WINTER OUTLOOK

2021/2022

CONTENTS

GRTgaz SA and TEREGA SA accept no liability for damages of any kind, whether direct or indirect, arising from the use or exploitation of the information contained in this document, including any business, financial or commercial loss.

FOREWORD

The French natural gas transmission network offers several entry and exit points (cross-border interconnections, LNG terminals, underground storage facilities), giving its users a choice between various supply combinations.

Since 1st November 2018, the TRF has become the contractual framework for the French transmission network. It is built to a model that combines judicious investments in terms of infrastructure with contractual mechanisms which facilitate the management of the network's residual bottlenecks.

A **prudent supply management, based on all available sources,** is required for the smooth running of the gas system in winter.

The French operators, GRTgaz and Teréga, must ensure the **safety, efficiency** and **balance coverage** of their networks at all times (1). In accordance with their obligations, GRTgaz and Teréga must be able to assure continuity in the transportation of gas, including in the event of a cold winter or a so-called P2 cold peak (2).

In this context, in accordance with the Energy Code, art. L141-10, GRTgaz and Teréga produce an annual **Winter Outlook** in order to verify compliance with these obligations and share their analysis of the coming winter with the market. The Winter Outlook is an exercise that makes it possible to assess the balance coverage for the French zone and downstream of the network bottlenecks for different gas demand scenarios and supply schemes.

The Winter Outlook 2021-2022 is the 4th edition to be published that incorporates the provisions made as part of the creation of the TRF on 1st November 2018.

(1) French Energy Code, Article L431-3
(2) French Energy Code, Article R121-8. The P2 peak corresponds to the gas demand at an extremely low temperature for a maximum period of three days, likely to occur statistically once every fifty years.

CHAPTER

01

PEAK BALANCE COVERAGE

MARKETABLE CAPACITIES

SUBSCRIBED CAPACITIES

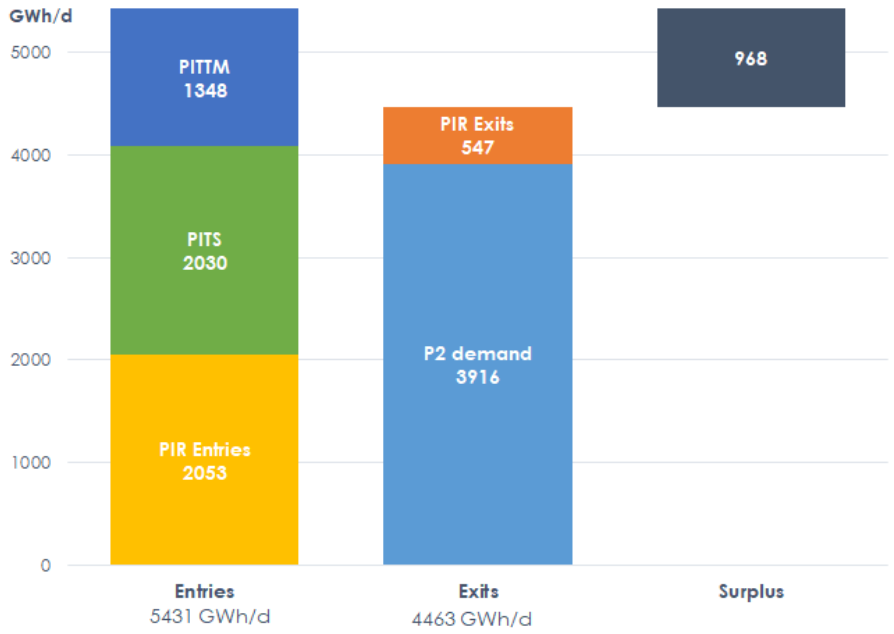
MARKETABLE CAPACITIES

The assessment of the peak balance considering marketable capacities makes it possible to check that the public service obligations during a cold spell with a 2% risk (1) are ensured.

The **marketable capacities** approach includes the firm entry capacities made available by the TSOs to PIRs and PITTMs for next winter, the underground storage subscribed capacities (peak capacities available at 45% of working gas volume in storage) and the total PIR exit capacities (firm + interruptible).

968 GWh/d

Margin observed at the 2% risk cold peak taking into account the entry marketable firm capacities (PIR + PITTM), subscriptions to the storage facilities(PITS) (2) and total exit capacities (PIR) (3).



The balance result for winter 2021-2022 is a surplus at a cold peak 2% risk.

This exercise is a theoretical approach that does not predict the actual use of network entry and exit points, especially for PITTMs.

Indeed, the PIR and PITTM facilities have never yet reached maximum usage of all firm capacities at most points, and never simultaneously.

(1) P2 peak, i.e. gas demand at an extremely low temperature for a maximum period of three days, likely to occur statistically once every fifty years (ref.: French Energy Code, Article R121-8).

(2) Draw-off rate at 45% of working gas volume.

(3) The Pirineos and Oltingue PIRs are considered to be outgoing.

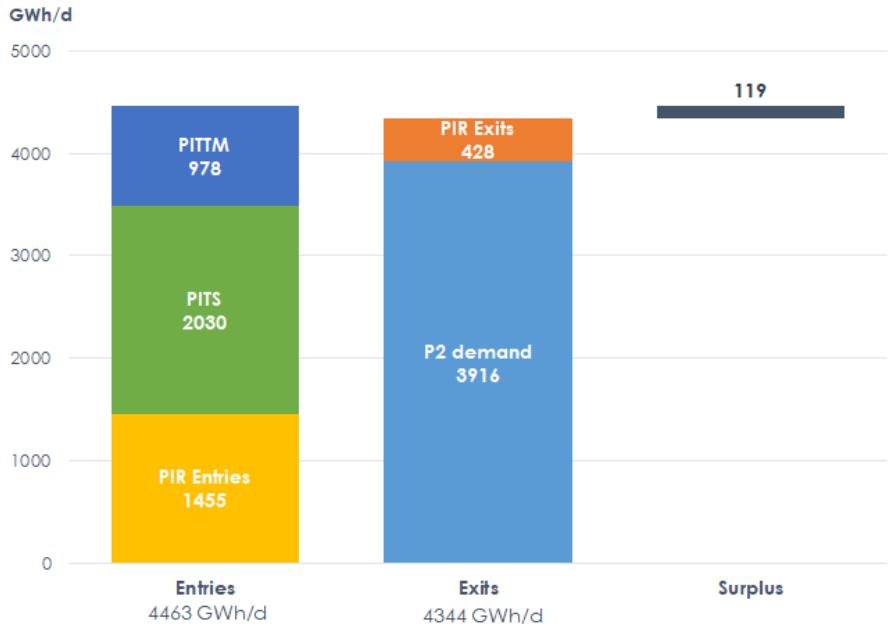
SUBSCRIBED CAPACITIES

The **subscribed capacities** reflect shippers' intentions in terms of supply with an optimal use of the capacities they have subscribed.

This approach includes the PIR and PITTM firm subscribed capacities (entry and exit) and the storage facility subscribed capacities (peak capacities available at 45% of working gas volume in storage) for next winter.

119 GWh/d

Margin observed at the 2% risk cold peak taking into account the entry and exit subscribed capacities
(PIR (1) + PITTM + PITS (2))



Full use of subscribed capacities gives a margin of 119 GWh/d.

This positive margin gives the system flexibility, allowing shippers to make decisions on their supplies including during the P2 peak. This margin still depends on the gas in storage at the PITTMs and on a sufficient fill level of the storage facilities to ensure their peak withdrawal performances (2).

The margin shows a decrease of nearly 200 GWh/d compared to the Winter Outlook 2020-21 calculation, due to the decrease of long term capacities subscriptions on some network entry PIRs.

Factually, the P2 peak balance will depend on potential additional short term subscriptions, and on the actual use of subscribed capacities at each point, decided on a daily basis by the shippers.

(1) The Pirineos and Oltingue PIRs are considered to be outgoing.

(2) Draw-off rate at 45% of working gas volume.

CHAPTER

02

SCENARIO ASSESSMENT FOR WINTER 2021/2022

PRINCIPLE

SCENARIOS EXAMINED

ASSUMPTIONS ADOPTED

RESULTS

PRINCIPLE

The reasoning in cold peak capacities is not enough to assess the overall balance coverage for the winter and in particular the balance between the various sources of supply considering the possible infringement of bottlenecks in the network.

In addition, the TSOs decided to make several projections on winters with varied gas demand levels.

The TSOs have voluntarily chosen to consider supply scenarios in a North-South direction (historical scenarios). Under this configuration, flows can approach North to South but also East to West bottlenecks depending on LNG supplies.

This exercise assesses the supply requirements for the French balance and downstream the limits NS1, NS2, NS3, NS4, EO2 and S1 of the network, as illustrated below, considering entries mainly on the Northern PIRs. More precisely, the studied scenarios prioritize the use of North PIRs, up to the saturation of the North-South limits if necessary, to identify not only the supply needs for the French balance but also the potential needs specifically located downstream of each limit.

SCENARIOS EXAMINED

➢ Methodology

On each winter day, we test the supply scheme in order to saturate the network if necessary, until one or more of its bottlenecks are reached (1). The contractual points are deployed in the following order:

- setting of exit PIRs: Oltingue, Pirineos,
- setting of PITTM,
- maximizing entries through the PIRs within the limit of the upstream balance of each limit,
- closing the French balance through the withdrawal from storage facilities in coherence with the different limits.

This approach, maximizing the entries through the PIRs, represents a minimal utilization of the storages to cover the French balance and to avoid congestions while preserving the stocks as far as possible.

The expected result is the additional gas needed to cover the French balance or the balance downstream of the limits.

➢ Gas demand scenarios

Two winter scenarios (gas winter from 1st November to 31st March) were created on the basis of historical winters with different profiles:

- **Cold winter**: simulation of a cold winter based on the profile of winter 2012-2013, which is characterized by cold episodes in February and March, corresponding to a total gas demand of **337 TWh**.
- **Winter with a cold peak**: simulation of a cold winter based on the winter of 2011-2012 and including a period of 3 consecutive days at the P2 peak, corresponding to a total gas demand of **338 TWh**.

Each of these scenarios includes the same combined gas cycle's demand assumptions, namely an average consumption of 265 GWh/d corresponding to the utilization rate reached or exceeded 10% of the time during the last four winters.

(1) The network bottlenecks modelisation includes the availability of infrastructures as anticipated for the winter to come (the limits NS3, NS4, EO2 and S1 are diminished due to unavailable facilities in Ars-sur-Formans; cf. UMM 21102921X-FR-A-A0A0A-S001).

ASSUMPTIONS ADOPTED

➢ **Pirineos and Oltingue exits:**

The PIRs Oltingue and Pirineos are considered exit points throughout the winter, at the level of subscribed capacities (217 GWh/d on Oltingue (1) and 147 GWh/d on Pirineos).

➢ **LNG scenarios:**

Two uniform output scenarios at the PITTM are examined:

- **"No LNG"** (0 TWh)
- **"Mini LNG"** : a constant flow of 230 GWh/d over the winter (155 GWh/d on Fos, 60 GWh/d on Montoir and 15 GWh/d on DK LNG) representing 35 TWh over the winter, corresponding to the lowest level on the last five years (Winter 2016-2017).

➢ **Contribution of the storage facilities:**

A fill level of **120 TWh** as of 31st October is considered (2), corresponding to 93% of the subscribed volume.
In the projections, the storage facilities are used in proportion to their characteristics and in an optimised way to ensure maximised use of the volume at the end of winter. In early winter, when the scenario permits, the use of storage facilities is configured to maintain sufficient peak withdrawal capacity until the month of February.

➢ **PIR entry contribution:**

Network entry PIRs are located in the North, upstream of the North-South bottlenecks. They are used, if the upstream balance allows it, at their maximum available capacities, according to the three scenarios described hereunder:

Scenario	Dunkerque	Virtualys and Obergailbach	Corresponding maximal volume over the winter
PIR+++	Firm marketable	Firm marketable	276 TWh
PIR++	Firm marketable*	Subscribed	228 TWh
PIR+	Subscribed	Subscribed	203 TWh

* The underlying assumption is additional short-term subscriptions on Dunkerque, founded on the trends observed on this point.

(1) This study was carried out before the emergence of technical difficulties limiting exportation capacities at Oltingue at the beginning of winter (cf. UMM 21102621X-FR-A-A0A0A-S001).

(2) To be compared with the actual level of storage on 31st of October: 121,7 TWh.

RESULTS

The simulation of the different supply scenarios at PIRs and PITTMs shows the following needs for additional supply to cover the French balance or the balance downstream of the bottlenecks:

Additional supply of gas for French balance* and balance downstream of limits

				Cold winter	Winter with cold peak
				Balance to cover (TWh) (gas demand & exportations)	
				370	371
Supply scenario			**Corresponding supply volume ****	**Need for additional gas supply (TWh)** *(including need localized downstream of limits)*	
N°	**PIR entries**	**LNG entries**			
1	**PIR+++**	**Mini LNG**	Up to 418 TWh	**0** ***(0)***	0,1 *(0)*
2	**PIR++**	**Mini LNG**	Up to 370 TWh	**5,0** ***(0)***	8,6 *(0)*
3	**PIR+**	**Mini LNG**	Up to 345 TWh	**26,2** ***(0,1)***	27,6 *(3,1)*
4	**PIR+++**	**No LNG**	Up to 383 TWh	**0,7** ***(0)***	4,0 *(0,2)*
5	**PIR++**	**No LNG**	Up to 335 TWh	**36,3** ***(4,5)***	37,6 *(7,4)*
6	**PIR+**	**No LNG**	Up to 310 TWh	**60,6** ***(8,4)***	61,9*** *(15,8)*

* The indicated figures correspond to the H-gas balance, excluding the L-gas zone (PIR Taisnières B, PITS Nord B, L-gas demand) which balance is independant. The available H-gas stock for the balance coverage is 107 TWh in the studied scenarios (93% of filling).

** The indicated volume corresponds to the cumulation of the PITTM supply as set in the scenario, and the maximal PIR (according to the scenario) and storage facilities contributions (107 TWh) as detailed in the hypothesis.

*** In this scenario, the coverage of the daily balance occasionally requires the reduction of flows considered in exit, the increase of PIR & PITTM entries up to the marketable capacities not being sufficient.

RESULTS

➢ **Scenario 1 :**

The simulation of PIR entries up to their marketable capacities, combined with a low but steady LNG supply, shows no need for additional gas supply to cover the French balance or the network bottlenecks'downstream balance over the winter, and this even for cold winters, with high exportations at Oltingue and Pirineos.

➢ **Scenarios 2, 4 :**

With supply volumes at PIRs and PITTM throughout winter still high, either exclusively located in the North (sc.4 : PIRs solicited up to their marketable capacities, and no LNG supply) or including a minimal supply on PITTM (sc.2), a limited need for additional gas supply (up to 8,6 TWh) appears in scenarios 2 and 4.

It is then a punctual need for the coverage of the daily balance on the coldest days as described in the 1st chapter, or for cold spells at the end of the winter. Indeed, storage facilities see their withdrawal capacity decrease with their level of filling (effect of the evolution factors of the storages), potentially leading in case of a punctual high demand to a need for PIR and PITTM supplies higher than the hypothesis initially adopted for these scenarios.

This supply can be made without localization constraints in the form of additional LNG flows, an increase of the entries and / or a reduction of exits on the PIRs considered as exits in the simulations.

➢ **Scenarios 3, 5 :**

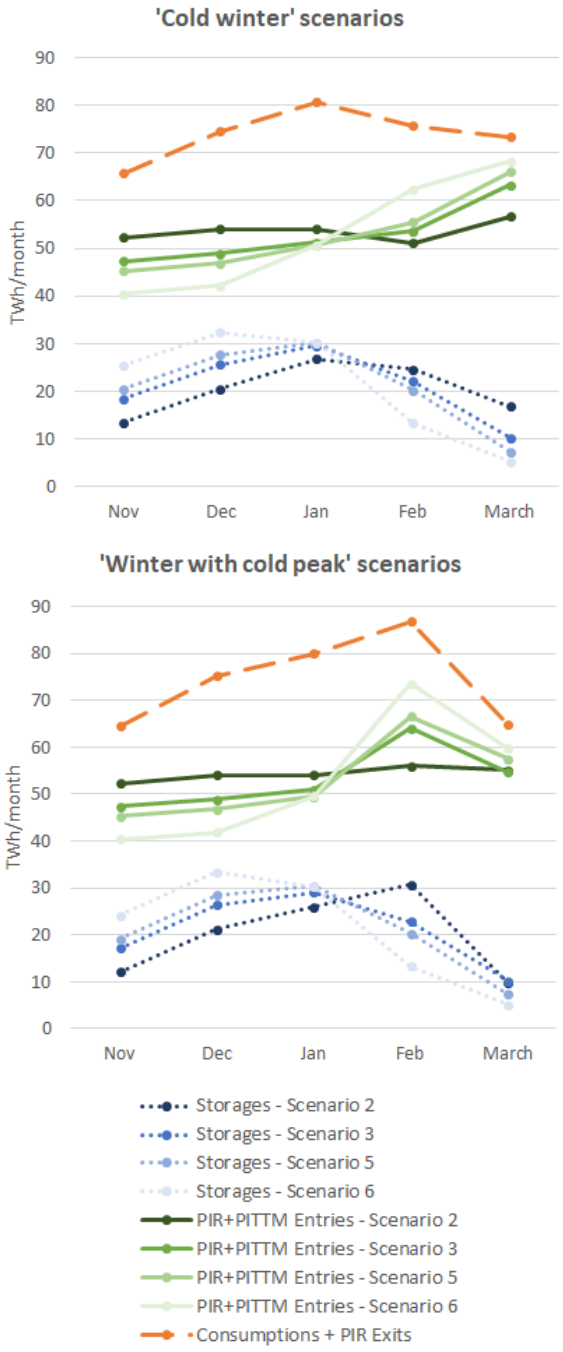
An additional supply through PIRs and PITTMs, beyond the initial assumptions considered in these scenarios, is anyway required to cover the French balance over the winter.

This need appears more frequently than in the previous scenarios to cover the daily balance at the end of the winter. Indeed, with lower PIR and PITTM supplies, the storage facilities are more solicited in the early winter, reducing the potential contribution of the storages for cold spells occuring at the end of the season. The additional supply need then may reach high levels to cover gas demand peaks on February or March, implying a high solicitation of all the PITTM and PIR supplying sources.

Besides, this additional supply, occuring after an extensive use of storages, happens too late to maintain a sufficient level of storage downstream of the bottlenecks NS2 and NS4, in particular in Lussagnet. The need for additional gas is then localized downstream of these bottlenecks and must result in LNG emissions on Fos and / or entries at Pirineos.

RESULTS

Monthly contribution of the different sources of supply for the balance coverage



The additional gas supply must be targeted in time depending on the storage and consumption levels to also ensure the coverage of the balance downstream of the limits, and to maintain a sufficient stock downstream of the limits until the end of the winter.

This supply can be made without localization constraints in the form of additional LNG flows, and / or entries or a reduction of exits on the PIRs considered as exits, or increased flows on entry points (implying additional subscriptions). For information, LNG volumes observed in recent years could satisfy this need.

➢ **Scénario 6 :**

In this scenario, the storage contribution capacity is limited in February / March. The simulation of this crash test shows the use of the PITTM and PIR entry points up to their marketable capacities on several days. The coverage of the French balance even requires reduced flows on exportation points.

This scenario underscores the necessity of an adequate use of the storages at the beginning of the winter to guarantee the coverage of high gas demands later in the winter without strong constraints on supply schemes.

As a reminder, the simulations are based on structuring assumptions regarding the use of the PIRs and storage facilities. The set of hypothesis is thought to carry out the Winter Outlook exercise, which aims at highlighting the conditions for covering the winter balance. These simulations are not representative of the effective use of the contractuel points, which will be monitored throughout the winter.

These graphs illustrate the effect of steady gas supplies along the winter: with sufficient PIR and PITTM supplies in the beginning of the winter (in green – sc.2), the storage solicitations are lower at the beginning of the winter (in blue – sc.2), maintaining their level high enough for the end of the winter. On the contrary, if the storage facilities are strongly used from the beginning of the winter (in blue – sc. 3, 5, 6), their performances decrease considerably before the end of the winter, requiring higher additional supplies on the PIR and PITTM (in green – sc. 3, 5, 6).

CHAPTER

03

CONCLUSIONS

KEY MESSAGES

KEY MESSAGES

Good level of filling of the storage facilities at the beginning of the winter, still requiring a prudent and reasonable management along the winter

Supply of LNG and/or additional subscriptions in entry required for the French balance coverage in the event of a cold winter or cold peak

Use of TRF mechanisms for the day-to-day management of the bottlenecks

Indicator of the level of strain on stocks downstream of the network bottlenecks

As we move into the winter, GRTgaz and Teréga consider that all the prerequisites are satisfied to ensure a season without tensions.

Indeed, the **capacities offered to the shippers as well as their subscription levels** for the winter of 2021-2022 (for all points) **are sufficient to cover the supply for French consumers in the event of a cold peak,** even if the shipping customers decide to maximise their use of the subscribed exit capacities to Switzerland and Spain. However, the margin on subscribed capacities for a cold peak decreases significantly compared to last winters, due to a decrease of the long-term subscriptions on some PIR entries.

The good level of subscription of storage capacities and a satisfactory fill rate, with a stock of 121,7 TWh on 31/10/2021, give the French transmission network more flexibility and strengthen the security of supply.

A prudent and reasonable stock management is nevertheless necessary throughout the winter in order to guarantee sufficient withdrawal capacities in the event of a cold peak, or a late cold spell. In case of too important withdrawals at the beginning of the winter, the necessity of covering the balance may then lead to strongly constrained schemes of supply.

Projections show that a minimal supply of **LNG** and/or additional subscriptions at entry points are necessary to **cover the balance** for cold winter scenarios or in the event of a spike in gas demand, while maximizing the exits.

The mechanisms defined as part of the TRF, in particular that of the **Locational Spread**, must resolve the occasional situations, throughout the winter, when bottlenecks are reached (see Appendix 2). To ensure the efficiency of these mechanisms, it is necessary to preserve stock downstream of the bottlenecks, especially downstream of NS4 (Lussagnet), until the end of winter.

The level of stock downstream of the bottlenecks in a North-South flow pattern have to be monitored, in order to decide on a possible use of the Flow Commitment mechanism. A downstream stock monitoring indicator will be issued to the market throughout the winter on the two TSOs' respective websites.

CHAPTER

04

APPENDICES

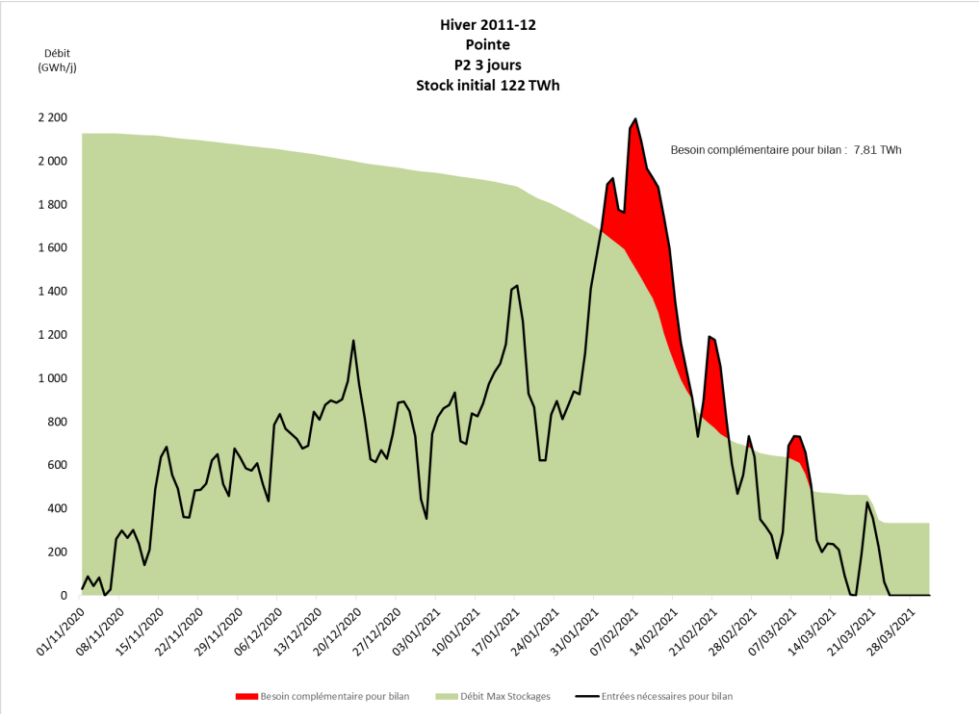
Appendix 1
Monitoring of downstream stocks

The Winter Outlook results provide an indication of the capacity of the gas system to deal with different scenarios throughout the entire winter.

To deal with this problem, short term mechanisms have been implemented in accordance with the TRF. In particular, the monitoring of stocks downstream of the bottlenecks makes it possible to examine the balancing coverage and the management of the bottlenecks.

The monitoring of downstream stocks, for each network bottleneck and each day of winter, consists of comparing the projected level of gas in storage downstream of the bottleneck to a minimum level required to guarantee a given scenario. If the projected stock is less than the minimum stock, the TSOs can trigger a preventive mechanism to guarantee the need for gas downstream of the bottleneck in that scenario.

The minimum stock necessary downstream of the bottlenecks is defined in such a way that each day of the winter, the storage facilities are in a position to produce the quantities that cover the chosen scenario. These quantities correspond to the complement to the capacity of the transits across the bottleneck and the downstream bottleneck entries (LNG if there is any in the scenario) to supply all downstream gas demands and exits in the chosen scenario. This minimum necessary flow rate is then compared to the flow rate available in the downstream storage facilities, taking evolution factors into account. Before each winter, the minimum required volume of downstream stock is thus determined in order to cover the chosen scenario.



Thus, each day of the winter, the TSOs monitor the level of the stocks located downstream of the bottleneck and carry out a projection of this stock for the remainder of the winter in the scenario to be covered.

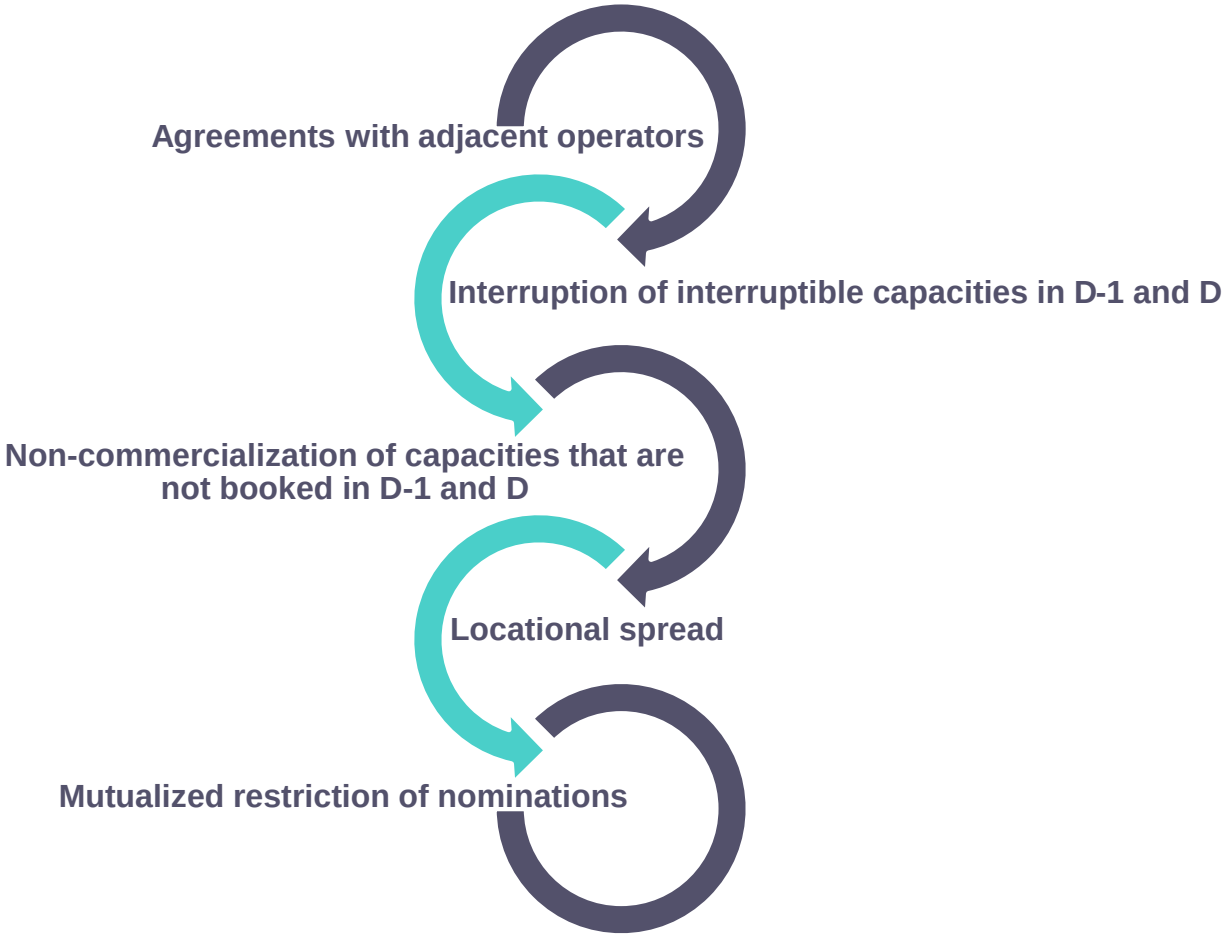
The aim is to check that on each day in winter, the storage facilities are able to supply the required minimum flow rate downstream of the bottlenecks for the scenario. Otherwise, the question arises of triggering and sizing a Flow Commitment as the identified risk period approaches.

Appendix 2
Note on TRF mechanisms

The **Trading Region France**, or **TRF** has been launched as a new market area with effect from 1st November 2018. The TRF market area offers for France a single point of entry/exit, a single gas exchange point (GEP) and two balancing zones (GRTgaz and Teréga).

Reasoned infrastructure developments, implemented in the framework of the single market, have not resulted in a perfect merger of the two pre-existing market areas (TRS and PEG Nord), and some **residual network bottlenecks** remain.

A joint study between Teréga, GRTgaz and various market stakeholders has been carried out as part of the gas Consultation to define the contractual mechanisms required for the smooth running of the TRF. The contractual mechanisms approved by the CRE resolutions of October 26th, 2017 and December 12th, 2019 are as follows:



The **Flow Commitment** completes this set of short-term mechanisms by ensuring the gas delivery downstream of the network bottlenecks, if the level of stock downstream is not high enough to guarantee the efficiency of these mechanisms.

Appendix 3
Winter 2020-2021 : no tension but an intensified stock monitoring from January onwards

Overall, a winter without any tension

The winter 2020-2021 showed a mean climate in France, leading to a moderate global gas demand.

With a level of storage filling close to 100% at the beginning of winter, combined with well-located supply sources – LNG supplies, importations from Spain in the end of the season – the TRF network showed no congestion all along the winter.

However, stocks were closely monitored from January until the end of the winter

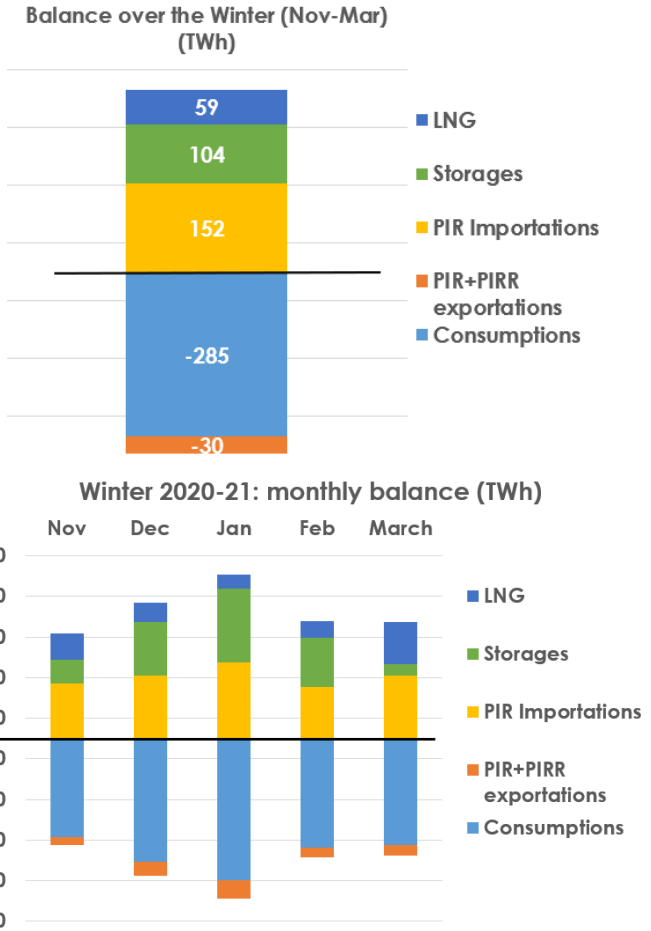
In January, France has seen an increase of gas demand and of gas exportations to Spain – up to their maximal capacities during 17 days.

Simultaneously, LNG supplies decreased significantly in France.

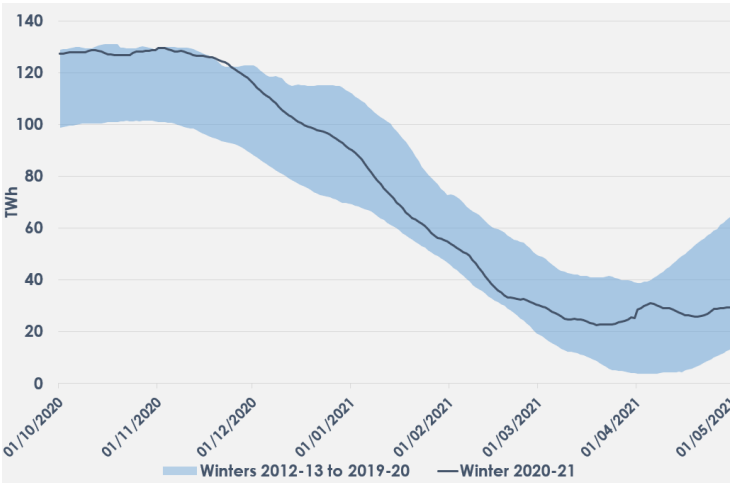
The coverage of the balance has then been ensured both by an increase of pipeline importations, and a high solicitation of the storage facilites, leading stocks to particularly low levels at the end of the month.

The TSOs thus reinforced the monitoring of stocks downstream of the bottlenecks until the end of the winter.

No alert occured for the rest of the winter, with a lower gas demand and important arrivals of LNG.



Gas demand and supplies : a mean overall balance, but a constrasted monthly balance. Low LNG supplies in January, leading to a stong solicitation of the storages



Gas in stock : from a very high level in November to a historically low level at the end of January

Crédits photos : Teréga