**NATURAL GAS SUPPLY IN ITALY: ANALYSIS AND PERSPECTIVES**

**Anna Tacente 1Bruno Notarnicola Giuseppe Tassielli Pietro A. Renzulli**

1 Ionian department of law, economics and environment. University of Bari “Aldo Moro”, Via Duomo 259, Taranto 74123 Italy

1AnnaTacente, [anna.tacente@uniba.it](mailto:anna.tacente@uniba.it),ORCID, 0000-0002-7548-6303; Bruno Notarnicola, bruno.notarnicola@uniba.it, ORCID 0000-0001-7359-7950;Giuseppe Tassielli, [giuseppe.tassielli@uniba.it](mailto:giuseppe.tassielli@uniba.it%20)  ORCID 0000-0003-1108-3385; Pietro A.Renzulli, [pietro.renzulli@uniba.it](mailto:pietro.renzulli@uniba.it) ORCID 0000-0001-8753-0909

Corresponding author: Anna Tacente, email:anna.tacente@uniba.it

The work analyses Italy's current strategies for gas supply in order to guarantee the energy security of the national market and its potential capacity for diversification.

In the first part, having examined the Italian situation relative to domestic production and the quantity of imported gas, the work focuses on the countries from which Italy imports natural gas through pipelines: Russia, Algeria, Azerbaijan, Libya and Northern Europe (Norway and Holland) and LNG through LNG carriers, also analysing the reserves, production and infrastructures present there.

In the second part, in the light of the current situation characterised by strong instability, the prospects of diversification of natural gas supply routes in the Mediterranean context are analysed.

The exploitation of natural gas reserves in the eastern Mediterranean area and the development of regasifiers to accommodate LNG can make a valuable contribution to the strategy of diversification of energy supplies.

Keywords: Energy, security, supply, diversification

**1.1 Introduction**

The conflict in Ukraine has highlighted Italy's strong energy dependence on foreign countries and in particular on Russia; this has made clear the need to diversify natural gas supply sources, increase domestic production and regasification capacity**.** National production of natural gas is insufficient to cover national needs: Italy extracted 3.4 billion m3 of natural gas in 2021, against consumption of 76.1 billion m3, an increase of 7.2 % compared to 2020. In 2021, Italy imported 72.7 billion m3 equal to 95% of its gas requirements[[1]](#footnote-1).

Gas supply in Italy is mainly supplied with gas imported from abroad via international pipelines or transported by sea in liquefied form as LNG and then regasified. On the basis of the data collected, it is intended to identify a possible strategy to diversify energy supplies in the coming years.

**1.2 Materials and methods**

The work is based on the analysis and selection of the main documents, plans and statistical data taken from the official websites of the Italian Government, the main operators in the energy sector and the companies that manage gas transportation at an international level. A further source is the sector's economic newspapers.

**1.3 Results and discussion**

Italy extracted (in 2021) 3.4 billion m3 of natural gas from 1.298 active wells (Table 1)[[2]](#footnote-2).

Table 1. Distinction of active wells in Italy

|  |  |
| --- | --- |
| ACTIVE PITS | GAS |
| Dispensing production wells | 514 |
| Non-dispensing production wells | 752 |
| Other active wells (monitoring, re-injection, other use) | 32 |
| Total | 1,298 |

Source: Pitesai 2021

The drilling of wells for gas extraction, which had reached its peak in Italy in the early 1990s (128 wells and up to 20 billion m3of natural gas) decreased in the following years to an average of around 30 wells per year, partly due to the limits imposed by the PITESAI plan for concessions on new wells. The largest proven and unexploited gas reserves are in the northern Adriatic. Other deposits are found in the Sicilian Channel, the Ionian Sea, and the sea northwest of Sardinia. There are approximately 350 billion m3 of natural gas in the Italian subsoil, which includes already confirmed or only potential reserves. Proven reserves are in the range of 70 to 90 billion m3. According to the most recent PITESAI estimates, by upgrading the non-operating wells and improving the operating ones, a natural gas production of 10 billion m3 per year could be achieved. The largest number of productive wells is in Emilia-Romagna (187), Tuscany (45), Sicily (44) and Molise (15). The number of wells per region does not correspond to the quantity of gas extracted, as can be seen from the comparison in the table below.

Table 2. National gas production 2021 broken down by regions and sea areas

|  |  |  |  |
| --- | --- | --- | --- |
| NATURAL GAS PRODUCTION *YEAR* 2021() | | | |
| ***Region*** | ***smc*** | ***Region*** | **smc** |
| Basilicata | 1,191,551,798 | Lombardia | 8,986,570 |
| Sicilia | 162,390,302 | Piemonte | 6,974,260 |
| Emilia-Romagna | 129,079,536 | Marche | 5,478,960 |
| Molise | 57,411,581 | Calabria | 5,157,142 |
| Puglia | 49,350,503 | Toscana | 3,175,178 |
| Abruzzo | 9,301,75 | Veneto | 924,443 |
|  |  | **TOTAL LAND** | **1,629,782,032** |
| ***Sea*** |  |  |  |
| ZONE A |  |  | 1,021,804,820 |
| ZONE B |  |  | 558.115.379 |
| ZONE C |  |  | 3,710,669 |
| ZONE D |  |  | 285,269,672 |
|  |  | **TOTAL SEA** | **1,868,900,540** |
|  |  | **TOTAL LAND+SEA** | **3,498,682,572** |

Source: Mite 2021

***1.3.1 Natural gas exporting countries to Italy***

In 2021, Italy imported 72.728 million m3 of gas from the countries shown in Table 3.

Table 3 Italian gas imports by country of origin

|  |  |  |
| --- | --- | --- |
| Natural gas imports by country of origin in millions of m3 | | |
| Country | Year 2021 | Percentage |
| Russian Federation | 28,988 | 39.86% |
| Algeria | 2,584 | 31.06% |
| Azerbaijian | 7,214 | 9.91% |
| Qatar | 6,877 | 9.46% |
| Libya | 3,231 | 4.45% |
| Norway | 1,937 | 2.67% |
| Netherland | 312 | 0.42% |
| Others | 1,585 | 2.17 % |
| Total | 72,728 | 100% |

source: Mite 2021

The gas is fed into the network at the nine entry points, at the six interconnection points with methane pipelines and the three interconnection points with LNG regasification terminals.

***1.3.2 Main natural gas import pipelines.***

Until 2021, Italy imported 28.988 million m3 from the Russian Federation via the 4,451 km long Urengoy-Uzhgorod pipeline, with an effective capacity of 28 billion m3 per year[[3]](#footnote-3), which starts from the Urengoy field in Siberia and connects to the 380 km long Tag (Trans Austria Gas) to reach Italy via the Tarvisio plant.

Algerian gas, currently at 22.584 million m3, arrives in Italy via the Transmed pipeline, about 2,000 km long, which crosses Tunisia and arrives at the Mazara del Vallo plant (Sicily)[[4]](#footnote-4). The transport system from Algeria to Italy consists of: the Enrico Mattei gas pipeline (GEM) section in Algerian territory; the connection section from the production wells of Hassi R'Mel to the Oued Safsaf station on the Tunisian border; the section in Tunisian territory, TTPC (Transtunisino); and the 'sea-line' section in the Strait of Sicily[[5]](#footnote-5).

The TAP (Adriatic Pipeline) gas pipeline, in operation since 2020, brought 7.214 million cubic metres of natural gas to Italy in 2021. With a capacity of around 10 billion m3 of gas per year, the TAP allows gas extracted in Azerbaijan from the Shah Deniz field in the Caspian Sea (which has an annual capacity of around 25 billion m3 standard[[6]](#footnote-6)) to reach Puglia via Turkey, Greece and Albania. The 878 km long TAP (773 on shore and 105 off shore) arrives at the pipeline receiving terminal in Meledugno (Lecce), connecting the extraction area in Azerbaijan through the SCP (South Caucasus Pipeline) for 692 km, the TANAP (Trans Anatolian Pipeline) for about 1800 km.

Libyan natural gas of 3.231 million m3 comes from the offshore Bahr Essalam and Wafa fields in the south-western part of Libya, compressed by the Mellitah Power Plant and fed into the 520 km long GreenStream via the Mediterranean Sea to the Gela gas reception terminal in Sicily.

From Northern Europe in Italy, 1.937 million m3 arrive from Norway and 312 million m3 from the Netherlands[[7]](#footnote-7) through the 293 km long Transitgas with a capacity of about 18 billion m3 per year[[8]](#footnote-8) connected to the national network at Passo Gries in Piedmont, as well as with the Trans Europa Naturgas Pipeline at Wallbach (in northern Switzerland) and the Rodersdort network (at the French border).

***1.3.3 Importing through LNG. The Regasifiers***

There are three regasification centres in Italy: Panigaglia and Livorno, on the Tyrrhenian Sea, and Rovigo, on the Adriatic Sea. The largest is Adriatic LNG, an offshore plant: off the coast of Porto Viro (Rovigo) that connects to the network at Cavarzere; in 2021 it regasified 7.3 billion m3 and it has a regasification capacity of 8 billion m3 per year.

6.877 million m3 of natural gas per year arrive in Italy from the "North Field" in Qatar. Liquefied gas (LNG) transported by ship arrives at the Adriatic LNG terminal in Rovigo with an annual capacity of 8 billion m3.

About 12 miles off the coast between Livorno and Pisa, in the Tyrrhenian Sea, there is the 'Fsru Toscana', which in 2021 regasified 1.4 billion m3. It has an annual capacity of 3.75 billion m3 and a gross storage capacity of about 137,100 m3 of LNG. The third active regasifier is located near Panigaglia an onshore facility with a maximum annual regasification capacity of 3.5 billion m3 of natural gas[[9]](#footnote-9): in 2021 it regasified 1.07 billion m3.

**1.4 Prospects for greater diversification**

In order to ensure a greater diversification of natural gas supply sources and reduce the strong dependence on Russia, the Italian government has recently planned gas for additional 25 billion m3 for 2024-2025 to be imported in various forms even from geographically distant countries.

***1.4.1 Domestic production and regasification capacity increase***

An increase in domestic gas production may come from existing or active wells by 2023 without the opening of new gas fields, but only by reducing the environmental and bureaucratic constraints imposed by PITESAI; a significant increase in production may only occur in the following years. Approximately 1.4 billion m3 per year may come from the Cassiopea and Argo fields in the Sicilian Channel, fully operational by the first half of 2024[[10]](#footnote-10).

The optimisation and expansion of the total annual capacity of the three existing regasification terminals, today 15.25 billion m3, are closely related with the possibility of importing additional quantities of gas. In December 2020, the Adriatic LNG Terminal S.r.l. (ALNG) submitted a request for authorisation to increase the current maximum regasification capacity from 8 billion m3 to 9 billion m3 for the off-shore terminal in Porto Levante Rovigo[[11]](#footnote-11). The purchase of FSRU (floating units) can provide a quick alternative to storage and regasification terminals. In May 2022, a contract was signed for the LNG carrier 'GolarArctic’ sale from Golar to Snam, which will be installed within two years in Portovesme, Sardinia, after being converted into a storage and regasification unit with a capacity[[12]](#footnote-12) up to 140,000 m3. In June 2022, Snam purchased the Golar Tundra, a storage and regasification vessel **(**FSRU) with a continuous regasification capacity of 5 billion m3 per year, which will be located in the central north and will start operations in spring 2023[[13]](#footnote-13).

***1.4.2 Increased imports through pipelines***

Additional volumes will increasingly arrive from the second half of 2022 by 2 billion m3 up to 25 billion m3 in 2025. The immediate goal is to replace the 50 per cent of Russian gas supplies by 2023. The energy cooperation agreement of 11 April 2022 between Italy and Algeria will make it possible to use the transport capacities of the Transmed-Mattei pipeline and supply Italy with 3 billion m3 more gas as early as 2022, plus another 6 in 2023 to reach 9 billion m3 per year in 2024[[14]](#footnote-14). An additional 2 billion m3 is also expected from Azerbaijan through TAP[[15]](#footnote-15). The uncertainty of the current political situation in Libya leads to the conclusion that an increase in supply to Italy is difficult today.

***1.4.3 Increased imports through LNG***

The possible increase in LNG supply from Congo, Angola, Egypt, Qatar, Mozambique, Nigeria and Indonesia is estimated to be approximately 1.5 billion m3 in the second half of 2022, rising to 12.8 billion m3 in 2025.

The agreement signed in April 2022 with Angola and Congo foresees a gas supplies increase in exports to Italy. Angola will increase its supply by 1 billion m3 of natural gas and Congo by more than 4.6 billion m3 per year[[16]](#footnote-16).

The April 2022 framework agreement between ENI and Egypt, together with that for the restart of the Damietta liquefaction plant, is aimed at maximizing the production and export of Egyptian gas to Europe and Italy with 3 billion m3 in 2022[[17]](#footnote-17).

Qatar has pledged to supply Italy with 2 billion m3 by exploiting the remaining capacity of the Transmed pipeline[[18]](#footnote-18). Other states, such as Mozambique, Nigeria, and Indonesia, areas where extraction activities have increased considerably, could supply a further 2.2 billion m3 of gas within the next three years [[19]](#footnote-19). There would also be other hypotheses to be developed involving African countries[[20]](#footnote-20).

**1.5 Conclusions**

The above analysis showed that it is possible to increase alternative supplies by 2025 through various strategies: through southern gas pipelines by 25.2 billion m3 as shown in Table 4. The expansion of regasification capacity could make Italy an important hub in the Mediterranean for gas transport.

Table 4. Additional imports from southern countries 2022-2025

|  |  |
| --- | --- |
| Alternative sources of supply to Russian gas 2022-2025 in billion m3 | |
| Italian production | 1.4 |
| Algeria | 9.0 |
| Azerbaijan | 2.0 |
| Congo | 4.6 |
| Angola | 1.0 |
| Egitto | 3.0 |
| Qatar | 2.0 |
| Mozambico, Nigeria, Indonesia | 2.2 |
| Total | 25.2 |

The answers to such a complex scenario cannot be of an emergency nature but imply a comprehensive EU supply strategy with long-term objectives that go beyond the current crisis.

**Sitography**

Dominelli, C. (2022) Gas: Government at work on 25 billion cubic metres plan in three years, 'Il Sole 24 ore 5 May 2022. [https://www.ilsole24ore.com/art/gas-governo-lavoro-un-piano-25-miliardi-meti-cubi-tre-anni-AEFMm1VB .(](https://www.ilsole24ore.com/art/gas-governo-lavoro-un-piano-25-miliardi-meti-cubi-tre-anni-AEFMm1VB%20.() Accessed 6/ 5/2022).

Eni (2022) Media. <https://www.eni.com/it-IT/media/news/2021/09/eni-avvia-a-gela-costruzione-impianto-trattamento-gas-argo-cassiopea.html>. (Accessed 4/4/2022).

Eni (2022) Natural Resources, <https://www.eni.com/it-IT/media/comunicati-stampa/2022/04/eni-egas-firmano-accordo-aumentare-produzione-fornitura-gas-egiziano.html> . (Accessed15/ 4/2022).

Mise (2022) Increase of regasification capacity. <https://www.mise.gov.it/index.php/it/energia/gas-naturale-e-petrolio/gas-naturale/rigassificatori/2042264>. (Accessed 3/ 4/2022).

Mite (2022) Analysis and statistics energy and mining. <https://dgsaie.mise.gov.it/importazioni-gas-naturale>.(Accessed 10/4/2022).

Mite (2022) Data, <https://unmig.mise.gov.it/index.php/it/dati>.( Accessed 2/5/2022).

Mise (2022) Energy Transition Plan (2021). <https://unmig.mise.gov.it/index.php/it/>.(Accessed 20/3/2022).

Snam (2022) Financial statements and reports. [https://www.snam.it/it/investor-relations/Bilanci\_Relazio ni/](https://www.snam.it/it/investor-relations/Bilanci_Relazio%20ni/) .(Accessed 30/ 4/2022).

Snam (2022) Report. https://www.snam.it/it/transizione\_energetica/report/. (Accessed 4/ 4/2022)

Snam (2022) Media. https://www.snam.it/it/index.html [/Snam\_acquista\_rigassificatore galleggiante\_da\_Golar\_LNG.html .(Accessed 2/6/2022](https://www.snam.it/it/media/comunicati-stampa/2022/Snam_acquista_rigassificatore_galleggiante_da_Golar_LNG.html%20(at%202022t)) .

Tansmed (2022) gas transport system,

[https://www.transmed-spa.it/sistema\_di\_trasporto.php?lingua=1. ( Accessed](https://www.transmed-spa.it/sistema_di_trasporto.php?lingua=1.%20(%20Accessed%20)  5/5/2022).

Trans-Saharan gas pipeline (2022). [https://www.aps.dz/economie/135710-gazoduc-transsaharien-des-etapes-decisives-franchies-dans-la-concretisation-du-projet.](https://www.aps.dz/economie/135710-gazoduc-transsaharien-des-etapes-decisives-franchies-dans-la-concretisation-du-projet.%20)  (Accessed 8/5/2022

Urengoy Pomary Uzhgorod gas pipeline (2021). <https://www.offshore-technology.com/marketdata/urengoy-pomary-uzhgorod-gas-pipeline-russia>..(Accessed 15/4/2022).

1. <https://dgsaie.mise.gov.it/importazioni-gas-naturale>. [↑](#footnote-ref-1)
2. PITESAI Sustainable Energy Transition Plan for Eligible Areas. Productive well means a well that has been successfully drilled. Producing well means a productive well that is currently extracting hydrocarbons from the reservoir. [↑](#footnote-ref-2)
3. https://www.offshore-technology.com/marketdata/urengoy-pomary-uzhgorod-gas-pipeline-russia/ [↑](#footnote-ref-3)
4. <https://dgsaie.mise.gov.it/importazioni-gas-naturale>. [↑](#footnote-ref-4)
5. https://www.transmed-.it/sistema\_di\_trasporto.php?lingua=1. [↑](#footnote-ref-5)
6. <https://www.snam.it/it/transizione_energetica/report/>. [↑](#footnote-ref-6)
7. <https://dgsaie.mise.gov.it/importazioni-gas-naturale>. [↑](#footnote-ref-7)
8. https://www.transitgas.ch/en/) . [↑](#footnote-ref-8)
9. SNAM, 2021 Annual Financial Report. [↑](#footnote-ref-9)
10. https://www.eni.com/it-IT/media/news/2021/09/eni-avvia-a-gela-costruzione-impianto-trattamento-gas-argo-cassiopea., [↑](#footnote-ref-10)
11. https://www.mise.gov.it/index.php/it/energia/gas-naturale-e-petrolio/gas-naturale/. [↑](#footnote-ref-11)
12. [https://www.snam.it/it/media/comunicati- stampa/2022/Snam\_Golar\_LNG\_nave\_FSRUl](https://www.snam.it/it/media/comunicati-%20%20stampa/2022/Snam_Golar_LNG_nave_FSRUl) [↑](#footnote-ref-12)
13. https://www.snam.it/it/media/comunicati-stampa/2022/. [↑](#footnote-ref-13)
14. https://www.eni.com/it-IT/media/comunicati-stampa/2022/04/eni-e-sonatrach-concordano-aumento-forniture-gas-algeria. [↑](#footnote-ref-14)
15. Dominelli, C. (2022) Gas: Government at work on 25 billion cubic metres plan in three years, 'Il Sole 24 ore” 5 May 2022. [↑](#footnote-ref-15)
16. <https://www.eni.com/it-IT/media/comunicati-stampa/2022/04/repubblica-congo-e-eni-> [↑](#footnote-ref-16)
17. https://www.eni.com/it-IT/media/comunicati-stampa/2022/04/eni-egas-firmano-accordo [↑](#footnote-ref-17)
18. <https://www.ilsole24ore.com/art/dall-algeria-qatar-accordi>. [↑](#footnote-ref-18)
19. .[https://euractiv.it/section/energia/news/gas-la-nigeria-si-propone-per-sostituire-la-russia-nelle- importazioni-europee/](https://euractiv.it/section/energia/news/gas-la-nigeria-si-propone-per-sostituire-la-russia-nelle-%20importazioni-europee/). [↑](#footnote-ref-19)
20. Supplies for Italy could come from the Trans-Sahara pipeline, also known as Nigal, of 4,128 km with a starting point in Nigeria, which when fully operational would transport 30 billion cubic meters of gas per year; but the uncertainties derive from the political instability in the territories crossed. [https://www.aps.dz/economie/135710-gazoduc-transsaharien-des-etapes-decisives-franchies-dans-la-concretisation-du-projet.](https://www.aps.dz/economie/135710-gazoduc-transsaharien-des-etapes-decisives-franchies-dans-la-concretisation-du-projet.%20)  [↑](#footnote-ref-20)