into account a pressure in Tuy / Valença do Minho of 55 bar.

From Spain to Portugal: The capacity was determined considering an average summer demand for the Conventional Market. The demand of the NG Power Plants depends on the expected workload for the time of the year, especially Tapada do Outeiro PP. The average pressure in the pipeline and its pressure drop is adjusted in order to maximize the inlet capacity.

From Portugal to Spain: The capacity was determined considering the peak demand in winter for the Conventional Market. The demand of the NG Power Plants depends on the expected workload for the time of the year, especially Tapada do Outeiro PP. The average pressure in the pipeline and its pressure drop is adjusted in order to maximize the outlet capacity.

1.3. Main point summary

Find below the chart which summarizes the firm technical capacity in GWh/day at 25°C:

	<u>ENAGÁS</u>	<u>REN</u>
<u>PT-ES</u>	80	80
<u>ES-PT</u>	144	144

1.4. Maximization of the technical capacity

The maximization of the technical capacity that can flow in both directions of the interconnection, is performed in a common way between both TSO's –by agreement of hydraulic parameters that lead to a unique result of the simulation– in the case of pipelines delimited by two compressor stations. In the case of interconnections in which the set point is established at the border, a mismatching is needed for the identification of the common value. It can be based on the lesser rule method.

Several meetings between REN and Enagás are set up in order to better identify the maximization of the technical capacity as well as the pressure and operative conditions as well as to solve possible discrepancies, if needed.

As a result of those meetings, Technical Agreements are signed internally between REN and Enagás, in which the maximum technical capacity as well as pressure, quality and measurement conditions are officially agreed.

New technical capacities calculation or updates on the agreed are usually presented in the South Gas Regional Initiative in order to keep all the involved regulators and stakeholders properly informed.

Once new investments are planned or developed, capacity figures at the Interconnection Points should be updated.

Additionally, each TSO reserves the right to review the capacity values in case of critical changes such as unpredictable demand variations at wide or local level, in case of commissioning of new infrastructures that may have an impact in cross-border capacities, or changes in the operative conditions of any facility working in the network.

2. Maximization of the Capacity Offered

2.1. Calculation of the bundled capacity offered

Each TSO calculates the maximum technical capacity and the maximum booked capacity in both directions of the interconnection. The common value is reached in order to identify the maximum bundled capacity that could be offered to the market.

In order to maximise the capacity to be offered to the market, each TSO will consider capacities from CMP procedures.

Until November 2015, Enagás and REN offer Yearly, Quarterly and Monthly products by auction. From November 2015, Daily and Within-Day auctions will also be held.

The calculation of the bundled capacity to be offered to the market starts with the available capacity for the annual yearly capacity auctions. The available capacity, that has not been allocated in the yearly auctions, will be offered in the upcoming auctions.

Both TSOs will take into account Chapter III of the NC CAM 984/2013, and analyse booked capacity within the time period to be offered. TSOs consider the maximum value of booked capacity for each year, thereby ensuring the minimum available capacity.

According to the results of the Annual Yearly capacity auctions and considering the amount of capacity set aside for this product, TSOs calculate bundled capacity to be offered at the Annual Quarterly capacity auctions.

After that, TSOs calculate bundled capacity to be offered at the Rolling Monthly capacity auctions according to the results of the Annual Quarterly capacity auction.

TSOs consider the maximum technical capacity value for each product. In case of different values in the same period of time, TSOs consider the minimum available value to ensure the offer capacity.

Find below the chart which summarizes the minimum common value capacity to be commercialized at VIP IBERICO in GWh/day at 25°C:

	REN-ENAGÁS
PT-ES	80
ES-PT	144

2.2. Offer of bundled capacity at PRISMA Platform and mismatching

Before each product is uploaded to PRISMA Platform, Enagás and REN hold a meeting in order to coordinate the capacities.

After which, TSOs upload each product according to the "Auction Calendar 2015 for Capacity Allocation Mechanism Network Code" provided by Entso-e. Furthermore, capacities to be offered are published not only on PRISMA platform but also on the TSOs websites according to the Entso-e's Calendar.

Then it is the Prisma platform itself which creates, bundled products, as a result of the mismatching.