GME
Gestore
Mercati
Energetici

ANNUAL REPORT 2022

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EXECUTIVE SUMMARY

The energy context

The geopolitical tensions triggered by the conflict between Russia and Ukraine deeply marked 2022, especially for what concerns the energy field.
Europe and the markets have faced an unexpected shock in the supply chain of raw materials, with results that affected commodities prices, driven by the progressive stop to import Russian oil and, above all, the cut Russia has made to its gas exports to the European continent.
In this context, Europe, with Italy as one of the most active player, has shown its ability to react, which has been reflected both in the rapid re-routing of gas imports from other suppliers and in adoption, at institutional level, of regulatory action to ensure adequate stocking for the following winter season and to contain electricity gas demand through the extraordinary and temporary use of other fossil sources.
This responsiveness has mitigated the impacts deriving from the reduction of the Russian offer and limited the use of excessively drastic measures against consumers, whose demand has, however, declined again, partly reflecting the strong growth in prices and partly the effects of the interventions promoted in the field of energy efficiency.
The deep uncertainty over supply and the resulting "gas rush" have been reflected in the European energy markets, which, even within this complex scenario, have proved to be key tools for an efficient and clear allocation of resources, acting as "thermometers" of the current situation and experiencing high level and price volatilities.
Record gas prices, which rose over the year to TTF and PSV from 45 €/MWh to 125 €/MWh, inevitably led to similar bullish dynamics on European electricity markets, which are closely integrated with each other through coupling mechanisms. The effects of this change vary according to the structural weight of natural gas in the individual national generation parks.

GME markets

This can also be seen immediately in the markets managed by GME.
In the electricity sector, on the day-ahead market (MGP), the Pun grew from 125 €/MWh to 304 €/MWh, driven mainly by the high prices recorded in summer, when, given high levels of electricity demand, the particularly dry climate, which limited the use of hydroelectric plants, as well as the unavailability of many combined cycle power plants, have worsened the supply shortage and made gas production even more expensive.
As a confirmation of the international dimension of the phenomena, it is worth noting that the strong increase recorded on the Pun was common to all the main European electricity prices, with respect to which the Italian price, despite the presence of a large differential, was frequently aligned. In terms of liquidity, given the reduction in electricity consumption, the volumes traded on the MGP remained substantially stable, at 289.2 TWh, in a sector in which, for Italy, the great news of 2022 was the full operation of the new Intraday Market structure (MI), Integrated through coupling mechanisms with the rest of Europe. In this new market design, where the continuous trading phase (XBID) is interrupted by local additional auctions, the MI has recorded volumes at its highest levels, confirming its strong support for optimizing operators' production programmes, especially in a year marked by exceptional volatility.

The strong need for gas supply, necessary to cope with the sudden drop in supply, was also reflected in the dynamics observed on the markets managed by GME, with an increase in the positive multiannual trend in volumes traded on the Spot Market (MP-GAS), which rose to their historical peak of 175 TWh. This is 24% of the total system consumption. Growth was mainly related to active Day Ahead Markets (MGP-GAS), among which the continuous trading segment became the most liquid among the gas markets operated by GME. The auction system (AGS) has been identified by the institutions as a suitable mechanism for purchasing gas for stocks by those appointed to act as "stoccatori di ultima istanza" (Snam Rete Gas, GSE).

The GME and the new challenges of the energy markets

As noted in 2022, Europe therefore faces the difficult challenge of directing the transition toward new balances in energy supply and demand in the framework of the wider green evolution process toward economically and environmentally sustainable systems. This is a process in which the GME will also continue to play its part, on the one hand, by continuing its efforts at national and international tables and within Europex, the European association of power exchange, and, on the other hand, by supporting, within the scope of its competences, the national institutions in the pursuit of the objectives set.
In this sense, with reference to the incentive mechanisms for the use of renewable sources, it is required to look at the activities that, in 2022, led GME to i) start the operation of the PPA Bulletin Board, as a meeting place for supply and demand of the Power Purchase Agreements, electricity purchase and sale contracts of long-term renewable energy and tools aimed at reducing the use of climate-altering sources in the electricity sector, ii) continue the developments necessary for the implementation of the amendments provided by Legislative Decree n. 199/2021 and subsequent ARERA Resolution 235/2022/R/COM, regarding the extension of the Guarantees of Origin mechanism to new renewable energy vectors, first of all biomethane.
Finally, in relation to the traditional areas of competence, GME will remain an active part in the evolution of the Italian electricity market, on the one hand, by taking part in activities that are functional to the provision of a platform for the supply of electricity storage capacity, which will support the energy markets, non-essential services and capacity – according to criteria and conditions defined by ARERA on the basis of the provisions of Legislative Decree N. 210 of 8 November 2021 – by providing support for the implementation of pilot projects for the provision of flexibility services to ensure an efficient supply of resources for balancing the network through market mechanisms, while ensuring operational coordination between the transmission network operator and local distributors.

The President
and Chief Executive Officer

Andrea Pèruzy

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The Company

THE PROFILE

Gestore dei Mercati Energetici S.p.A. (GME) is the joint stock company established in 2000 as part of the liberalisation process of the energy sector and wholly owned by Gestore dei Servizi Energetici S.p.A. (GSE), whose shares are in turn held by the Ministry of Economy and Finance (MEF). GME is a ***multi-commodity company*** which operates in compliance with the guidelines of the Ministry of Environment and Energy Security (MASE, Ministero dell'Ambiente e della Sicurezza Energetica) and with the regulatory provisions defined by the Energy, Network and Environment Regulatory Authority (ARERA, Autorità di Regolazione per Energia, Reti e Ambiente).

THE MARKETS

GME organises and manages the electricity and gas markets – characterised by the obligation of ***physical delivery of the commodity*** – as well as the environmental and fuel markets. In particular, GME manages:

- in the ***electricity sector***, *i*) the Spot Energy Market (MPE), in turn divided into the Day-Ahead Market (MGP), the Intra-day Market (MI) and the Daily Products Market (MPEG), *ii*) the Forward Energy Market (MTE), *iii*) the Forward Energy Accounts Platform (PCE) for the recording of forward electricity purchase and sale contracts concluded outside the market system and *iv*) the Bulletin Board long-term electricity purchase contracts from renewable sources (PPA Bulletin Board)[1], operational since 26 April 2022, and divided into three sections (Notices Section, Contract Registration Section, Energy Release Section). Again within the MPE, GME manages the operations of the Dispatching Services Market (MSD), concerning the procurement of resources for the dispatching service and whose economic management is the responsibility of Terna S.p.A. (henceforth: Terna);
- in ***gas sector***, *i*) the Gas Spot Market (MP-GAS), is organized as Day-Ahead Market (MGP-GAS), Intraday Market (MI-GAS). These last ones further consist of continuous trading and auction segments (AGS), Locational Product Market (MPL) and Marketing for the trading of gas stored (MGS), and *ii*) the Gas Forward Market (MT-GAS). GME also manages the operations of the Platform for the fulfilment of the obligations as mentioned in Article 11 of Law 40/07 (P-GAS), as well as the Regasification Capacity Allocation Platform (PAR);
- in the ***environmental sector***, *i*) the Energy Efficiency Certificates Market (MTEE), *ii*) the Guarantees of Origin Market certifying the production of electricity from renewable sources (MGO) and *iii*) the Market for certificates of release to consumption of biofuels (MCIC). GME also manages the TEE and GO bilateral trading registration platforms (TEE and PB-GO Register);
- in the ***fuel sector***, *i*) the Mineral-oil storage and transit capacity data reporting platform (PDC-OIL), *ii*) the Platform for the trading of petroleum logistics services for mineral oils (P-LOGISTICS).

1 For more details, see paragraph NEW INITIATIVES on page 6 of this Report.

GME operates as a central counterparty on its markets and platforms, with the exception of the MSD, where the central counterparty is Terna, of the P-GAS, PAR and PPA Bulletin Board, and the platforms for registering bilateral contracts of the GOs and TEEs.

On the markets/platforms managed by GME, the number of registered participants continued to grow in 2022, rising to 2,851 units (+134 compared to 2021), confirming a positive multi-year trend extended to all areas of competence, and the volumes in total traded. The evolution of these last ones in the main sectors of GME's competence confirmed the centrality of the electricity markets, settled at physiologically high levels, and highlighted, at the same time, the progressive and significant increase in the degree of maturity of the gas markets which in 2022 played a decisive role in the system to guarantee, in a context of deep scarcity of raw materials, the supplies of the national TSO and RdB and of the participants[2] (from Fig. 1. 1 to Fig. 1. 3).

2 For further details on the market trends, reference should be made to section 2.

Fig. 1.1 Volumes and participants registered by market/platform in 2022

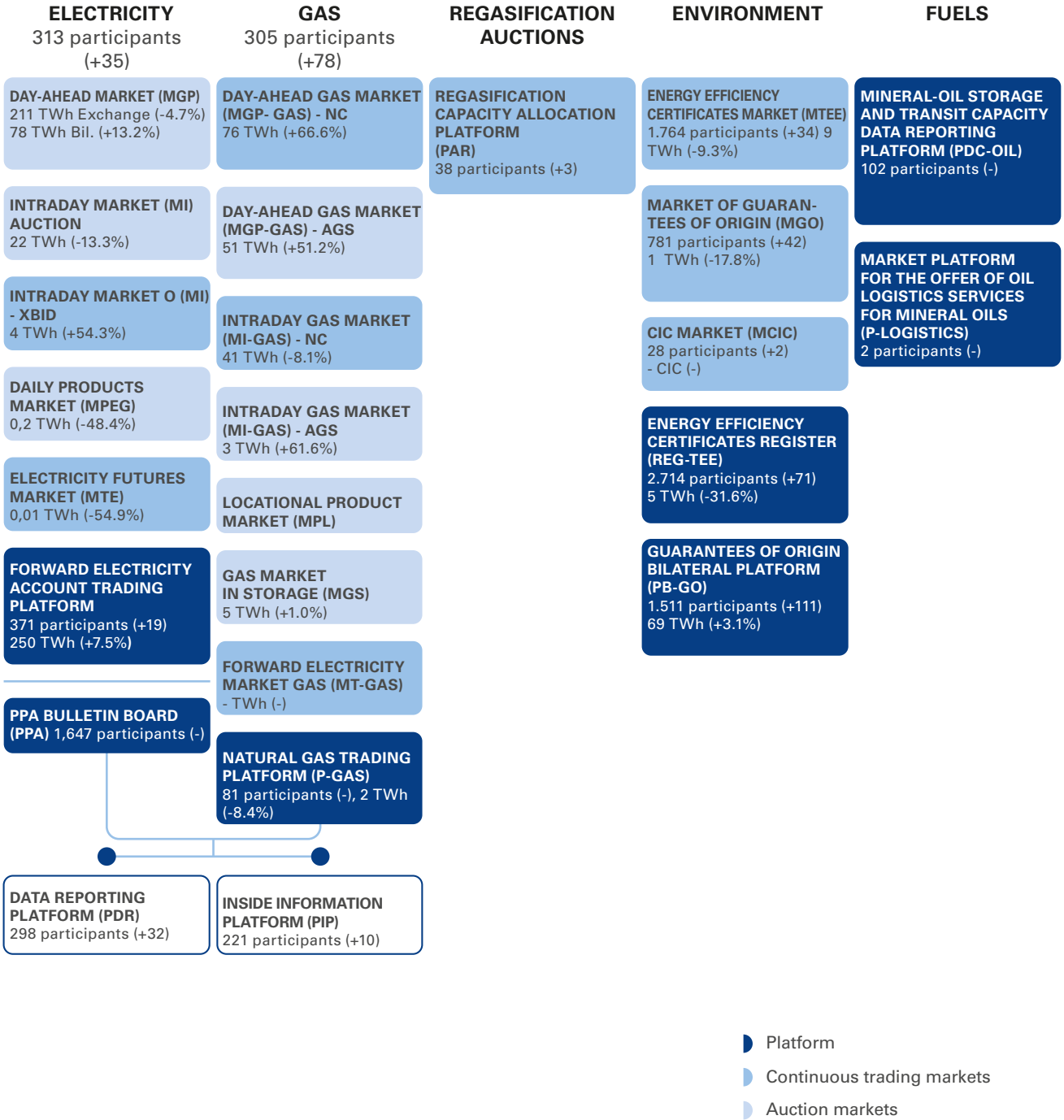


Fig. 1.2 Participants registered in GME's markets

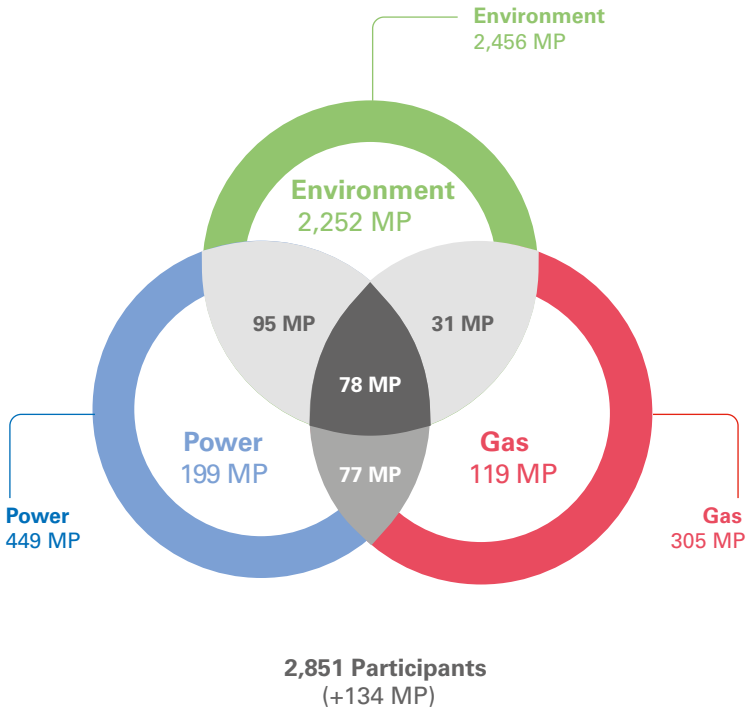
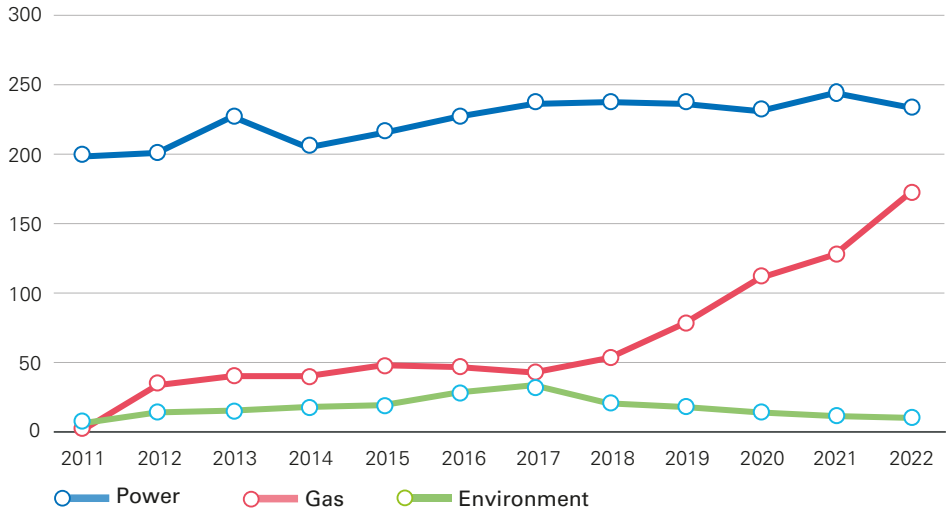


Fig. 1.3 Development of volumes by sector[3]

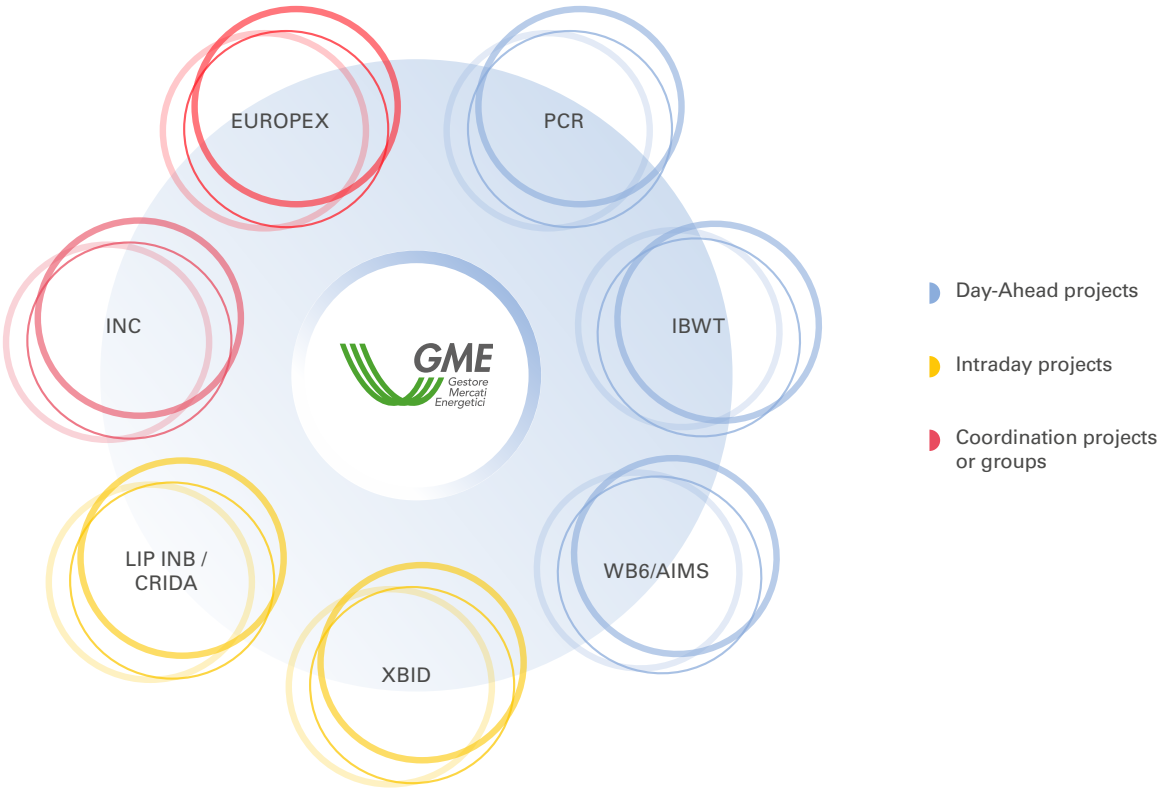


3 In the Power sector, volumes related to MGP Stock Exchange, MI (Auction+XBID), MPEG are included. Gas includes volumes for MGP-GAS (auction+continuous trading), MI-GAS (auction+continuous trading), MGS, MPL. The Environment segment includes MTEE, MGO, and MCIC volumes.

INTERNATIONAL ACTIVITIES

The GME is a member of Europex, the association of European energy exchanges, and cooperates, as NEMO[4], with other designated European exchanges and with European network operators (called TSO[5]) in day-ahead and intraday electricity market coordination and integration projects (NEMO Cooperation, SDAC, SIDC)[6] for efficient management of market coupling processes and full implementation of European Regulation N. 2015/1222 (CACM). GME also participates together with ARERA, Terna and MASE in the WB6[7] project (Western Balcan 65), aimed at promoting the launch of a regional coupling in the Balkan area, and the related integration with the EU SDAC and SIDC, on the basis of the experience gained in the organisation and management of national markets and the integrated European electricity market.

Fig. 1.4 International projects



4 NEMO shall mean "Nominated Electricity Market Participant", as defined in article 4 of European Regulation n. 2015/1222 (hereinafter: CACM), a role assigned to GME for Italy by the Ministry for Economic Development (now MASE).

5 Transmission System Operator.

6 SDAC and SIDC are the operation coordination projects for the full implementation of the Single Day-ahead Coupling (SDAC) and the Single Intra Day Coupling in Europe (SIDC), integrated within the so-called Market Coupling Steering Committee (MCSC).

7 WB6 is a cooperation project between national Regulators, Network Participants and Market Participants from Albania, Bosnia and Herzegovina, Macedonia, Montenegro and Serbia for the creation of a regional electricity market in the Balkan region, to be eventually integrated with the European Union energy market. The WB6 Program coordinates a series of sub-projects aimed at promoting the development and integration of electricity markets in WB6 countries (with the exception of Kosovo) both locally and regionally. This project is supported by the European Union and by the Energy Community.

NEW INITIATIVES

In coordination with the relevant institutions and in agreement with the actors directly involved, in 2022 GME launched and/or completed projects in the different areas of interest, confirming its role as a support to national and Community policies aimed at market integration and the energy transition. This is the context of the following initiatives undertaken by GME in the areas of electricity, gas and environment.

- In the electricity sector:
  - **The launch of the long-term electricity purchase and sale contract from renewable sources (so-called PPA Bulletin Board),** operational since 26 April 2022 in compliance with Article 28 of Legislative Decree n. 199 of 8 November 2021 with the aim of *i)* promoting the meeting between the parties potentially interested in concluding contracts for the long-term purchase and sale of electricity from renewable sources (PPA), *ii)* ensuring the fulfilment of the obligation to record PPA data, *iii)* Promote the maximum dissemination of the results of the sales and purchase operations and monitor the evolution of the mechanism, *iv)* carry out the electricity allocation procedures as mentioned in Decree N. 341 of 16 September 2022 (or Energy Release). To do this, the Bulletin Board is divided into three sections:
    - ***Notices Section,*** in which persons intending to sell/buy PPAs may *i)* publish their advertisements, anonymously and in a non-binding form, *ii)* display advertisements of other participants and, where appropriate, express their interest;
    - ***Contract Registration Section,*** where selling entities can fulfil the obligation to register PPAs already signed;
    - ***Energy Release Section,*** where the procedures for the allocation of the electricity sold by the GSE are carried out in accordance with the provisions of Decree N. 341 of 16 September 2022.
  - **The entry into force of the "Multi NEMO Arrangements" (so-called MNA),** introduced starting from 9 June 2022 as part of the regional day-ahead coupling project on Italian borders (IBWT), in order to allow the operational activities provided by the single coupling to be carried out with all NEMOs designated in the adjacent "Multi NEMO Areas". With specific reference to the Italian market, to date, these agreements cover the borders between Italy and France and Italy and Austria;
  - **The extension of the SIDC on the Italy-Greece border,** which became operational, in coordination with Terna S.p.A. and its Greek counterparts, starting from 29 November 2022 as part of the "4th go-live wave" and aimed at ensuring the integration of the Hellenic Intraday market in European Intraday coupling;
  - **The implementation of functional activities at the go-live of the Intraday auctions (IDA),** the pan-European auctions dedicated to the enhancement of Intraday capacity to replace CRIDA, currently planned in the first half of 2024;
  - **The go-live of the PICASSO project** (*Platform for the International coordination of Automated Frequency Restoration and Stable System Operation*), implementing the provisions of European Commission Regulation (EU) 2017/2195 of 23 November 2017 on the integration of European balancing markets. In this context, as far as it is within its competence, GME has prepared the necessary technical and operational changes to the platforms it manages in the context of the national dispatching market and will proceed in 2023 to complete all activities aimed at the participation of the Italian Network Manager (Terna S.p.A.) on the platform for the exchange of balancing energy from automatically activated secondary reserve (aFRR platform), as scheduled for July 2023 pursuant to what provided in ARERA Resolution 46/2022/R/eel;

- In addition, during 2023, **the start of activities for the implementation of a platform for the supply of electric storage capacity**, organized and managed by GME according to criteria and conditions defined by ARERA, on the basis of the provisions of Legislative Decree N. 210 of 8 November 2021 on the introduction into the architecture of the Italian electricity market of the supply system for electricity storage resources, as support to energy markets, capacity and non-essential services.

◗ in the environmental sector:

- **The expansion of the MCIC platform trading books,** carried out by GME during 2022 to ensure trading for the certificate types "CIC biofuels — source biomethane" and "CIC_{BMTAV} advanced biomethane" related to the year of validity n+1;
- In coordination with the GSE, **the start of activities to transpose the amendments introduced in the field of Guarantees of Origin (GO)** by Legislative Decree N. 196/2001 and subsequent ARERA Resolution 235/2022/R/COM, implementing Article 19 of Directive (EU) 2018/2001, with particular reference to: *i)* the breakdown into individual production periods of the current "Other Months" production period for GOs in the electricity sector and *ii)* the extension of GOs to the gas sector, including biomethane.

MONITORING AND REMIT SERVICES

GME oversees the regular conduct of trading and transactions in the markets that manages through a monitoring activity in order to protect its integrity, in coordination with the main relevant reference institutions (in particular ACER[8] and ARERA) in accordance with the current European and national regulations (REMIT[9], TIMM[10] and TIMMIG[11]),
In addition, GME, as RRM (Registered Reporting Mechanism)[12] and as an ACER-certified IIP (Inside Information Platform) provider, supports market participants in fulfilling their data reporting and inside information publication obligations under the REMIT Regulation.
For this purpose, GME provides participants with two platforms, the Data Reporting Platform (PDR) and the Inside Information Platform (PIP), with respectively 298 and 221 participants registered, for a total annual amount of just over 100 million records transmitted to ACER by the PDR and about 55,000 messages recorded on the PIP.
Both platforms were subject to technical-IT adaptations in 2022 to include the changes to the schemes and standards required by ACER and thus to ensure that they remain fully compliant with the requirements of the European regulator.

8 European Agency for the Cooperation of Energy Regulators.

9 European regulation no. 1227/2011.

10 "Integrated text of the monitoring of the wholesale electricity market and of the market for the dispatching service" (resolution ARG/elt 115/08, as subsequently integrated and amended).

11 "Integrated text of the monitoring of the natural gas wholesale market" (Annex A of the resolution ARERA 631/2018/R/gas).

12 The Registered Reporting Mechanism is the person qualified at ACER for reporting on behalf of market participants subject to the REMIT obligations.

02

Market trends

2.1 ENERGY MARKETS

EUROPEAN ENERGY MARKETS IN THE CHANGED GEOPOLITICAL ENVIRONMENT. 2022 has been characterized by unprecedented levels, increases and volatility in European commodity prices. This phenomenon, which is of international level, already in place at the end of 2021, has further intensified since the beginning of 2022, following the onset of the Russian-Ukrainian conflict and its consequences for Europe in terms of the supply of energy raw materials. The progressive stop to import Russian oil and Russia's drastic cut in gas supplies to Europe have pushed commodity prices to record values, triggering an inflationary spiral not without impacts on energy demand.

The data seem to explain the extent of the phenomenon: *i)* Brent prices have returned to exceed 100 $/bbl (103.81 $/bbl, +46% if compared to 2021), which had not happened since 2014, in line with what was also recorded on US crude oil, as evidence of a global and supranational dynamic, *ii)* The coal price, a fuel that has been used again in the context of gas supply shortages, has more than doubled in a year, reaching an annual average of 288 $/MT (+140%), but with significantly higher monthly peaks, *iii)* the cost of emission rights rose to € 80.9 per ton per year (+51%), increased by both the progressive growth of EU environmental targets and the increased use of fossil fuels induced by the Ukrainian crisis and the increasing drought, *iv)* European gas prices rose by three figures (125/131 €/MWh, +166/+190%), subject to the extreme uncertainty of Russian supplies that led them in some cases to exceed 300 €/MWh on a daily basis, making it difficult to predict its evolution, *v)* electricity prices have reached their all-time highs, diversified by Country according to the increased/reduced structural dependence on gas (Italy: 304.0 €/MWh; France: 275.9 €/MWh; Germany: 235.4 €/MWh) (Fig. 2.1.1, Fig. 2.1.2, Fig. 2.1.3, Fig. 2.1.8).

THE TRANSITION TO NEW BALANCES IN THE GAS SYSTEM. The onset of the Russian-Ukrainian conflict have undermined the relations between Europe and its first natural gas supplier, leading to the need to identify new and additional sources of supply that could ensure to satisfy this demand, not only in the long term, but also and above all in the short term. Without Russian exports, the need to achieve proper storage for the winter season has therefore set in motion mechanisms in each country, often supported by regulatory and institutional interventions, aimed at finding the raw material gas from other suppliers. In the high complexity of this context, Europe has demonstrated a strong adaptability by turning its gas imports mainly to US LNG and gas via pipeline from Norway. Crucial is the contribution to the "redistribution of sources" provided by Italy, which, taking advantage of the peculiarities of its system, has worked to help and facilitate the maximization of flows from Algeria and Azerbaijan and their partial redirecting to the rest of Europe. This responsiveness mitigated the impacts of cutting Russian supplies, allowing adequate stocks to be reached in storage systems and avoiding excessively drastic measures being taken against final consumers, whose demand, however, mainly in the civil and industrial sectors, has returned to the lowest levels of the last five years, reflecting reductions partly sustained by the inflationary spiral and partly triggered by the promotion of energy efficiency measures.

THE EFFECTS OF THE ECONOMIC SITUATION ON THE GAS MARKETS. This particular context had its effect on Europe's gas markets, not only through an increase in the aforementioned exploit of prices, but also for what concerns their volatility, and, while average price levels are broadly aligned on the main continental hubs, some significant spread reversals have been noted during the year. In particular, in 2022, the quotations for the Dutch TTF and the Italian PSV amounted to 125 €/MWh, as proof of increases in percentages of extraordinary intensity (+166%/167% if compared to 2021) and an infra-annual trend characterized by a first peak in March (120/130 €/MWh), which was followed by new records in summer (especially in August, around 230 €/MWh), with further tensions related to the damage and closure of Nord

Stream. This high uncertainty linked to the conflicting news on Russian supplies led to large fluctuations in these two prices in 2022. As consequence, volatility significantly increased on an annual basis (10/11%, +4.9/4.8 p.p. If compared to 2021) and has shown, over the months, a strong persistence to remain at levels rarely seen before[13]. The exceptional variability also affected the daily and intraday developments, on which, taking as an example the Italian PSV, there was a strong amplification *i)* of the spread between the quotations recorded in two consecutive days, substantially a null value until September 2021 (with rare exceptions) and then with a strong growth in 2022 with record monthly peaks in March (63.5 €/MWh) and steadily above 30 €/MWh between July and November; *ii)* the spread between maximum and minimum intra-session price, which is also progressively stronger from September 2021, with its maximum in March 2022 (72 €/MWh) and still very high between July and September (from Fig. 2.1.1 to Fig. 2.1.7).

PRICES IN EUROPEAN ELECTRICITY MARKETS. This particular exceptional condition has been absorbed by the main European electricity markets, which, as a result, have everywhere expressed prices at their all-time highs (Italy: 304.0 €/MWh; France: 275.9 €/MWh; Germany: 235.4 €/MWh), even higher than the already strongly bullish expectations that the futures markets had predicted at the end of 2021 for 2022. In the context of an exponential increase in the costs of the gas raw material, the structural difference between the Italian power park module (where gas is a "baseload" resource) and the French power park module[14] (where gas is a "peak" resource) favoured a significant increase in the spread between the two neighbouring price references (North price - France price: 31.9 €/MWh, about +16 €/MWh).[15]
This statement is also confirmed by the analysis of the differential by day type: the difference between the North and French price, equal to 26.2 €/MWh on working days (14.4 €/MWh in 2021, the previous maximum value recorded in the four-year period 2018-2021), rose, in fact, to almost 45 €/MWh on non-working days (about 19.7 €/MWh the previous maximum value in 2021), days when demand usually drops, with a reduced need of gas in France and therefore with a less "expensive" transalpine power park.
On a monthly basis, the price in the North area was higher than in France in all months of the year, as historically observed for several years now, with few exceptions. There have been peak levels in July and August (50/55 €/MWh), also driven by the figure observed on public holidays (86/112 €/MWh).
The price increase, unexpectedly, has also created opposite effects, with the price gap between Italy and France, even if more intense, with positive results[16] but with a lower frequency. The number of hours in which the North price was equal to or lower than the transalpine price (41%) reached the peak in 2022 for the period 2018-2022, pushing to its lowest values in the same five-year period, in a complementary way, the frequency with which the Italian reference was found to be strictly higher than the French one (59%). This situation must be read both in the structural situation in which Italy is more dependent on gas and in the sharp increase of gas price. Therefore, on those occasions when the North price has been separated from the France import, the price gap has been further widened, fuelled by the growth, significantly increased, of the variable costs underlying the Italian reference[17].

13 The annual volatility was calculated from the daily logarithmic returns of prices, aggregated on a monthly basis in the form of standard deviation. The annual figure was finally obtained as the arithmetic mean of the monthly standard deviations. In particular: 1) Volatility month M = DevStd(RLg), where RLg = ln(Pzg/Pzg-1), with Pzg and Pzg-1 prices on day d and day d-1 respectively of month M (on the first day of month M the ratio is made to the last day of month M-1); 2. Volatility year A: ∑M[DevStd(RLg)]/(number of months year A).

14 Throughout the paragraph, the analyzes were carried out using, for example, France, the largest market to which Italy is interconnected.

15 However, this value, assessed in the light of the highest price levels, remains absolutely in line with the past, even falling in percentage terms to the lowest level of the five-year period 2018-2022 (PzNorth-PzFrance: 10%).

16 As the North-France alignment increased, in 2022 there was a decrease in the share of hours in which Italy, in addition to France, was simultaneously joined with Germany (13% versus 16% in 2021).

17 In the hours when North was separated in import in 2022, the difference between the Italian reference and the French price rose to 57 €/MWh (compared to 25 €/MWh in 2021).

It should also be noted that a higher frequency of alignment (or reversal) between prices of Italy and France was also found at the "most critical" moments of the year, meaning that they were the subset of hours with higher quotations[18] (North price<=France price in 52% of cases, value according to the five-year period only to the figure observed in 2021), both the months of July and August, characterized by particularly high prices (respectively 37% and 44%, values at their second place only if compared to January and March) (from Fig. 2.1.8 to Fig. 2.1.12).

Fig. 2.1.1 Prices of the main European fuels. Annual average

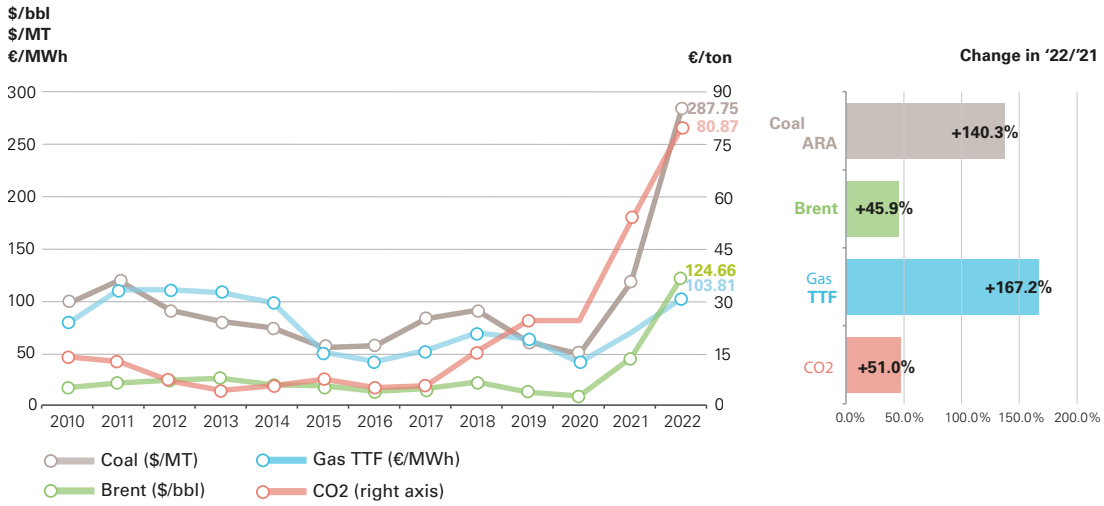
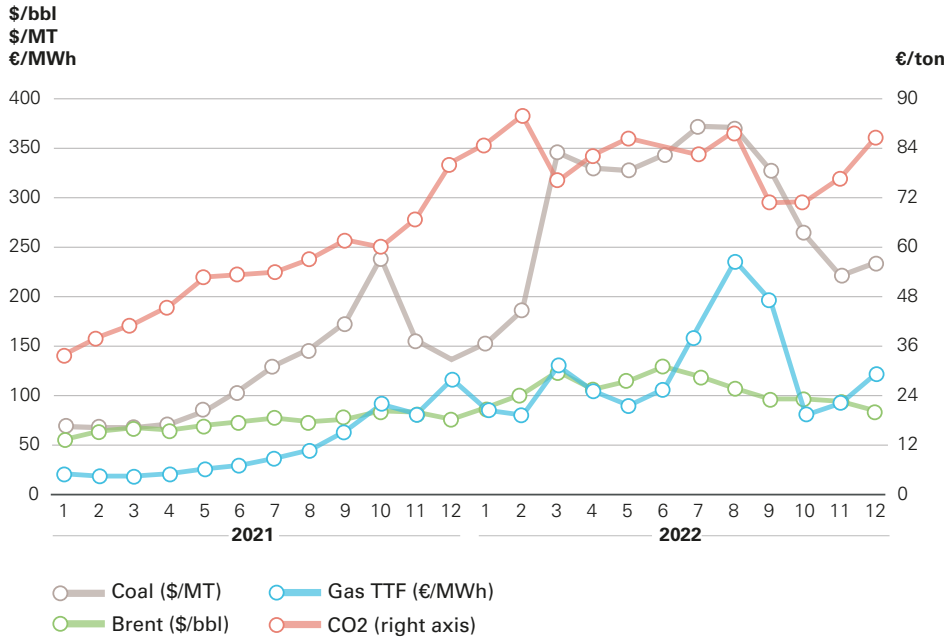


Fig. 2.1.2 Prices of the main European fuels. Monthly trend for the years 2021-2022



18 This refers in particular to the 20% higher priced hours.

Fig. 2.1.3 Prices on the main European gas hubs. Annual average

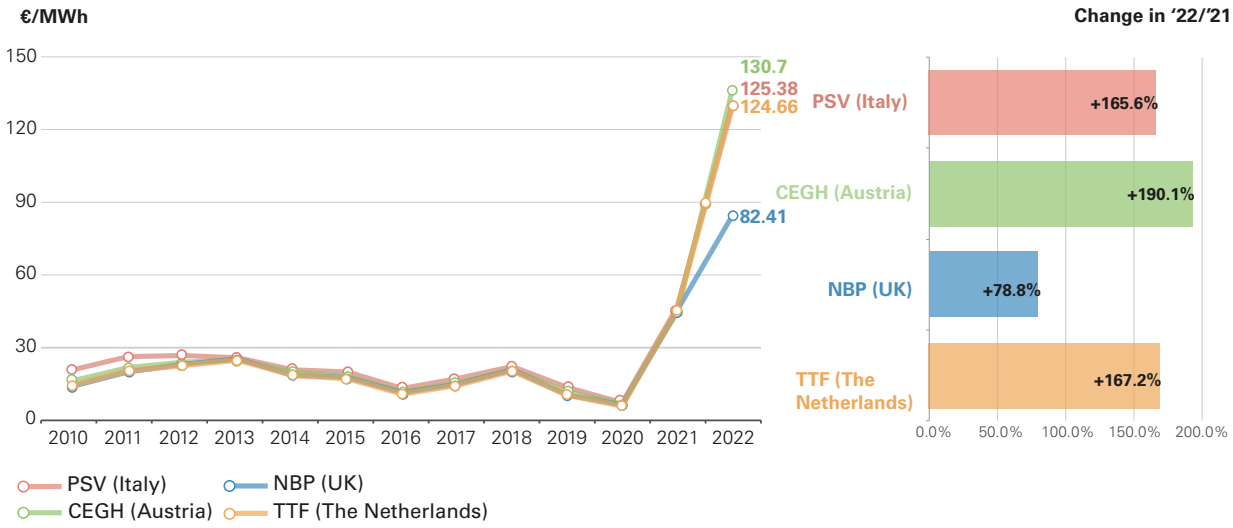


Fig. 2.1.4 PSV and TTF prices. Monthly trend for the years 2021-2022

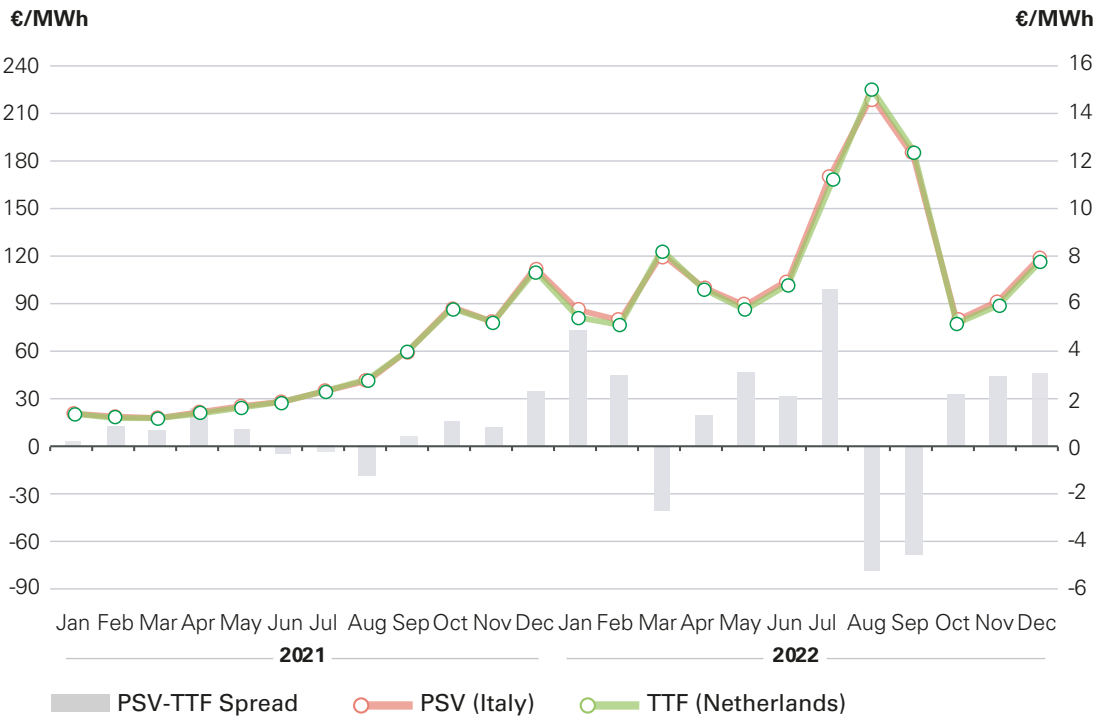


Fig. 2.1.5 PSV and TTF volatile. Monthly trend for the years 2021-2022

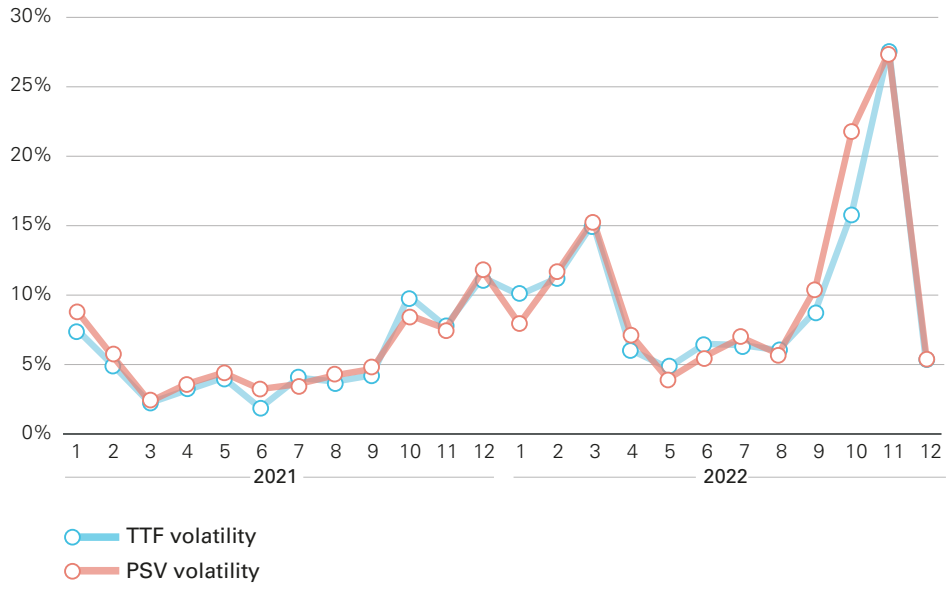


Fig. 2.1.6 PSV daily volatility. Differential between following sessions. Monthly trend 2021-2022

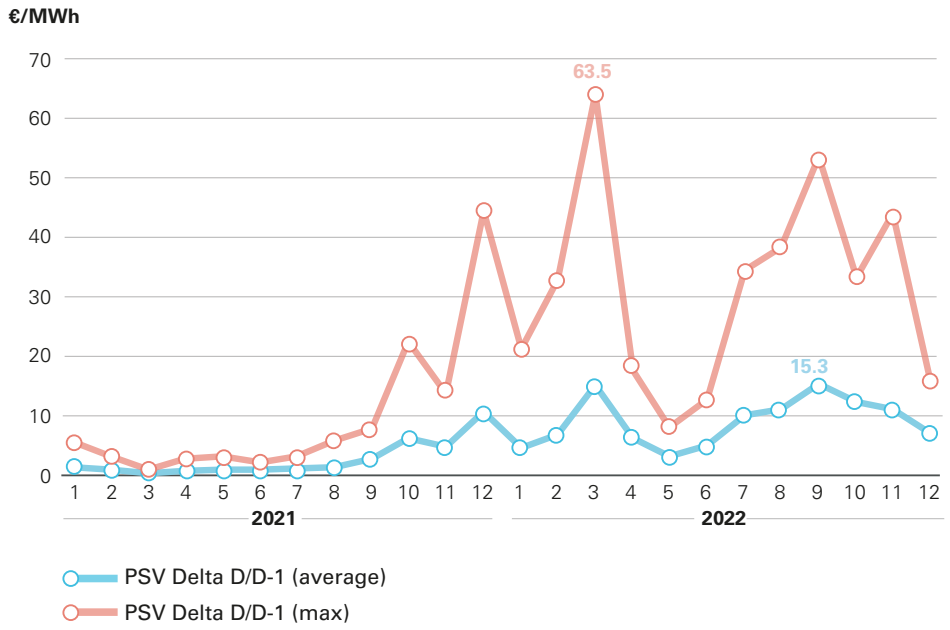


Fig. 2.1.7 PSV intra-session volatility. Monthly data 2021-2022

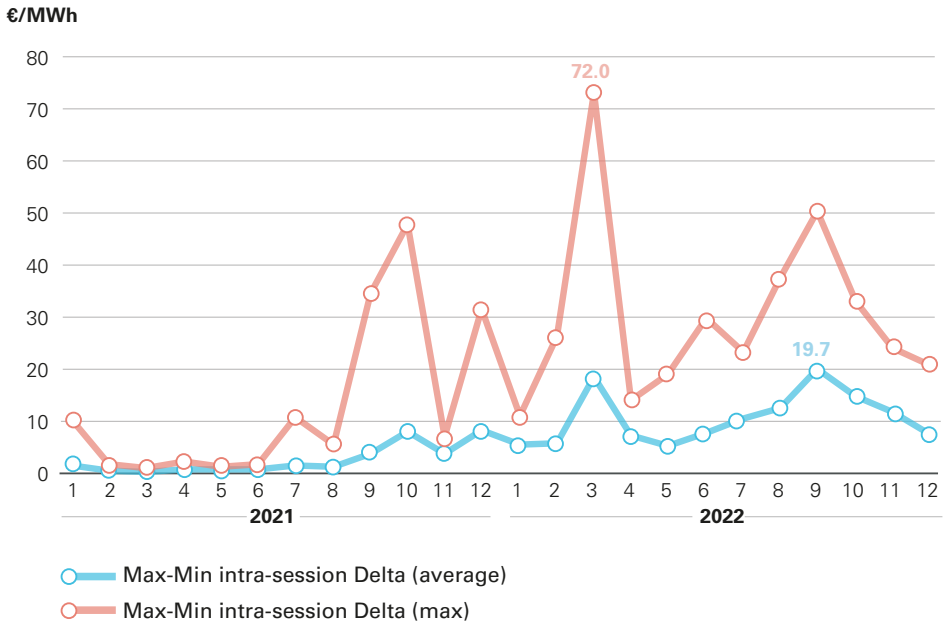


Fig. 2.1.8 Day-ahead prices on the main European power exchanges. Annual average

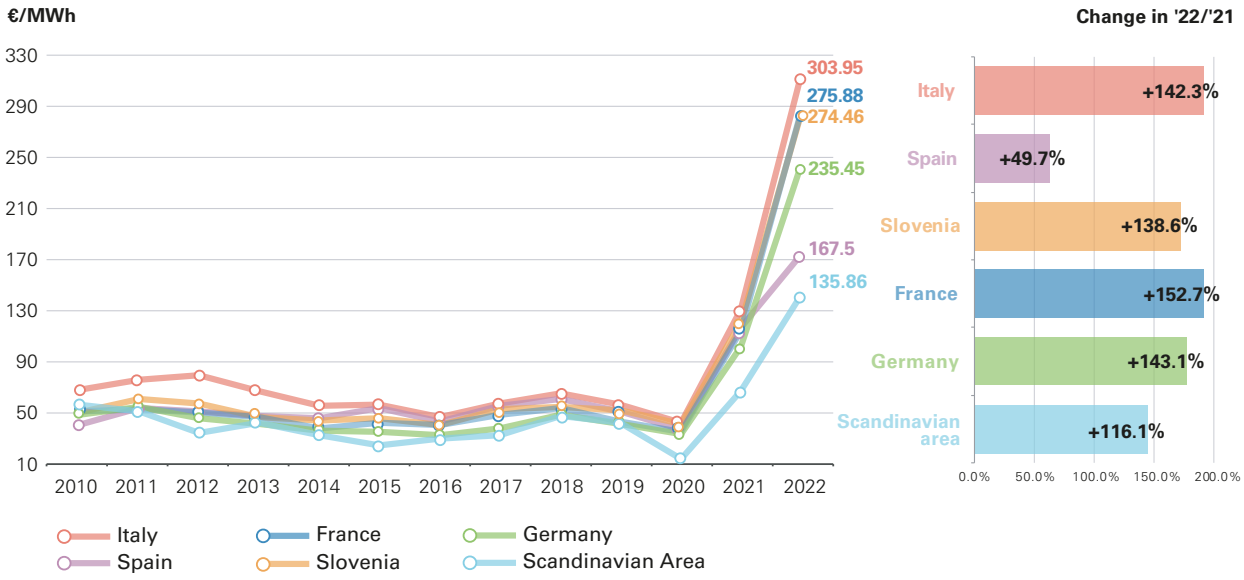


Fig. 2.1.9 Day-ahead prices on the main European power exchanges. Monthly trend for the years 2021-2022

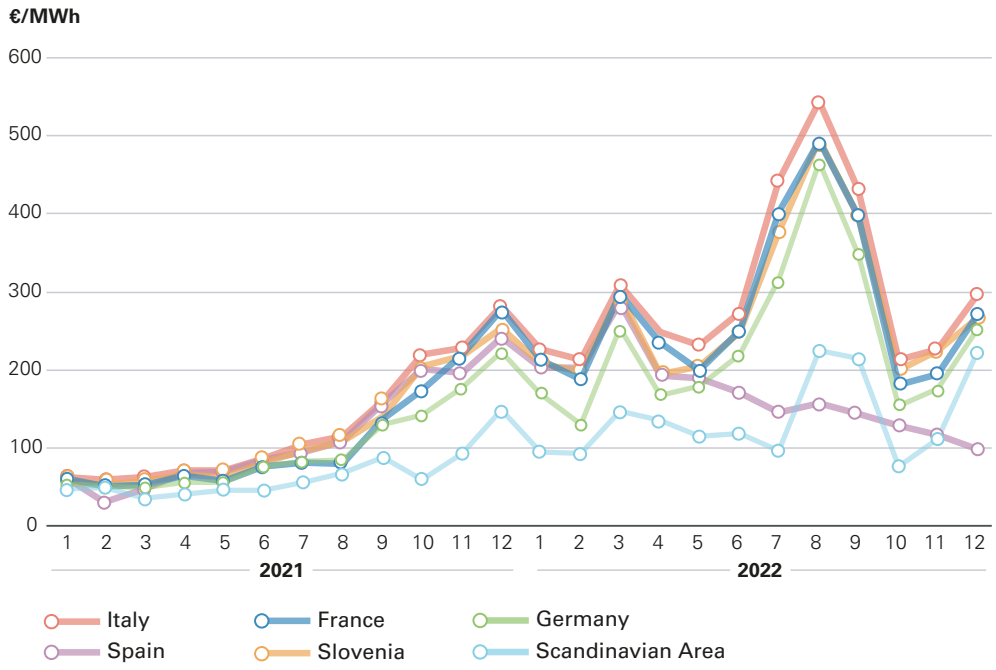


Fig. 2.1.10 North zone price and France price and their differential. Years 2018-2022

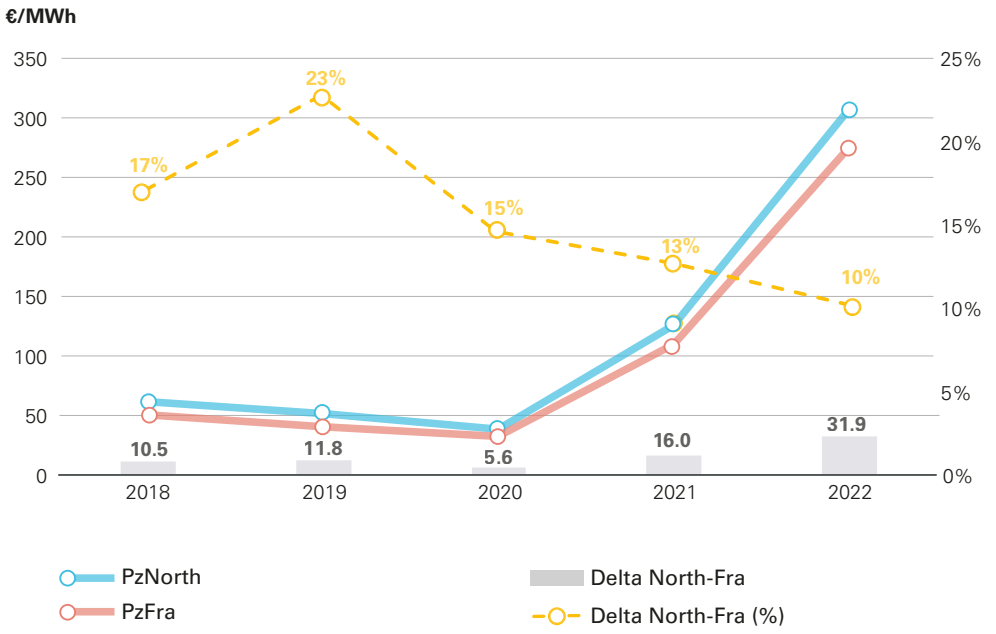


Fig. 2.1.11 North-France alignment frequency. Years 2018-2022

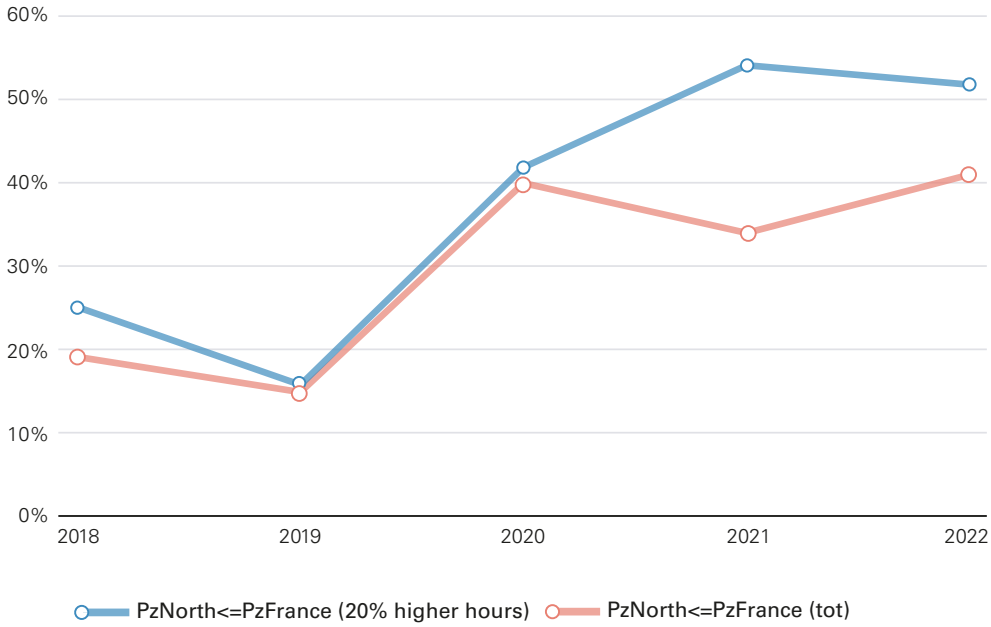


Fig. 2.1.12 Day-ahead prices and corresponding calendar baseload prices

2.2 ELECTRICITY MARKETS IN ITALY

2.2.1 Day-Ahead Market (MGP)

THE EFFECTS OF THE ENERGY CRISIS ON THE MGP. The inflationary push triggered by the surge in gas prices was also reflected in the fall in electricity consumption, which, while remaining at significantly higher levels than in 2020, have returned to decline on an annual basis, as evidenced by the reduction observed in both the energy demand measured by Terna (316.8 TWh, -1.0%), and in the volume of trade recorded by GME on the MGP (289.2 TWh, -0.4%), the latter representing 91.3% of system demand. The decrease in MGP trading affected *i)* the stock exchange component (210.9 TWh, -4.7%), which fell from very high values in 2021 as well as liquidity, which was however lower since the market started only at the peak levels of the previous two years (72.9%, -3.3 p.p.); *ii)* to an almost exclusive extent the period August-December, in which, by reversing the positive trend of the first seven months of the year, the heaviest effects of energy price increases were likely to have been discharged. In terms of price, Italy's increased exposure to spikes, fluctuations and uncertainties in gas prices has not only favoured the formation of day-ahead prices that are higher on average than elsewhere (with specific daily exceptions), but also, sometimes, the temporary expansion, of some differentials stabilized over the past few years on physiological and structural levels, such as the clean spark spread (CSS)[19] and the North-South spread. These dynamics, deepened in the following, were mainly driven by the North area, concentrating in the two-month period of July-August, when, in addition to the gas price increase, the Italian electricity system experienced a significant supply shortage, falling to its all-time lowest values due to, mainly, climate factors (Tab. 2.2.1, from Fig. 2.2.1 to Fig. 2.2.4).

PUN AND CSS. On the Italian MGP, the average annual Pun reached 304.0 €/MWh (+142% on 2021), showing higher levels in July (441.7 €/MWh), August (543.2 €/MWh) and September (429.9 €/MWh)[20] and a volatility of 10.1% (+1.5 p.p. on 2021), lower than that observed in France and Germany (15.7% and 30.7% respectively). The increase in prices affected all hour groups and led to a broadening of the CSS which, from the end of 2021 and throughout 2022, was significantly higher than in the past. In particular, in 2022 the average CSS observed in Italy stood at 40 €/MWh compared to just over 17 €/MWh recorded in 2021 and about 12 €/MWh recorded on average in the four-year period 2018-2021. Strong context uncertainty may have played a significant role in these dynamics, pushing up expectations on generation costs and thus on the resulting CSS. Incorporating a gas volatility effect[21] into the CSS's calculation would reduce the value of the index for 2022, while keeping those in the years before 2021 substantially unchanged (with the latter only impacted in the final quarter). High levels of CSS were recorded throughout the year, resulting, as often happened in the past, particularly marked especially in summer. In this case, July and August had a decisive role in driving the sharp growth of the annual average of the index, with exceptional levels of around 4 times the monthly peak over the previous four-year period. The focus on these two months has shown that *i)* in the case of July, the growth of the CSS was mainly concentrated in the second part

19 CSS was calculated as the difference between the electricity price and a variable cost of the national power park, predominantly related to gas, approximated at first by the formula: PSV/0.54 price + CO2 price *0.39, where 0.54 was considered as the performance of a CCGT plant with 0.39 as its emission factor.

20 In the same months hourly peaks were also observed among the highest of the year (July: 651 €/MWh; August: 870 €/MWh; September: 816 €/MWh)

21 The volatility effect has been included into the gas price by assuming that each daily PSV quotation is added with a volatility calculated as standard deviation of the quotations of the last 5 days or the last 10 days.

of the month, when in some days the index even exceeded 200 €/MWh; *ii)* on these days, the Pun showed large increases, driven in particular by the North which between 19 and 31 July experienced a clean spark spread on average higher than that of the South of almost 59 €/MWh (147 €/MWh vs. 89 €/MWh) due also to specific internal dynamics (further details in the following paragraph); *iii)* in the case of August, on the other hand, the CSS exploit was distributed more over the days, affecting substantially all the areas as evidenced by the narrowing of the North-South differentials (just under 8 €/MWh) (from Fig. 2.2.5 to Fig. 2.2.8).

THE ROLE AND DYNAMICS OF THE NORTH AREA. The most relevant macro data observed at zonal level is the reversal of the historical price ranking, which for the first time was higher in the North (307.8 €/MWh) and lower in the islands (287/295 €/MWh), where, even in a strongly bullish context, several hours were also recorded at 0 €/MWh (48 in Sicily, 101 in Sardinia). The national observations therefore mainly stem from the dynamics observed in the North, both because of the increased structural weight in terms of volumes and because of the presence of current situations that had a significant impact on the supply-demand balance.
In particular, reference is made to the high level of supply shortages caused by the particularly dry climate, which, especially in the hot months typically characterized by high demand, has made hydroelectric and, in part, combined-cycle plants unavailable, by accentuating the already significant effects of the gas price race and gradually pushing the zonal reserve margin to its lowest levels for the five-year period 2018-2022[22]. No less important contribution to the shortage in the North came from the reduced availability of competitive supply from Central and Northern Europe, which is affected by similar difficult production conditions and more often aligned with Italian prices.
The low level of domestic supply and the presence of more expensive foreign volumes pushed in 2022 the price differential between North and South, in the absence of significant reductions in the internal transit limits of the peninsula, to 12 €/MWh (South: 295.8 €/MWh), compared to values between - 1.2 €/MWh and 1.6 €/MWh in the previous four years. As confirmation of this situation, it can indeed be observed that the hours when the spread between the two prices was higher showed high residual demand in the North[23], *ii)* French prices are high and close to those in the North (in about 74% of the 664 hours in which the North-South delta was greater than 50 €/MWh, the North-France differential was small, on average with negative value, about -3 €/MWh). With regard to this second case, the observations made in 2022 seem to reinforce the "driving effect" carried out by France on the price of the North also in the two-year period 2020-2021, in which, in most of the hours in which the North-South delta was significant[24], The North-France differential was negative on average and was -0.6 €/MWh.

22 The reserve capacity figure was approximated to the level of the rejected offer.

23 Residual demand in the North is calculated as the difference between purchases and sales of FER (including water), coal and foreign imports.

24 This refers to about 77% of the total 1,066 hours in which the North-South delta was greater than 10 €/MWh.

The strong competitive supply shortages have been addressed by the North *i)* transforming itself into a South structural importer and reversing flows which, especially in the summer, were often directed in the opposite direction, *ii)* pushing the use of available CCGT facilities to the maximum, the success rate was very high (in July 68% versus 61% in 2021, in August 63% versus 47% in 2021) and in 838 hours over 90% (250 in 2021), *iii)* using, where necessary, the more expensive supply of pumping systems.
These dynamics were also reflected in the marginality of the area, showing a clear predominance of hours in which the price in the North was set by CCGT power plants (52%, was 49% in 2021) or from abroad (29%, was 25% in 2021), confirming the low contribution of the hydroelectric component[25] (9%, 15% in 2021) and the European dimension of the exceptional price increases recorded in 2022. The two-month period July-August, characterized by the most extreme price dynamics, showed no substantial differences compared to the rest of the year: combined cycle power plants have been confirmed as the most available technology, offered in the context of a rather distributed audience of participants, followed by the foreign "source", prevailing in the subset of hours characterized by very high North quotations[26] (from Fig. 2.2.9 to Fig. 2.2.15, Tab. 2.2.2, Tab. 2.2.3).

FURTHER NATIONAL DYNAMICS: SOURCES AND FOREIGN TRADING. In terms of composition of national sales[27], in 2022, the number of thermoelectric power plants (156.3 TWh, 65% of national sales) increased significantly, fed, in addition to the already mentioned CCGT facilities (120.6 TWh, 50%), also by coal (21.0 TWh, 9%), which was gradually decommissioned in the three-year period 2019-2021, and by fuel oil, In the context defined by Decree-Law N. 16 of 28 February 2022 and ARERA Resolution 430/2022/R/eel, which aim to ensure the maximisation of the use of thermoelectric sources other than "scarce resource" of gas. At the lowest levels in the last decade, the volumes from renewable sources (82.9 TWh, 35%), whose decline is driven by the collapse of hydroelectric power plants[28] (34.8 TWh, 14%), supported by solar power plants (23.8 TWh, 10%) and only partially limited by the good performance of wind power plants (20.1 TWh, 8%). For what concerns foreign trading, the Italian net import, amounting to 44.0 TWh, showed a slight decrease in 2022 (-0.6 TWh compared to 2021), due to an increase in export flows (+1.3 TWh) higher than import flows (+0.7 TWh). This dynamic has been mainly related to the South-East Area, mainly affecting Greece, where exports have more than doubled in contrast to the increase in imports observed on the most important North borders, in particular from Switzerland. In the individual months, the lowest annual level of net imports was recorded in December, marked, in the first fifteen days, by foreign prices frequently higher or in line with the North price, then by reductions in the Swiss NTC and, finally, by limitations induced by the activation by the TSO of the generalised constraint for joint and safe management of North border flows in coupling (Tab. 2.2.4 and Fig. 2.2.16).

25 The figure was calculated with run-of-river power plants, modulation and pumped-storage power stations in a single entry.

26 In the 345 hours when the price in the North was greater than or equal to 600 €/MWh, foreign countries were marginal 98 times, followed by CCGT power plants (90 times) and pumped-storage power stations (89).

27 Domestic sales are total Italian sales without foreign volumes.

28 The figure was calculated with run-of-river power plants, modulation and pumped-storage power stations in a single entry.

Tab. 2.2.1 Volume trend in the MGP

TWh	2015	2016	2017	2018	2019	2020	2021	2022	Change '22/'21
Terna request	**316.9**	**314.3**	**320.5**	**321.4**	**319.6**	**301.2**	**319.9**	**316.8**	**-1.0%**
Demand	**305.3**	**301.5**	**297.4**	**301.6**	**302.3**	**287.2**	**298.6**	**296.1**	**-0.8%**
rejected	*18.2*	*11.8*	*5.2*	*6.0*	*6.5*	*7.1*	*8.2*	*6.9*	-15.5%
Purchases	**287.1**	**289.7**	**292.2**	**295.6**	**295.8**	**280.2**	**290.4**	**289.2**	**-0.4%**
% upon Terna request	90.6%	92.2%	91.2%	92.0%	92.6%	93.0%	90.8%	91.3%	0.5%
Supply	**500.2**	**502.4**	**489.9**	**507.5**	**503.6**	**496.7**	**472.4**	**455.5**	**-3.6%**
Sales	**287.1**	**289.7**	**292.2**	**295.6**	**295.8**	**280.2**	**290.4**	**289.2**	**-0.4%**
with price <= 0	190.5	172.2	162.6	165.6	166.2	168.8	166.2	156.5	-5.8%

Fig. 2.2.1 MGP Liquidity

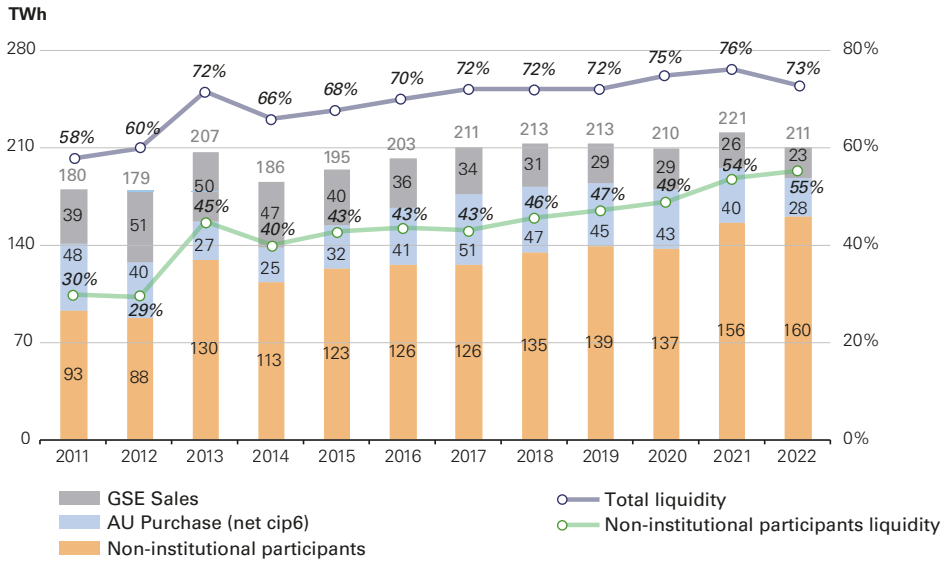


Fig. 2.2.2 Supply in the MGP

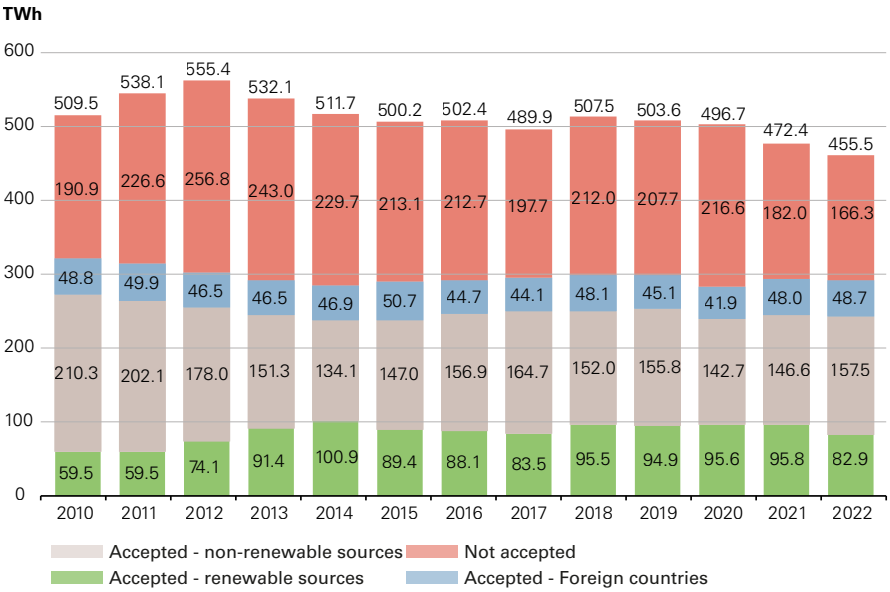


Fig. 2.2.3 MGP Volumes. Monthly trend for the years 2021-2022

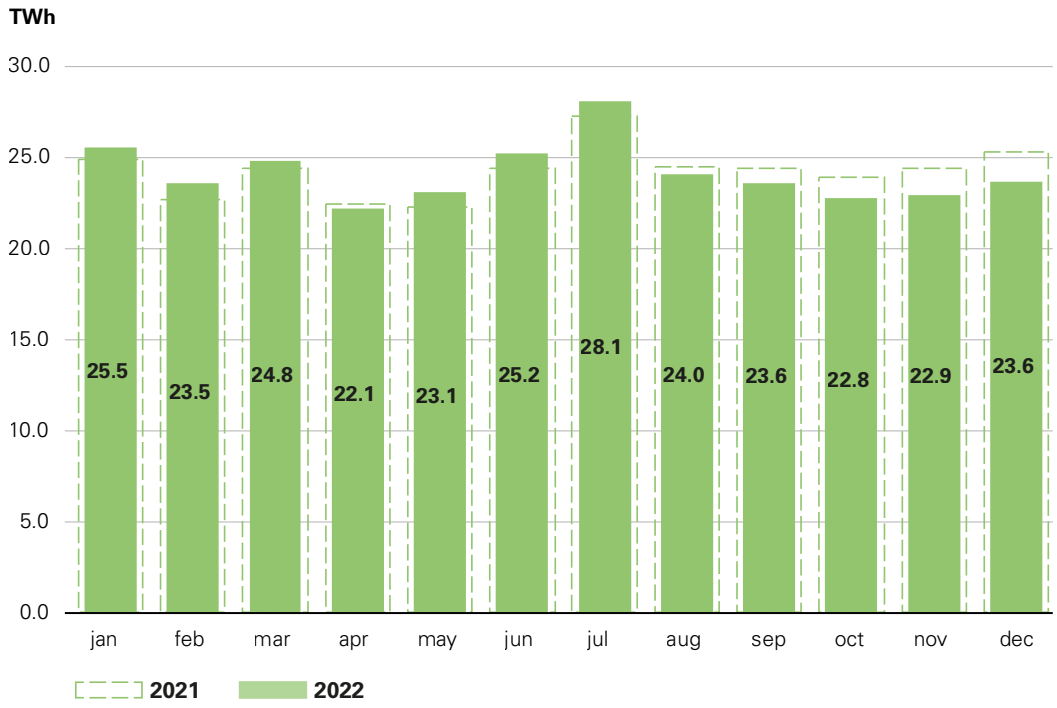


Fig. 2.2.4 PUN trend and its determinants

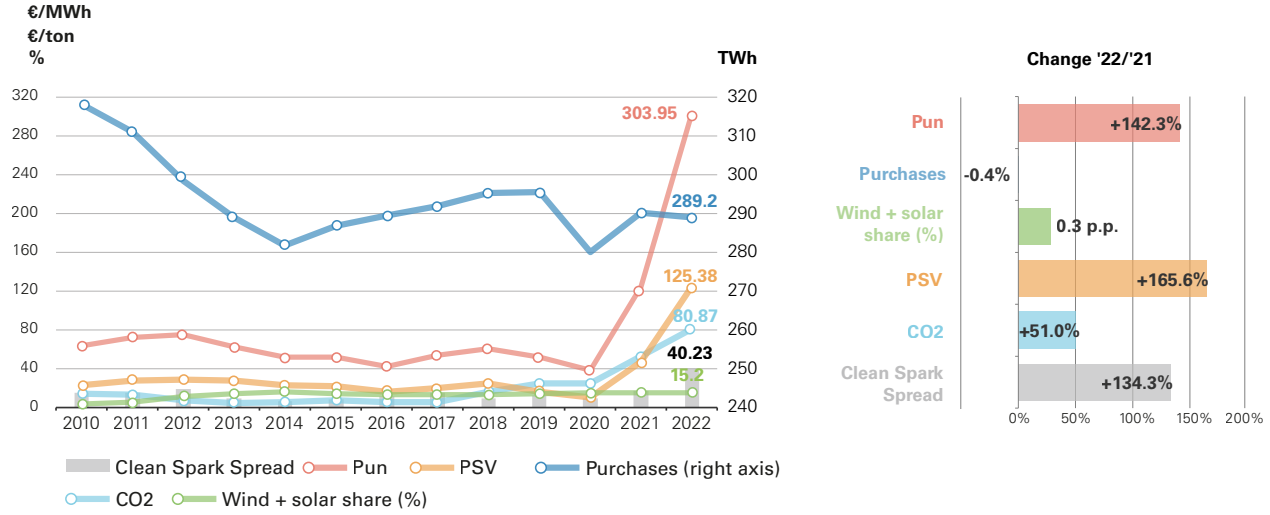


Fig. 2.2.5 Pun Variation. Monthly trend year 2022

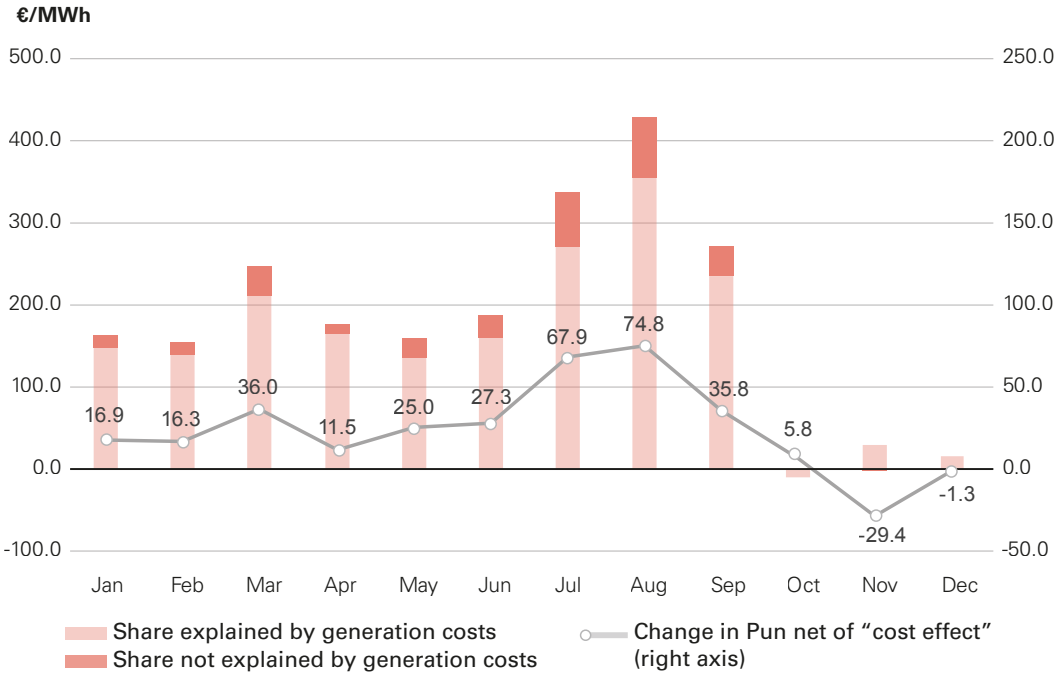


Fig. 2.2.6 Pun by groups of hours. Annual average

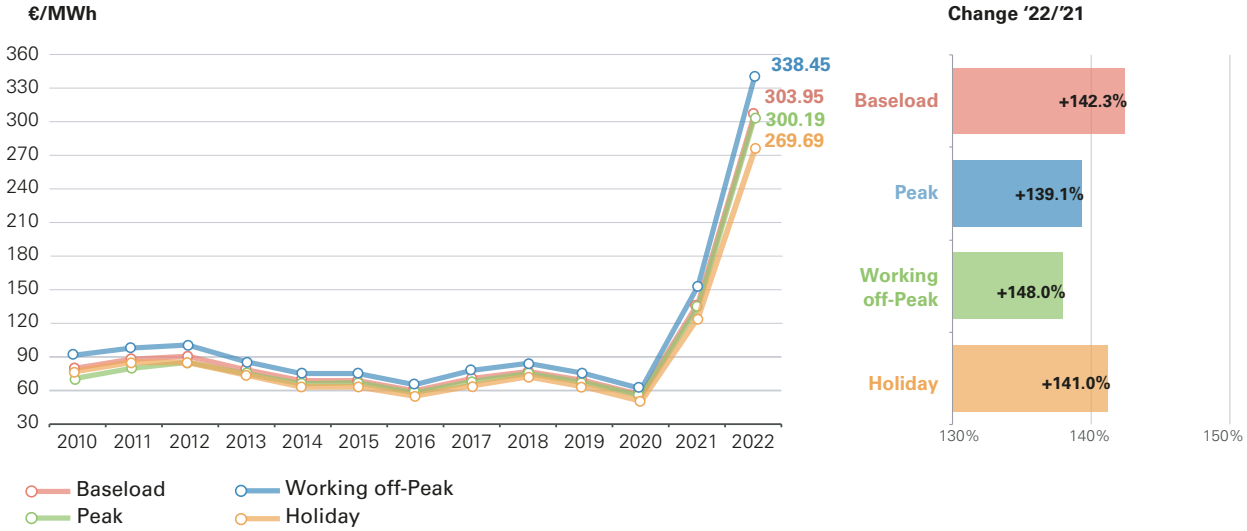


Fig. 2.2.7 CSS years 2018 – 2022. Annual average

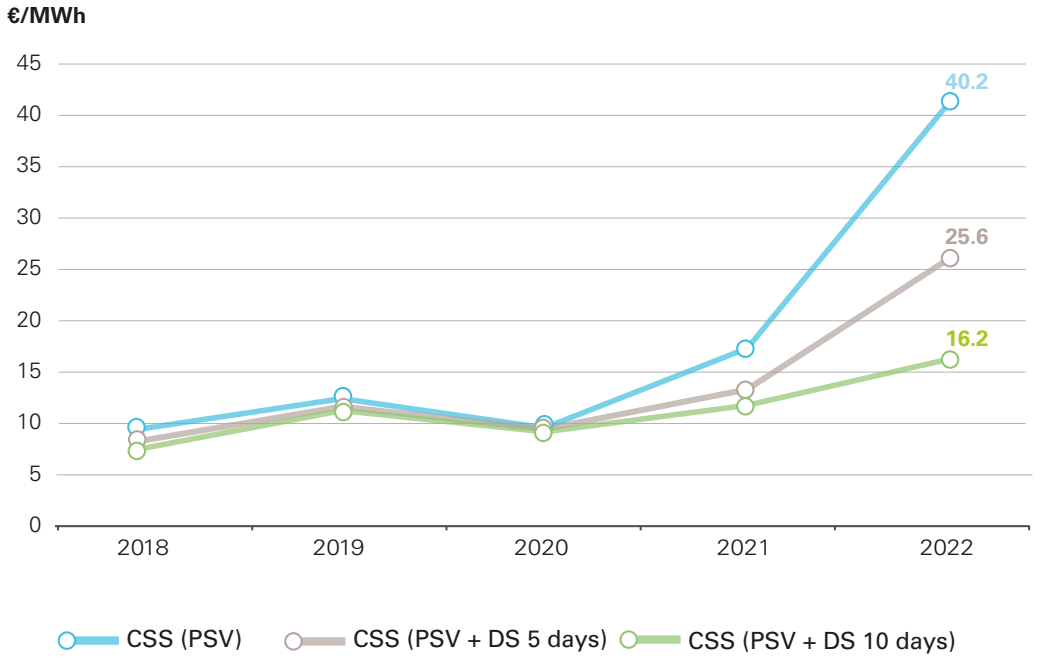


Fig. 2.2.8 Pun and CSS. Monthly trend for the years 2021-2022

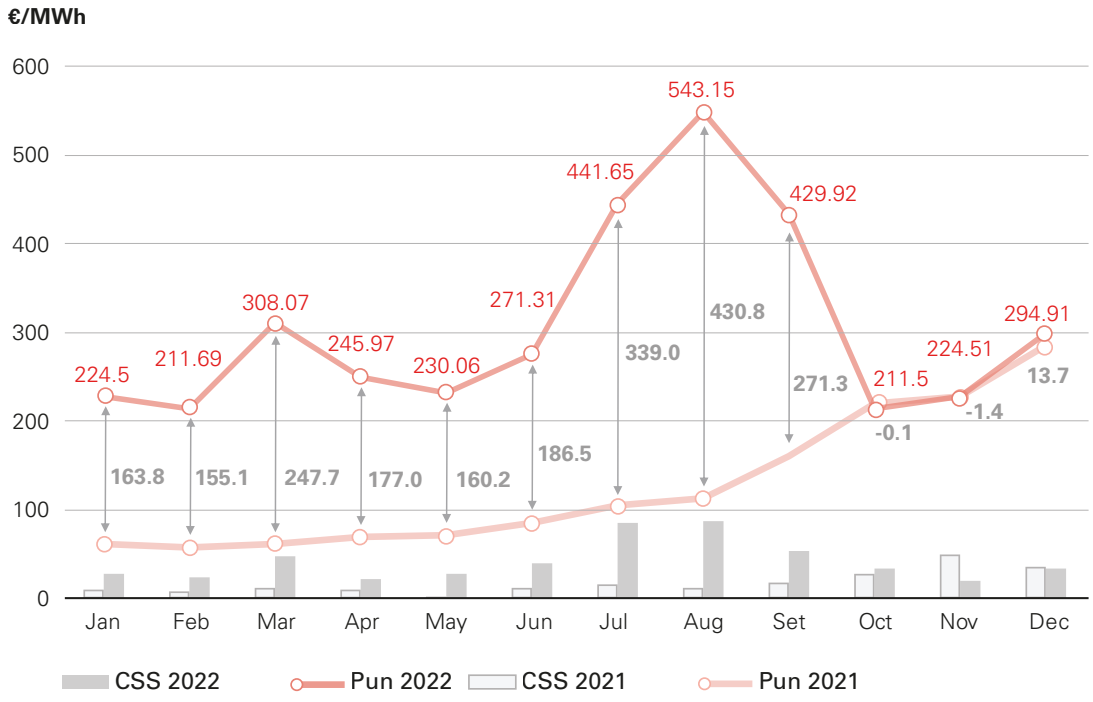


Fig. 2.2.9 Average annual zonal prices in the MGP

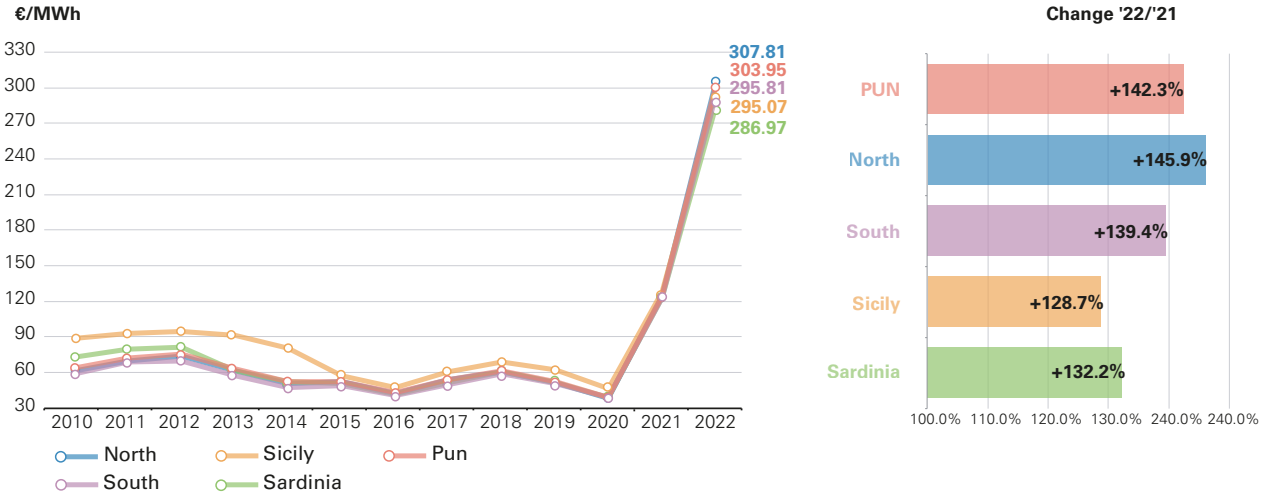


Fig. 2.2.10 Zonal prices. Monthly trend for the years 2021-2022

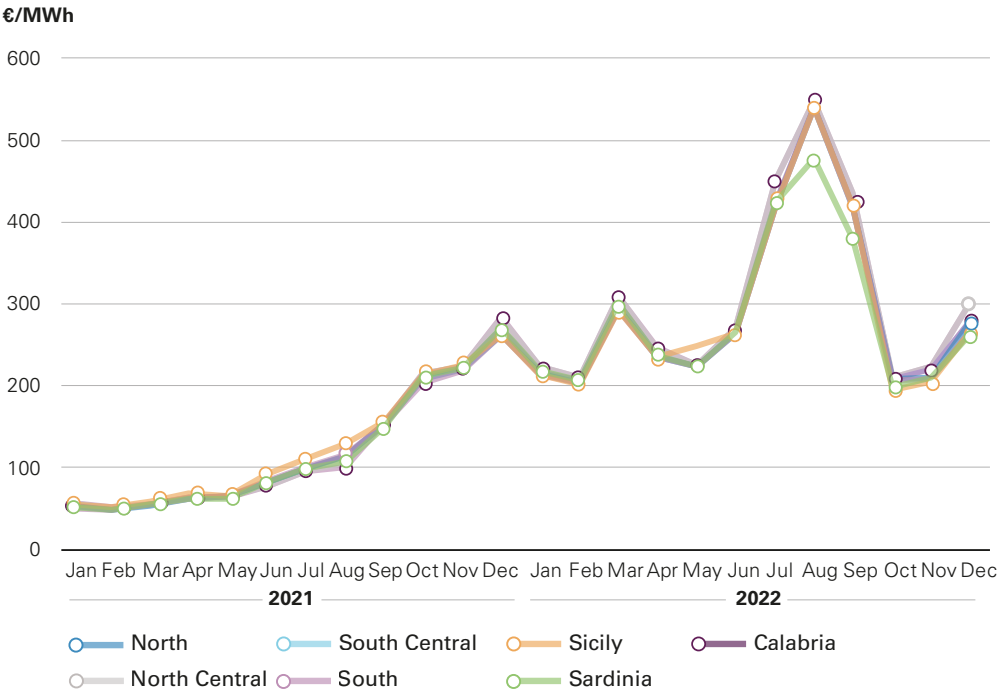
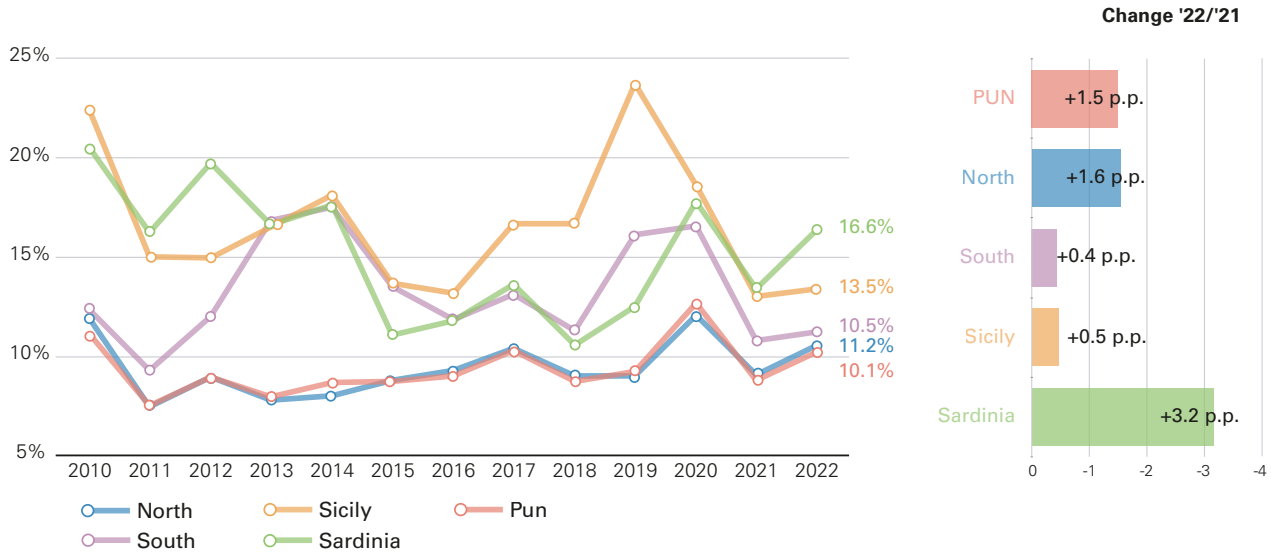


Fig. 2.2.11 Price volatility

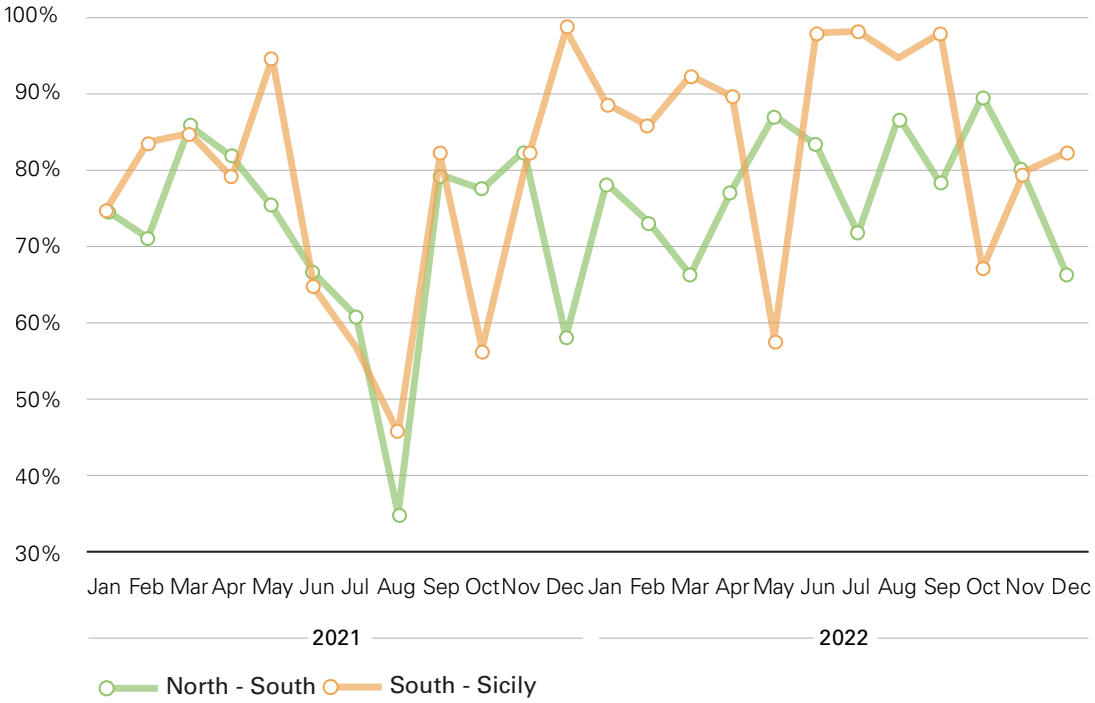


Tab. 2.2.2 Zero prices and day/night price reversals in the MGP. Year 2022

	PUN		North		Centre North		Centre South		South		Calabria		Sardinia		Sicily	
N° hours with price equal to zero	**-**	*(0)*	**-**	*(0)*	**-**	*(0)*	**-**	*(0)*	**2**	*(0)*	**3**	*(0)*	**101**	*(70)*	**48**	*(0)*
N. of sessions with at least an hourly price equal to zero	**-**	*(0)*	**-**	*(0)*	**-**	*(0)*	**-**	*(0)*	**1**	*(0)*	**1**	*(0)*	**18**	*(16)*	**8**	*(0)*
N. of sessions with day-time prices<night- time prices	**97**	*(81)*	**93**	*(66)*	**93**	*(74)*	**119**	*(99)*	**133**	*(111)*	**136**	*(121)*	**137**	*(118)*	**145**	*(137)*
% of sessions with day-time prices<night-time prices	**26.6%**	*(22.2%)*	**25.5%**	*(18.1%)*	**25.5%**	*(20.3%)*	**32.6%**	*(27.1%)*	**36.4%**	*(30.4%)*	**37.3%**	*(33.2%)*	**37.5%**	*(32.3%)*	**39.7%**	*(37.5%)*
Average difference in sessions with daytime prices <night-time prices. €/MWh	**-36.84**	*(-6.63)*	**-36.45**	*(-5.78)*	**-37.72**	*(-6.02)*	**-35.52**	*(-9.17)*	**-36.34**	*(-9.46)*	**-35.87**	*(-10.65)*	**-62.89**	*(-15.35)*	**-37.34**	*(-10.58)*

() Values of the previous year

Fig. 2.2.12 Frequency of zonal alignment. Monthly trend for the years 2021-2022



Tab. 2.2.3 Zonal volumes in the MGP (TWh). Year 2022

Area	Purchases		Sales		Supply		Demand		Rejected Supplies	
North	159.86	*(-0.7%)*	116.30	*(-9.7%)*	196.23	*(-15.4%)*	161.35	*(-1.5%)*	79.93	*(-22.4%)*
Centre North	24.51	*(-0.2%)*	14.94	*(-7.2%)*	17.65	*(-8.3%)*	24.84	*(-1.2%)*	2.71	*(-14.3%)*
Centre South	49.76	*(-1.7%)*	29.21	*(+0.7%)*	64.44	*(+16.1%)*	50.13	*(-1.8%)*	35.23	*(+33.0%)*
South	18.03	*(-0.3%)*	36.55	*(+17.0%)*	53.95	*(+18.1%)*	18.19	*(-0.6%)*	17.40	*(+20.5%)*
Calabria	5.61	(-4.9%)	14.55	(-3.7%)	29.31	(+7.1%)	5.63	(-4.8%)	14.76	(+20.3%)
Sicily	17.41	*(+1.7%)*	16.41	*(+56.0%)*	28.92	*(+9.3%)*	17.46	*(+0.8%)*	12.50	*(-21.6%)*
Sardinia	8.47	*(-4.4%)*	12.50	*(+7.6%)*	14.90	*(-11.5%)*	8.61	*(-4.6%)*	2.41	*(-54.0%)*
Foreign countries	5.53	*(+29.6%)*	48.72	*(+1.5%)*	50.11	*(+1.4%)*	9.89	*(+22.5%)*	1.39	*(-1.6%)*
Italy	**289.17**	**(-0.4%)**	**289.17**	**(-0.4%)**	**455.50**	**(-3.6%)**	**296.10**	**(-0.8%)**	**166.33**	**(-8.6%)**

() The values of the previous year are shown in brackets

Fig. 2.2.13 Italy and North "Reserve capacity". Monthly trend for the years 2021-2022

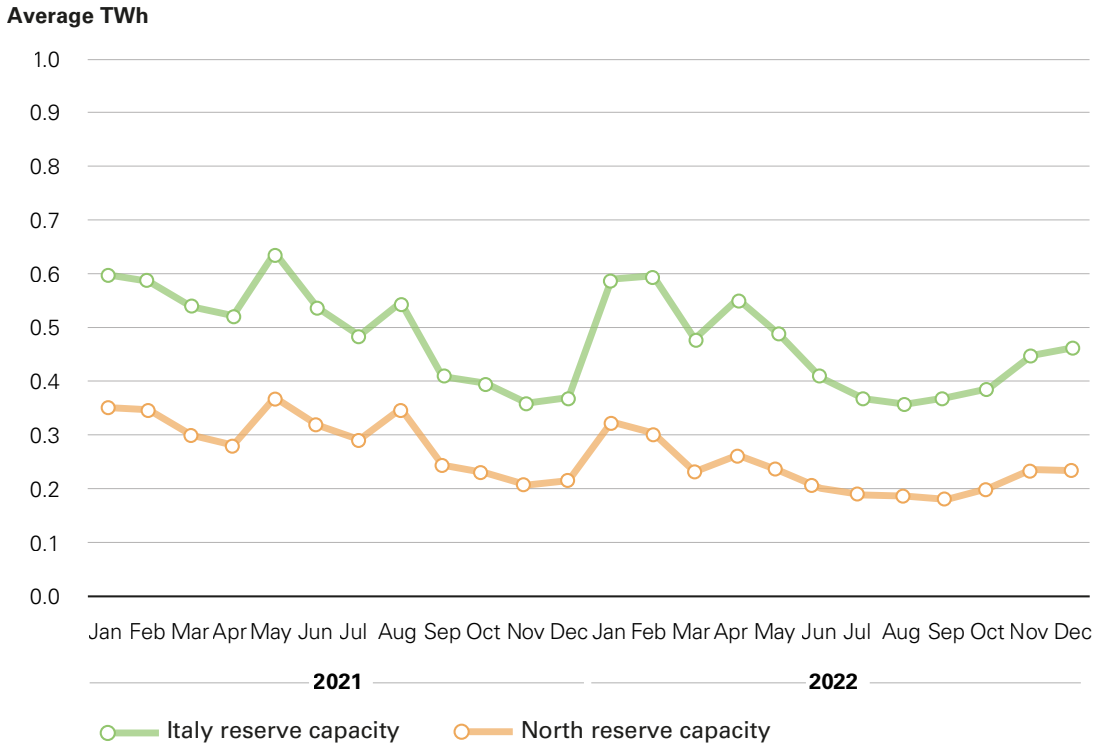


Fig. 2.2.14 Offer in the North Zone. Monthly trend for the years 2021-2022

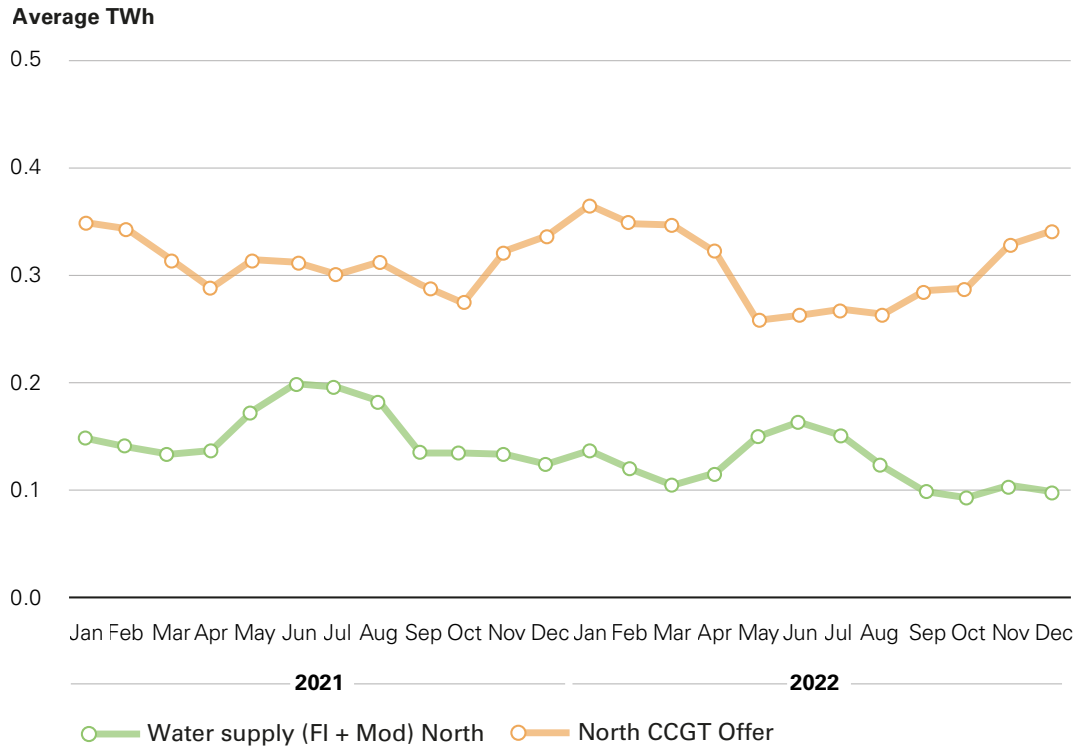
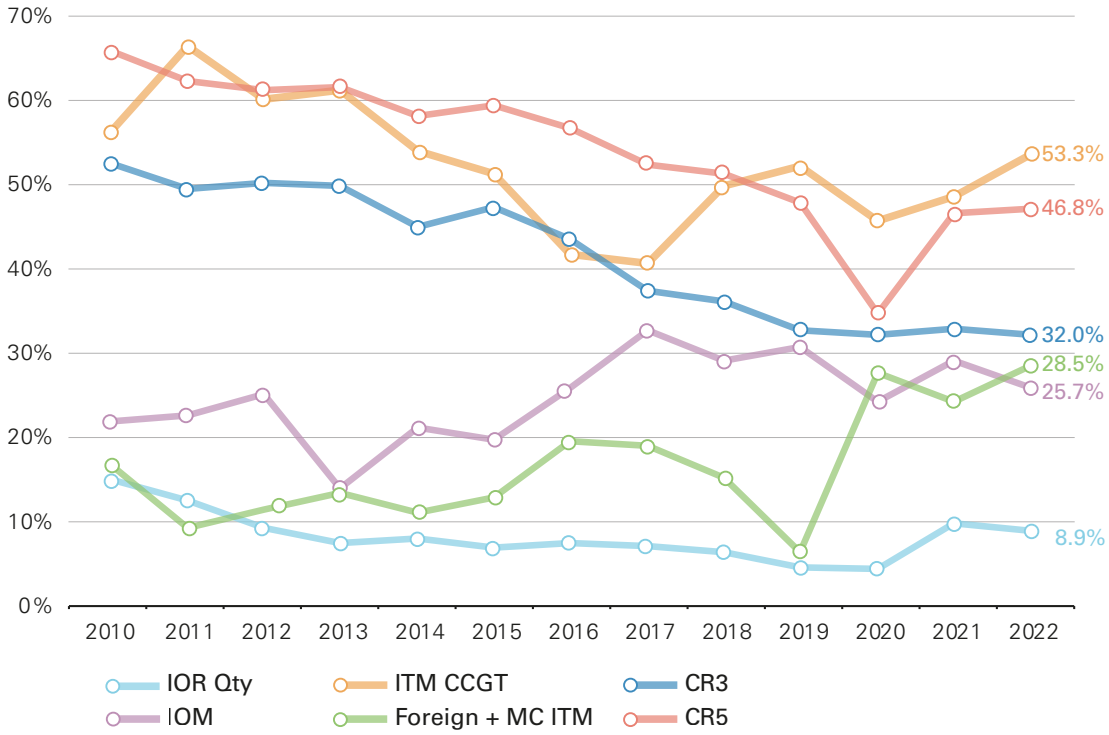


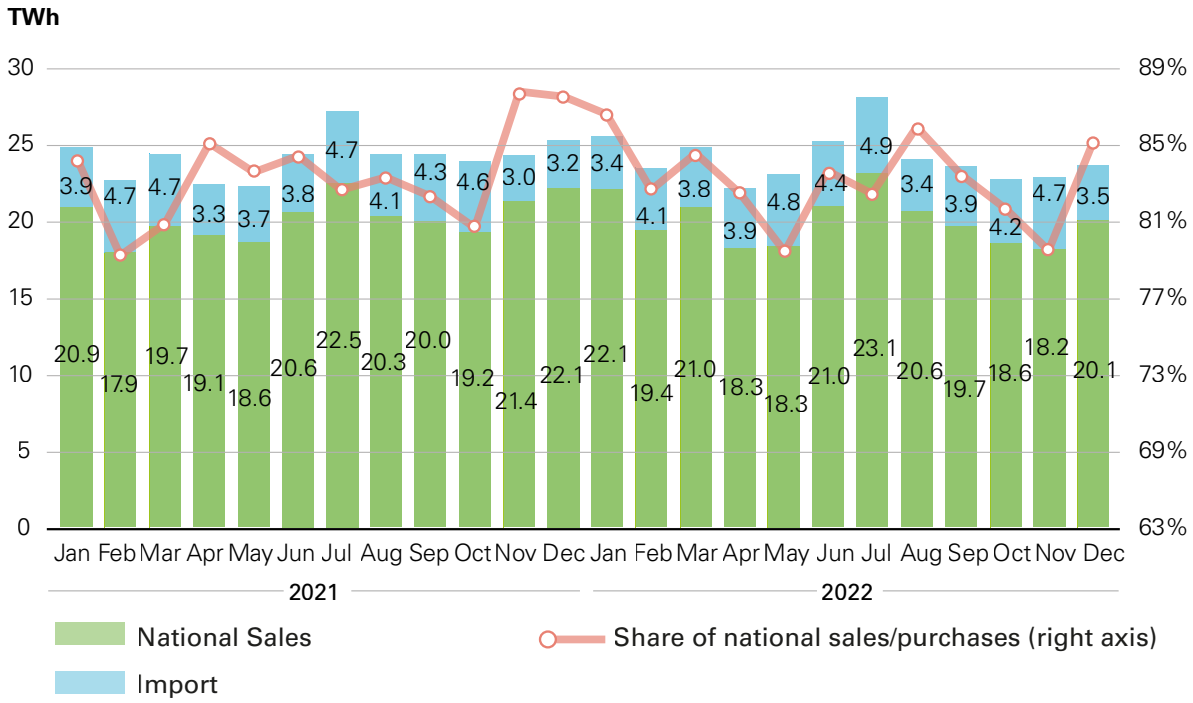
Fig. 2.2.15 Competitiveness indicators



Tab. 2.2.4 Zonal sales by source and technology (average MWh). Year 2022

	North		Centre North		Centre South		South		Calabria		Sicily		Sardinia		Italy system	
	MWh	Var	MWh	Var	MWh	Var	MWh	Var	MWh	Var	MWh	Var	MWh	Var	MWh	Var
Traditional sources	**9,183**	***+0.9%***	**698**	***-6.3%***	**1,983**	***+8.0%***	**2,454**	***+25.4%***	**1,238**	***-3.4%***	**1,243**	***+98.7%***	**1,045**	***+10.7%***	**17,845**	***+8.2%***
Gas	7,990	*-1.4%*	651	*-6.0%*	1,090	*-7.2%*	1,438	*-1.6%*	1,109	*-3.9%*	990	*+92.7%*	501	*+13.2%*	13,769	*+1.6%*
Coal	409	*+179.2%*	-	-	655	*+53.3%*	856	*+146.3%*	-	-	-	-	479	*+7.7%*	2,398	*+75.6%*
Other	784	*-7.4%*	47	*-9.6%*	239	*+1.7%*	160	*+8.4%*	129	*+1.2%*	254	*+126.3%*	64	*+15.2%*	1,678	*+6.4%*
Renewable sources	**3,979**	***-26.3%***	**1,007**	***-7.8%***	**1,332**	***-7.6%***	**1,718**	***+6.8%***	**423**	***-4.4%***	**627**	***+9.4%***	**381**	***+0.2%***	**9,468**	***- 13.4%***
Hydraulic	2,392	*-35.2%*	161	*-28.8%*	508	*-26.5%*	435	*+6.4%*	117	-	148	*+19.3%*	77	*-11.1%*	3,838	*- 28.4%*
Geothermal	-	-	622	*-1.7%*	-	-	0	-	0	*-100.0%*	-	-	-	-	622	*- 1.7%*
Wind	17	*+57.1%*	23	*-15.3%*	463	*+14.5%*	996	*+9.9%*	243	*-3.8%*	357	*+5.0%*	194	*+1.0%*	2,294	*+7.5%*
Solar and others	1,570	*-7.2%*	201	*-2.4%*	361	*+4.3%*	288	*-2.1%*	63	*+1.6%*	121	*+11.7%*	110	*+8.2%*	2,713	*-3.4%*
Pumping	**114**	***-45.4%***	**-**	**-**	**18**	***-44.9%***	**-**	**-**	**-**	**-**	**4**	***+43.5%***	**1**	***-50.0%***	**136**	***- 44.4%***
Total	**13,276**	***-9.7%***	**1,705**	***-7.2%***	**3,334**	***+0.7%***	**4,172**	***+17.0%***	**1,661**	***-3.7%***	**1,874**	***+56.0%***	**1,427**	***+7.6%***	**27,449**	***- 0.8%***

Fig. 2.2.16 Distribution of sales. Monthly trend for the years 2021-2022



2.2.2 The Intra-day Market (MI)

THE FIRST YEAR OF FULL OPERATION. In the first year of full operation of the new set-up, characterized by a continuous trading session in coupling with the rest of Europe (XBID) and three local auctions (MI-A1, MI-A2, MI-A3), the Intra-day market showed a consolidation of the dynamics already emerging in the last three months of 2021, it is a tool to support participants in setting their production schedules especially in a very volatile year like 2022.
Overall, in 2022, the volumes traded on the MI were in line with the previous year, at 26.0 TWh (-0.3%), still among the highest in the last decade. Trends just outlined in the final quarter of 2021 found new strength in 2022, highlighting *i)* the confirmation of a greater use of auctions on an annual basis (21.9 TWh, approximately 85% of the total), and in particular of the MI-A1 (13.9 TWh), *ii)* a progressive greater use of continuous trading, in which almost 1.7 million combinations were concluded for over 4.0 TWh (15% of the total), mostly traded after the auction MI-A2 (phases 2 and 3 of the XBID), *iii)* in the XBID, the confirmation of a prevalence of trades carried out with a foreign counterparty (68% of the total XBID against shares equal to 7% and 25% of trades which took place respectively at within the same national zone or between national zones, *iv)* a greater intention to operate close to real time as evidenced by the high shares of exchanges recorded in the four and eight hours prior to delivery (respectively 50% and 73%), *v)* a high use of XBID by renewable plants, counterparties in about 50% of combined volumes both in sales and purchases, *vi)* a stabilization in the use of tools made available by continuous negotiation, such as, for example, portfolio offers (23% and 26% of the total in purchases and sales respectively) and basket offers (68% of the total).
On a local basis, while the North is the most significant area in terms of both the amount of electricity purchased and sold, the volumes had contrasting variations, but, in general, of the same intensity. Indeed, on both sides of the market, the decline in trading observed mainly in the North, South and Calabria had a full compensation by the strong increase in trade in the South Central, abroad and in Sicily, This has the effect of having the aforementioned substantial stability of the annual volumes contracted in total on the MI.
Finally, with regard to prices, there was also a general average convergence between prices for MI and MGP in terms of both average levels and dynamics in 2022. As with the day-ahead segment, prices also rose on the Intra-day markets to values never seen before, ranging from 298/299 €/MWh of the first two auctions to 311.5 €/MWh of MI-A3, indicating progressive growth, even compared to the corresponding hours of the MGP, when approaching real time (MI-A1 and MI-A2: -4/-6 €/MWh compared to MGP; MI-A3: +8 €/MWh compared to the corresponding MGP hours). In the XBID (300.6 €/MWh) there was a high variability of the prices during the interchange, with several sessions characterized by many combinations with negative prices, in particular on the islands (especially in Sicily) and in the months of October and November (from Fig. 2.2.17 to Fig. 2.2.20, Tab. 2.2.5).

Fig. 2.2.17 Volumes traded on the MI

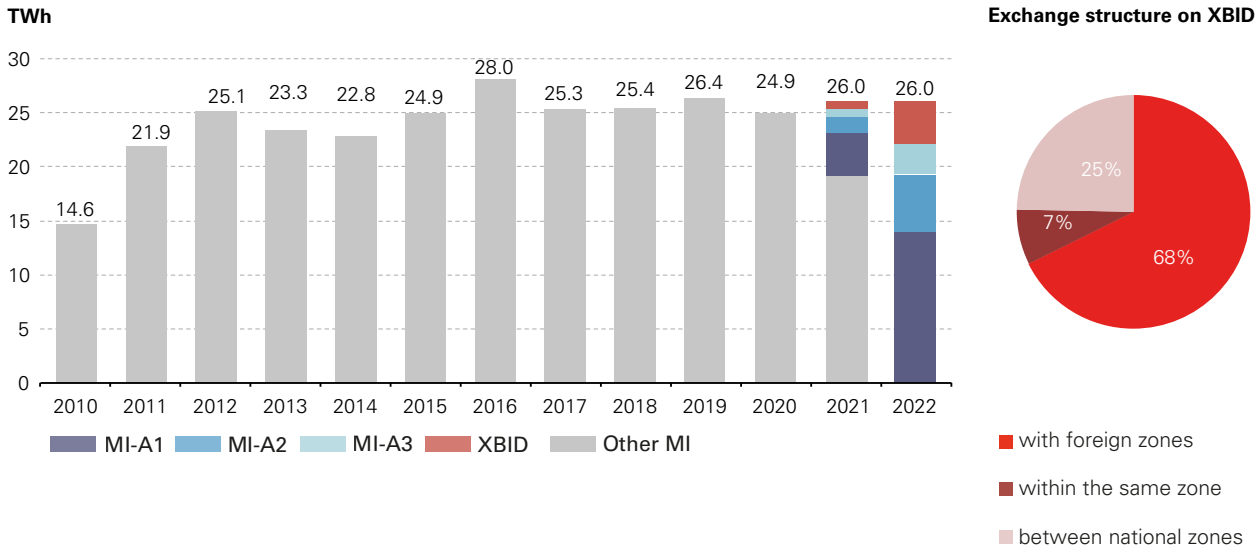


Fig. 2.2.18 Volumes traded on the MI. Monthly trend 2021-2022

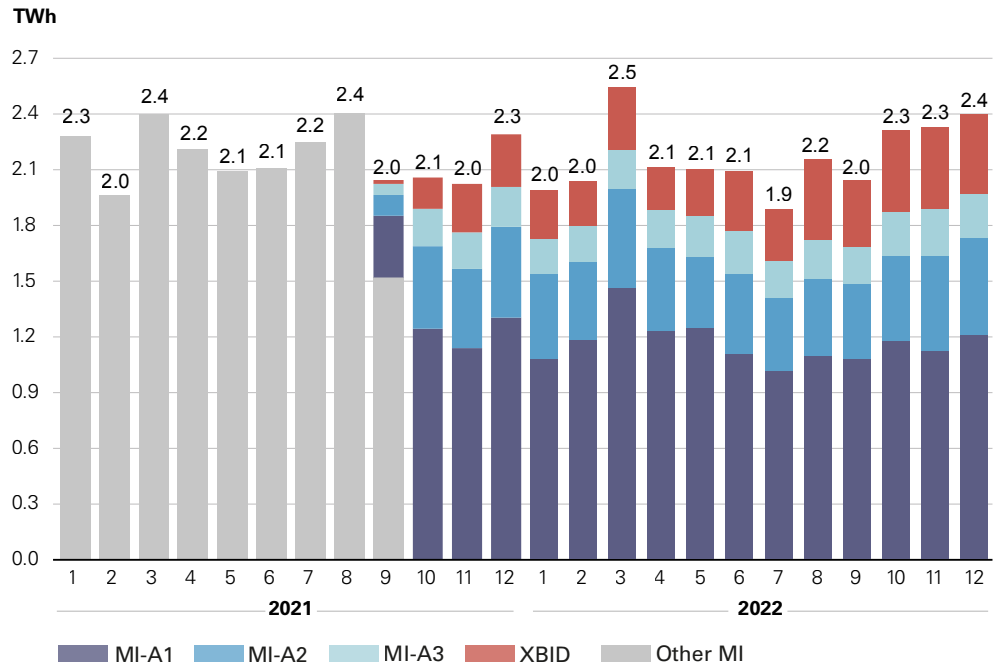


Fig. 2.2.19 MI prices. Annual trend

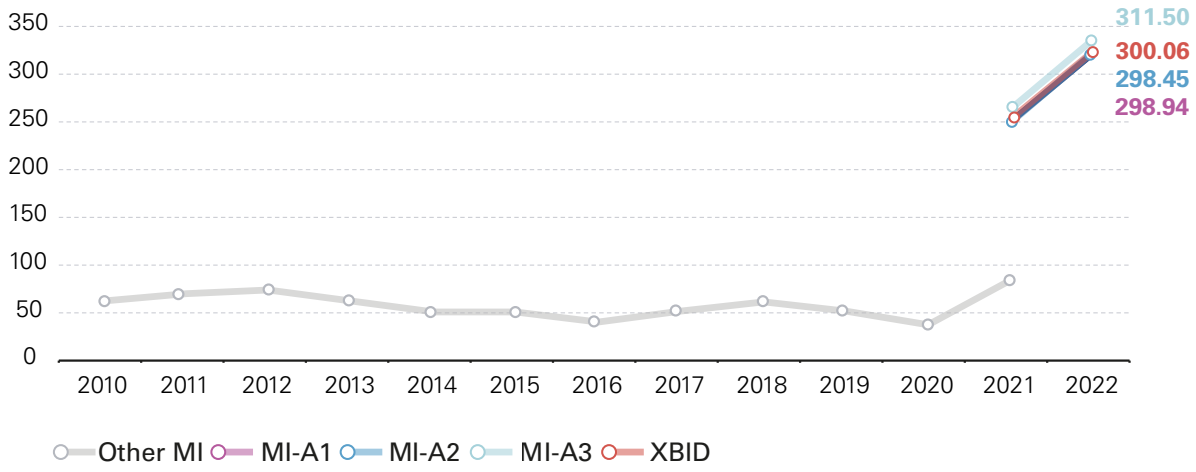
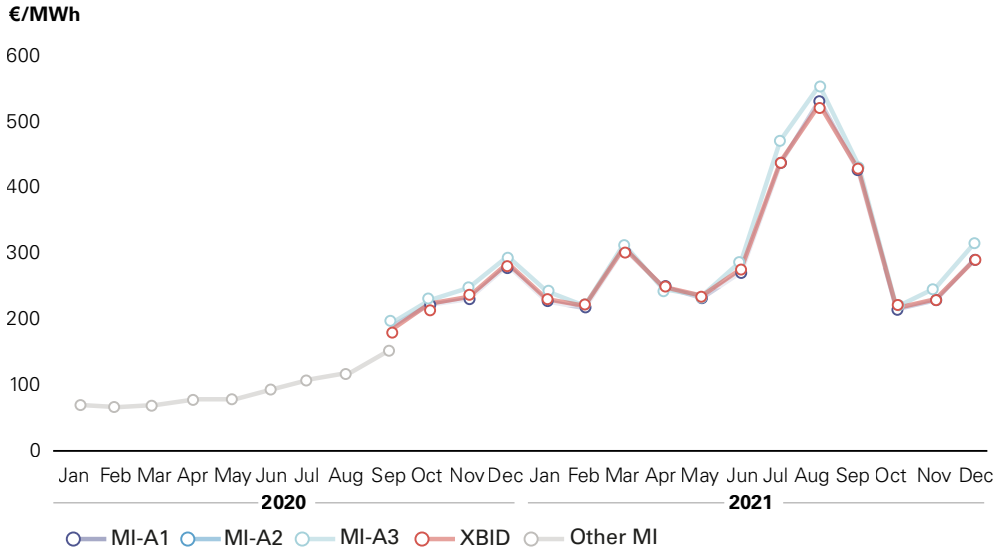


Fig. 2.2.20 MI prices. Monthly trend 2021-2022



Tab. 2.2.5 Zonal purchases and sales on the MI. Year 2022

PURCHASES	AUCTION				CONTINUOUS TRADING	INTRA-DAY MARKET	
	MI-A1 (1-24 h)	MI-A2 (1-24 h)	MI-A3 (13-24 h)	TOTAL	XBID (1-24 h)	TOTAL	
	MWh	MWh	MWh	MWh	MWh	MWh	Change %
North	6,627,928	1,974,366	885,341	**9,487,635**	**1,026,580**	**10,514,215**	-11.4%
Centre North	817,877	323,409	152,188	**1,293,474**	**265,957**	**1,559,430**	-0.3%
Centre South	2,274,304	841,064	395,805	**3,511,173**	**443,776**	**3,954,949**	33.1%
South	1,853,929	981,512	480,851	**3,316,292**	**518,893**	**3,835,185**	-15.8%
Calabria	319,536	130,584	84,966	**535,086**	**80,257**	**615,343**	-42.7%
Sicily	1,079,165	357,421	214,201	**1,650,787**	**128,191**	**1,778,979**	23.5%
Sardinia	365,734	201,616	117,460	**684,810**	**117,874**	**802,684**	2.9%
Foreign countries	586,273	614,626	245,457	**1,446,356**	**1,462,264**	**2,908,620**	63.4%
Total	**13,924,746**	**5,424,599**	**2,576,267**	**21,925,613**	**4,043,793**	**25,969,406**	**-0.3%**

SALES	AUCTION				CONTINUOUS TRADING	INTRA-DAY MARKET	
	MI-A1 (1-24 h)	MI-A2 (1-24 h)	MI-A3 (13-24 h)	TOTAL	XBID (1-24 h)	TOTAL	
	MWh	MWh	MWh	MWh	MWh	MWh	Change %
North	6,975,493	2,126,761	972,820	**10,075,074**	**1,177,659**	**11,252,733**	-12.4%
Centre North	628,595	179,314	90,516	**898,425**	**225,740**	**1,124,165**	1.2%
Centre South	2,322,590	856,813	339,530	**3,518,933**	**321,118**	**3,840,051**	15.4%
South	1,596,120	930,265	395,458	**2,921,843**	**472,124**	**3,393,967**	-4.6%
Calabria	471,339	201,125	96,063	**768,526**	**68,114**	**836,640**	-40.0%
Sicily	1,151,682	399,403	198,002	**1,749,087**	**148,496**	**1,897,583**	32.4%
Sardinia	336,767	174,063	101,043	**611,873**	**102,163**	**714,036**	6.9%
Foreign countries	442,160	556,856	382,836	**1,381,851**	**1,528,379**	**2,910,230**	72.2%
Total	**13,924,746**	**5,424,599**	**2,576,267**	**21,925,613**	**4,043,793**	**25,969,406**	**-0.3%**

2.2.3 Other electricity markets

MPEG. The movements on the "unit price differential" product showed a new decrease on an annual basis in 2022, updating the all-time low both in terms of matching (101 versus 504) and volumes (0.15 TWh versus 0.30 TWh). The trades, attributable only to the baseload profile, were carried out mainly in the first eight months of the year at an average price of 0.28 €/MWh (+0,05 on 2021) (Fig. 2.2.21).

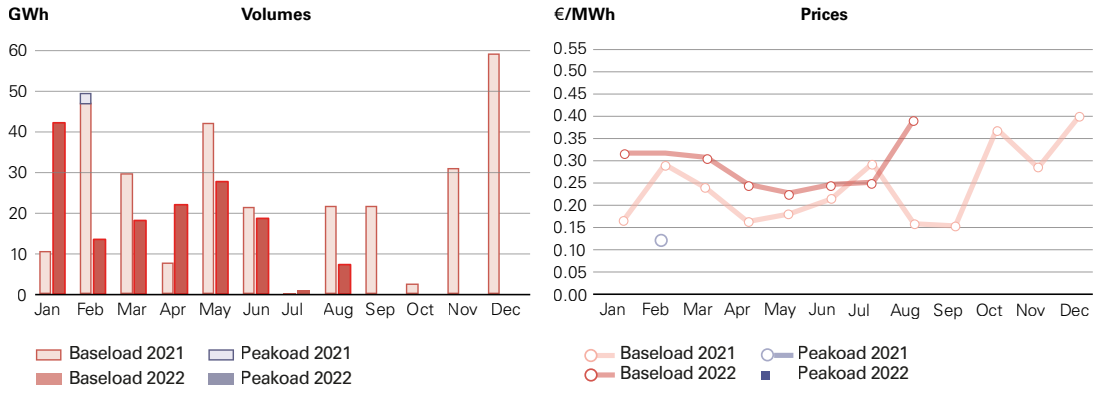
PCE. The transactions recorded on the OTC Registration Platform (PCE) with delivery/withdrawal in 2022 reversed the trend that has characterized them since 2015, rising to 249.3 TWh (+4.9% from the very low level in 2021), driven exclusively by those resulting from bilateral contracts (+5.2%). A similar dynamic was observed for the net position of the Energy accounts determined by the total of transactions recorded, amounting to 150.7 TWh (+10.9%), while the turnover[29] increased to 1.65 (-0.09). The programmes recorded in the Injection accounts increased again by 78.7 TWh (+13.8% on 2021), and the corresponding imbalances per programme to 72.0 TWh (+6.6%), while in the withdrawal side, programmes remained in decline (106.8 TWh, -5.2%), with imbalances growing to 43.9 TWh (+82.3%) (Fig. 2.2.22, Tab. 2.2.6 and Fig. 2.2.23).

MTE. The volumes traded on the MTE were concentrated on 6 matches amounting to 10 GWh, all of which related to monthly and quarterly baseload products, most of which were concentrated in December (4 matches per 7 GWh). With regard to quotes, similar to what was observed on spot, the control price of trading products showed strong increases until August (approaching 600 €/MWh) and a mitigation in the last quarter, with the annual baseload product for 2023 that closes in December the trading period at 263.58 €/MWh (Tab. 2.2.7).

Fig. 2.2.21 MPEG prices and volumes traded by type

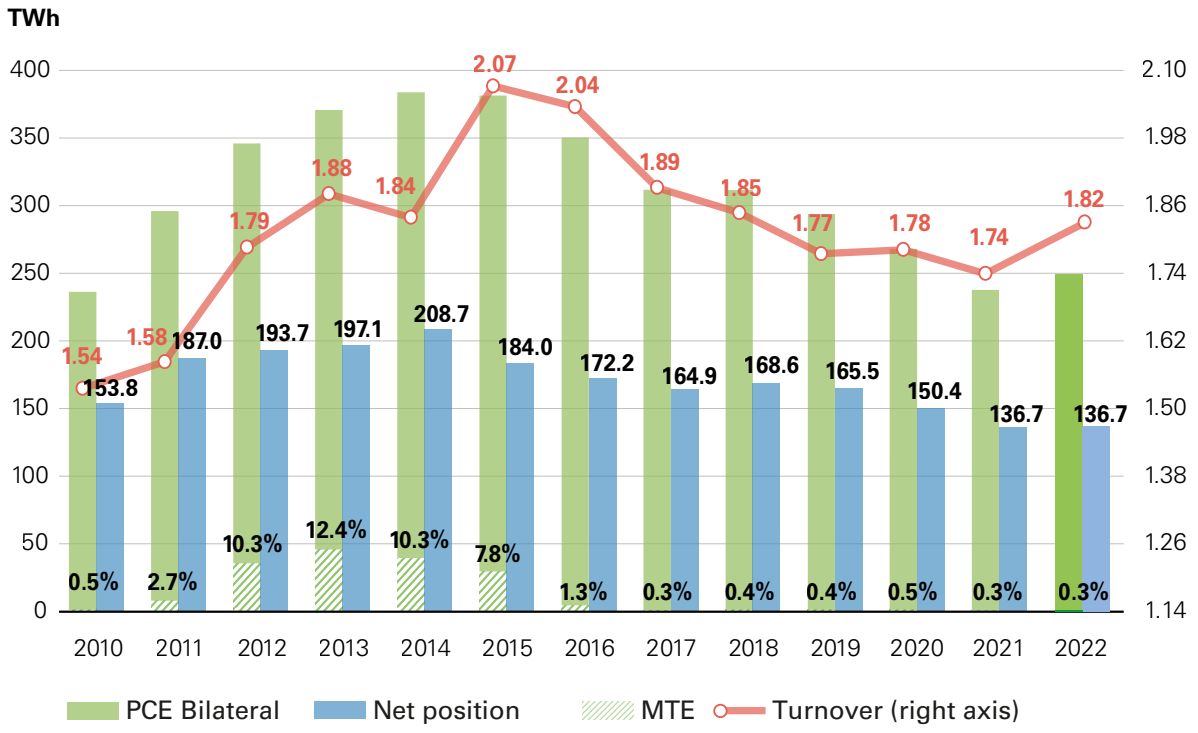
	Tradings	Traded products	Price			Volumes	
			Average	Minimum	Maximum		
Type	*N°*	*N°*	*€/MWh*	*€/MWh*	*€/MWh*	*MWh*	*MWh/g*
Baseload	101 (504)	56/365 (232/363)	0.28 (0.23)	0.20 (0.23)	1.00 (2.50)	149,784 (294,792)	2,675 (1,271)
Peakload	- (2)	0/260 (2/260)	- (0.11)	0.11 (0.00)	- (0.11)	- (3,000)	- (1,500)
Total	**101 (506)**					**149,784 (297,792)**	

() The values of the previous year are shown in brackets



29 This means the ratio between the recorded transactions and the net position.

Fig. 2.2.22 Registered transactions, net position and turnover



Tab. 2.2.6 Profile of registered transactions and schedules

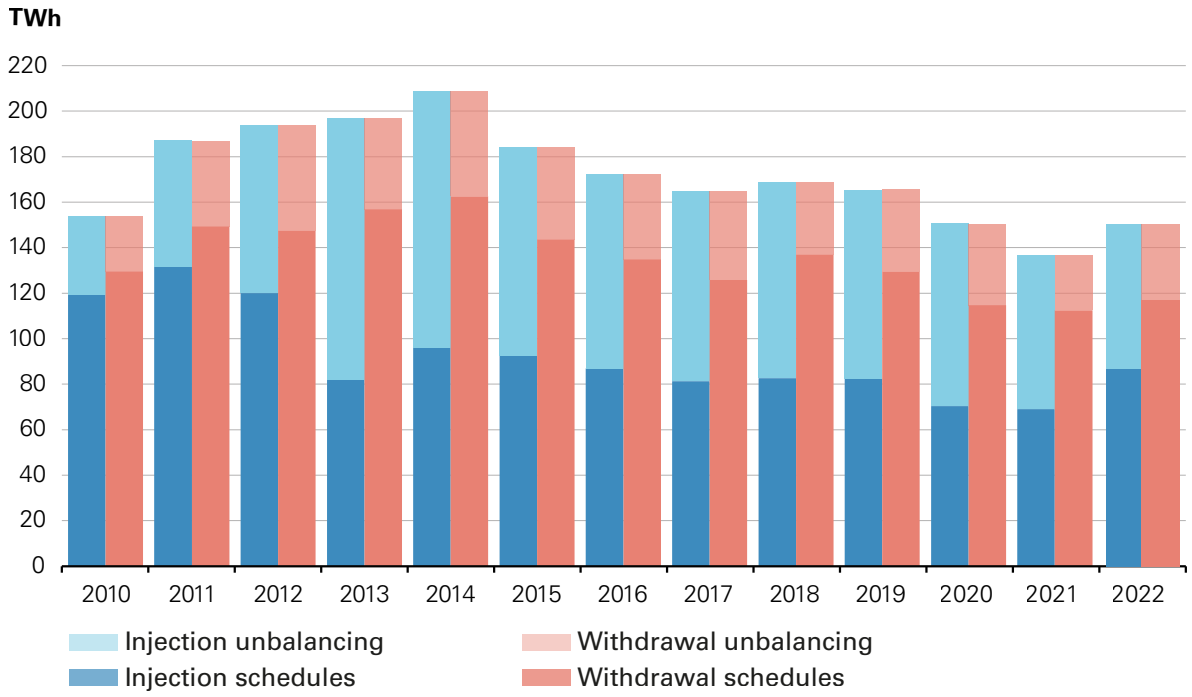
REGISTERED TRANSACTIONS

Profile	MWh	Change	Structure
Baseload	69,412,224	*-0.6%*	*27.8%*
Off Peak	2,463,440	*155.0%*	*1.0%*
Peak	2,437,986	*124.8%*	*1.0%*
Weekend	28	*-92.7%*	*0.0%*
Total Standard	**74,313,677**	**3.4%**	***29.8%***
Non-standard total	**174,806,880**	**6.0%**	***70.1%***
Bilateral PCE	**249,120,557**	***5.2%***	***99.9%***
MTE	**11,590**	***-98.2%***	***0.0%***
MPEG	**149,784**	***-49.7%***	***0.1%***
CDE	**-**	**-**	***0.0%***
Total	**249,281,931**	**4.9%**	**100.0%**
Net position	**150,673,927**	**10.3%**	

PROGRAMMES

	Injection			Withdrawal		
	MWh	Change	Structure	MWh	Change	Structure
Request	97,837,138	*13.4%*	*100.0%*	106,918,462	*-5.3%*	*100.0%*
Registered	**78,665,387**	***13.8%***	***80.4%***	**106,755,151**	***-5.2%***	***99.8%***
Rejected	19,171,752	*11.7%*	*19.6%*	163,311	*-47.2%*	*0.2%*
Schedule unbalance	**72,008,541**	***6.6%***		**43,918,777**	***82.3%***	
Schedule balance	**400,021**	**-**		**28,489,785**	***-34.4%***	

Fig. 2.2.23 Registered physical programs and unbalance schedules



Tab. 2.2.7 MTE: volumes traded by trading year

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Δ% 2022/2021
Contracts (MW)													
Total	**8,228**	**12,697**	**6,096**	**4,550**	**1,004**	**411**	**518**	**391**	**596**	**213**	**19**	**10**	**-47%**
Baseload	6,018	11,633	4,604	4,410	899	323	449	357	561	174	19	**10**	-47%
Peakload	2,210	1,064	1,492	140	105	88	69	34	35	39	0	**0**	-
Volumes (TWh)													
Total	**33.44**	**54.96**	**41.10**	**32.27**	**5.09**	**1.07**	**1.36**	**1.19**	**1.64**	**0.77**	**0.02**	**0.01**	**-55%**
Baseload	29.75	52.27	36.72	32.21	5.01	1.00	1.33	1.16	1.60	0.73	0.02	**0.01**	-55%
Peakload	3.69	2.69	4.38	0.07	0.08	0.07	0.02	0.04	0.04	0.04	0.00	**0.00**	-
Number of matching													
Total	**665**	**953**	**342**	**500**	**252**	**85**	**139**	**130**	**176**	**62**	**7**	**6**	**-14%**
Baseload	478	884	136	488	239	73	123	119	165	52	7	**6**	-14%
Peakload	187	69	206	12	13	12	16	11	11	10	0	**0**	-
Number of OTC matching													
Total	**2**	**25**	**33**	**14**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**
Baseload	2	23	33	14	0	0	0	0	0	0	0	**0**	-
Peakload	0	1	0	0	0	0	0	0	0	0	0	**0**	-
OTC volume share													
Total	**5%**	**45%**	**81%**	**43%**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Baseload	6%	45%	90%	43%	-	-	-	-	-	-	-	**-**	-
Peakload	1%	46%	0%	29%	-	-	-	-	-	-	-	**-**	-

2.3 GAS MARKET IN ITALY

2.3.1 Gas Spot Market (MP-GAS)

THE CONTEXT IN THE ITALIAN GAS SYSTEM. In 2022, the world economic scenario, marked at the beginning of the year after the start of the conflict between Russia and Ukraine, was affected by the uncertainty arising from political instability and supply shortages along the value chains, to which were added exceptionally high inflation and worsening financial conditions. The need to maintain a restrictive orientation by cooling demand, after the surge in 2021, both to address lower supply and more generally to contain inflation, has also had an impact on gas, affecting the whole of Europe. Moreover, because of the risks to security of supply, the price of natural gas in Europe has reached new historic highs, reaching record levels in August and only falling back after the storage targets have been met.

In Italy, demand for natural gas has been at its lowest levels since 2016 (729 TWh), with a drop of 9.5% on an annual basis, with more evident declining trends in the last quarter, owing also to particularly mild climate conditions. Consumption has been reduced in the three sectors of distribution: a more marked dynamic for the civil and industrial sectors and a more moderate

one for the thermoelectric sector, which showed a trend growth until August and a reversal of trends in the latter part of the year. On the other hand, exports and other consumption increased (31 TWh, +2.7%), with price differentials at European hubs still low and very volatile, with more marked dynamics in March, October and November, in the last two months also supported by the aforementioned low levels of demand.

On the supply side, imports of natural gas have fallen again on an annual basis, mainly due to the fall in pipeline flows (576 TWh, -12% and to its lowest levels in recent years), mainly in Tarvisio, the entry point linked to imports from Russia (116.2 TWh, -182.4 TWh). In this context, imports were supported by the increased flows *i)* from Algeria to Mazara (249.0 TWh, +25.0 TWh), which is the most used pipeline in terms of supply (with 34%); *ii)* from Azerbaijan to Melendugno, in the second year of full operation (107.7 TWh, +31.8 TWh); *iii)* from Northern Europe to Gries Pass (75.0 TWh, +53.0 TWh); *iv)* from the three regasification terminals that enter the grid and reach their all-time high (150 TWh, +47 TWh). The increase in LNG regasification activity was made possible by the increase in loads on all supply routes, in particular *i)* from the United States of America, whose share of total LNG imported rises to 20 % (87 TWh, +60 TWh, +10 p.p. in terms of share); *ii)* Northern Europe and Spain (29 TWh, +26 TWh); *iii)* from Asia, in particular from Qatar (216 TWh, +18 TWh), which has been confirmed as the first source of LNG supply.

With regard to storage, the need to ensure an adequate level of stocks, even under unfavourable geopolitical, economic and commercial conditions, has led the Institutions to take regulatory measures to encourage replenishment activities. This includes *i)* the DM of 1 April 2022 on the Regulation of storage arrangements for the contractual period 2022–2023; *ii)* the ARERA Resolution 165/2022/R/gas of 8 April 2022, for the introduction of contracts for differences and a "deposit premium" of 5 €/MWh for the reservation of capacity and the injection of gas into storage, and for defining how Snam will supply gas covering volumes for the operation of the system and for the management of the technical consumption of storage companies; *iii)* the Ministerial Decree of 22 June and 20 July 2022, and the ARERA Resolution 274/2022/R/Gas of 24 June 2022, defining the arrangements for providing a last-resort service for the filling of storage and identifying institutional entities, Snam Rete Gas S.p.A. (henceforth: Snam) and GSE S.p.A (hereinafter referred to as GSE) to ensure their execution.

As a result of these measures, injections into storage systems and the balance between injections and dispensations, with the latter declining in the context of lower demand (96.8 TWh, -22.7 TWh), have risen to or near an all-time high (126 TWh, +22.4 TWh and 29.7 TWh, +45,1 TWh respectively). The level of gas storage, therefore, which was at a low level in the first months of the year, was already high at the end of September, reaching a high level for more than a decade on the last day of the year (159.5 TWh, +30,1 TWh), due to the high filling commitment and low demand conditions (from Fig. 2.3.1 to Fig. 2.3.5).

VOLUMES. In this context, in 2022, the following important phenomena were observed on the spot gas market (MP-GAS) *i)* the increase in day-ahead trading, both continuously traded and auctioned, whose share in total spot trading increased by more than 72%, *ii)* the growth in volumes traded by non-Snam participants (107 TWh, +28 TWh), mainly related to continuous trading, *iii)* the increase in volumes handled by Snam as a TSO, mainly driven by the aforementioned regulatory measures and functional to the last resort service carried out in the auction markets.

The MP-GAS trading, at the fifth consecutive increase, has therefore updated the all-time high to 175 TWh (+45 TWh, +35% on 2021), with the share of the total consumed in the gas system at 24%, which has never been so high since the start of negotiations (+8 p.p. on last year), with a monthly peak of 42% in July (Fig. 2.3.6).

- **The Day-ahead gas market (MGP-GAS).** The volumes traded on the MGP-GAS, on continuous trading markets, stabilized the growth trend observed in recent years, progressively reaching the first market position in terms of liquid assets, with 75.6 TWh (+67% on 2021 and all-time maximum result), representing 43% of the total spot trading (+8 p.p. on annual basis). The trades mainly took place in session G+1 (56 TWh, 74% of the total), with a growing appreciation for the weekend product, whose volumes rise to 18.6 TWh, with a share of the total traded stable at 25%. On a monthly basis, volume growth seemed to be widespread and intense, with peaks in the last four months of the year, particularly in December, when trades broke their record, exceeding 8 TWh.
  For what concerns AGS, a market identified by the abovementioned regulatory provisions as Snam's supply of the necessary storage resources, the volume traded reaches an all-time high of 51.1 TWh (+51%), representing 29% of the total spot traded (+3 p.p.), of these 37.7 TWh can be related to purchases by the TSO (74% of the volumes).
- **Intra-day Gas Market (MI-GAS).** MI-GAS trades, on continuous trading markets, continued their decrease, year after year, while remaining at high levels and above 40.5 TWh (-8%), representing 23% of the total spot trading (it was 34% in 2021). This decrease, which was broadly widespread throughout the year and interrupted in November and December, when trades were back to their historical peak (5.6 TWh), is mainly due to a further contraction in RDB movements (10.2 TWh, -2.9 TWh, -22%). This decrease affected only RDB purchases (3.5 TWh, - 62% and at least since the start of the new balancing system), compared with sales growing to 6.7 TWh (+79% from the low levels in 2021). Less intense was the reduction in trade between participants other than RdB, which, for the first time since 2016, fell on an annual basis to 30.3 TWh (-0.7 TWh, -2% over last year), representing 75% of the total traded in the sector (+5 p.p. on 2021). In the AGS segment, the Intra-day segment remained less liquid, albeit increasing on an annual basis, with volumes of 2.6 TWh (1.6 TWh in 2021), of which 66% related to purchases by the TSO.
- **Marketing for the trading of gas stored (MGS).** Quantities traded on the MGS, only for Stogit, remained at very low levels of 5.1 TWh (+1% from the historic low of 2021), with a share of the total traded at 3% (it was 4% last year). The volumes processed by Snam for the Balancing purposes are growing, both on the purchase side (0.8 TWh, +65%) and on the sales side (3.1 TWh, +78%), while the negotiations between third parties (1.2 TWh, -58%) have been delayed.
- **The Locational Product Market (MPL).** Also, in 2022 no session was activated by Snam.

PRICES. In the political and economic context of the cut in Russian imports, the search for new supply routes, both via pipelines and LNG, the rush to fill up the stockpiles, natural gas prices showed strong bullish pressures on all the trading places, reaching historic highs and high volatility in Asia and Europe.

Prices on spot gas markets managed by GME, reflecting the dynamics of the main national and international references and remaining closely aligned with the quotations on PSV (125.4 €/MWh, cf. Sec 2.1), have climbed everywhere to all-time highs, ranging from 122.6-124.9 €/MWh, with the sole exception of the Intra-day AGS compartment, to 134 €/MWh. With the exception of the latter segment, the alignment between the prices recorded in the markets is also confirmed on a monthly basis, with MGS prices slightly lower in the first months of the year (when the growth of title prices started to intensify) and higher in October and November (when, on the other hand, the downward trend in prices started), due to the lower responsiveness to punctual spikes due to its nature as a storage market.

As regards the System Average Price (SAP)[30], in 2022 this reference rose to 123.4 €/MWh, determined for 65% by the day-ahead trading, weight which gained about 26 p.p. in the last two years and 53 p.p. if compared to 2017, the first year of full operation of the current balancing system. SAP has remained closely related to the PSV, although their differential[31], which is still small, has been growing compared to previous years (SAP-PSV: 1.04 €/MWh, +0.5 €/MWh). This dynamic seems to be a reflection of the large volatility recorded by gas quotations, given that, by its nature, the SAP obtained from transactions carried out on different days: on a monthly basis, in fact, the delta between the two indicators, never exceeding 1 €/MWh in the past, showed significant fluctuations, reaching almost 10 €/MWh in December. Also, the SAP volatility index (10.6% of the PSV vs. 8.2% of SAP) is slightly below the PSV, as a result of a dynamic that derives from the greater weight taken by the MGP-GAS in determining its value. Indeed, the volatility of the MGP-GAS price was substantially lower than that recorded in all other spot markets (9.4%, +4 p.p.) and marked by the lower trend increase. MI-GAS, on the other hand, remained the most volatile sector (13.5%, +7 p.p.), structurally impacted by the effects of RDB interventions. On a monthly basis, volatility indices were higher in March, when the Russia-Ukraine conflict began, and in October-November, when the market began to take the first bearish signals (15-50%). For the MGS quotation, the infra-annual peak of the volatility indicator was in February (30%), maintaining a similar profile to that of the other markets in the following months (Fig. 2.3.7 and Fig. 2.3.8).

SNAM OPERATIONS AS RDB. In 2022, the volumes moved by Snam in the exercise of the RdB function were overall slightly decreasing and concentrated in MI-GAS alone (10.2 TWh, -2.9 TWh). This decrease was only for purchases, as the RdB was significantly more active on sale, even compared to previous years (6.7 TWh, which has never been so high since 2017 and represents 65% of the total traded by the RdB).

The detailed analysis of the movements showed a greater intervention of Snam in long system situations (266 against 140 combinations), a dynamic also favoured by the greater frequency with which the system was positively unbalanced, in contrast to the last years (4,587 publications/hours in long system conditions versus 3,590 publications/hours in short system conditions). In detail, under conditions of positive residual unbalancing, Snam's sales, on average amounting to 25,105 MWh, amounted to a total of 6.5 TWh (65% of the total handled) and produced predominantly at a system imbalance within the classes [31,400-60,000 MWh] for 1.8 TWh and [60,000-100,000 MWh] for 2.7 TWh. In contrast, under conditions of negative residual imbalance, Snam's purchases were on average 26,630 (3.4 TWh in absolute terms and 34% of the total) and concentrated in the medium to high unbalancing classes: [60,000-100,000 MWh]

30 The SAP is the average of the prices recorded on the MGP-GAS and on the MI-GAS in continuous trading weighted for the respective combinations. 35 Its spread with PSV is calculated only on the days in which PSV shares are available.

31 The average differential is calculated considering the session date and only the gas days in which the price on the PSV is available.

for 1.6 TWh and [100,000-200,000 MWh] for 1.2 TWh. Finally, the volumes traded inconsistently with the sign of the unbalancing by the RdB were residual, a circumstance which occurred both in the short and long system conditions (respectively in 11 and 6 cases, for a total of 0.3 TWh) (Tab. 2.3.1).

MARKET CONCENTRATION. In 2022, greater competition was confirmed on the continuous trading title markets, especially in purchases, highlighted by the drop in the market share held by the first participants (CR5) both on the MGP-GAS and on the MI-GAS in continuous trading (30/37%; -5/-18 p.p.) (Fig. 2.3.9).

2.3.2 Other gas markets

MT-GAS. In 2022, there was no trade on the MT-Gas futures market.

P-GAS. In the Royalties segment, 2.0 TWh were traded, of which 1.3 TWh to be delivered in the period October-December 2022, at an average price of 147.35 €/MWh. No trade, however, in the Import segment.

PAR. In the Regasification Capacity Allocation Platform, the increased inflows of LNG encouraged an increase in the contributions on the two segments dedicated to LNG Italia and OLT Offshore LNG Toscana. A total of 178 slots were allocated (11 in 2021), amounting to 17.9 million m^3 liquefied (compared with 1.2 million m^3 liquefied last year), at an average price of 16.7 €/m^3 liquefied.

Fig. 2.3.1 Natural gas consumption trend

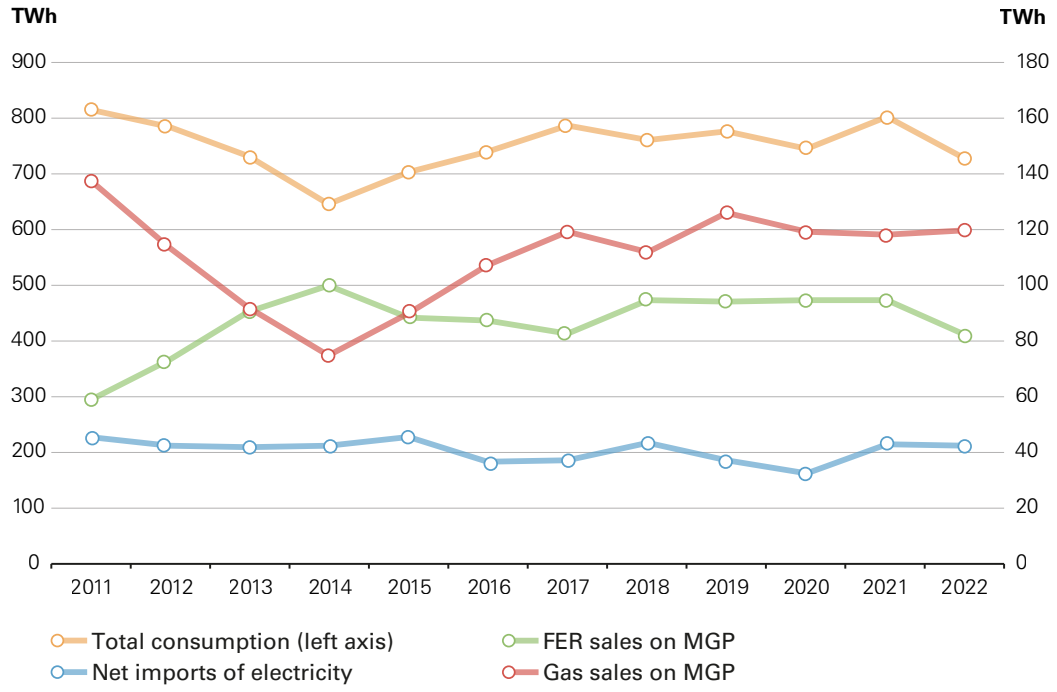


Fig. 2.3.2 Natural gas demand in Italy

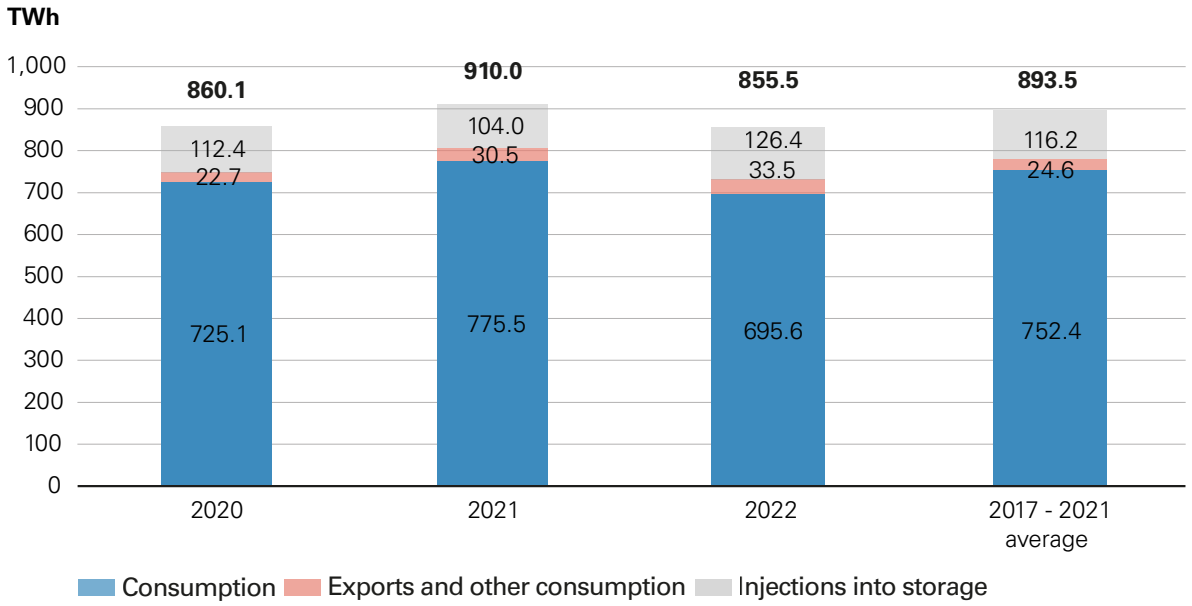


Fig. 2.3.3 Trend of natural gas demand in Italy

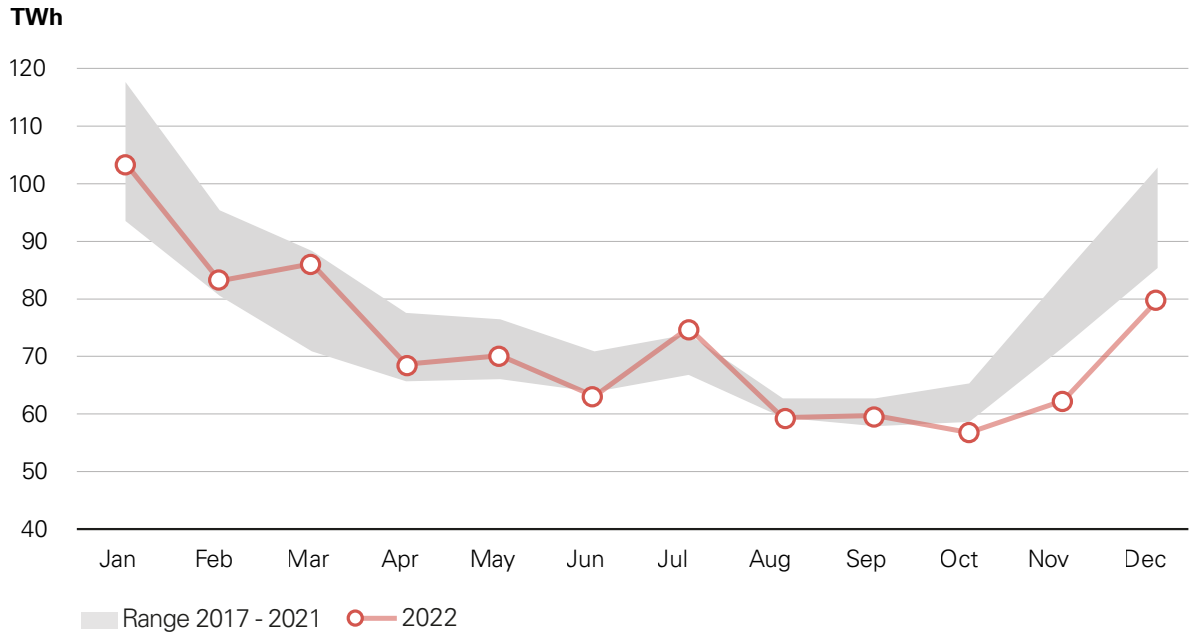


Fig. 2.3.4 Gas import trend

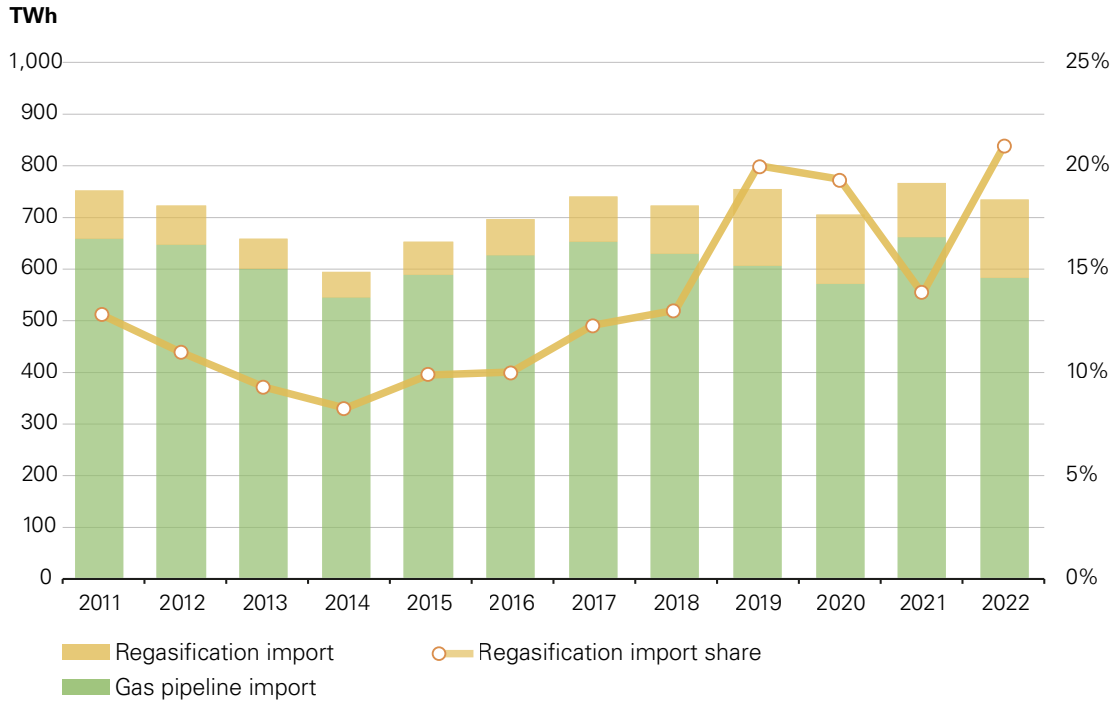


Fig. 2.3.5 Level of stock in storage at the end of the year

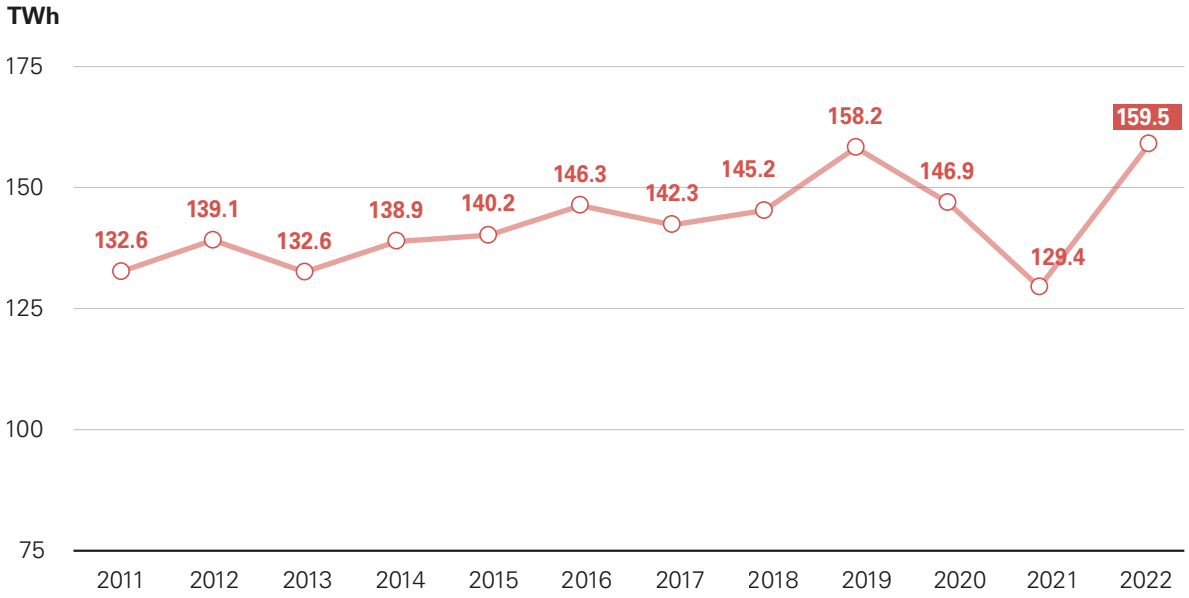


Fig. 2.3.6 Trading trend

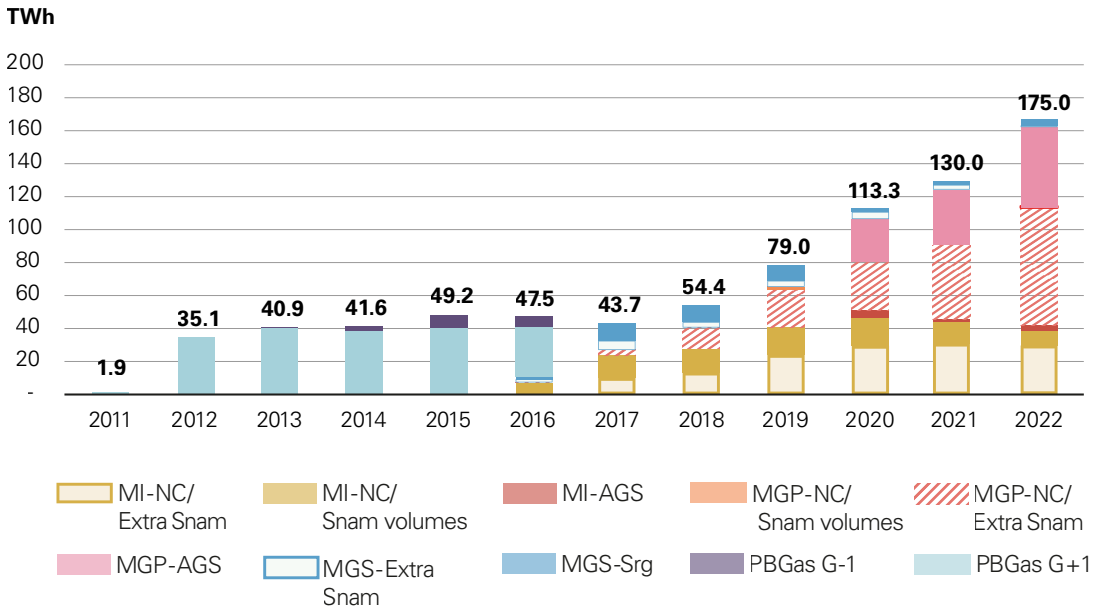
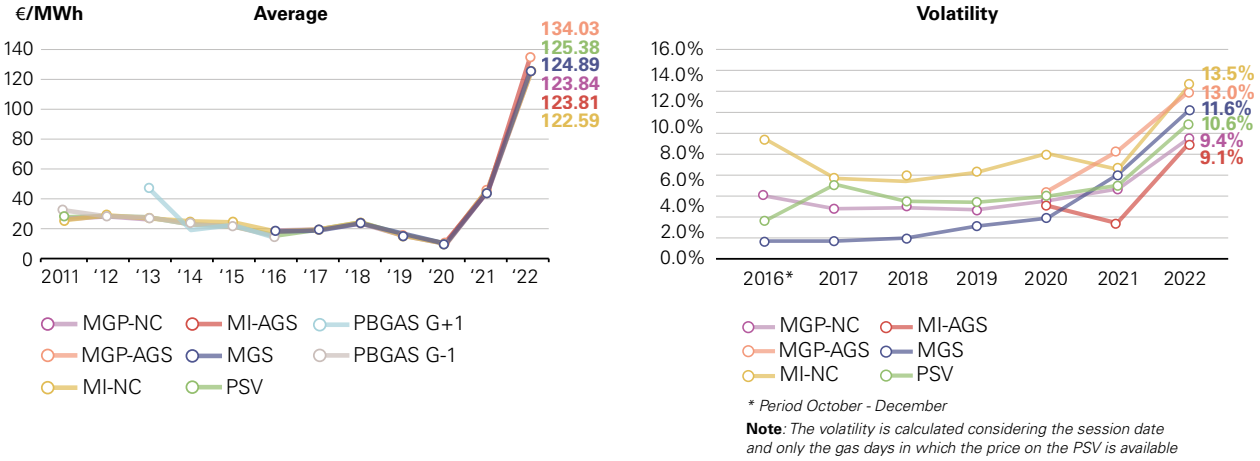


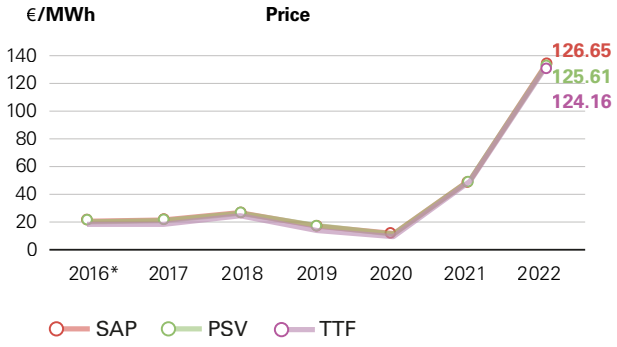
Fig. 2.3.7 MPGAS average price and volatility

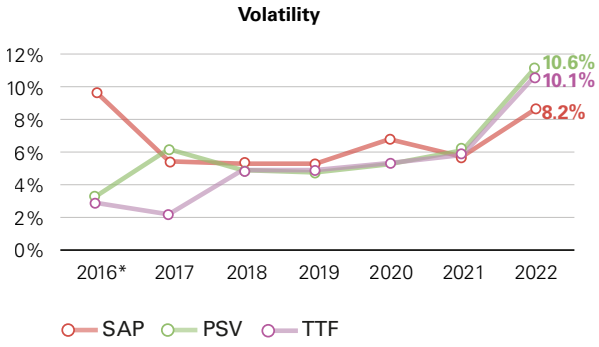


** Period October - December*

Note: *The volatility is calculated considering the session date and only the gas days in which the price on the PSV is available*

Fig. 2.3.8 Average price and volatility. SAP comparison with PSV and TTF





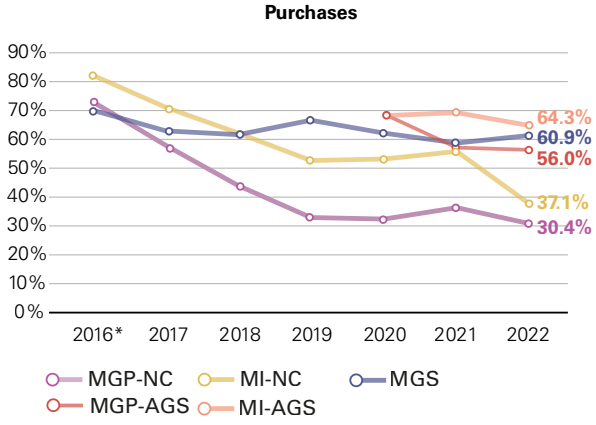
** Period October - December*

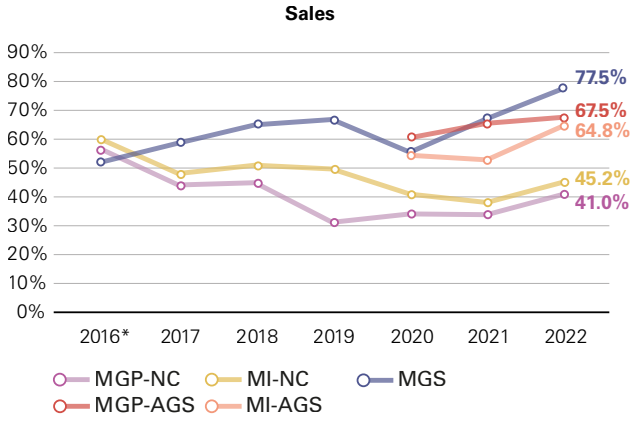
Note: *The average price is calculated considering the session date and only the gas days in which the price on the PSV is available*

** Period October - December*

Note: *The volatility is calculated considering the session date and only the gas days in which the price on the PSV is available*

Fig. 2.3.9 Market shares





** Period October - December*

Note: *For AGS segment the indicator is calculated net of the TSO's trade*

** Period October - December*

Note: *For AGS segment the indicator is calculated net of the TSO's trade*

Tab. 2.3.1 Snam's operations in the MI-Gas. Year 2022

SHORT SYSTEM *(Negative residual unbalancing)*

Unbalancing Classes *MWh*	Unbalancing *MWh*		Purchases *MWh*			Sales *MWh*		
	Average	N. of cases	Average	% on unbal.	N. of matchings	Average	% on unbal.	N. of matchings
(0-15,000]	7,063	772	24,240	1155%	2	9,688	163%	3
(15,000-31,400]	23,218	742	19,920	97%	5	8,816	40%	3
(31,400-60,000]	43,907	1,009	19,347	40%	23	20,362	45%	5
(60,000-100,000]	75,664	676	27,153	35%	59			
(100,000-200,000]	133,301	347	31,534	23%	38			
>200,000	237,918	44	20,952	10%	2			
Total	**48,706**	**3,590**	**26,630**	**30%**	**129**	**14,302**	**51%**	**11**

LONG SYSTEM *(Positive residual unbalancing)*

Unbalancing Classes *MWh*	Unbalancing *MWh*		Purchases *MWh*			Sales *MWh*		
	Average	N. of cases	Average	% on unbal.	N. of matchings	Average	% on unbal.	N. of matchings
(0-15,000]	7,374	749	29,364	284%	2	16,949	191%	5
(15,000-31,400]	23,096	932				14,376	65%	12
(31,400-60,000]	44,204	1,379	14,448	30%	3	22,454	49%	80
(60,000-100,000]	76,060	929	3,144	4%	1	25,699	34%	105
(100,000-200,000]	137,349	504				28,635	21%	49
>200,000	247,910	94				41,355	17%	9
Total	**54,762**	**4,587**	**17,536**	**42%**	**6**	**25,105**	**31%**	**260**

2.4 ENVIRONMENTAL MARKETS

2.4.1 Energy Efficiency Certificates Market (TEE)

THE CONTEXT. The geopolitical and energy-market situation has led to an accelerated transition to clean energy and increased energy independence for Europe from highly volatile fossil fuels from unreliable suppliers. On 18 May 2022, the REPowerEU Plan was adopted which, in addition to setting out different measures to rapidly reduce dependence on Russian fossil fuels and speed up the green transition, set for 2030 a 20% increase in the EU's targets for renewable sources. Under the Energy efficiency incentive mechanism, the Plan includes, inter alia, an update and enhancement action with a view to simplifying and optimizing the entire process of recognizing energy savings: a reduction in the time taken to approve, issue and offer securities on the market.
In the current Italian regulatory framework – defined by the Ministerial Decree of 11 January 2017, as amended by the Ministerial Decree of 21 May 2021, and by the ARERA Resolution 547/2021/R/EFR, which reduced the obligations and introduced some additional contributions – it was favoured a rebalancing between the demand for securities necessary to fulfil the obligation and the available supply and, with it, an easing of price tensions. The estimates published by the GSE[32] for the 2022 obligation year show that, to date, securities have grown slightly if compared to 2021, but are still sufficient to cover maturing obligations (Tab. 2.4.1, Fig. 2.4.1).

VOLUMES AND LIQUID ASSETS. Although the estimated emissions in the 2022 obligation year are higher than last year's levels (1.8 million toe), the capacity to issue energy efficiency bonds remains very far from that of 2019 and even more from 2016 (5.1 million toe and 7.5 million toe respectively). This shortage of securities was directly reflected in the trend of total trades which, in 2022, fell to its fifth consecutive decline, to its lowest level since 2010 (2.7 million toe, -0.6 million toe).
This decrease was most intense on the bilateral platform, where trading has been at its lowest levels since 2009 (0.97 million toe, -0.4 million toe), and smaller on the organized market (MTEE), where the amount of trades is 1.75 million toe (-0.2 million toe and minimum level since 2012). As a result of these dynamics, market liquidity increases to 64% (+5 p.p. on an annual basis and all-time high), confirming the greater intention of participants to source from the market, even with low-volatility prices. The infra-annual volume analysis showed a concentration of total trades close to the annual maturity of obligations and in correspondence with a high quantity of securities issued, with a share of the annual total of 24% in May and around 11% in July and November. This trend was more marked in the context of trading carried out on the bilateral platform, while the monthly profile of trading on the market seemed to be more homogeneous (Fig. 2.4.2).

PRICES. In the context of substantial price stability as defined by the abovementioned regulatory measures, the variations observed in these measures were also rather limited in 2022. In particular, the average price on the MTEE has fallen to its lows since 2017, equal to 257.85 €/toe, a decrease of 4% year-on-year (-10 €/toe). This a dynamic can be found throughout 2022, with its peak in February and March (-6/-10% from the very high levels achieved in 2021, recorded in a context of uncertainty arising from the gap in supply and demand for securities). In an infra-annual analysis quotations they showed substantial stability at 260 €/toe in the first five months of the year, with a high in May

32 GSE, White Certificates Annual Report 2022, p. 45.

at 261 €/toe, and a slight but progressive decreasing trend in the following months, placing around 256 €/toe, with a low in December at 253 €/toe.
It has been found also a decrease in the average price recorded on the bilateral platform (242 €/toe, -11 €/toe), which widened the annual spread at the corresponding market level to 26 €/toe, peaking at 118 €/toe in March, when the bilateral price fell to its lowest since 2017, at 142 €/toe, corresponding to monthly volumes at levels among the lowest ever (8.2 thousand toe) and a 54% share of trades recorded at 0 €/toe. The annual difference between the market benchmark and the bilateral benchmark is only 3 €/toe, considering only bilateral transactions recorded at a price above 1 €/toe, representing a share equal to 91% of the total recorded on the platform, among the highest ever. In terms of volatility, in the light of the above, the index remained very low, below 1%, on the MTEE, and higher and equal to 22% for registrations made at strictly positive prices on the bilateral platform (Fig. 2.4.3, Fig. 2.4.4, Fig. 2.4.5).

MARKET CONCENTRATION. The competitiveness level of the market reflects the structure behind the incentive mechanism, which is characterized by a few buyers, subject to obligation, compared to the large number of sellers, including the ESCo[33]; therefore, market competitiveness indicators are physiologically higher for purchase and lower for sale. In 2022, in correspondence with the substantial contraction in trade and a reduced trading activity, a worsening of the competitiveness rates in purchases and, basically, their stability in sales was observed, close to the lowest levels since 2010 (CR3: 12%, CR10: 30%) (Fig. 2.4.6).

2.4.2 Guarantees of Origin Market (GO)

VOLUMES AND LIQUID ASSETS. Recent European legislation on the promotion of energy production from renewable sources has extended the use of guarantees of origin to other renewable energy vectors, in particular gas, including biomethane and hydrogen, as well as energy products for heating and cooling. Pending the introduction of the new provisions (see Sect. 1), the electricity Guarantee of Origin (GO) mechanism has consolidated the growth signals already observed in previous years, with a total amount of securities movements at the highest levels ever (94 TWh including Intra-group trades, +1% on 2021), against a system background characterized mainly by a significant reduction in renewable energy (-13%)[34].
The increase in volumes focused exclusively on the Bilateral Platform of Guarantees of Origin (PBGO), which, confirming itself as the main form of trading, reinforced the multi-year bullish trend, setting a new record at 69.2 TWh (+2.1 TWh), representing 79% of the total traded (net of intra-group trades). On the other hand, trading on the Guarantees of Origin Market (MGO), where volumes have fallen to their lowest levels in the last five years (1.0 TWh, -0.2 TWh), and on the GSE auctions, whose allocations have fallen to 17.7 TWh (-2.5 TWh and minimum level since 2016), equal to 20% of the total traded. In 2022, the trade structure per production year[35] showed a predominant share of volumes traded for the previous year of production, mainly in the quarter January–March, trend driven by PBGO (76% of registrations).
The composition of trades by type of renewable source for securities referring to the year of production 2022 showed greater liquidity on the PBGO for securities referring to hydroelectric

33 Energy Service Company (ESCo) means a company capable of providing technical, commercial and financial services necessary for the implementation of energy efficiency interventions.

34 TERNA, Monthly Report on the Electricity System - December 2022.

35 Year of production means the one which runs from April to March of the following year. For the production year 2022 the data were calculated up to 31/12/2022.

production (37%), followed by wind power (32%), while on the MGO the share of the Other typology appeared to be prevalent (36%), although the weight of the Wind and Solar categories is increasing, in line with the Hydroelectric one (all around 20%). Finally, the share of the Solar power increased in the GSE allocation auctions (50%), mainly with detrimental effect on the Hydroelectric power generation (Fig. 2.4.7, Fig. 2.4.8, Fig. 2.4.11).

PRICES. The prices observed on the three trading modes have all shown a trend increase, more intense on the MGO and GSE auctions, reaching levels never seen since the launch of this mechanism, respectively 2.21 €/MWh and 3.83 €/MWh (+1.87 €/MWh, +3.19 €/MWh), which is significantly higher than the price recorded on the bilateral platform. The latter slightly increased to 0.64 €/MWh (+0.13 €/MWh), widening the spread with the other platforms, as has never been seen in the past, a dynamic confirmed even if we consider only transactions recorded at strictly positive prices (0.67 €/MWh). The monthly price analysis on MGO showed increasing average prices until November, when they reached their highest level ever (9.32 €/MWh), and a sudden reversal in December. For each type of GO traded per year of production, the highest prices on the PBGO were for the Other type (2.36 €/MWh), while the Solar category was the most expensive on the MGO and GSE auctions, where it was traded on average at 5.09 €/MWh and 4.84 €/MWh respectively (Fig. 2.4.9, Fig. 2.4.10).

Tab. 2.4.1 Certificates needed to comply with the obligation

Year of obligation	Actual Obligations Total Distributors (Mtoe/a)	Actual Obligations Electricity (Mtoe/a)	Actual Obligations Gas Distributors (Mtoe/a)	Cumulative total for fulfilment (Mtoe)	Certificates issued since the launch of the mechanism (Mtoe)	Delta Certificates issued - Obligation (Mtoe)	Certificates issued January - May (**) (Mtoe)	Available Certificates at the end of the year (GSE net account) (Mtoe)
2005	0.16	0.10	0.06	0.16	-			
2006	0.31	0.19	0.12	0.47	-			
2007	0.64	0.39	0.25	1.11	1.79	0.68	0.52	1.31
2008	2.20	1.20	1.00	3.31	3.73	0.42	1.14	2.62
2009	3.20	1.80	1.40	6.51	6.63	0.12	1.42	3.45
2010	4.30	2.40	1.90	10.81	9.64	-1.17	1.64	4.05
2011	5.30	3.10	2.20	16.11	14.74	-1.37	3.32	5.62
2012	6.00	3.50	2.50	22.11	20.69	-1.42	3.46	6.00
2013	5.51	3.03	2.48	27.62	28.17	0.55	4.19	7.75
2014	6.75	3.71	3.04	34.37	34.65	0.28	2.38	7.66
2015	7.75	4.26	3.49	42.12	40.04	-2.08	2.32	7.14
2016	9.51	5.23	4.28	51.63	47.57	-4.06	3.61	8.27
2017	5.34	2.39	2.95	56.97	53.62	-3.35	2.62	5.47
2018	5.57	2.49	3.08	62.54	58.72	-3.82	2.23	4.45
2019	6.20	2.77	3.43	68.74	63.83	-4.91	1.38	4.49
2020	2.84	1.27	1.57	71.58	66.07	-6.37	1.31	2.56
2021	1.00	0.45	0.55	72.58	67.83	-4.75	1.17	1.98
2022	**1.68**	**0.75**	**0.93**	**74.26**	**69.60 (*)**	**-4.66**	**0.59 (*)**	**2.47 (*)**

(*) The data is calculated on the basis of the estimate of the number of available certificates published by the GSE in the Rapporto Annnuale Certificati Bianchi 2022.
(**) Number of certificates issued between January and May of each year of obligation.

Fig. 2.4.1 Available certificates and obligations

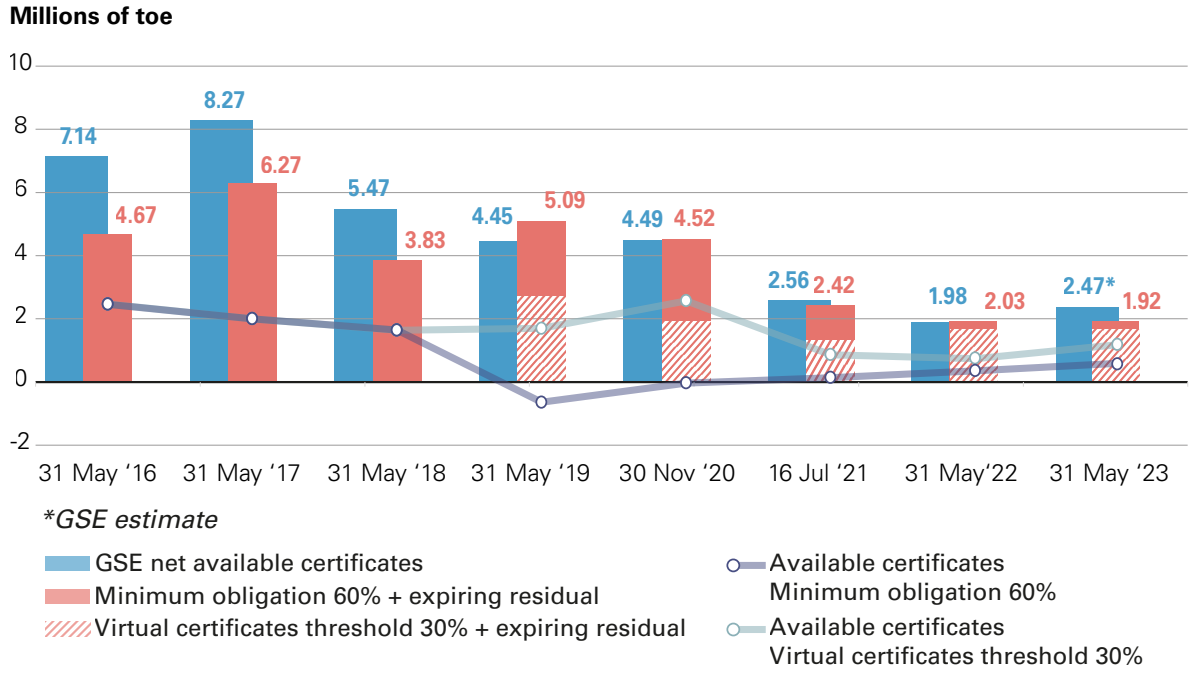


Fig. 2.4.2 TEE - Volumes traded

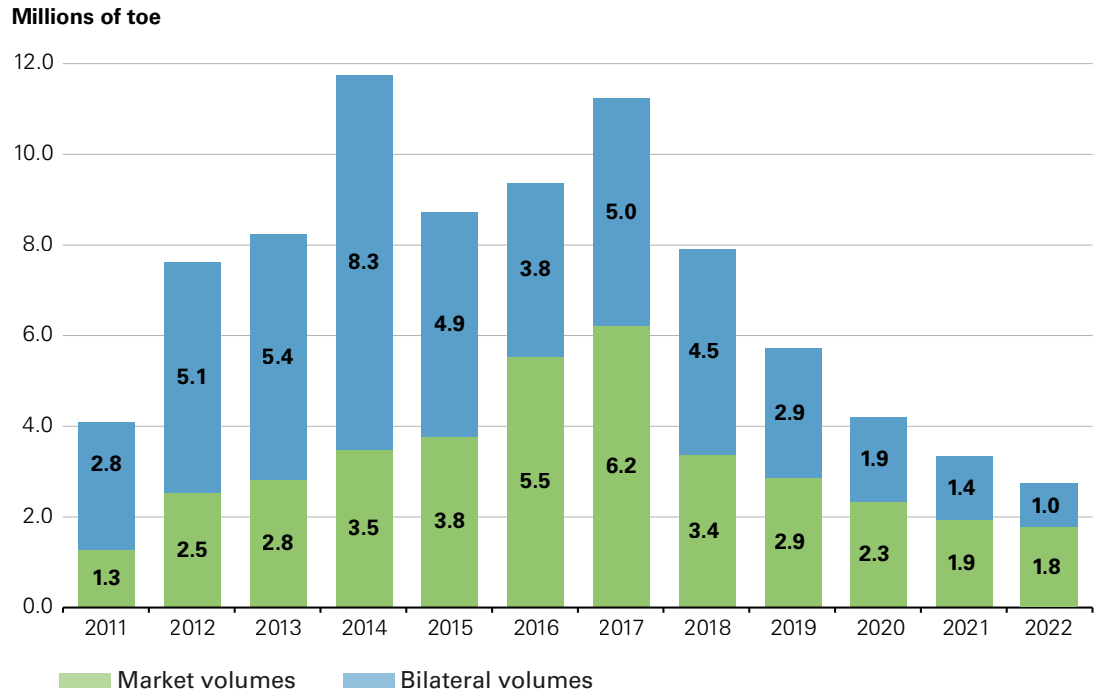


Fig. 2.4.3 TEE prices. Annual average

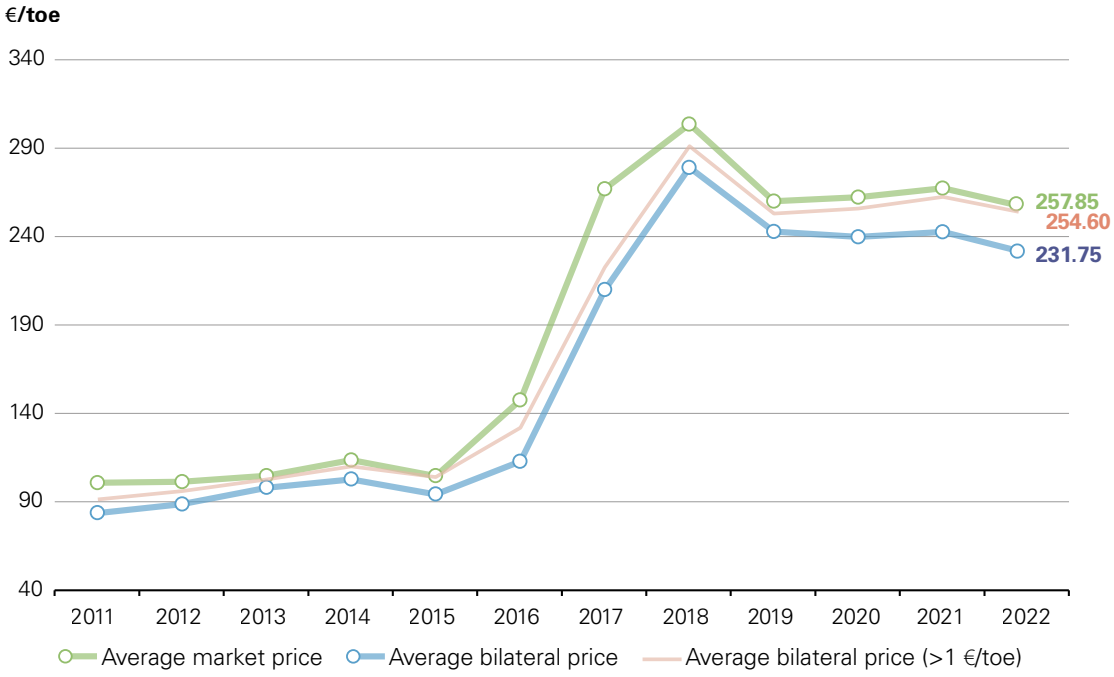


Fig. 2.4.4 MTEE price session trend. Year 2022

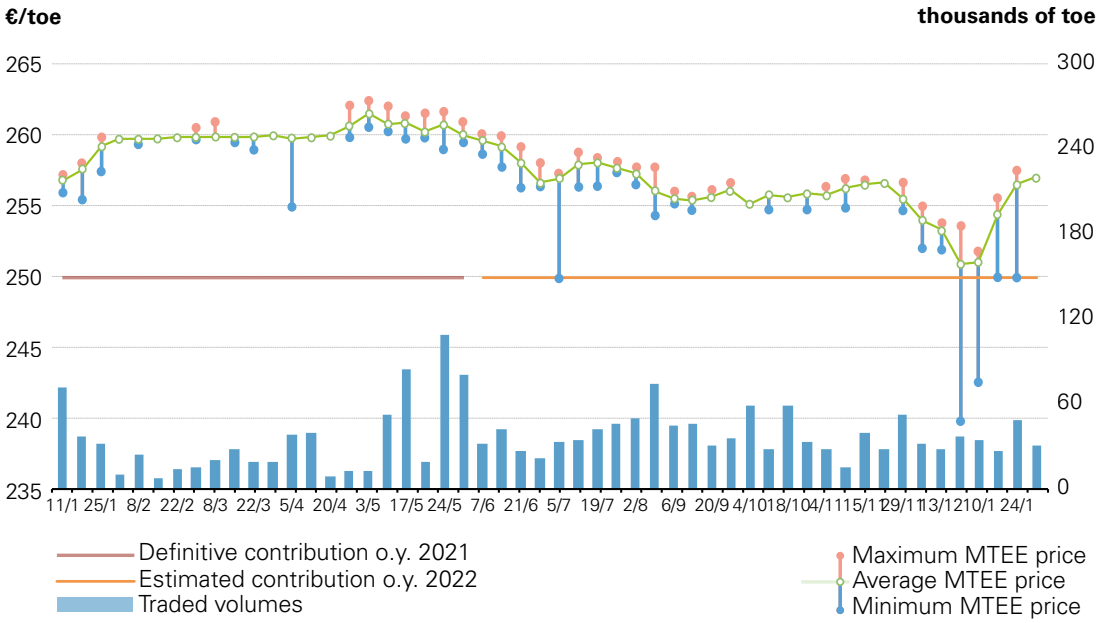


Fig. 2.4.5 TEE Price volatility

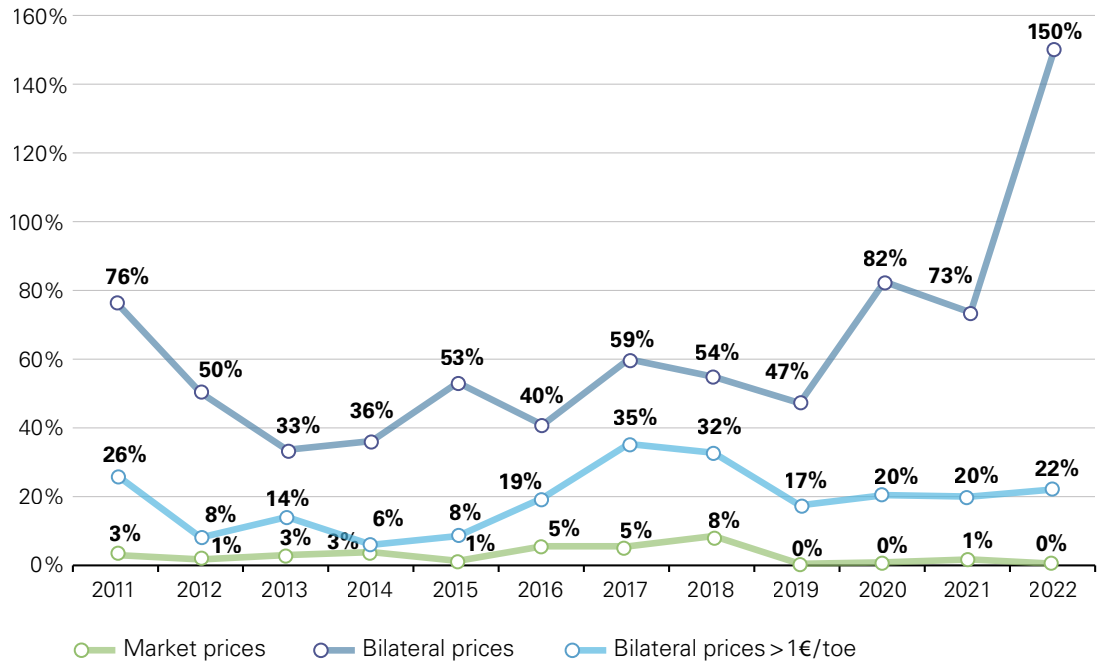


Fig. 2.4.6 Market concentration

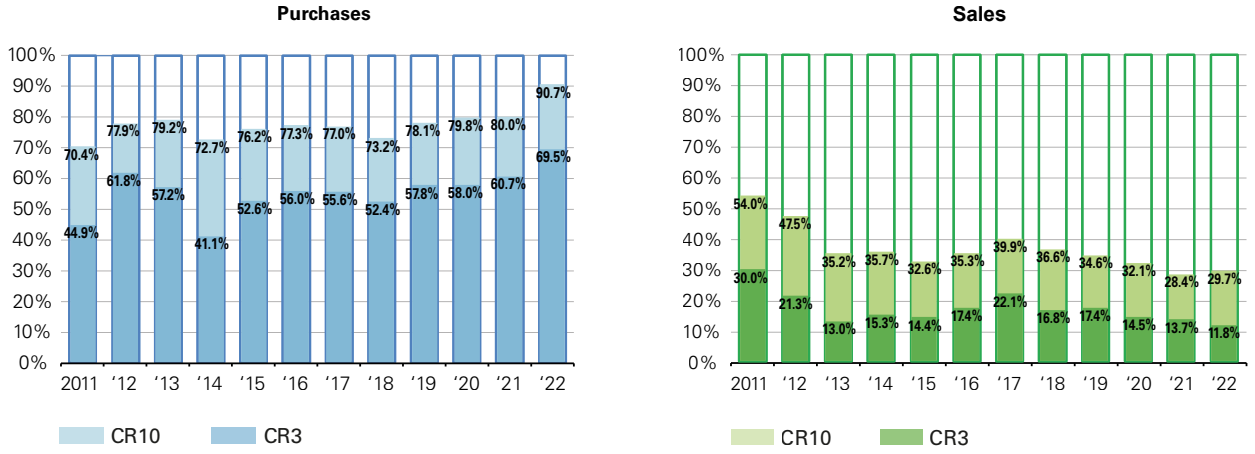


Fig. 2.4.7 GO - Volumes traded

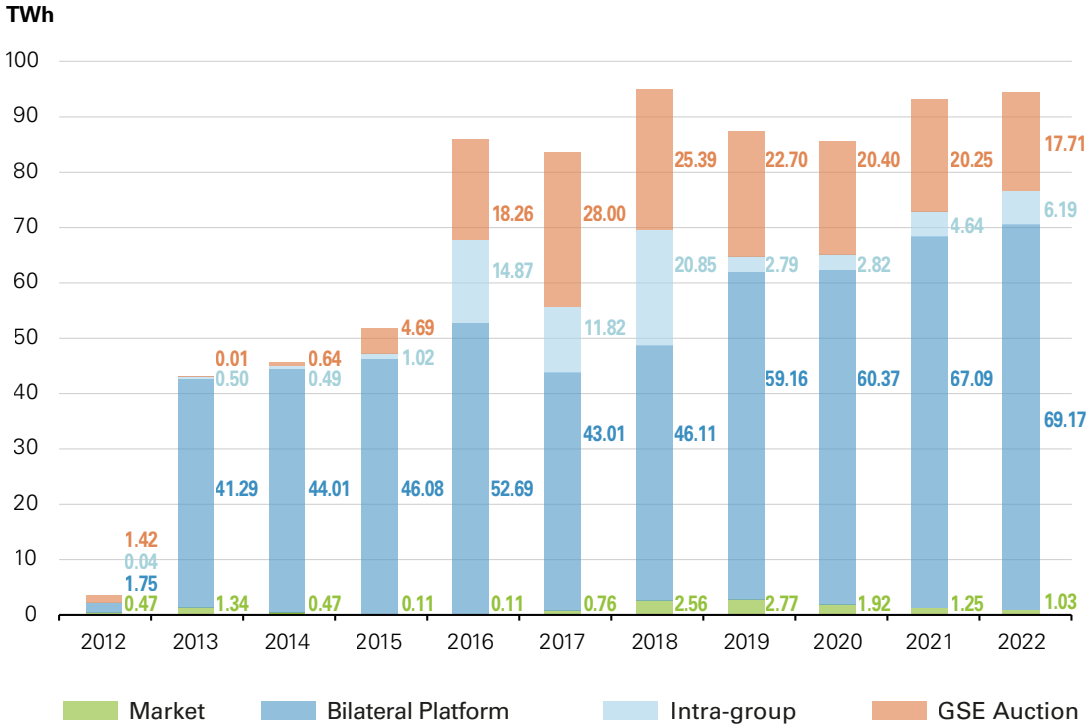
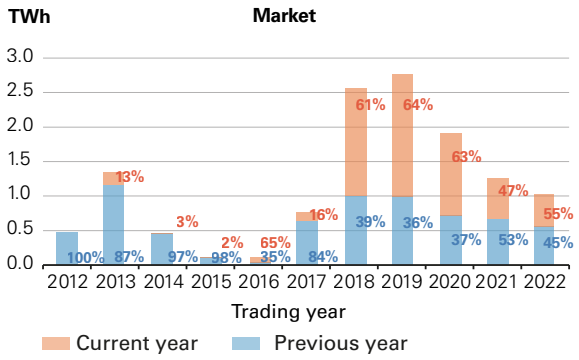


Fig. 2.4.8 Structure of volumes traded by year of production



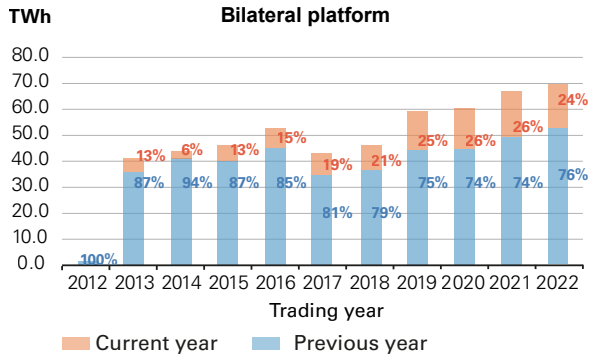


Fig. 2.4.9 GO prices. Annual average

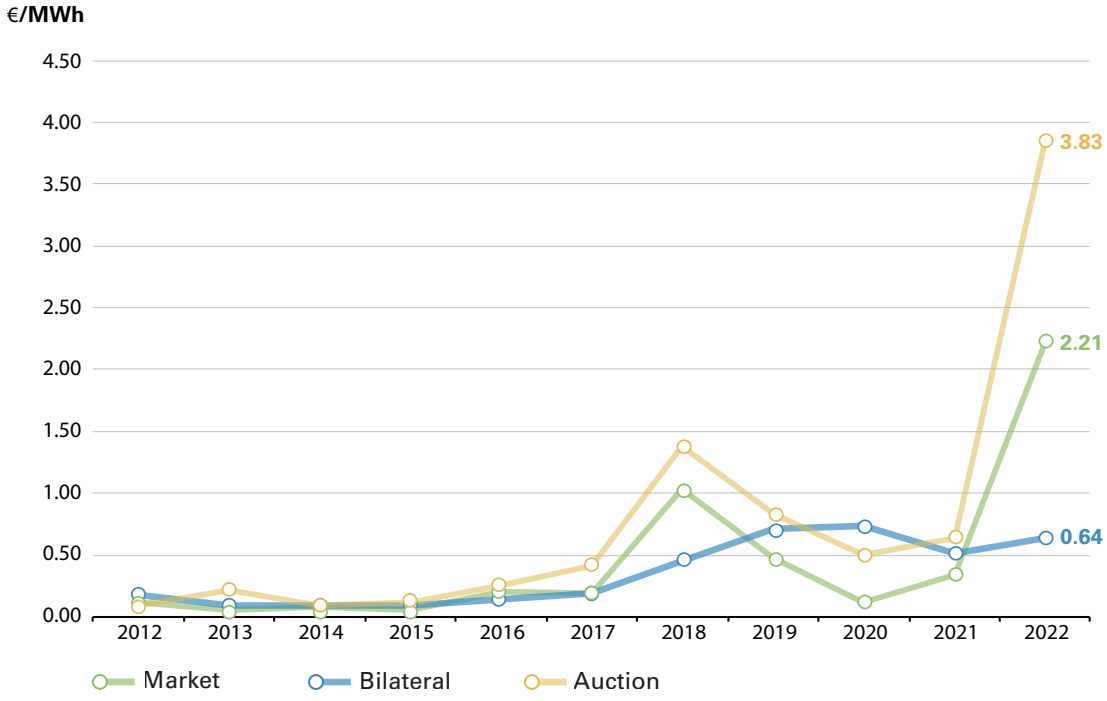
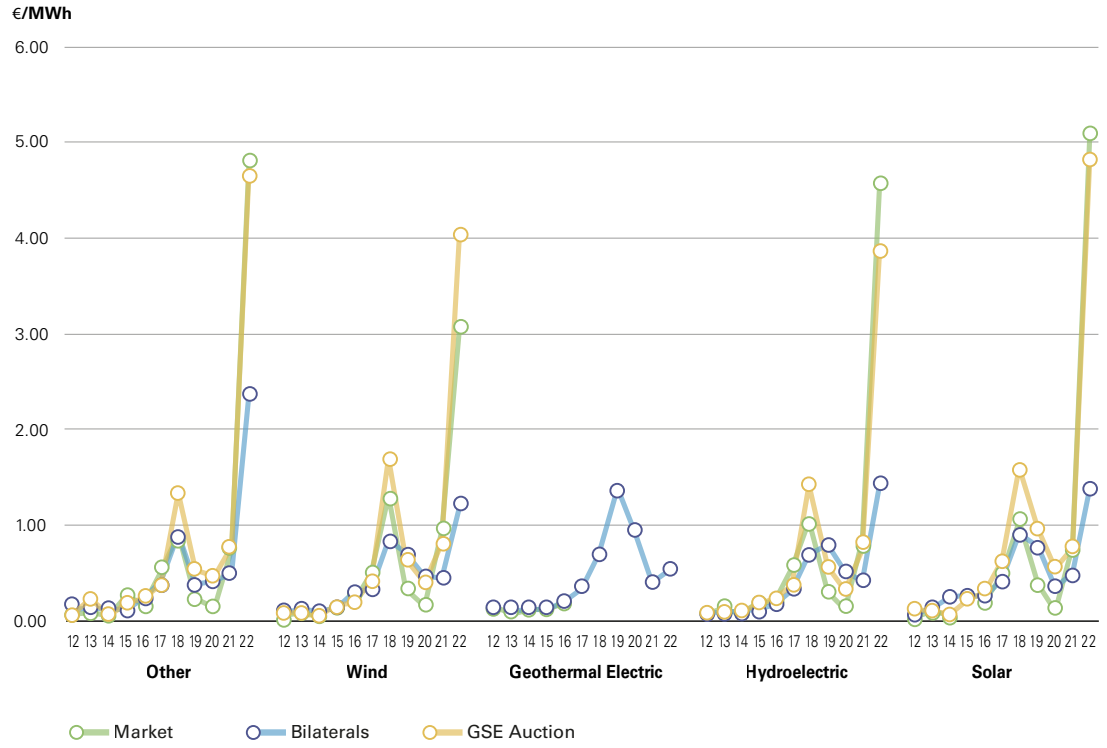
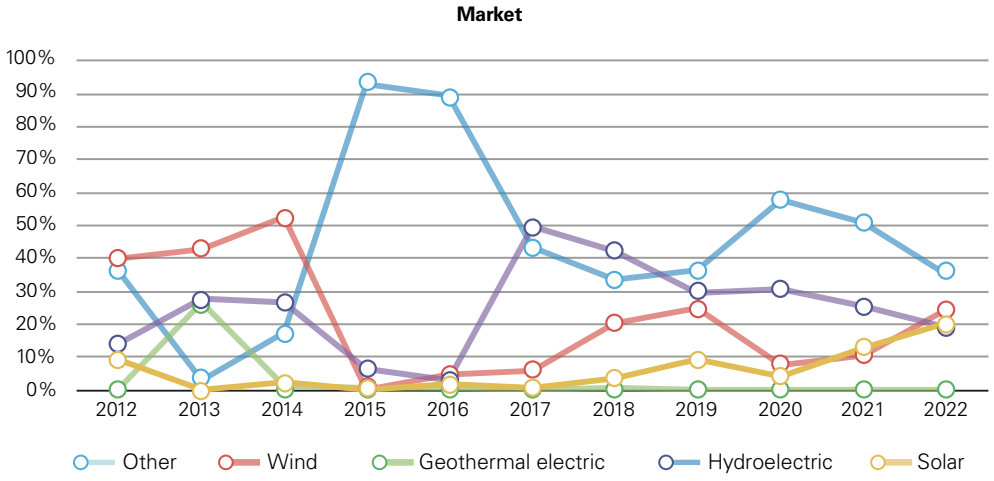


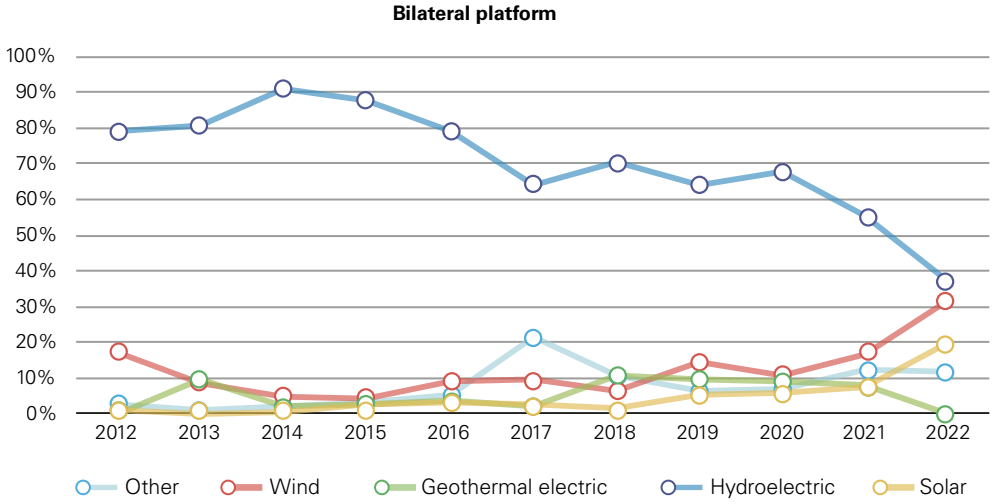
Fig. 2.4.10 GO prices by type and year of production[36]

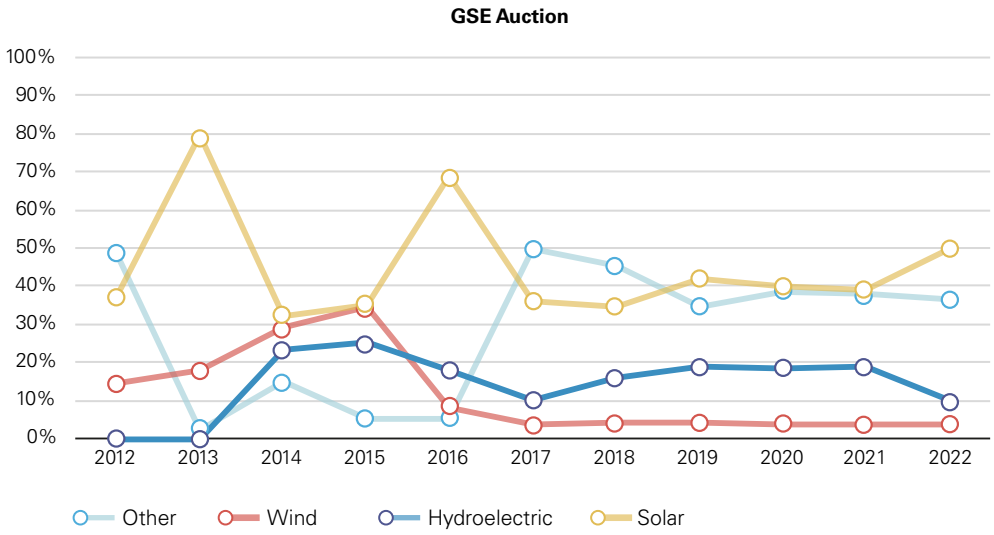


36 The data relating to the year of production 2022 are calculated as of 31/12/2022.

Fig. 2.4.11 Structure of volumes traded. Year of production[37]



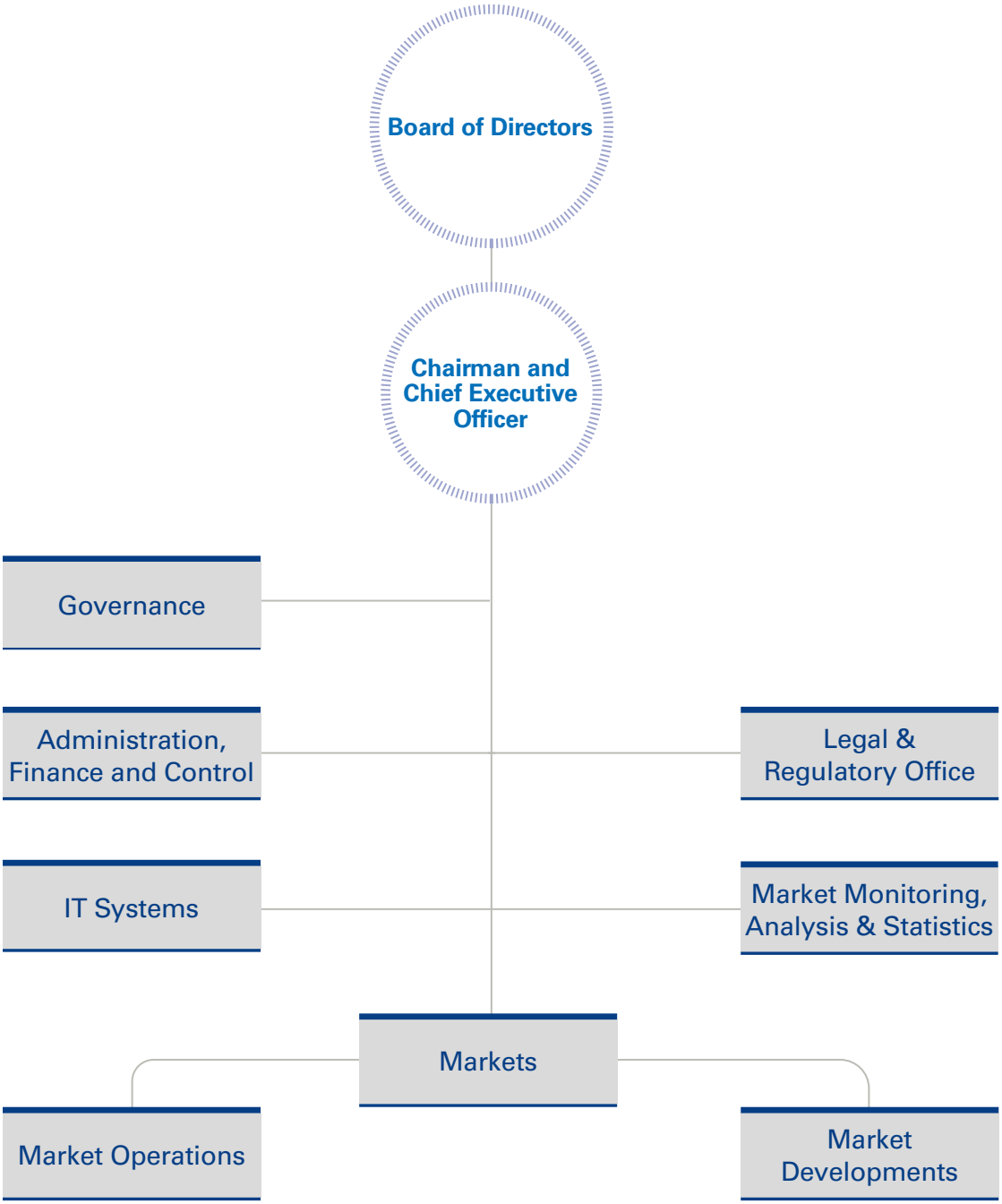




37 The data are calculated as of 31/12/2022.

Appendix 1

GME organizational structure


Board of Directors
Chairman and Chief Executive Officer
Governance
Administration, Finance and Control
IT Systems
Legal & Regulatory Office
Market Monitoring, Analysis & Statistics
Markets
Market Operations
Market Developments

Appendix 2

Market rules

Market rules

	ELECTRICITY MARKET				GAS MARKET			
	MPE	**MTE**	**PCE**	**PPA**	**MGP-GAS MI-GAS**	**MGS**	**MPL**	**MT-GAS**
Participation	Voluntary on MGP, MI and MPEG Mandatory on MSD	Voluntary	Voluntary	Voluntary	Voluntary	Voluntary	Voluntary	Voluntary
Requirements for admission to markets and participation in tradings (*)	Ownership of an energy account to deliver a net position required	Ownership of an energy account to operate	Only dispatching users are allowed and subjects from their delegates	Enabled users	Need to be a user of PSV to operate	Need to be a user of PSV and storage services user to operate	Need to be a user of PSV and be entitled to submit offers at offer points of the transport network in order to operate	Need to be a user of PSV to operate
Traded product	MGP hours: 1-24 MI1: 1-24 MI2: 1-24 MI3: 4-24 MI4: 8-24 MI5: 12-24 MI6: 16-24 MI7: 20-24 MI-A1: 1-24 (**) MI-A2: 1-24 (**) MI-A3: 13-24 (**) XBID: 1-24 (**) MPEG Daily (with baseload and peakload profile)	Annual, Quarterly, Monthly (with baseload profile and peakload)	OTC Contracts	Long-term contracts for the purchase and sale of electricity from renewable sources	Daily	Daily	Daily	BoM, Monthly, Quarterly, Half-yearly, Annual (both thermal and calendar)
Trading methods	Auction on MGP, MI and MSD Continuous trading on XBID, MPEG	Continuous trading	Bilateral trading	Auction (Energy Release)	Continuous trading/Auction (AGS)	Auction	Auction	Continuous trading
Price rule	Zonal marginal price on the MGP and MI Pay as bid on XBID, MPEG and MSD	Pay as bid	N/A	N/A	Pay as bid/ Marginal price (AGS)	Marginal price	Marginal price	Pay as bid
Guarantees	Bank guarantee and/or cash deposit		Bank Guarantee Cash deposit only in cases of necessity and urgent cases	N/A	Bank guarantee and/or cash deposit	Bank guarantee and/or cash deposit	Bank guarantee and/or cash deposit	Bank guarantee and/ or cash deposit
Central counterparty	GME on MGP, MI and MPEG Terna on MSD	GME	GME (only for CCT)	N/A	GME	GME (from 1st April 2017)	GME (from 1st April 2017)	GME
Payments	W+1 (from 1st December 2016) for MGP and MI M+2 for MPEG	M+2	W+1 (from 1st December 2016)	N/A	W+1 for the transactions (from 1st September 2016) M+3 for the closure of the non-delivered positions	W+1 for the transactions M+3 for the closure of the non-delivered positions	W+1 for the transactions M+3 for the closure of the non-delivered positions	W+1 for the transactions (from 1st September 2016) M+3 for the closure of the non-delivered positions

(*) The requirements for participation in the markets are indicated in the rules and regulations of each market.
(**) Valid from September 2021.

PGAS			MTEE	MGO	MCIC	PAR
Import	Virtual Storage	Royalties				
Mandatory (sales side)	Mandatory (sales side)	Mandatory (sales side)	Voluntary	Voluntary	Voluntary	Voluntary
PSV users subject to the requirement of offer for shares of import	PSV users subject to participation in the service of Register for virtual storage	PSV users subject to the obligation of offer for royalties	Need to register an account in the TEE register for trading on the MTEE	Need to register an account in the GOs Register for trading on the MGO	Need to register an account in the CIC Register	Users enabled at the regasification terminal
Monthly, Yearly Thermal	Monthly, Half-yearly	Monthly	Single order book for unified type (1 toe)	Certificate by type of source (1MWh)	Certificate by type of source (1 CIC)	Yearly and multi-year capacity Capacity during the progress of thermal year; Residual capacity of thermal year; regasification capacity that can no longer available in the auction
Continuous	Continuous	Auction	Continuous	Continuous	Continuous	Auction/FCFS
Pay as bid	Pay as bid	Marginal price	Pay as bid	Pay as bid	Pay as bid	Pay as bid/ Marginal
Defined by each selling participant	Defined by each selling participant	Defined by each selling participant	Cash deposit to cover total purchases	Cash deposit to cover total purchases	Cash deposit to cover total purchases	NA
N/A Invoicing and payments between participants	N/A Invoicing and payments between participants	N/A Invoicing and payments between participants	GME	GME	GME	Regasification terminal
Deadline defined by each selling participant	Deadline defined by each selling participant	Deadline defined by each selling participant	D+3	D+3	D+3	Regasification terminal

Appendix 3

Statistical data

Table 1 – Traded volumes

TWh	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change '22/'21
ELECTRICITY MARKETS													
MGP	**311.49**	**298.67**	**289.15**	**281.98**	**287.13**	**289.70**	**292.20**	**295.56**	**295.83**	**280.18**	**290.40**	**289.17**	**-0.4%**
Exchange	180.35	178.66	206.90	185.85	194.59	202.82	210.92	212.93	**213.26**	**209.83**	**221.28**	210.91	-4.7%
Bilateral	131.15	120.00	82.25	96.13	92.54	86.88	81.28	82.63	**82.56**	**70.35**	**69.12**	78.27	+13.2%
MI	**21.87**	**25.13**	**23.34**	**22.79**	**24.92**	**28.01**	**25.35**	**25.38**	**26.37**	**24.91**	**26.04**	**25.97**	**-0.3%**
MI-A1											**4.01**	13.92	-3.0%
MI-A2											**1.47**	5.42	3.3%
MI-A3											**0.67**	2.58	7.3%
XBID											**0.73**	4.04	54.3%
MI1	14.47	15.99	12.80	12.23	12.91	15.04	13.81	13.35	**12.73**	**11.39**	**9.19**		
MI2	5.38	6.21	6.07	6.47	6.15	6.97	5.45	4.53	**4.44**	**4.58**	**3.10**		
MI3	1.22	1.72	2.00	2.01	2.39	2.50	2.38	3.34	**4.19**	**3.65**	**2.72**		
MI4	0.80	1.21	2.47	2.09	1.22	1.20	0.78	0.93	**1.20**	**1.34**	**1.07**		
MI5					2.24	2.31	1.12	1.15	**1.40**	**1.31**	**1.10**		
MI6							1.47	1.59	**1.82**	**1.96**	**1.47**		
MI7							0.34	0.48	**0.61**	**0.68**	**0.49**		
MA													
MTE	**33.44**	**54.96**	**41.10**	**32.27**	**5.09**	**1.07**	**1.36**	**1.19**	**1.64**	**0.77**	**0.02**	**0.01**	**-54.9%**
Exchange	31.67	30.36	8.00	18.40	5.09	1.07	1.36	1.19	**1.64**	**0.77**	**0.02**	0.01	-54.9%
OTC clearing	1.77	24.60	33.10	13.87	-	-	-	-	-	-	-		
MPEG						0.00	**3.93**	**3.16**	**0.70**	**0.72**	**0.29**	**0.15**	**-48.4%**
PCE (*)	**290.82**	**307.61**	**325.50**	**345.72**	**354.47**	**342.14**	**302.83**	**311.57**	**291.74**	**265.14**	**232.22**	**249.72**	**+7.5%**
Registrations	290.82	307.61	325.50	345.72	354.47	342.14	302.83	0.00					
GAS MARKETS													
MGAS	**0.16**	**0.17**	**0.02**	**0.10**	**1.01**	**10.69**	**43.92**	**55.16**	**82.17**	**113.79**	**129.99**	**175.01**	**+34.6%**
MGP-NC	0.15	0.14	0.01	0.00	0.00	0.33	3.28	13.01	24.56	**30.08**	**45.40**	75.64	+66.6%
MGP-AGS										**25.72**	**33.79**	51.11	+51.2%
MI-NC	0.01	0.04	0.00	0.10	1.01	7.09	23.83	27.86	41.05	46.70	**44.09**	40.53	-8.1%
MI-AGS										**4.36**	**1.61**	2.60	+61.6%
MGS						3.27	16.63	13.50	13.37	6.45	**5.08**	5.13	+1.0%
MPL						-	-	-	-	-	**-**	-	
MTGAS			-	-	-	-	0.19	0.79	3.19	0.48	**0.02**	-	
PB-GAS	**1.71**	**34.93**	**40.88**	**41.52**	**48.19**	**36.79**							
G+1 Segment	1.71	34.93	40.83	38.58	40.86	30.57							
G-1 Segment			0.05	2.94	7.33	6.22							
P-GAS	**2.91**	**2.87**	**0.62**	**-**	**-**	**-**	**1.95**	**2.43**	**0.44**	**-**	**2.22**	2.03	**-8.4%**
Import	-	-	-	-	-	-	-	-					
Former Legislative Decree 130/10		-	-	-	-	-	-	-					
Royalties	2.91	2.87	0.62	-	-	-	1.95	2.43	0.44	-	**2.22**	2.03	-8.4%
ENVIRONMENTAL MARKETS													
CV	**31.09**	**32.33**	**44.81**	**43.05**	**36.78**	**9.23**							
Exchange	4.13	3.81	7.57	8.20	6.95	1.26							
Bilateral	26.97	28.52	37.25	34.85	29.84	7.98							
TEE	**21.91**	**40.73**	**44.04**	**62.88**	**46.67**	**50.15**	**60.04**	**42.30**	**30.60**	**22.48**	**17.87**	**14.52**	**-18.7%**
Exchange	6.83	13.56	15.06	18.66	20.21	29.64	33.26	18.03	15.27	12.55	**10.32**	9.36	-9.3%
Bilateral	15.08	27.17	28.98	44.22	26.45	20.52	26.78	24.27	15.33	9.93	**7.55**	5.16	-31.6%
GO		**2.22**	**42.63**	**44.48**	**46.18**	**52.80**	**43.77**	**48.67**	**61.93**	**62.29**	**68.35**	**70.21**	**+2.7%**
Exchange		0.47	1.34	0.47	0.11	0.11	0.76	2.56	2.77	1.92	**1.25**	1.03	-17.8%
Bilateral		1.75	41.29	44.01	46.08	52.69	43.01	46.11	59.16	60.37	**67.09**	69.17	+3.1%
MCIC (**)										421	-	**-**	-

(*) Contracts registered in the PCE by trading year, net of the contracts relating to MTE (including OTC clearing) and to the CDE.
(**) The data is expressed in number of CICs.

Table 2 - Registered participants

N. registered participants (*)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change '22/'21
ELECTRICITY MARKETS													
IPEX	192	200	223	254	264	245	258	269	282	280	278	**313**	*+35*
PCE	208	259	287	317	321	321	331	332	350	345	352	**371**	*+19*
GAS MARKETS													
MGAS	33	42	66	71	88	158	179	186	201	207	227	**305**	*+78*
PB-GAS	60	65	74	86	96	107							
P-GAS	61	72	77	78	80	86	85	85	80	80	81	**81**	*0*
ENVIRONMENTAL MARKETS													
MCV (**)	675	745	852	901	908	911							
PBCV (**)	1,082	1,177	1,381	1,466	1,509	1,509							
MTEE	379	447	588	838	1,055	1,281	1,499	1,558	1,623	1,673	1,730	**1,764**	*+34*
TEE Register	513	635	866	1,196	1,469	1,775	2,155	2,307	2,409	2,529	2,643	**2,714**	*+71*
MGO		180	262	291	299	325	396	469	651	709	739	**781**	*+42*
PBGO		219	324	359	374	405	509	713	1,022	1,225	1,400	**1,511**	*+111*
MCIC										19	26	**28**	*+2*

(*) The number of registered participants refers to the figure calculated as at 31 December of each year.
(**) The number of registered participants for 2016 refers to the figure calculated as at 30 June.

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