# Malta's Preventive Action Plan

Gas Security of Supply
Version: March 2023

# Contents

# Executive summary

The 2023 update of Malta's Preventive Action Plan comes at a time when the EU and its Member States are going through an unprecedented energy crisis. The situation has been exacerbated by the Russian aggression in Ukraine. A number of EU countries have experienced disruptions of supplies of gas from Russia. Gas flows over a number of gas pipelines, such as Yamal or NordStream were completely halted, and the share of Russian gas imports to the EU has dropped from circa 40% before the crisis to approximately 9%. For this reason, a number of Member States have triggered an "early warning" or "alert" crisis level in line with the Gas Security of Supply Regulation (EU) 2017/1938. The continued reduced availability of natural gas in Europe has negatively impacted energy prices and contributed towards inflation across the whole Union, including Malta.

Due to a relatively mild winter 2022/2023 and emphasis on preparedness from the side of the EU and its Member States, the level of gas storages remains historically high at this time of the year. This is a huge boost in the preparedness for next winter. Nevertheless, the likelihood of a full disruption of Russian gas flows to Europe remains very high and therefore Member States must continue to implement measures to phase out fossil fuel imports, in particular from Russia.

Malta does not depend on Russian gas and hence is not directly affected by a disruption of Russian gas supplies. This is mainly due to the fact that it is disconnected from the trans-European gas network and sources LNG from the global market. Nevertheless, Malta is indirectly exposed to potential gas disruptions in mainland Europe given that around 20% of Malta's electricity demand is imported from Italy, which in turn is highly reliant on gas for the production of electricity. Additionally, Malta is exposed to increasing prices of electricity imports from Italy, which during summer 2022 peaked at a maximum of around 850 EUR/MWh.

In view of possible further supply cuts of Russian gas flows and the need for the EU to jointly address preparedness and phasing out of fossil fuel imports, the EU Member States agreed on a number of legislative instruments. On June 29, 2022, Regulation (EU) 2022/1032, dealing with Gas Storage obligations was adopted and on July 26, 2022, the Council Regulation (EU) 2022/1369 for coordinated demand reduction measures for gas was approved. These Regulations created a coordination framework for national gas storage filling and gas demand reduction measures, introduced a possibility for the European Commission to declare a "Union alert" triggering a mandatory 15% gas demand reduction obligation and mandated Member States to update their gas Emergency Plans in line with these developments. These Regulations were further complemented by Council Regulation (EU) 2022/1854 focusing on an emergency intervention to address high energy prices adopted in October 2022 and Council Regulation (EU) 2022/2578 establishing a temporary market correction mechanism to protect Union citizens and the economy against excessively high prices.

The Competent Authority responsible for the implementation of the Gas Security of Supply Regulation, including the development of the Preventive Action Plan and Emergency Plan in Malta is the Ministry responsible for energy.

As natural gas in Malta is used exclusively for the generation of electricity, energy demand for gas equates to the demand for electricity. In Article 5 of Regulation 2017/1938 concerning measures to safeguard the security of gas supply, (the "Regulation"), the "N-1" assessment highlighted that:

- Malta has one gas facility. Therefore "N" = 1, and consequently "N-1" = 0, highlighting the strategic dependency of Malta's electricity sector on the gas facility.

- Malta uses natural gas exclusively to generate electricity. There are no end-use gas customers in Malta and no gas distribution networks. Therefore demand-side measures are focused on management of LNG deliveries, alternative sources of electricity, and demand reduction.

- Whilst the Regulation considers gas supply and demand at daily granularity, it is necessary to balance electricity supply and demand in real time.
- The update of the N-1 assessment carried out in 2022/2023 demonstrated that the available alternative non-gas-fired capacity would not be sufficient to meet the exceptional once-in-20-year peak demand on a daily basis, in particular during the summer period. During the rest-of-the-year period, alternative sources would be adequate to satisfy the infrastructure standard due to relatively lower demand combined with relatively higher capacity of certain generation units in winter compared to summer. Within-day energy supply and demand had also been assessed. This analysis confirmed that existing alternative resources are also not adequate to meet extreme peak demand in most within-day and seasonal variations. The diurnal demand profile and the nature of the existing capacity also means that the exceptional high demand may not be met in extreme circumstances due to the lack of PV contribution when peak evening demand occurs.
- It was also noted that Solar PV is intermittent and provides no load or frequency management capability.

The updated 2022/2023 Common Risk Assessments for Algeria and Libya together with the simulations done by ENTSO-G for the European Commission and presented during the Gas Coordination Group (GCG) confirmed that Malta is not at significant risk from disruption to gas supply. The only source of natural gas in Malta is imported Liquified Natural Gas (LNG). This enables flexibility in the country of origin. To date LNG has not been sourced from Russia, Algeria or Libya. Regional Risk Groups have worked on updating the common risk assessments to take into account recent developments, and in particular assessing the impact of a full Russian gas disruption.

Natural gas in Malta is used exclusively for the generation of electricity and constitutes the largest share of Malta's electricity generation mix (69% in 2021, including electricity imports in the total share). Electricity is dispatched from local generation plants and the electricity interconnector with Sicily based on their order of economic merit, technical capacity and existing contractual arrangements. The National Risk Assessment, required under the Regulation, identified that should the single largest piece of gas infrastructure be lost, and this coincides with an exceptionally high energy demand day, there would be difficulty in meeting electricity demand in Malta.

The Risk Assessment identifies a series of risk scenarios, which are:

I. A gas disruption in third countries and/or a commercial dispute with suppliers;
II. Sabotage, vandalism or industrial disputes affecting the gas facility;
III. Explosion, fire, leak or lighting strike at the Delimara site. Lack of / inadequate maintenance;
IV. Failure of electricity supply to LNG jetty and regasification facility;
V. ICT failure and/or cyber-attack to gas facility;
VI. Extreme weather conditions damaging or disrupting the FSU, Jetty or regasification facility;

Compared to Malta's first National Risk Assessment, the 2023 update included two additional risk scenarios, one which stems from the ongoing geopolitical situation and energy crisis, and another which is particular to Malta's energy system:

VII. Security of supply consequences of the war in Ukraine;
    - Full Russian gas disruption affecting Europe

- Global or regional LNG supply disruption or diversion of LNG flows due to the war in Ukraine;

VIII. Prolonged loss of or damage to the electricity interconnector with Italy.

The Preventive Action Plan describes existing measures and proposes new actions to mitigate and remove the above risks, in particular those which are to be implemented prior to an emergency Preventive measures in Malta can be broadly split into the following categories: Diversification of sources; Reduce reliance on fossil fuels; Energy system preparedness; and other measures, such as those focusing on reporting and monitoring, protection of critical sites, cyber-security and statutory obligations under EU and national law. Under diversification of sources, preventive measures focus primarily on planned or ongoing transmission infrastructure projects such as the hydrogen-ready gas pipeline or the second electricity interconnector with Italy. Malta's goal to reduce reliance on fossil fuel imports is driven by accelerating the deployment of renewable energy sources, implementation of energy efficiency and demand reduction measures, as well as increasing the flexibility of the energy system. Energy system preparedness is achieved through ensuring the capability of alternative electricity generation sources, through the long-term LNG supply contract, routine emergency testing as well as general physical security arrangements and national security measures. All the above measures are described in more detail under Sections 5 and 6 of the Plan.

Since Malta only uses gas for its critical gas-fired power plants and is currently not connected to the trans-European gas network, Malta does not have "*protected customers*" or "*solidarity protected customers*" within the Regulation's definition. However, due to the island's dependence on gas for electricity production the Competent Authority, the Regulator and the Distribution System Operator are in the process of implementing a framework for the protection of critical sites and vulnerable groups of electricity customers. This will be the basis for prioritisation of customers' electricity supply in the event of a disruption, including one caused by a disruption to the supply of gas.

Although no other EU Member States are obliged by the Regulation to engage with Malta in a solidarity agreement, in order to meet the aims of the Regulation in extreme conditions Malta could require the support of other Member States in a similar spirit as that of the solidarity measures.

# General information

In line with Article 3 of Regulation (EU) 2017/1938 (Gas Security of Supply Regulation), each Member State is required to designate a Competent Authority responsible for the implementation of the Regulation. The designated Competent Authority in Malta is the Ministry responsible for energy, which at the time of writing refers to the Ministry for Environment, Energy and Enterprise. The Ministry is formally designated as the Competent Authority through Legal Notice 69 of 2021[1]. In line with the aforementioned article of the Regulation and point 4 of the Legal Notice, the Competent Authority can delegate specific tasks set out in the Regulation to other bodies.

In view of this, the task of developing the Risk Assessment, the Preventive Action Plan and the Emergency Plan was designated to the Energy & Water Agency (EWA), the technical and policy arm of the Ministry. To support the task of developing the three original documents in line with the requirements of the Regulation, Ainsty Risk Consulting Ltd has been commissioned on behalf of the Competent Authority. The 2023 update of the Preventive Action Plan was carried out by EWA in coordination with the Ministry and Enemalta Plc (DSO and designated lead in developing Malta's Electricity Risk Preparedness Plan).

Article 7 (3) of the Regulation requires that each Member State prepares a **National Risk Assessment** of all relevant risks affecting the security of gas supply. Malta's first National Risk Assessment was completed and submitted to the European Commission in December 2018 and updated in 2022/2023. Malta's National Risk Assessment includes an analysis of the infrastructure standard and the calculation of the N-1 formula in line with Article 5(1) of the Regulation. The National Risk Assessment is consistent with the assumptions and results of the common risk assessments of the Libyan and Algerian risk groups, to which Malta is a member. The common risk assessments of the relevant risk groups have also been submitted to the European Commission in line with the requirements of the Regulation. Given the ongoing geopolitical situation and energy crisis, the updated national and common risk assessments take into account and assess the impact of a potential full Russian gas disruption.

Article 8(2) of the Regulation requires that the Competent Authority of each Member State establishes a **Preventive Action Plan** containing the measures needed to remove and mitigate the risks identified in the risk assessment in accordance with Article 9 and the template in Annex VI and an **Emergency Plan** containing the measures to be taken to remove or mitigate the impact of a disruption of gas supply in accordance with Article 10 and template in Annex VII. The PAP update is in line with the requirements of the Regulation.

[1] Legal Notice 69 of 2021 is available online: https://legislation.mt/eli/ln/2021/69/eng

# 1 Description of the Gas System

## Description of Regional Gas System

In line with Annex I of the Regulation, Malta is part of the following risk groups:

1. North African gas supply risk groups:
   (a) Algerian Risk Group: Greece, Spain, France, Croatia, Italy, Malta, Austria, Portugal and Slovenia
   (b) Libyan Risk Group: Croatia, Italy, Malta, Austria and Slovenia


Figure 1 - Algeria Risk Group


Figure 2 - Libya Risk Group

2. South-East gas supply risk groups:
   (a) Southern Gas Corridor – Caspian: Bulgaria, Greece, Croatia, Italy, Hungary, Malta, Austria, Romania, Slovenia and Slovakia
   (b) Eastern Mediterranean: Greece, Italy, Cyprus and Malta

Article 20 (2) of the Regulation states that for the time being the obligations related to the work of the South-East gas supply risk groups shall remain on hold and start only from the date of when the major infrastructure/ pipeline enters the test operation.

At the time of the writing the South-East gas supply risk groups, that is the Southern Gas Corridor (Caspian) and Eastern Mediterranean group were not formally set up and the relevant Common Risk Assessments were not drafted.

Therefore, it should be noted that Malta's National Risk Assessment is drawing from the North African Common Risk Assessments only. At the time of writing, the update of the Common Risk Assessment for the Algerian Risk Group considering recent developments and assessing the impact of a full Russian gas disruption was concluded, and the results of this assessment have been taken into consideration here. The update of the Common Risk Assessment for the Libyan Risk Group was not finalised and was submitted to the Commission only very recently. Therefore only the results from the European Commission's Joint Research Centre which was tasked by the group to carry out a pan-European crisis scenario focusing on the prolonged halt of Russian gas flows are being taken into consideration here.

## Algeria Risk Group

The Algeria risk group covers three gas interconnectors that import gas from Algeria, two in Spain (Tarifa and Almeria) and one in Italy (Mazara del Vallo), with a total import capacity of Algerian gas of 2,009 GWh/d. At the time of writing of the Common Risk Assessment for the Algerian Risk Group (Q4 2022), the Spanish IP point of Tarifa did not have any booked capacity, and therefore no physical gas was being imported to Spain through this interconnection point. From a technical perspective, the facility is fully available. The area has seventeen (17) regasification plants and the quantity of LNG received from Algeria was equivalent to 97 TWh during 2019 and 91 TWh in 2020. In summary, the gas imports supplied by Algeria to the risk group accounted for 17,1% of the total imports in 2020 and 17,4% in 2021.

For the Algerian risk group, the infrastructure with the greatest flow capacity at regional level was identified as the interconnection between Austria and Slovakia, via Baumgarten, with a firm entry capacity of 2,306 GWh/d. This infrastructure was considered for the calculation of the N-1 formula at regional level. The constitution of the Risk Group is based on the importance of supply of Algerian gas in the region, thus an analogous calculation of the N-1 formula, considering the largest infrastructure that imports gas from Algeria, has also been carried out. This infrastructure is the Transmed pipeline with the entry point at Mazara del Vallo in Italy, at 1,203.3 GWh/d.

The analysis for the Common Risk Assessment highlighted that if a total disruption of the gas flow through the Baumgarten interconnection occurred, both Austrian and Italian gas systems would be able to react swiftly and meet demand through alternative withdrawal capacity. Results of the N-1 standard are well above 100%: decreasing from 124% in the winter 2022/2023 to 123% in the winter 2025/2026. A total disruption of the gas flow through Baumgarten interconnection took place in winter 2017/2018 in especially demanding conditions. Nevertheless, both the Austrian and Italian gas systems were able to react swiftly and supply their demand thanks to withdrawal capacity. Moreover, Transmed pipeline also increased significantly its flow during that day.

The same principle could be applied for any disruption to the Transmed supply where the results of the N-1 infrastructure standard are also well above 100%: decreasing from 131% in the winter 2022/2023 to 130% in the winter 2025/2026. This showed sufficient resources are available in case of a disruption to this system.

As a result of the meetings held by the Algeria Risk Group and after analyzing the EU-wide simulation carried out by ENTSOG, four main risk scenarios were identified:

1. Algeria total disruption
2. Maghreb-Europe pipeline and MEDGAZ disruption
3. Transmed pipeline disruption
4. Liquefaction trains out of service in Algeria

For each scenario, a specific simulation has been carried out. The simulation calculates if a gas deficit is observed and if any specific group of customers experiences supply curtailments. No demand curtailment has been observed in any scenario. Considering that infrastructure usage is well below the technical capacities, even in the worst scenario, and that LNG entries are lower than the LNG arrival curve proposed by the IEA, the results are especially positive. The Algeria risk group demonstrates high resilience in the case of a total disruption of the Algerian gas supply. Alternative infrastructure, especially LNG facilities, support the gas system and avoid any curtailment.

The above results, however, do not take into account the current geopolitical situation and a possible full Russian gas disruption. Considering the current geopolitical situation, it has been appraised appropriate to study, to the extent possible, the impact that a full Russian gas disruption could have on the members of the Risk Group. For this reason, an additional scenario was included focusing on the total unavailability of gas from Russia. However, each member of the Risk Group evaluated the impact on its own through a qualitative analysis (e.g. a full simulation was not carried out). A summary is provided below:

- **Greece**: In case of a total cut of Russian supply, flows from Sidirokastro IP will be zero. In this case, quantity deficits will be recorded during periods of very high demand (expected during winter), when the remaining import capacity of other entry points will not be enough to supply consumption.
- **Portugal**: Low severity associated with this scenario is considered, due to the expected readiness of replacing Russian LNG supplies in the portfolios of importers who supply LNG from this source.
- **Slovenia**: Following the supply cuts of Russian pipeline gas, the supply situation may change in member states of this Risk Group, except Spain and Portugal where these have a negligeable direct effect.
- **Spain**: In terms of impact, the Spanish system would focus on the decrease on the imports of LNG. During 2021 Spain received 37 TWh of LNG coming from Russia which represents around the 9% of the total supply. The Spanish system is able to access to a wide variety of origins, due to its six LNG terminals in operation. This provides the possibility to the shippers to reschedule it supply portfolio in case of necessity.

Though part of the Algerian risk group, Malta was not included in the balance analysis due to its small-scale national network and absence of a connection to the trans-European gas network via a gas pipeline. The Floating Storage Unit (FSU) at Delimara has not received Algerian gas to date, so the Maltese gas system would not be directly affected by a hypothetical curtailment in the Algerian LNG supply. Should Malta become interconnected via a gas pipeline, the risk to Malta in the context of Regional Risk Groups would change and the risk to gas security of supply would need to be reassessed.

## Libya Risk Group

According to the 2019 Common Risk Assessment, the Libya risk group members consumed a total of ~80 bcm in 2018, with a peak demand for 2018/2019 of ~520 bcm. Gas to this risk group is mainly sourced from Algeria and Russia. The largest interconnectors are: Baumgarten, Austria (217,2 mcm/d); and Mazara del Vallo, Italy (108,8 mcm/d). Gas is sourced from Libya via the Greenstream pipeline at the interconnection point in Gela, Sicily. The only LNG terminals are in Italy with a total capacity of 108,8 $MSm^3/d$. Storage capacity for the risk group totalled 24 bcm/d in 2018. There are gas production activities in all risk group Member States but Malta and Slovenia. Production totalled ~22 mcm/d or ~8 bcm/year in 2018.

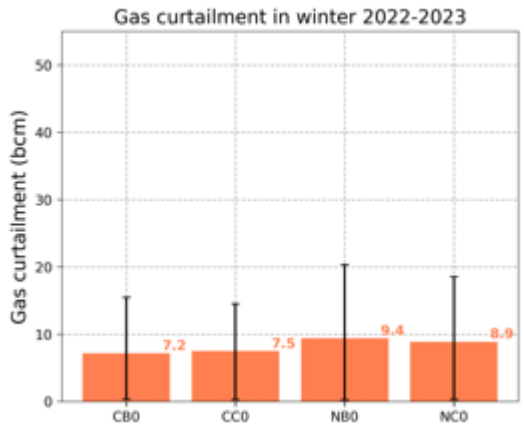
Due to the geopolitical context and its impact on security of gas supply in Europe, for the purpose of the 2022/2023 version of the Common Risk Assessment of the Libyan Risk Group a slightly different

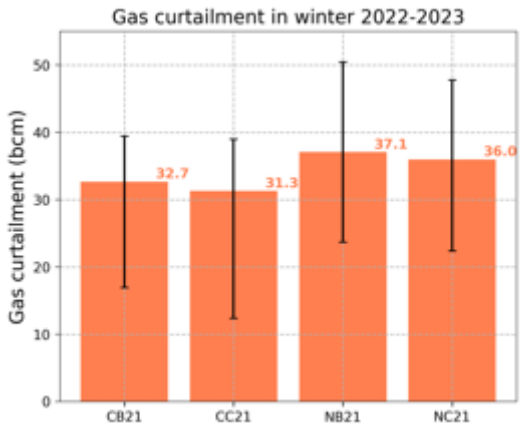
approach was taken compared to previous years. The Belarus, Ukraine, Trans-Balkan, Libyan and Caspian Risk Groups requested assistance of the European Commission's Joint Research Centre in order to carry out a pan-European crisis scenario focusing on the prolonged halt of Russian gas flows through all routes from 1 October 2022 to 31 December 2023. Multiple scenarios were developed testing the impact of various gas storage levels, interconnection point capacities and strategies (cooperative vs non-cooperative). The objective was to analyse impacts from an EU-wide perspective under the following contexts:

| | CB0 | CC0 | NB0 | NC0 | CB21 | CC21 | NB21 | NC21 |
|---|---|---|---|---|---|---|---|---|
| **Strategy** | cooperative | cooperative | non cooperative | non cooperative | cooperative | cooperative | non cooperative | non cooperative |
| **IP capacities** | BAU | MS responses | BAU | MS responses | BAU | MS responses | BAU | MS responses |
| **Gas in storage 31 Dec 2023** | 0% | 0% | 0% | 0% | end 2021 | end 2021 | end 2021 | end 2021 |

The available results of the JRC simulations show that under the scenario where gas storages are considered 0% at end of 2023 gas curtailment would range from 7.2%-7.5% under a cooperative strategy up to 8.9%-9.4% under a non-cooperative strategy. It is noted that demand variability drastically affects gas curtailment. In the scenarios assuming gas storages at a level corresponding to end 2021, under the cooperative strategies gas curtailment ranges from 31.3%-32.7% compared to 36%-37.1% under the non-cooperative strategies. Gas curtailment is much higher compared to the previous 4 scenarios because the boundary condition at the end of 2021 must be fulfilled. The largest gas curtailments in winter 2022-2023 are identified in Germany, Italy and France.

There is no gas curtailment or unserved gas demand registered in Malta in the simulations. This is due to the nature of Malta's energy system, e.g. absence of a gas connection to the internal EU gas market and the fact that Malta does not import any Russian gas. When considering gas curtailment from the perspective of the relevant Risk Groups, the Libyan Risk Group would be the least affected, second only to the Trans-Balkan group, with gas curtailment amounting 0.7 bcm under the 0% gas storage scenario and 8.1 bcm under the end 2021 gas storage scenario.



Additional scenarios, such as a total disruption of Algerian gas supplies for a 2-month period were also simulated. This scenario would specifically impact the Libyan Risk Group, potentially leading to a maximum gas curtailment of 5.7 bcm. It can be concluded that a cold spell and total disruption of Algerian gas supplies may worsen the situation when assuming historical demands in most Regional Groups. It was also concluded that a 15% gas demand reduction is necessary from a security of supply perspective, in particular to ensure filling of storages when assuming a prolonged Russian disruption extending into 2023.

From the analysis, the Common Risk Assessment of the Libyan Risk Group submitted in 2019 concluded:

- The regional N-1 demonstrates the technical capacity of remaining gas infrastructure is adequate to meet maximum gas demand in the event of a disruption to the single largest gas infrastructure. It was highlighted that vulnerability to interruption to gas supply has been increased due to recent reduction in capacity.
- Scenario S.01 (failure of Baumgarten; a sudden complete disruption of flows crossing Baumgarten hub for 7 days at the beginning of February) is potentially the most challenging of those considered. A large proportion of demand would be uncovered in Slovenia, as well as resulting in reduced supplies to Italy and Croatia.

## Malta's Gas System

Natural gas in Malta is used solely for the generation of electricity and currently constitutes the largest share of Malta's electricity generation mix at around 70%. The only source of natural gas in Malta is imported LNG. Malta does not have gas distribution networks or district heating networks and there are no end-use gas customers apart from two electricity producers at the Delimara Power Station. Currently, Malta does not form part of the EU internal gas market as it is not interconnected via a gas pipeline.

In both 2020 and 2021, gas consumption (i.e. deliveries of natural gas from the regasification plant to the power sector) amounted 0.38 bcm. This is equivalent to 4,112 GWh in 2020 and 4,114 GWh in 2021 based on the average higher heating value. These volumes were used entirely for electricity generation.

A comparison of gas deliveries for 2017 and 2018 is shown in Table 1, below:

**Table 1 – Gas Deliveries to power sector, 2017-2021**

| Gas deliveries | *bcm*[2] | *TJ*[3] | *GWh* |
|---|---|---|---|
| **2017** | 0.27 | 10,776 | 2,993.24 |
| **2018** | 0.35 | 13,614 | 3,781.70 |
| **2019** | 0.37 | 14,230.5 | 3,952.93 |
| **2020** | 0.38 | 14,801.9 | 4,111.63 |
| **2021** | 0.38 | 14,811.0 | 4,114.17 |

Electricity generation and supply in Malta has changed significantly since 2015 due to the upgrade of inefficient infrastructure and introduction of LNG-based generation. Changes include:

[2] Standard Temperature and Pressure (15°C, 760mm Hg)
[3] Based on average higher heating value

- closing the inefficient HFO-fired power station at Marsa,
- introducing the 200 MW electricity interconnector with Sicily,
- the commissioning of 205 MW gas-fired high efficiency combined cycle gas turbine (CCGT) powerplant (D4) and an LNG facility for the import of natural gas,
- The conversion of the 149 MW powerplant (D3) to run on Natural Gas instead of HFO. (4 of the 8 engines are dual-fuel and can still run on Gas-Oil, supporting security of gas supply in Malta).

In the past decade Malta has diversified its energy sources and moved towards a more sustainable energy mix, moving away from gas-oil based electricity generation towards natural gas and renewable generation and electricity imports. Gas-oil is still used in emergency situations as back-up fuel.

Malta only has one piece of gas infrastructure, an LNG facility consisting of import and offloading capability; a floating storage unit ("FSU"); an LNG jetty, pipework and other services; and an on-shore regasification facility with ancillary services and internal gas pipework[4], all located within the Delimara complex. The FSU has a total nominal capacity of 125,000$m^3$, while the regasification plant has a maximum send-out capacity of 20 GWh/d. The FSU is berthed at Marsaxlokk port, adjacent to the Delimara power station site.

The regasification facility provides natural gas to two centrally dispatched electricity generation units: D-3 (operated by D3 Power Generation Ltd.) and D-4 (operated by Electrogas Malta Ltd.), both co-located at Delimara. Both gas-fired power plants are considered critical.

- **D-3** consists of 8 natural gas fueled internal combustion reciprocating engines, with a maximum continuous rated capacity of 151.8MWe, and an export capability of 146$MW_e$ when operating on natural gas.
    - 4 of the 8 engines are configured for dual fuel and can be run on gas oil in case of an emergency, with an export capability of ~66$MW_e$
    - Exhaust from all the engines is directed onto heat recovery steam generators, whose superheated steam is directed into a steam turbine.
- **D-4** is a combined cycle gas turbine (CCGT) with a maximum continuous rated capacity of 215$MW_e$ and is contracted to deliver 205$MW_e$.

LNG is imported via marine carriers and held in the FSU supplying gas to the regasification plant and subsequently to D3 and D4. There are neither gas nor LNG storage facilities.

The LNG that has been delivered to Malta at the Delimara facility between 2017 and end 2021 originated from eight different countries. The single largest country of origin for natural gas import has been Trinidad and Tobago, contributing to a figure of 69% of all deliveries being imported from South America.

A breakdown of countries of origin for LNG deliveries to date is shown in Table 2 - LNG deliveries by region of origin, below:

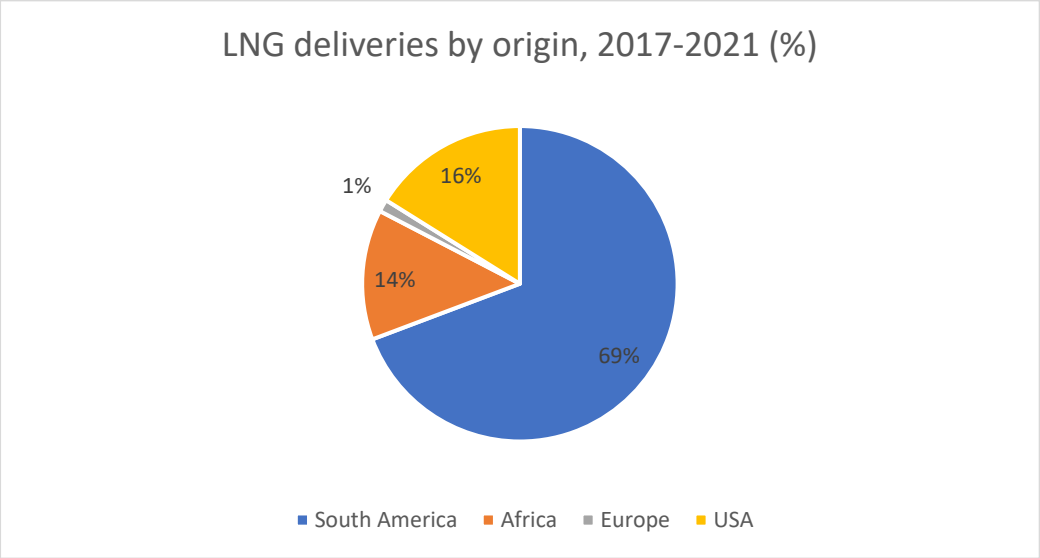
**Table 2 - LNG deliveries by region of origin**

| $m^3$ of LNG | **2017** | **2018** | **2019** | **2020** | **2021** |
|---|---|---|---|---|---|

[4] Internal gas pipework is intended to deliver natural gas to the two gas-fired power plants co-located within the Delimara complex. Malta does not have a gas distribution network.

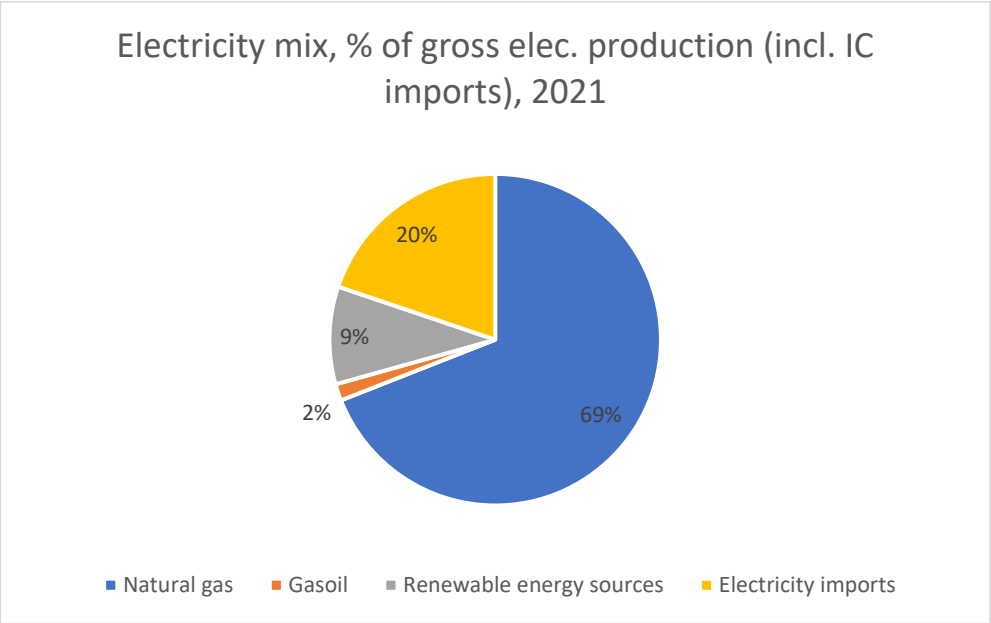
| | | | | | |
|---|---|---|---|---|---|
| South America | 325,226 | 324,759 | 505,146 | 488,822 | 430,704 |
| Africa | 119,008 | 189,823 | 91,174 | 0 | 0 |
| Europe | 13,525 | 10,047 | 14,356 | 0 | 0 |
| USA | 39,982 | 100,060 | 14,907 | 111,634 | 216,066 |
| **TOTAL** | **497,741** | **624,689** | **625,583** | **600,455** | **646,769** |

**Figure 1 – LNG deliveries by region of origin in 2017-2021, %**




In 2021, LNG constituted 69% of the local energy mix for electricity generation, with electricity imported over the interconnector amounting to 20%, renewable energy sources amounting to 9.5% and gasoil, used only in emergencies, covering the remaining portion at 2%. Figure 2 shows Malta's energy mix used for electricity generation in 2021.

**Figure 2 – Electricity generation mix in 2017, ktoe**




## 2 Summary of the Risk Assessment

The National Risk Assessment considered the loss of the gas facility at Delimara on a day of peak demand with a likelihood of occurring once in 20 years. As the only use of gas in Malta is for electricity generation, the Risk Assessment considered how the loss of the LNG facility would impact the supply of electricity to the archipelago. Although the Regulation only requires the Risk Assessment to consider the resilience of the system in this case at a daily granularity, the Maltese Risk Assessment also considered the within-day peak periods. This is because meeting electricity demand is more sensitive to within-day peaks as compared to gas due to the need to match demand with supply in real time.

The updated risk assessment carried out in 2022/2023 (and based on demand data of 2021), demonstrated that the available market-based demand-side measures would not be sufficient to meet the exceptional demand as required by the Regulation on a daily basis. In addition, they would not be adequate to meet most variations in electricity demand seen within day. The diurnal demand profile and the nature of the existing capacity also means that the exceptional high demand may not be met in extreme circumstances due to the lack of PV contribution when peak demand occurs.

A summary of the N-1 results is shown in Table 3 – Summary of Max Demand v. Available Capacity of Market-based Demand-side Measures, below.

| Seasonal time of day | | Max demand, $D_{max}$ | | Available capacity, $D_{eff}$ | | Margin | Max Demand, $D_{max}$ | | Available capacity[5], $D_{eff}$ | | Margin |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MWh | mcm | MWh | mcm | % | MWh | mcm | MWh | mcm | % |
| 01:00 - 07:59 | | **3,120** | **0.61** | **2,856** | **0.56** | **92%** | **13,079** | **2.57** | **10,611** | **2.08** | **81%** |

[5] Includes contribution from solar PV

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 08:00 - 17:59 | Summer (Jul-Aug-Sep) | **5,988** | **1.18** | **4,899** | **0.96** | **82%** | | | | | |
| 18:00 - 00:59 | | **3,971** | **0.78** | **2,856** | **0.56** | **72%** | | | | | |
| 01:00 - 07:59 | Rest of year | 2,720 | 0.53 | 3,129 | 0.61 | 115% | 10,467 | 2.06 | 11,371 | 2.23 | 109% |
| 08:00 - 17:59 | | 4,361 | 0.86 | 5,113 | 1.00 | 117% | | | | | |
| 18:00 - 00:59 | | **3,387** | **0.67** | **3,129** | **0.61** | **92%** | | | | | |
| | | **WITHIN-DAY ANALYSIS** | | | | | **ANALYSIS AT DAILY GRANULARITY** | | | | |

**Table 3 – Summary of Max Demand v. Available Capacity of Market-based Demand-side Measures**

Due to the singular nature and criticality of Malta's gas facility, its loss would have a significant impact to the social and economic wellbeing and security of the Maltese islands. As the main elements of the alternative electricity generation infrastructure (considered as 'market-based demand side measures' for the purpose of the National Risk Assessment) are co-located at the Delimara site the importance of securing the site against natural hazards or man-made threats is of strategic national significance to Malta. Scenarios were selected based on the National Risk Assessment and adapted to apply to gas security of supply. In comparison to the National Risk Assessment submitted in 2019, given the current geopolitical context two additional risk scenarios were included, one focusing on the consequences of the conflict in Ukraine on gas and LNG security of supply in Europe, and another focusing on the loss of the electricity interconnector with Italy, which is a specific national scenario included based on experience of a number of outages.

Scenarios considered include:

I. A gas disruption in third countries and/or a commercial dispute with suppliers
II. Sabotage, vandalism or industrial disputes affecting the gas facility
III. Explosion, fire, leak or lighting strike at the Delimara site. Lack of / inadequate maintenance
IV. Failure of electricity supply to LNG jetty and regasification facility
V. ICT failure and/or cyber-attack to gas facility.
VI. Extreme weather conditions damaging or disrupting the FSU, Jetty or regasification facility
VII. Security of supply consequences of the war in Ukraine;
    - Full Russian gas disruption affecting Europe
    - Global or regional LNG supply disruption or diversion of LNG flows due to the war in Ukraine;
VIII. Prolonged loss of or damage to the electricity interconnector with Italy.

The geopolitical context (e.g. high energy prices and war in Ukraine) has had a substantial impact on traditional market behaviour and availability of several supply routes, forcing European countries into a period of readjustment and focus on efforts to reduce Russian gas dependency. Malta does not depend on Russian gas and hence gas deliveries are not affected by a disruption of Russian gas supplies. This is mainly due to the nature of its energy system, the fact that it is disconnected from the trans-European gas network and because it relies on LNG imports from the global market.

Nevertheless, Malta is exposed to possible disruptions in gas flows in mainland Europe, through its electricity link with Italy.

# 3 Infrastructure Standard (Article 5)

## a) N – 1 formula, Article 5 (1)

In Malta there is only one gas facility, meaning N = 1, and therefore N - 1 = 0. Due to the absence of any other gas infrastructure in Malta, the other gas supply side measures are also zero. This is demonstrated as follows:

There are no other **technical entry points for gas** $(EP_m = 0)$,

There is no **local gas production capability**, $(P_m = 0)$,

There is no **storage of natural gas in Malta** $(S_m = 0)$

Presently, as there is just the single LNG facility in Malta, the **capacity of the single largest gas infrastructure** is equal to the **sum of the maximal technical LNG facility capacity**, i.e.

$$(LNG_m = I_m\ ,\ \therefore LNG_m - I_m = 0)$$

Therefore,

$$\frac{EP_m + P_m + S_m + LNG_m - I_m}{D_{max}} = \frac{0}{D_{max}} = 0\ \%$$

In the case of the loss of the single largest gas infrastructure in Malta the maximum demand ($D_{max}$) for gas must be zero and demand greater than zero cannot be met.

## b) N-1 using demand-side measures, Article 5 (2)

**$D_{eff}$** means the part (in mcm/d) of $D_{max}$ that in case of a disruption of gas supply can be sufficiently covered with market-based and non-market-based demand-side measures in a timely manner. The obligation is satisfied provided that the capacity of these measures meets or exceeds the total requirements, i.e. $D_{eff} \geq D_{max}$. Article 7 (4) b explicitly requires that the Risk Assessment is carried out considering the role of gas with respect to electricity generation.

In Malta the only demand for gas is for electricity generation and there is no other demand for gas due to the absence of a gas distribution network. If peak electricity demand can be met without gas generation, then effectively peak gas demand will be reduced to zero. Therefore, the market-based demand-side measures ($D_{eff}$) must consist of alternative electricity generation. Alternative (non-gas-fired) electricity generation sources in Malta consist of:

a. Back-up gasoil-fired generation;
b. Malta-Sicily electricity interconnector:
c. On-island solar PV generation;

We therefore considered exceptional demand for electricity in order to know if $D_{max}$ can be met by $D_{eff}$ consisting of non-gas sources of electricity.

This can be demonstrated by using the demand-side measures N - 1 formula in Annex II part 4;

$$\frac{EP_m + P_m + S_m + LNG_m - I_m}{D_{max} - D_{eff}} \geq 100\ \%$$

By rearranging the formula, you get;

$$EP_m + P_m + S_m + LNG_m - I_m \geq D_{max} - D_{eff}$$

As above, the sum of the supply side measures is zero, therefore,

$$0 \geq \left(D_{max} - D_{eff}\right)$$

For Malta, to satisfy gas demand using demand-side measures, alternative forms of electricity generation ($D_{eff}$ measured in MWh) must equal or exceed the electricity demand ($D_{max}$ measured in MWh) on the one exceptional demand day in 20 years, i.e.

$$D_{eff} \geq D_{max}$$

The statistical probability applied in this analysis is the one day of extreme demand in twenty years, i.e. 1 / 7,305, or 0.014%. This equates to the maximum daily gas demand not being exceeded 99.986% of the time (i.e. "$P_{99.986}$").

As previously noted, in Malta natural gas is used solely for electricity generation. The sources of electricity (generated on-island with gas-oil and natural gas, solar PV and through the interconnector) to meet this demand are interchangeable and, once dispatched, are indistinguishable. The proportion of the electricity consumed on-island which is derived from gas is impossible to determine. Therefore, maximum electricity demand is used as proxy for maximum gas demand when assessing this formula. This ensures consistency when calculating supply and demand, and plant thermal efficiency (either for the gas CCGT plant or for the gas-oil plant) does not need to be considered in the risk assessment. Thus, it is necessary to consider all electricity supply infrastructure when evaluating the marginal impact of the loss of the single largest gas infrastructure when calculating $D_{eff}$.

Calculating $D_{eff}$

The demand side measures are the sum of the technical capacities of all existing electricity infrastructure, accounting for long term trends, energy efficiency measures and utilisation rates. Currently for Malta these are the interconnector, gas-oil generation (D3, D2 and GT9) and solar PV. The technical capacities of several units differ depending on the season, whereby the capacity is relatively higher in winter compared to the summer months[6]. This is the case for the interconnector, D2 and GT9 units. The average daily generation by solar PV installations also varies depending on the season.

The maximum capacity and energy supplied in **summer**, not allowing for utilisation rates[7], is therefore;

| | | |
|---|---|---|
| Interconnector | 192 $MW_e$ | = 4,608 MWh / day |
| D2 (gas-oil) | 120 $MW_e$ | = 2,880 MWh / day |
| D3 (gas-oil) | 66 $MW_e$ | = 1,584 MWh / day |
| GT9 (gas-oil) | 30 $MW_e$ | = 720 MWh / day |
| **Sub-Total** | | **= 9,792 MWh /day** |
| | | **= 1.92 mcm/day equivalent** |
| Solar PV[8] | 205 $MW_e$ | = 819 MWh / day. |
| | | = 0.16 mcm / day equivalent |

[6] For the purpose of this analysis, summer months are considered July-September.

[7] It is assumed that the different infrastructure components, except for solar PV, are always capable of running when and as required (e.g. full day).

[8] Solar PV generation is not included in the subtotal as it is only available during daylight hours but is considered in the seasonal time of day analysis where appropriate.

The maximum capacity and energy supplied in **winter** (and assumed for the rest-of-the-year period in this analysis), not allowing for utilisation rates, is therefore;

| | | |
|---|---|---|
| Interconnector | 216 $MW_e$ | = 5,184 MWh / day |
| D2 (gas-oil) | 132 $MW_e$ | = 3,168 MWh / day |
| D3 (gas-oil) | 66 $MW_e$ | = 1,584 MWh / day |
| GT9 (gas-oil) | 33 $MW_e$ | = 792 MWh / day |
| **Sub-Total** | | **= 10,728 MWh /day** |
| | | **= 2.11 mcm/day equivalent** |
| Solar PV | 205 $MW_e$ | = 643 MWh / day. |
| | | = 0.13 mcm / day equivalent |

Estimating $D_{max}$

The historical peak electricity demand during 2021 was the following:

- Hourly peak: 553.8 MWh (August 5th at 14.00)
- Daily peak: 11,434.8 MWh (August 5th)

To appropriately reflect actual asset utilisation rates, it is necessary to segment supply and demand by seasonal time of day. Electricity demand typically peaks in Malta during the late evenings in the hottest summer months (July-August-September). This is mainly attributed to cooling demand loads arising from air conditioning. Electricity demand is highest during the summer months also due to the island's reliance on tourism. Therefore, segmentation by seasonal time of day is applied to show the distribution of demand over the course of the day, by peak / off-peak months.

1) Splitting a day into three time periods; ("STOD", or Seasonal Time of Day.)

- morning 01:00-07:59
- midday 08:00-17:59
- evening 18:00-00:59

2) Splitting by seasonal peak demand months (July-August-September) and "Rest-of-Year".

The forecast of extreme demand is modelled from the calculated mean ($P_{50}$) and standard deviation derived from the segmented data. This is the analysis of the 2021 total on-island generation (including PV) and interconnector flows. The model uses standard statistical techniques to determine the one day in 20 years peak demand. This represents a probability of 1 in 7,305 i.e. 0.014%. ("$P_{99.986}$") and provides a forecast of peak electricity demand ($MW_e$) by each seasonal time of day segment. For the purpose of this analysis, the total sent-out (as opposed to generated) was used. This is summarised in Table 4 - STOD Demand Mean & Std Deviation below.

**Table 4 - STOD Demand Mean & Std Deviation**

| | Time of day | $MW_e$h per hour | | |
|---|---|---|---|---|
| | | Mean ($P_{50}$) | Standard deviation | Peak demand ($P_{99.986}$) |
| Jul–Aug–Sep | 01:00-07:59 | 318 | 35 | 446 |
| | 08:00-17:59 | 412 | 51 | 599 |
| | 18:00-00:59 | 403 | 45 | 567 |
| Rest-of-Year | 01:00-07:59 | 207 | 27 | 389 |
| | 08:00-17:59 | 301 | 31 | 436 |
| | 18:00-00:59 | 300 | 45 | 483 |

So, at an aggregate level daily peak demand is as follows:

**Table 5 - Aggregate Total Daily Demand**

| | Hours per period | Peak demand ($P_{99.986}$) ($MW_e$) | **Peak Aggregate demand** | |
|---|---|---|---|---|
| | | | **Electricity ($MW_e$h)** | **Equivalent gas (mcm / day)[9]** |
| **Jul-Aug-Sep** | 7 | 446 | 3,120 | |
| | 10 | 599 | 5,988 | |
| | 7 | 567 | 3,971 | |
| | TOTAL DAILY ($D_{max}$) | | **13,079** | **2.57** |
| **Rest-of-Year** | 7 | 389 | 2,720 | |
| | 10 | 436 | 4,361 | |
| | 7 | 483 | 3,387 | |
| | TOTAL DAILY ($D_{max}$) | | **10,467** | **2.06** |

**By inspection, the highest daily energy demand case is the Jul-Aug-Sep period where $D_{max}$ = 13,079 MWh. For the same summer period $D_{eff}$ is 9,792 + 819 (allowing for average daily summer solar PV) i.e. 10,611 MWh. Therefore, based on the analysis for summer, $D_{eff} < D_{max}$**

**The daily energy demand case during the rest-of-the-year period amounted to $D_{max}$ = 10,467 MWh. For the same summer period $D_{eff}$ equals 10,728 + 643 (allowing for average daily summer solar PV) i.e. 11,371 MWh. The analysis for rest-of-the-year shows that $D_{eff} > D_{max}$.**

**Therefore, in the event of once-in-20-year peak demand, it would be challenging for Malta to meet such demand without the availability of the gas facility and relying only on demand-side measures (e.g. alternative electricity generation sources) during the summer period.**

**For the highest daily energy demand case during summer, demand-side measures would not be adequate to fully satisfy the Article 5, Infrastructure Standard, if analysed on a daily basis. During the rest-of-the-year period, demand-side measures would be adequate to satisfy the Infrastructure Standard, if analysed on a daily basis. This is due to the lower demand experienced outside of summer months combined with the relatively higher capacity of certain generation units in winter compared to summer.**

[9] Based on weighted average capacities and heat rates (HHV) for D-3 and D-4

**Within-day analysis:**

The obligation defined by the Regulation is based on a daily analysis. However, within day sensitivities of the demand side measures and available capacity for electricity are significantly influenced by time of day, temperature and solar irradiation as compared to gas. Breaking this down by seasonal time of day allows for these variables. It is also appropriate to consider generation mix and percentage of extreme day demand met in the six N-1 scenarios below. In four of these cases demand side measures are insufficient.

| Season | Time-of-day period | Extreme period demand ($P_{99.986}$) | Available capacity of non-gas sources | | | | | 100% x Demand-side measures / Extreme period demand |
|---|---|---|---|---|---|---|---|---|
| | | | Solar PV[10] | IC | D2 (gasoil) | D3 (gasoil) | GT9 (gasoil) | |
| Summer (Jul-Aug-Sep) | 01:00 - 07:59 | 446 | 0 | 192 | 120 | 66 | 30 | **92%** |
| | 08:00 - 17:59 | 599 | 82 | 192 | 120 | 66 | 30 | **82%** |
| | 18:00 - 00:59 | 567 | 0 | 192 | 120 | 66 | 30 | **72%** |
| Rest of year | 01:00 - 07:59 | 389 | 0 | 216 | 132 | 66 | 33 | 115% |
| | 08:00 - 17:59 | 436 | 64 | 216 | 132 | 66 | 33 | 117% |
| | 18:00 - 00:59 | 484 | 0 | 216 | 132 | 66 | 33 | **92%** |

**Table 6 - Within Day Demand Analysis (MW)** [11]

Article 5 (Infrastructure Standard) when applied to Malta highlights the limited capability of alternative generation sources to meet extreme demand following the loss of the single largest gas facility and highlights the importance and criticality of gas-fired power generation in Malta for security of energy supply. Gas is only used for electricity production, and electricity supply and demand must be balanced instantaneously.

Table 6 - Within Day Demand Analysis (MW) , above, demonstrates this sensitivity to within day fluctuations of supply and demand. Meeting high demand without gas fired electricity production requires all available gasoil, PV and interconnector sources to be available to cover demand. Nevertheless, in the majority of within-day periods, meeting extremely high demand without gas-fired generation capacity would not be feasible.

The above analysis highlights the importance and criticality of gas-fired power generation in Malta, and in particular the need for ensuring continued deliveries of LNG in line with the long-term gas supply contract and ensuring the operational capability of the gas facilities, including D3 and D4. All gas-fired power plants in Malta are considered critical. Gas supply is covered by a take-or-pay long-

[10] Solar PV capacity reflects the average daily generation in summer and rest-of-year periods recorded in 2021. It is not the full installed solar PV capacity on the Maltese islands.

[11] Consideration has not been given to the impact on electricity demand (for air conditioning and cooling) and reduced solar PV generation where there may be hot/humid conditions accompanied by cloud cover.

term gas supply contract and therefore reducing gas for electricity production is, in practice, unfeasible in the short to medium term.

### c) Storage capacity

Calculation of the N-1 formula considering the level of storages at 30% and 100% of the maximum working volume. As Malta has no gas storage infrastructure this clause is **Not Applicable**.

### d) Bi-directional capacity

There is no interconnection gas capacity between Malta and any other EU or non-EU country, and there is no gas storage in Malta. There is no bidirectional capacity, therefore, **Not Applicable.**

# 4 Compliance with the Supply Standard (Article 6)

Since natural gas is used exclusively for the purpose of electricity generation and no gas reaches end-users in Malta, the Competent Authority does not believe there to be any protected gas customers or solidarity protected gas customers on the islands as defined by the Regulation. Therefore, **total gas used by protected customers is 0 mcm/year**.

Having brought the absence of gas end-users to the attention of the European Commission, it was acknowledged that Malta should be exempt from giving a definition of "protected customers"[12]. As it is dependent on protected customers, **the Supply Standard (Article 6) does not apply to Malta.**

The Competent Authority notes that natural gas is an essential component of Malta's electricity generation mix – comprising the majority of national generation capacity. As shown in the N-1 calculations, gas is critical in meeting electricity demand in Malta. As such, the Competent Authority, the Regulator and the Distribution System Operator have adopted an approach for defining "priority customers" for electricity to be used in order to prioritise supply to vulnerable users (such as households and essential services) in the event that electricity supply is restricted, including when such a restriction is a consequence of a disruption to gas supply.

[12] EC was notified in Jan 2018.

# 5 Preventive Measures

Preventive measures in Malta, which are either adopted, implemented, or planned can be split into a number of high-level categories, such as those focusing on the diversification of energy sources, those focusing on reducing reliance on fossil fuels, measures boosting energy system preparedness and other measures focusing on monitoring, protection of critical sites, cyber-security or statutory obligations. The high-level preventive measures which have been adopted and implemented in Malta, which directly or indirectly contribute to security of gas (and electricity) supply, are outlined in the table below:

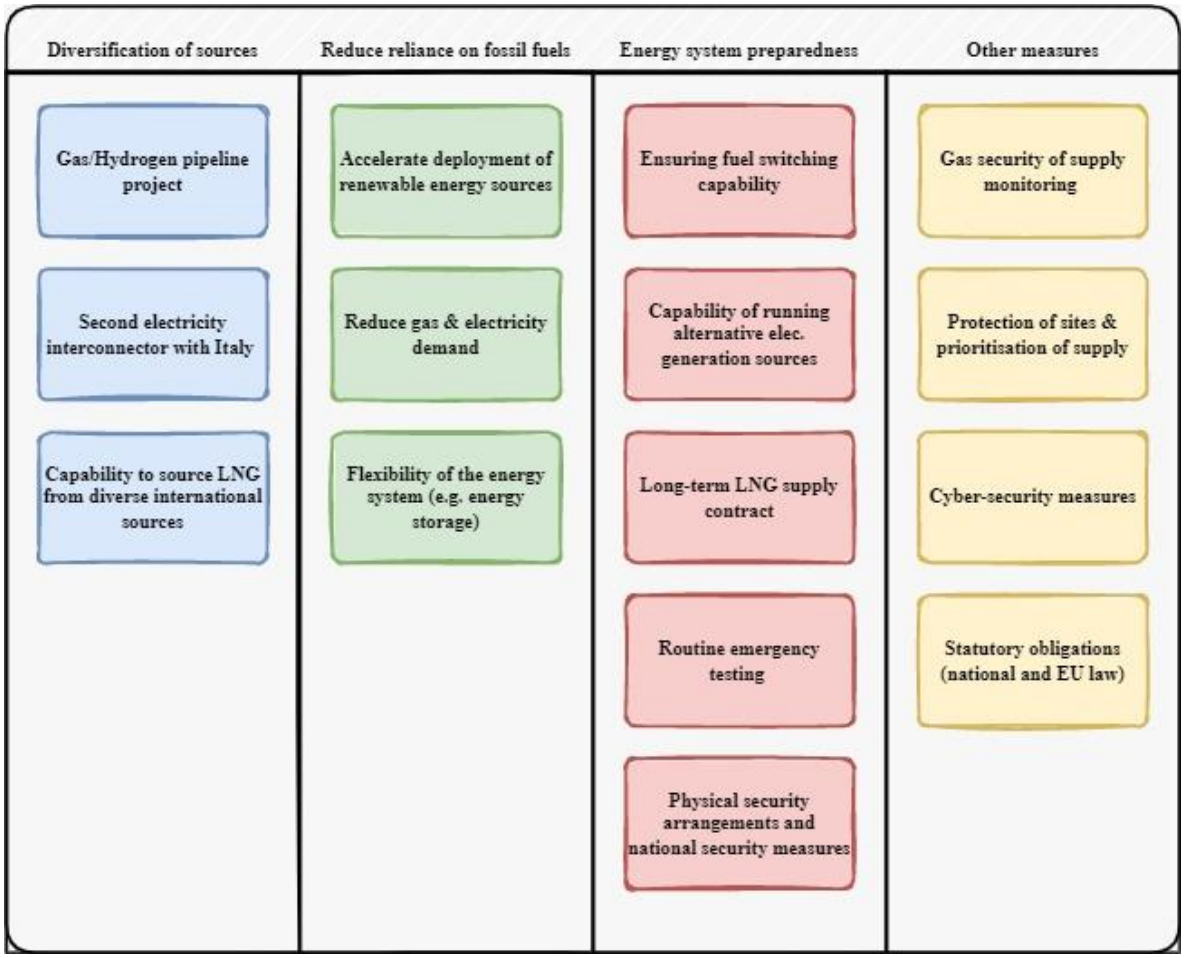



**Figure 3 - Schematic of high-level preventive measures**

The table below describes each of the preventive measures in place, or to be adopted, that address risks identified in the risk assessment. An assessment of the impacts of the below measures on the economy, the functioning of the EU internal market, on the environment and customers is provided in Annex A.

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| (0) | Overall strategic risk - energy import dependency<br>- Absence of gas or other indigenous energy sources<br>- High population density<br>- Energy dependent economy (finance, tourism, gaming, electronics, manufacturing)<br>- Typical Mediterranean climate with hot / dry summers<br>- Isolated island location. | Diversify sources of energy supply | Requires action in the form of additional infrastructure: Studies for upgrading the design of the Malta-Italy hydrogen-ready gas pipeline PCI to allow transmission of pure hydrogen and blends of natural gas and hydrogen are at an advanced stage and shall be finalised by mid-2023. ; Second electricity interconnector between Malta and Italy is under development and planned for commissioning by end of 2026. Other initiatives include: increased RES, energy efficiency measures and system flexibility in the form of battery energy storage | Ministry responsible for energy to continue to seek and assess opportunities to enhance other energy interconnections with neighbouring countries. Ministry to oversee the successful completion of ongoing transmission infrastructure projects in the area of electricity and gas.<br>Ministry responsible for energy to monitor progress of hydrogen-ready pipeline development & periodically assess impact of potential delay on gas security of supply. Ministry to continuously monitor development of a hydrogen/renewable fuels market in Europe. |
| | | Exploit viable indigenous renewable energy sources ("RES)". See note 1) below. | Solar photovoltaic is currently the sole significant indigenous source of electricity. Other viable renewable sources, such as offshore renewables to be explored. | Distribution system operator to support connection and utilisation of RES when technically and economically feasible.<br>Ministry responsible for energy to explore viability of renewable |

[13] National or regional dimension, economic impact, effectiveness and efficiency and impact on customers

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| | | | | sources, in particular offshore installations and support measures that enable demand side flexibility that enable increased indigenous RES, such as energy storage solutions, in line with Government policy on the clean energy transition. |
| | | | Further RES deployment will require investments to solve increasing grid stability issues. | Ministry responsible for energy and NRA to oversee the strengthening of the grid and the . deployment of energy storage to enable further integration of intermittent renewable energy sources. |
| | | Reduce gas and electricity demand growth. See note 2) below. | Due to higher projected energy consumption as a result of population increase, the potential for reducing primary gas demand without reducing reliance on fossil fuels is limited. | Ministry responsible for energy to continue to deploy energy efficiency measures to reduce energy consumption. Ministry to implement electricity and gas demand reduction measures adopted in line with Council Regulations (EU) 2022/1369 and (EU) 2022/1854. |
| (1a) | Delay or disruption to mid-term LNG shipments:<br>• medium (1 to 3 months) and | Monitoring and reporting of gas supply/demand/stock levels & forecast use | Acceptable – routine gas/electricity security of supply monitoring framework is operational since the development of Malta's first | REWS provide Ministry responsible for energy, Crisis Manager and other relevant stakeholders with a monthly report addressing gas |

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| | • long term (3 months +)<br><br>Due to disruption in third countries or commercial dispute with suppliers resulting in disruption to planned deliveries. | | Preventive Action Plan & Emergency Plan. | supply/demand/stock levels & forecast use based on information provided by gas and electricity system operators. The report includes a recommendation for triggering of crisis level if applicable. |
| | | Prolonged use of alternative electricity generation sources, including maximisation of electricity imports | Increased vulnerability to secondary supply side issues, significantly increasing risk of maintaining energy supply. There remains a risk during periods of high demand (e.g. summer evenings) to meet demand without availability of natural gas. | A formalised process for managing restricted electricity supply capability through rotating disconnections & protection of critical sites and vulnerable electricity consumers is being established. |
| | | Source LNG from diverse international sources | | Gas facility operator has alternative sources of LNG supply in line with existing contractual obligations. |
| | | Additional gas or other energy infrastructure | Acceptable – Projects for a hydrogen-ready gas pipeline (MTGP) and second electricity interconnector with Italy are planned/underway | Ministry responsible for energy to continue to seek and assess opportunities to enhance other energy interconnections with neighbouring countries.<br>Ministry to oversee the successful completion of ongoing transmission infrastructure projects. |

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| (1b) | Cancelation of near term (within month) LNG shipment | Short term use of alternative electricity sources | Acceptable – However, there remains a risk during periods of high demand (e.g. summer evenings) to meet demand without the availability of natural gas. | A formalised process for managing restricted electricity supply capability through rotating disconnections & protection of critical sites and vulnerable electricity consumers is being established. |
| | | Gas facility operator to identify & source alternative LNG supplies in line with existing contractual obligations | Acceptable | Present supplier has access to global sources of LNG supply that is compliant with D3 and D4 gas quality standards (e.g. Methane number & sulphur content). |
| (2) | Sabotage, vandalism or industrial disputes affecting the gas facility (FSU, jetty and regasification plant) | Physical security arrangements in place | Acceptable | Continued vigilance on behalf of the port authorities and asset owners/operators at Delimara and periodic updates to operator security plans |
| | | Wider national security measures | Acceptable | Ensure AFM, CIPD and CPD continue to review security arrangements associated with critical energy infrastructure. Ministry responsible for energy to ensure coordination with civil protection entities prior, during and following an emergency, as required. |
| (3) | Loss of capacity following explosion, fire, leak or lightning strike at the gas facility due | Periodic COMAH inspections and reporting to appropriate on-island authorities | Acceptable | Issues identified to be notified to Ministry responsible for energy by OHSA/CPD/ERA and facility operators |

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| | inadequate maintenance or operating procedures. | Regular engineering inspections of facilities by operator | Periodic energy emergency testing procedure implemented following the development of Malta's first Preventive Action Plan & Emergency Plan | DSO and facility operators to report on outcome and lessons learned from emergency tests carried out. REWS report to Ministry responsible for energy and relevant stakeholders on routine monitoring of plant efficiency by electricity system operator;<br>Any material deterioration of overall performance shall be reported to the Ministry responsible for energy. |
| | | Operators following good operational & maintenance procedures | | |
| (4) | Failure of electricity supply to LNG jetty and regasification facility. | Commercial risk of disruption of gas supply is aligned with responsibility for provision of electricity. Consideration of gas facility as critical infrastructure. | Acceptable | Gas facility operator has measures in place to ensure standby electricity supply arrangements to restart supplies to gas facility are effective.<br>Gas facility is identified as critical infrastructure. |
| (5) | Information communication technology failure affecting the ability to operate of the: FSU, LNG pumps, regasification facility, or power plants resulting from systems failure and / or cyber-attack. | Gas facility has manual override capability. | Acceptable | Gas facility operator has measures in place to carry out periodic testing of manual over-ride capability |
| | | Cybersecurity measures for the FSU, regasification facility, D-3 and D4 | Acceptable – however, there is increased likelihood for a cyber-attack | Periodic penetration testing & independent review (e.g. by MITA) |

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| | | | | Gas facility operator has measures in place to maintain effective firewall and physical security controls |
| | | | | Gas facility operator to ensure software updates are maintained. |
| (6) | Damage or disruption to the FSU, Jetty or regasification facility following storm or other extreme weather conditions. | Temporary use of alternative electricity generation sources. Ensure spare capacity available. | Acceptable – practicality of testing of FSU recovery capability to be periodically formally reviewed. | Gas security of supply monitoring framework is operational. Competent Authority to monitor short-medium-long term availability of capacity versus demand forecast and assess acceptability of capacity margin. |
| | | Gas facility identified and designated as "critical infrastructure" (SL 460.24) | Acceptable - Risk assessment completed | Periodic risk analysis assessments are updated based on major threat scenarios, vulnerability of gas facility, and potential impact of its loss[14] and ensure any risks highlighted are addressed |
| | | Move FSU off the jetty and onto storm moorings. | Acceptable - due to adverse weather conditions the FSU has been moved to storm mooring position two times in the period between 2017-2022. | Technical and operational capability of this procedure, which involves high risk exposure, has already been confirmed in practice. Total reconnection process was carried out in less than 10 hours. |

[14] Article 7, Critical Infrastructure and European Critical Infrastructure (Identification, Designation and Protection) [Subsidiary legislation 460.24]

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| | | Identify potential sources of replacement FSU | Acceptable | DSO and Gas facility operator to discuss potential emergency replacement FSU |
| | | Redundancy and resilience of the regasification facility | Acceptable | Gas facility operator carries out tests to confirm redundancy & resilience |
| (7) | Security of supply consequences of war in Ukraine:<br>a) Full Russian gas disruption affecting Europe;<br>b) Global or regional LNG supply disruption or diversion of LNG flows due to war in Ukraine | Ensuring operational capability of alternative electricity generation sources, electricity interconnector and LNG deliveries within long-term gas supply contract. | Acceptable – Malta does not import any Russian gas and therefore is not directly affected by a disruption of Russian gas supplies. Malta is faced with indirect exposure to disrupted gas flows in mainland Europe, in particular Italy, should this negatively affect electricity flows over the interconnector. Additionally, Malta is exposed to increasing prices of electricity imports from Italy. | Gas (LNG) supply is covered by a take-or-pay long-term gas supply contract. |
| (8) | Prolonged loss of or damage to the electricity interconnector with Italy | Ensuring operational capability of alternative electricity generation sources, electricity interconnector and LNG deliveries within long-term gas supply contract. | High risk to security of electricity supply in particular during summer peak demand period. Increased reliance on gas supplies. | Supply of electricity is intrinsically vulnerable to losses of any single asset (N-1). Loss of interconnector would increase Malta's reliance on gas-fired power generation and the gas facility and gasoil-fired emergency backup. |

| Scenario Ref | Description of Risk | Preventive measure (details in place or to be adopted) [13] | Assessment & Acceptability | Actions required |
|---|---|---|---|---|
| | | | | Requirement for additional infrastructure e.g. 2nd electricity interconnector with Italy, additional on-island generation, or energy storage solutions. |

Notes to table

**1) Renewable Energy Sources**

- Malta has a high energy import dependency due to:
    i. Very high population density (>1,300 people per sq km, the highest population density in Europe), and
    ii. Lack of indigenous energy sources and restrictions on local RES production capacity.
- Malta exhibits strong solar PV technology deployment, which is the most robust of all indigenous renewable energy sources in Malta, with yield of PV systems amongst the highest in Europe. By the end of 2022, Malta has reached 218 MW of solar PV capacity. As per Malta's first National Energy and Climate Plan (NECP) submitted in 2020, solar PV projections are expected to reach 266 MW by 2030[15].
- The Government continues to provide financial support to further increase the deployment of solar PV technology. Feed-in-Tariffs (FiTs) are made available to both residential and commercial systems. As from 2021 competitive bidding was extended to all schemes awarding support to renewable installations with a capacity of at least 40 kW. Beneficiaries of the PV grant scheme now also have the option to benefit from a battery storage scheme and install a battery storage system in order to increase the consumer's flexibility by storing excess renewable energy generated instead of exporting to the grid.

    The Government continues to offer various financial initiatives and grant schemes for renewable energy, including schemes targeting households to incentivise the purchasing of solar water heaters (SWH) and heat pump water heaters (HPWH). As part of Malta's forward outlook and ambition in increasing the share of renewable energy, the Government continues to focus on the potential deployment of (floating) offshore renewable solutions.

[15] In view of the ongoing NECP update, the draft of which is expected to be submitted by June 2024, Malta is revising its renewable energy projections and therefore the figure of 266 MW by 2030 is subject to change.

**2) Energy Efficiency Measures**

- Malta has the second lowest final energy consumption per capita in the EU due to a favourable climate and lack of energy-intensive industry.
- Malta's energy system and market are small, with no natural gas networks, district heating networks or cooling networks. Measures to meet energy savings obligations under the Energy Efficiency Directive are therefore relatively limited.
- Domestic / household electricity use - schemes are in place to provide grants for households to invest in double glazing, roof insulation, solar water heaters and heat pump water heaters. Heating requirements are on the lower end of the scale, and there is a high penetration of heat pumps for heating and cooling purposes without the need for Government intervention.
- Malta implements a number of measures which incentivize lowering consumption of electricity amongst its citizens and businesses in the various sectors. The most notable one being the eco reduction scheme and the rising block tariff in the residential sector. Under the eco-reduction, households consuming either: (i) less than 2,000 kWh of electricity per year in a single household; or (ii) less than 1,750 kWh per person in a two or more-person household, receive a direct rebate of 15-25% on their electricity bills. This policy incentivises efficiency and lower consumption, while also having a positive effect on the electricity bills of low-income households who fall within the consumption limit.
- In addition, the electricity tariff in Malta adopts a rising block structure to incentivise energy efficiency by applying higher tariffs as consumption increases whilst ensuring that industries having a high reliance on energy by virtue of their operations remain competitive.
- The Energy Audit scheme and The Energy Efficiency scheme for Industry are also important measures which help with reducing electricity consumption. Cost efficient measures identified through an energy audit can benefit from a grant under the Energy Efficiency Scheme for Industry. Through this scheme, a cash grant or tax credit (which can be utilised against tax payable by the beneficiary) is available to businesses that:
    - Invest in the substitution or upgrading of equipment to reduce energy consumption.
    - Renovate or upgrade existing installations for heating or cooling systems.
    - Improve the energy efficiency of existing illumination systems.
- The Energy & Water Agency (EWA) provides free on-going professional advice to households on energy efficient appliances and behaviour. This measure provides guidance to residential consumers to lower their energy and water utility bills through the implementation of small actions. For vulnerable households/energy poor, this is complemented by a financial scheme designed to replace old and inefficient household appliances.
- In the context of the energy crisis, the Government has committed to implement additional measures focusing on energy demand reduction in particular by issuing guidelines on efficient energy use to be followed by all public buildings and public open spaces and through the launch of information/public awareness campaigns focusing on inducing energy saving behaviour in the residential sector.

# 6 Other measures and obligations

The statutory obligations and other measures that are in place that impact on security of gas supply include legal requirements and operational measures. Statutory requirements comprise EU regulations and national legislation. Operational measures relate to information provision, coordination, security measures and contractual.

*Statutory obligations*

The directly applicable regulations and national legislation that impact the security of gas supply include gas market regulations, emergency powers, infrastructure protection and security measures.

Under the national **Natural Gas Market Regulations**[16]**,** the Regulator for Energy and Water Services ("REWS") is responsible for monitoring of:

- the balance between supply and demand of natural gas,
- the level of expected future demand and available supplies,
- the envisaged additional capacity being planned or under construction,
- the quality and level of maintenance of the networks, and
- measures to cover peak demand and to deal with shortfalls of one or more suppliers.

The functions of the energy regulator, "REWS", are set out in the **Regulator for Energy and Water Services Act.**[17] These include establishing minimum quality and security standards to ensure public and private safety, and to regulating the supply and use of natural gas.

The **Emergency Powers Act**[18] assigns legal responsibility upon the President of Malta, in accordance with the advice of the Prime Minister, and if satisfied that a public emergency exists, to make regulations which are necessary or expedient for securing public safety and maintaining supplies and services. In the event of a public emergency, this legal provision effectively places authority over the allocation and utilisation of electricity and gas resources with the President.

The **Civil Protection Act** establishes the **Civil Protection Department** (CPD), responsible for preparing disaster and emergency contingency plans.[19] The CPD organises crisis and emergency plan co-ordination between relevant parties. The CPD is responsible for providing first response during emergency situations, which includes providing first response should there be an emergency at the gas facilities within the Delimara power station. This act also establishes the Civil Protection Council, an official body appointed by the Prime Minister, which is responsible for formulating, directing and co-ordinating national civil protection policy and practice. Although the Act allows that a representative member is appointed onto the Council to perform duties related to fuel and energy affairs, currently no such member sits on the Council.

[16] Natural Gas Market Regulations (SL 545.12) - http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=12360&l=1

[17] "REWS" is the Regulator for Energy and Water Services; Regulator for Energy and Water Services Act (Article 5 (1) e, Chapter 545 of Laws of Malta):

[18] The Emergency Power Act. Available online: https://legislation.mt/eli/cap/178/eng/pdf

[19] Civil Protection Act (Chapter 411 of Laws of Malta): Article 3 www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=8877&l=1

The energy sector, including operators of gas facilities, are subject to **The Critical Infrastructures and European Critical Infrastructures (Identification, designation and protection) Order**.[20] This designates critical assets and facilities, supports management of critical infrastructure protection and establishes liaison with emergency organisations. The Critical Infrastructure Protection Directorate assesses the security, technical, communication and organisational measures in place. This includes a **Measures for High Common Level of Security of Network and Information Systems Order** which identifies and designates "essential services" and their operators.[21] These include the electricity and gas undertakings who are encouraged to protect their information infrastructure assets and systems from cyber threats and incidents.

Ship and port security in Malta is governed by **Port Security Regulations**[22] covering the Marsaxlokk Port, including the gas facility at Delimara. This requires the port facility operator, Enemalta, to ensure the security of the facility with appropriate measures that address three graduated security levels. Specific measures must be maintained when an incident is probable or imminent. Malta's inter-ministerial **Maritime Security Committee** promotes maritime security in part through the Port of Marsaxlokk Security Working Groups.

On 11 October 2020, the Law regulating the **National Foreign Direct Investment Screening Office in Malta (NFDIS)** was enacted as Chapter 620 of the Laws of Malta (the NFDIS Law)[23]. The Law was transposed from Regulation (EU) 2019/452 establishing a framework for the screening of foreign direct investments into the Union (the Regulation).

With the Regulation, the EU aims to safeguard Europe's interests with an EU-wide investment screening mechanism, whereby Member States examine carefully transactions by foreign companies that target EU's strategic interests. In particular, it creates a framework for the exchange of information and opinions between EU Member States and the European Commission. Accordingly, NFDIS reviews investments in other EU jurisdictions to determine whether such investments impact the security of public order of Malta. NFDIS may comment and provide input on such investments.

NFDIS carries out screening on foreign direct investments in Malta originating from third-countries on grounds of security or public order. Investments which would require screening would fall under the Schedule of the NFDIS Law - which includes a non-exhaustive list of sectors and factors including critical infrastructure, critical technologies, the supply of critical inputs, such as energy or raw materials, access to sensitive information or the ability to control information, or the freedom and pluralism of the media. In some cases, NFDIS may impose obligations and/or mitigating measures as part of a screening decision, and perform monitoring and checks to ensure compliance with the conditions imposed. NFDIS carries out KYC type of screening on the beneficial owners behind the

[20] The Critical Infrastructures and European Critical Infrastructures Order (Subsidiary Legislation 460.24): www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=11808&l=1 transposes EU Directive 2008/114/EC of 8 Dec 2008.

[21] Measures for High Common Level of Security of Network and Information Systems Order (Legal Notice 216 of 2018):www.justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29161&l=1 implements Directive (EU) 2016/1148 of the European Parliament and of the Council concerning measures for a high common level of security of network and information systems across the Union is transposed into national legislation.

[22] Ports Security Regulations (Subsidiary Legislation 499.35): www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=11357

[23] National FDI Screening Office Act, 2020: https://parlament.mt/media/109955/act-lx-national-foreign-direct-investment-screening-act.pdf

investments, and in many cases liaises with other Government departments and regulatory bodies in Malta for their input where necessary.

### *Other Measures*

Other measures that impact on the security of gas supply in Malta fall broadly into four categories:

1. Timely disclosure of critical information and co-ordinating between dependant parties,
2. Obligations to maintain the gas facility including contingency arrangements,
3. Contractual requirements related to the management of LNG deliveries, and
4. Undertaking independent inspections and testing.

The Government, through Enemalta, implements a security of supply principle described as the N-1 system/generation adequacy standard. This requires that even when losing the largest piece of power generation infrastructure (e.g. electricity interconnector or gas facilities) the system needs to be sufficiently resilient to meet the maximum electricity demand.

As part of their contractual obligations the gas facility operator must keep the electricity system operator fully and accurately informed of gas availability. This supports active management of gas supply to D3PG, back-up fuel (gas-oil) supplies and gas stocks. The gas facility operator must also maintain detailed procedures that co-ordinate the delivery of gas to the other main gas users, D3PG and D4, and to co-ordinate maintenance and shutdowns.

The gas facility operator maintains contingency arrangements should the FSU be required to leave the berth. This includes emergency arrangements for supply of ship-to-ship LNG equipment and the ability to accommodate alternative LNG delivery vessels. Additionally, the gas facility operator is contractually obliged to operate and maintain the gas facilities in accordance with applicable laws and manufacturer's guidelines and instructions, and to have in place safety control and permit to work systems across the facility. Malta's LNG facilities are approved for LNG deliveries by suppliers amounting to more than 50% of the global LNG supply. Additionally, the Delimara terminal is designed in line with international standards to ensure that as many vessels as possible are suitable to berth and supply LNG to Malta.

Under a business-as-usual situation, the planning and management of LNG deliveries is handled through the existing contractual arrangements between the electricity DSO and the natural gas undertaking, as well as between the natural gas undertaking and LNG supplier. The DSO has a long-term gas supply agreement in place ensuring long-term and secure supplies of LNG. This agreement expires in August 2026.

The management and planning of LNG deliveries takes into account the need for retainment of, at least, the contract stock requirement of 20,000$m^3$ until the next cargo is delivered. As per the gas supply contract, the contract stock requirement includes the gas volumes which are already in transit (cargo within 195 hours of destination), less the minimum technical level of LNG to be stored in the FSU amounting to 6,250 $m^3$. Actual consumption is monitored on a daily basis to ensure its alignment with the delivery schedule and to allow enough room in the FSU to transfer the scheduled cargo on the agreed delivery date. This ensures that any developing problems are detected well in advance.

COMAH Regulations identify the Delimara site as one of six upper tier sites on Malta with two operators, ElectroGas Malta and Enemalta, operating on the site.[24] The gas facility operator, ElectroGas, installations include the Floating Storage Unit (FSU), the regasification plant, pipelines between the FSU and the regasification facility. The Enemalta installations consist of oil tanks and pipelines on the site. As a top-tier site, operators at Delimara must demonstrate they have taken all necessary measures to prevent major accidents and to limit consequences to people and the environment should one occur. COMAH also obliges the gas facility operator to implement safety management systems and a major accident prevention policy (MAPP). Enemalta, as the coordinator for the Delimara Power Station COMAH site, is responsible for the organisation of major COMAH exercises and drills involving all relevant entities on site. Major COMAH exercises are carried out every two years and are complemented by additional minor emergency and security drills. Drills related specifically to the gas facilities (Delimara 4, regasification plant, FSU) are coordinated and carried out by the gas facility operator ElectroGas.

[24] COMAH Regulations - Seveso III Directive (2012/18/EU). Transposed into Maltese law through the Control of Major Accident Hazards (COMAH) Regulations and the Occupational Health and Safety Authority Act

# 7 Infrastructure Projects

Malta is currently working on different infrastructure projects related to security of energy supply:

*Hydrogen-ready gas pipeline:*

The Melita TransGas hydrogen-ready pipeline project consists of c.a. 159 km of onshore/offshore pipeline between Malta and Italy. The project will end Malta's gas isolation by connecting the island to the trans-European Natural Gas Network and to the emerging Italian/EU hydrogen network. It will contribute to the decarbonisation of the local power generation and future inland market by enabling the access to renewable gases (hydrogen/biomethane). By replacing the need for the current FSU, the pipeline will improve the technical capacity limit of the existing LNG Facility and will be the enabler for Malta to import 100% Green Hydrogen subject to its availability and the maturity of the H2 market. The project will furthermore contribute to market integration, competitiveness and improved security of energy supply, whilst removing the emissions from the current LNG supply chain and generate environmental landscape benefits.

The Project is a Project of Common Interest under the 5$^{th}$ list of 2021 and is currently being assessed by the EU Commission to retain this status under the 6$^{th}$ PCI list of 2023 pursuant to Article 24 derogation for Malta and Cyprus under the new TEN-E Regulation (EU) 2022/869.

The realization of the hydrogen-ready MTGP may also allow the use of renewable gases not solely for energy generation purposes but for future inland uses. The PCI is listed in Malta's 2030 National Energy and Climate Plan and in the Low Carbon Development Strategy, and if it materialises, it may contribute towards the decarbonisation goals for Malta in line with the EU's ambition towards carbon neutrality.

<u>Impact on Security of Supply</u>

The pipeline is expected to contribute to security of supply by providing an alternative vehicle for energy supply given the increased dependency of Malta on electrical interconnectivity with Italy which is planned to double by 2026 .

The project is expected to result in a more reliable, secure and energy efficient form of transport of fuel. The Project will contribute to limit the actual risks of supply due to the stress weather conditions and technical capacity failure of the present LNG supply chain and potential increased capacity for future demand.

*Second electrical cable-link with Italy:*

Malta's reliance on fossil fuels will continue to diminish with the addition of the second sub-sea electrical cable-link with Italy. This shall consist of an underwater and onshore AC cable link with a nominal continuous rating capacity of 225MW, operating at 220kV between Malta (Magħtab) and Sicily (Ragusa) to be laid in parallel but at a safe distance to the existing AC cable-link. The preliminary identified desktop route is foreseen to have an approximate length of 118km in total: 2km in Malta, 98km offshore, 18km in Ragusa.

The Project is therefore an enabler for Malta in its roadmap to reach its 2030 climate and energy targets and shall contribute in the transition to a carbon neutral economy by 2050 and is included in the European Ten-Year Network Development Plan (TYNDP) of 2022[25]

**PROJECT BENEFITS:**

- The Project will double the electricity interconnectivity capacity of Malta with the European electricity network to meet the forecasted increase in the islands' electricity demand expected from projected economic growth, the electrification of the transport sector and the use of onshore power for vessels.

- It will contribute to Malta's 2030 energy and climate targets and the transition to a carbon neutral economy by allowing the importation of green electricity and the optimisation of the power generation mix.

- The Project will also act as an enabler for increased indigenous renewable electricity generation, including offshore RES, by providing a buffer to counterbalance for the RES intermittency and by enhancing the stability and balancing of the Maltese electricity grid.

- It will provide security of electricity supply to the island by serving as a back-up in case of failure in the first cable link and/or domestic power generation.

- The Project will also contribute towards reducing the dependency on domestic fossil-fuel fired (LNG and gasoil) electricity generating plant.

The second cable link project is planned to be commissioned in 2026.

### *Battery Energy Storage Systems (BESS)*

Malta is also looking at grid-scale Battery Energy Storage Systems (BESS). BESS presents an important potential contribution for Malta to achieve its EU decarbonisation commitments and feature in the Malta Low Carbon Development Strategy (June 2021) and Malta's 2030 National Energy and Climate Plan (December 2019).

**PROJECT BENEFITS:**

The purposes of the Battery Energy Storage Systems are to:

- Provide a source of secure supply in cases of plant outages thereby enhancing the grid's resilience and stability,
- Address grid bottlenecks to accelerate the penetration of RES and offer solutions to alleviate congestion in the distribution network,
- Provide black start facility capable of restarting the power station and grid in the event of a total shutdown and supply power to part of the network,
- Store energy generated by renewables during hours of maximum delivery and use it during peaks, thus flattening the variance between day and evening on conventional generation plant output,

[25] https://tyndp2022-project-platform.azurewebsites.net/projectsheets/transmission/1085

- Reduce the effect of the variability and intermittency caused by renewables, in periods of variable cloud cover, and thus permit the operation of conventional plant in a more stable manner, with inherent gains in plant reliability, plant emissions and $CO_2$ emission savings,
- Enable the ingress of further RES, including large-scale renewable energy offshore projects, thereby reducing the use of fossil fuels for electricity generation.
- Provide fast frequency and voltage stabilisation to the Maltese grid in case Malta is isolated from the Italian grid because of maintenance or faults.

# 8 Public service obligations related to the security of supply

The electricity distribution system covering Malta remains under the responsibility of one distribution system operator which forms part of a vertically integrated company, Enemalta plc. Enemalta is the only undertaking licensed to carry out all the three activities of generation, distribution and supply together and remains the exclusive supplier of electricity in Malta

ElectroGas Malta Ltd (EGM) owns and operates the combined cycle gas turbine (CCGT) at D4 running on natural gas. The licence to generate electricity from this plant was issued by the Regulator (REWS) to ElectroGas Malta Ltd in 2017. The CCGT plant was constructed as part of a single electricity and natural gas supply project, the scope of which was to enhance the security of supply of electricity, replace inefficient generation plants and switch to natural gas as the main source of local power generation. The project and underlying agreements were subject to an assessment by the European Commission under the Services of General Economic Interest (SGEI) framework which led to the *State Aid Decision SA 45779 (2016/NN) – Malta Delimara Gas and Power Energy Project*. In its Decision, the European Commission recognised the importance of the project for the security of electricity supply in Malta. The Commission concluded that ElectroGas Malta Ltd has been entrusted with a Public Service Obligation (PSO) to make available electricity and gas to Enemalta when dispatched and nominated by Enemalta, and this entrustment constitutes a SGEI in terms of Article 106 of the Treaty on the Functioning of the EU ("TFEU").

The project involves the following contractual structure:

I. **Security of Supply Agreement (SSA)** – agreement between the Government of Malta, Enemalta and EGM to ensure that, should any circumstances arise which are capable of leading to the termination of the IA, PPA and GSA, or in the event that Enemalta is unable to continue procuring electricity and/or gas from EGM, the Government will be able to assume Enemalta's obligations under the relevant supply arrangements.
II. **18-year Power Purchase Agreement (PPA)** – supplying up to 215 MW of energy every hour from D4 CCGT; The PPA is an agreement between EGM and Enemalta, whereby EGM agrees to make available electrical energy to Enemalta, and to supply electrical energy when dispatched by Enemalta. In turn, Enemalta agrees to pay for availability of D4 and the electrical output delivered by EGM to the electricity distribution network.
III. **18-year Gas Supply Agreement (GSA)** – providing the volume of gas required to meet demand to both D3 and D4; The GSA is an agreement between EGM and Enemalta, whereby EGM agrees to make gas available to Enemalta, and to supply gas to D3 when nominated by Enemalta. In turn, Enemalta agrees to pay for the availability of the LNG facility and the gas delivered by EGM to D3.

According to the agreements mentioned above, Enemalta benefitted from a fixed price for both electricity and gas for the first five years of supply between April 2017 and April 2022. As of April 2022, following the expiry of the Fixed Price LNG Supply Term, the four years four months Indexed Price LNG Supply Term has come into effect (end of term is in August 2026), where the price of gas is indexed to Brent. ElectroGas Malta has agreed to make available electricity and gas to Enemalta and supply electrical energy and gas when dispatched and nominated by Enemalta, for an 18-year term pursuant to the terms of an Implementation Agreement (IA) and the transaction agreements mentioned above. The GSA agreement will expire on the same date as other transaction agreements, subject to early termination at the option of Enemalta, known as the "GSA Exit" clause, which is designed to accommodate a potential future hydrogen-ready gas interconnector with Italy.

As part of the agreements EGM has agreed to procure LNG on a fixed and indexed price basis for consumption as gas in D4 and delivery as gas in D3, and to procure and maintain the FSU for the term.

In 2014, by virtue of a public service agreement and pursuant to Recital 5 and Article 3(2) of Directive 2009/72/EC ("Electricity Directive"), the Government of Malta entrusted Enemalta plc. with the public service obligation (PSO) to provide and maintain a reliable source of supply of electricity in Malta. By contracting with EGM for the supply of gas and electricity to Enemalta, the latter delegated part of its PSOs to EGM in compliance with Article 3(5) of the 1977 Enemalta Act.

As regards the existence of a genuine and clearly defined SGEI, the measures are indispensable to ensure security of supply, which is an objective which justifies PSOs. In particular, the measures guarantee system reliability and adequate generation capacity at all times, as per the N-1 system adequacy requirements. As regards the amount of compensation for the SGEI, D4 and the Gas facilities will be entirely dedicated for the attainment of the PSO. Payments under the Transaction Agreements constitute the compensation for the provision of the PSO. The PSO has been set up with the aim of ensuring security of supply and contributing to environmental protection and energy affordability.

The European Commission noted that the PSO complied with Article 3(2) of the Electricity Directive due to the following reasons:

- They are justified in the general economic interest as they aim to ensure security of supply, which is specifically recognized in the Directive as a legitimate objective for imposing PSOs in the electricity sector;
- They are proportionate since the use of a CCGT plant sourced by a local gas terminal, was found to be the best available option in the context of Malta to ensure security of supply;
- They are clearly defined, transparent, non-discriminatory and verifiable;

# 9 Stakeholder consultations

Consultations on the Preventive Action Plan and Emergency Plan were carried out with the following national stakeholders:

- a) Natural gas undertakings (as defined by point 1 of Article 2 of Directive 2009/73/EC)
    - ElectroGas Malta (LNG supplier, LNG facility operator and natural gas supplier)
    - InterConnect Malta Ltd (Project Promoter of PCI 5.19 and prospective TSO for MTGP)
- b) Relevant organisations representing the interests of households
    - There are no household gas customers in Malta.
- c) Relevant organisations representing the interests of industrial gas customers, including electricity producers
    - Enemalta plc (electricity distribution system operator)
    - ElectroGas Malta (electricity producer)
    - D3 Power Generation ltd (electricity producer)
- d) National Regulatory Authority
    - REWS (Regulator for Energy and Water Services)
- Other stakeholder consultations
    - Transport Malta (Transport Authority)
    - CPD (Civil Protection Department)
    - CIPD (Critical Infrastructure Protection Directorate)
    - OHSA (Occupational Health and Safety Authority)
    - ERA (Environment and Resources Authority)

For the purpose of the development of Malta's first PAP and EP in 2019 the mechanism for consultation included an initial outreach email describing the Competent Authority's obligations and explaining why the stakeholder had been identified as such. This was followed by an initial meeting in order to brief the stakeholder fully on what information was required from them in order to prepare for the consultation. Finally, over the course of a week the EWA and their consultant, met with each stakeholder to consult in detail and to gather any necessary information to produce these plans.

Following the initial draft of the plans, stakeholders were sent the relevant sections of the plan which affected or were affected by them, in order to update/verify as necessary and endorse relevant sections of the plan. Stakeholders have reviewed the documents, confirmed the accuracy of and endorsed these sections. For the updates of the PAP and EP in 2022/2023 specific meetings with identified stakeholders were only held when deemed necessary. Stakeholders were consulted on updated sections of the Plans, insofar to the extent that the updates affected them. Stakeholders were also consulted on any possible new measures, obligations, legislative acts, which are of relevance to ensuring gas (and electricity) security of supply in Malta.

# 10 Regional

## National circumstances affecting security of supply

Specific circumstances of Malta's energy system and market, such as its small nature, the existence of a single electricity supplier, the absence of natural gas pipeline interconnection with the European gas grid substantially affect the security of supply. The above also has to be seen in conjunction with the geographical location of Malta as a small island Member State.

Additionally, the steep increase in population, growing demand in the housing market, increasing immigration due to increased demand in the labour market and growth of tourism intensify pressure on land and scarce water resources. This has led to an increase in energy demand, which is expected to continue growing in the short to medium term. As highlighted in previous sections, as a result of these factors a decision was taken by Government to invest in a second electricity sub-sea link with Italy by 2026. This project would contribute to long-term security of supply as well as allow for the integration of a higher share of renewable energy, thus decreasing Malta's reliance on fossil fuels.

To strengthen the diversification of energy supply whilst also achieving Malta's goals on the road to decarbonisation of the energy system, Malta's policy in the area of renewable energy is to fully exploit all reasonable potential indigenous renewable energy sources. Malta's potential for renewable energy deployment is mainly affected by physical and spatial limitations, technological advancement and resource potential, with the availability of and cost of land being the predominant restrictions for further deployment. Solar energy remains the predominant viable renewable energy source in Malta. However, the deployment of solar PV is also leading to grid stability issues, which will require the implementation of innovative and flexible solutions, such as energy storage. As part of Malta's forward outlook and ambition in increasing the share of renewable energy, the Government continues to focus on the potential deployment of (floating) offshore renewable solutions.

The update of Malta's plans comes at a time when the EU and its Member States are going through an unprecedented energy crisis, which has been exacerbated by the Russian aggression in Ukraine. Gas flows from the East have been significantly reduced and Member States are facing new challenges, which required the implementation of emergency measures at European and national level, such as obligations for filling of gas storages, voluntary gas demand reduction measures or sourcing gas from alternative suppliers or via new alternative infrastructure. In view of this, LNG has to large extent replaced Russian pipeline gas and is currently the largest source of gas in Europe, while Norway has become the largest supplier of gas into Europe.

Whilst Malta does not depend on Russian gas imports and hence is not directly affected by a disruption of Russian gas supplies, it is nevertheless affected by the evolving dynamics of the European energy markets, for example through exposure to high prices of electricity imports, which cover approximately 20% of the electricity demand.

A combination of all the above factors magnifies the pressure to achieve a desired level of security of energy supply in Malta and safeguard that Maltese citizens and businesses are provided with sustainable and secure forms of energy. Malta's strategy in the area of energy security, as outlined in its National Energy and Climate Plan, is to continue to emphasize the Government's commitment to achieve greater security of supply through the diversification of energy sources in terms of procurement channels, exporting country and supplier, as well as contingency planning in case of a disruption in supply.

As described in section 9 of the Plan, the Competent Authority, EWA and their consultant held stakeholder consultations for the purpose of the development of the Preventive Action Plan and Emergency Plan in line with Article 8(2) of the Gas Security of Supply Regulation. LNG used in Malta for electricity generation is currently sourced from international markets. Additionally, the hydrogen-ready gas pipeline project would end Malta's isolation by connecting the island to the trans-European Natural Gas Network. At this stage, the impact of Malta's gas market on the security of supply of the regional risk groups is practically negligible, which is also recognized in the Common Risk Assessments of the relevant Risk Groups. In view of this, stakeholder consultations held with national undertakings focused primarily on the gas security of supply in Malta without giving consideration to the regional aspect. This would inevitably be revisited should Malta become connected to the trans-European gas network.

# 11 Regional N-1

The sections hereunder were jointly drafted within the relevant regional risk groups. For the 2023 update, the regional chapters of the Libyan Risk Group remain under development.

## 1. Libya Risk Group

### 11.1 Infrastructure standard

The "N – 1 formula at regional level" demonstrates that technical capacity of gas infrastructures in the Libyan Risk Group are barely sufficient to satisfy maximum gas demand of the involved Member States, in the event of disruption of the single largest gas infrastructure. Nevertheless, taking into account existing capacity reduction the system is quite more fragile than in the past. Supply may be jeopardized only with regards to the scenario involving a disruption related to the Baumgarten hub. The scenario of a sudden complete disruption of flows crossing Baumgarten hub for 7 days at the beginning of February is considered the most challenging since a huge share of demand remains uncovered in Slovenia and smaller shares in Italy and Croatia.

**Table 7 - Data for 2018/2019 [mcm/d]** [26]

| Member State | $Ep_m$ | $LNG_m$ | S 100% | S 30% | $P_m$ | $D_{max}$ | | ($I_m$) |
|---|---|---|---|---|---|---|---|---|
| **Austria** | 172,2 | - | 66,4 | 44,4 | 3,4 | 55,3 | | *Baumgarten* 148,1 |
| **Croatia** | 7,2 | - | 5,8 | 3,2 | 3,5 | 16,6 | | |
| **Italy** | 198,0 | 51,9 | 263,2 | 171,8 | 15,5 | 443,0 | | *Gela* 49,2 |
| **Slovenia** | - | - | - | - | - | 4,9 | | |
| **TOTAL** | ***377,4*** | ***51,9*** | ***335,3*** | ***219,3*** | ***22,4*** | ***519,8*** | | |

**Table 8 - 2018/2019 N-1 Index values**

| | | N-1 index | N-1 index (TENP reduction) |
|---|---|---|---|
| **Baumgarten** | **S 100%** | *123%* | *117%* |
| | **S 30%** | *101%* | *95%* |
| **Gela** | **S 100%** | *142%* | *136%* |
| | **S 30%** | *120%* | *114%* |

**Table 9 - Data for 2020/2021 [mcm/d]**

| Member State | $Ep_m$ | $LNG_m$ | S 100% | S 30% | $P_m$ | $D_{max}$ | | ($I_m$) |
|---|---|---|---|---|---|---|---|---|
| **Austria** | 172,1 | - | 66,4 | 44,4 | 3,4 | 55,3 | | *Baumgarten* 148, |

[26] Definitions of parameters used are in line with Annex II point 3 of the Gas Security of Supply Regulation (EU) 2017/1938

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Croatia** | 7,2 | - | 5,8 | 3,2 | 3,5 | 16,6 | | |
| **Italy** | 198,0 | 51,9 | 291,3 | 190,8 | 18,9 | 438,0 | | *Gela* 49,2 |
| **Slovenia** | - | - | - | - | - | 6,1 | | |
| **TOTAL** | ***377,3*** | ***51,9*** | ***363,4*** | ***238,3*** | ***25,8*** | ***516,0*** | | |

**Table 10 - 2020/2021 N-1 Index values**

| | | N-1 index | N-1 index (TENP reduction) |
|---|---|---|---|
| **Baumgarten** | **S 100%** | *130%* | *124%* |
| | **S 30%** | *106%* | *100%* |
| **Gela** | **S 100%** | *149%* | *143%* |
| | **S 30%** | *125%* | *119%* |

## 11.2 Mechanisms developed for cooperation

### 11.2.1 Regional Coordination System for Gas (ReCo System for Gas)

Article 3(6) of the Gas Security of Supply Regulation highlights the role of ReCo, as established by ENTSOG, and composed of standing expert groups, as enabling the cooperation and exchange of information between TSOs in the event of a regional or EU emergency.

There are three ReCo teams: North West, East and South. Most members of the Ukrainian and Libyan Risk Group are included within the ReCo Team East. Malta is currently not part of the ReCo system or any regional team established therein. However, this does not preclude the possible future involvement of Malta in the ReCo system during and following the development of the MTGP hydrogen-ready gas pipeline project.

The main aim of the ReCo teams is to establish channel to exchange information between TSOs, to approve common procedures to use in case of an emergency and to organise emergency exercises to test the resilience of the communication flowchart and explore how to improve them. Consequently, the existence of the ReCo teams is a preventive measure even though all their operation procedures can be considered emergency measures.

The ReCo Team East was launched in November 2017. The role of the facilitator is to be the first TSO to contact in case of an emergency and to activate the communication flowchart.

### 11.2.2 New and permanent procedure of exchange of relevant information between Competent Authorities within the Risk Group

According to Article 11 of the Gas Security of Supply Regulation (EU) 2017/1938, when a Competent Authority declares one of the crisis levels, it shall immediately inform the Commission as well as the competent authorities of the Member States with which the Member State of that competent authority is directly connected.

Moreover, when the Competent Authority declares an emergency it shall follow the pre-defined action as set out in its Emergency Plan and shall immediately inform the competent authorities in the risk group as well as the competent authorities of the Member States with which it is directly connected in particular of the action it intends to take.

As described above, a Competent Authority shall only inform to the rest of the Risk Group when an emergency level is declared. However, in order to improve coordination, **if a Competent Authority of the Libyan Risk Group declares any crisis level, it shall inform the rest of members at the same time as the Commission**.

Furthermore, **if a Competent Authority within the Libyan Risk Group identifies a potential disruption affecting the gas supply from Libya, it shall inform the rest of Competent Authorities as soon as possible before any level of crisis**. A fully comprehensive list of risk triggering events within the Libya Risk Group is the following:

- relevant reduction in gas flows from Baumgarten and Gela interconnection points;
- relevant reduction of Russian gas flows to one or more Member States of the group;
- incidents or discovery of technical problems that could end into flow restrictions involving the main transmission pipelines interconnecting Member States belonging to the risk group;
- short notice forecast (one or two days before) of exceptionally high demand due to extreme weather conditions in a Member State belonging to the risk group.

A contact list of Competent Authorities will be updated yearly by the Competent Authority acting as Risk Group Facilitator as well as by the Competent Authority that experiences any change in its contact details.

## 11.3 Preventive Measures

### 11.3.1 Interconnection Agreements

The regulation of the interconnection agreements between adjacent TSOs is established by the Chapter II of the Commission Regulation (EU) 2015/703 of 30 April 2015 establishing a network code on interoperability and data exchange rules. Article 3 of the Regulation lays down the points necessarily covered by an interconnection agreement.

Generally, the contents covered in the Interconnection Agreements are as follows:

A. General provisions
B. Glossary: a glossary of terms used in the text, including conventions such as the schedule of the day of gas in any system.
C. Common referential:
    - Units (pressure, temperature, volume, gross calorific value, Wobbe index)
    - Shipper codes to facilitate identification in matching processes.
D. Forecasts: monthly and weekly forecast include the quantities to be transported across the interconnection point for the next month/week. Planned maintenance plays a significant role in the interconnection management and an annual plan is approved apart from specific updates a week before the maintenance action takes place.
E. Nominations: details of nomination and re-nomination cycles are agreed.
F. Matching procedure: in order to obtain the confirmed quantities (CQ) that will be delivered at the interconnection point by each shipper avoiding any discrepancy in the nominations.
G. Allocation: once the measured quantities (MQ) are confirmed, the TSOs calculate the difference between MQ and CQ to obtain the Daily Deviations (DD). The DD will be allocated to a deviation account known as the Operational Balancing Account (OBA).
H. Exceptional Event Situation: analysed in the Emergency Plan.

These interconnection agreements deliver a unified language to exchange information and procedures to detect imbalances and invalid control variables.

In Malta, this preventive measure will be taken into account during and following the development of the hydrogen-ready MTGP gas pipeline project.

### 11.3.2 Solidarity mechanisms between Member States

The solidarity mechanism established in Regulation (EU) 2017/1938 of the European Parliament and of the Council, dated October 25, 2017, on measures to ensure gas supply security and the repeal of Regulation (EU) no. 994/2010 has been modified following the publication of Regulation (EU) 2022/2576 of the Council on December 19, 2022. This modification strengthens solidarity by improving coordination of gas purchases, establishing reliable price references, and facilitating cross-border gas exchanges.

With the new regulation, solidarity measures will not only apply to Member States directly connected to the Member State requesting solidarity, but also to Member States with LNG facilities, provided the necessary capacity in the relevant infrastructure, including the LNG vessels and carriers, is available. As per the Regulation, Member States are allowed to exempt critical gas volumes used for electricity generation. Additionally, it is established that, in the absence of bilateral agreements on solidarity measures, default rules established in article 27 of the aforementioned regulation will apply.

Whilst Malta due to the nature of its energy system (e.g. using all of its LNG volumes for critical gas-fired generation) and its isolated position cannot fully contribute to the goals of Regulation (EU) 2022/2576 and provide solidarity to other Member States during an emergency by supplying other Member States with gas, it is nevertheless doing its utmost to utilise existing and new measures focusing on the reduction of electricity (and gas) consumption while ensuring that its electricity system is able to switch to alternative sources, such as gasoil, when the need arises.

## 2. Algeria Risk Group

**11.1 Calculation of the N-1 at the level of the risk group of Algeria**

The area covered by the Algerian Risk Group includes three interconnections that import gas from Algeria, two in Spain (Tarifa and Almeria) and one in Italy (Mazara del Vallo), with a total import capacity of Algerian gas of 2,009 GWh/d. The area has 17 regasification plants and the quantity of LNG received from Algeria was equivalent to 97 TWh during 2019 and 91 TWh during 2020. In summary, the gas imports supplied by Algeria to the Risk Group accounted for 17,1% of the total imports in 2020 and 17,4% in 2021.

The infrastructure with the greatest capacity at the regional level is the interconnection between Austria and Slovakia via Baumgarten with a firm entry capacity of 2,081 GWh/d. Thereby this infrastructure was considered for the calculation of the N-1 formula at regional level.

The constitution of the risk group is based on the importance of supply of Algerian gas in the region, thus an analogous calculation of the N-1 formula, considering the largest infrastructure that imports gas from Algeria, has also been carried out. This infrastructure is Transmed pipeline across the entry point of Mazara del Vallo in Italy with a capacity of 1,227 GWh/d.

Both N-1 formulas are calculated taking into account different points of the withdrawal capacity curve of underground storages, for different filling levels. Consequently, different results can be obtained for each of the infrastructures.

Results of the N-1 standard are well above 100%: decreasing from 124% in the winter 2022/2023 to 123% in the winter 2025/2026. In fact, a total disruption of the gas flow through the Baumgarten interconnection took place in the winter of 2017/2018 during less than 24 hours in especially demanding conditions. Both Austrian and Italian gas systems were able to react swiftly and supply their demand thanks to withdrawal capacity. Moreover, Transmed pipeline also increased significantly its flow during the day.

The results of the N-1 standard are well above 100% even in the case of failure of Mazara del Vallo: decreasing from 131% in winter 2022/2023 to 130% in winter 2025/2026. The Algeria Risk Group therefore demonstrates a high resilience even in case of a total disruption of Algeria gas supply, being an unlikely event.

## Table 11 - N-1 formula: Failure of Baumgarten with SM 30% filled

| | winter 2022-2023 | | winter 2023-2024 | | winter 2024-2025 | | winter 2025-2026 | |
|---|---|---|---|---|---|---|---|---|
| | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d |
| **Epm** | **7.941** | **683** | **7.946** | **683** | **7.946** | **683** | **7.990** | **687** |
| *Tarifa (Spain) ** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Almería (Spain)* | 338 | 29 | 338 | 29 | 338 | 29 | 338 | 29 |
| *Mazara del Vallo (Italy)* | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 |
| *Gela (Italy)* | 546 | 47 | 546 | 47 | 546 | 47 | 546 | 47 |
| *Passo Gries (Italy)* | 695 | 60 | 695 | 60 | 695 | 60 | 695 | 60 |
| *Melendugno (Italy)* | 487 | 42 | 487 | 42 | 487 | 42 | 487 | 42 |
| *Baumgarten (Austria)* | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 |
| *Oberkappel (Austria)* | 246 | 21 | 246 | 21 | 246 | 21 | 246 | 21 |
| *Überackern (Austria)* | 114 | 10 | 114 | 10 | 114 | 10 | 114 | 10 |
| *Kulata (BG) / Sidirokastron (Greece)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *Kipi (Greece)* | 49 | 4 | 49 | 4 | 49 | 4 | 49 | 4 |
| *Nea Mesimbria (Greece)* | 53 | 5 | 53 | 5 | 53 | 5 | 53 | 5 |
| *Dravaszerdahely (Croatia)* | 78 | 7 | 78 | 7 | 78 | 7 | 78 | 7 |
| *Obergailbach (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Taisnieres (France)* | 770 | 66 | 770 | 66 | 770 | 66 | 770 | 66 |
| *Dunkerque (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Pince (Slovenia)* | 0 | 0 | 5 | 0 | 5 | 0 | 49 | 4 |
| **Pm** | **247** | **21** | **247** | **21** | **247** | **21** | **247** | **21** |
| *Austria* | 27 | 2 | 27 | 2 | 27 | 2 | 27 | 2 |
| *Croatia* | 18 | 2 | 18 | 2 | 18 | 2 | 18 | 2 |
| *France* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 191 | 16 | 191 | 16 | 191 | 16 | 191 | 16 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Spain* | 11 | 1,0 | 11 | 1,0 | 11 | 1,0 | 11 | 1,0 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Sm (30 % filled)** | **4.915** | **423** | **4.915** | **423** | **4.915** | **423** | **4.915** | **423** |
| *Austria* | 1.083 | 93 | 1.083 | 93 | 1.083 | 93 | 1.083 | 93 |
| *Croatia* | 61 | 5 | 61 | 5 | 61 | 5 | 61 | 5 |
| *France* | 1.669 | 143 | 1.669 | 143 | 1.669 | 143 | 1.669 | 143 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 1.880 | 162 | 1.880 | 162 | 1.880 | 162 | 1.880 | 162 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 71 | 6 | 71 | 6 | 71 | 6 | 71 | 6 |
| *Spain* | 152 | 13 | 152 | 13 | 152 | 13 | 152 | 13 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **LNGm** | **4.456** | **383** | **4.457** | **383** | **4.457** | **383** | **4.457** | **383** |
| *Dunkerque LNG Terminal (France)* | 520 | 45 | 520 | 45 | 520 | 45 | 520 | 45 |
| *Fos Tonkin LNG Terminal (France)*<br>*Fos Cavaou LNG Terminal (France)* | 410 | 35 | 410 | 35 | 410 | 35 | 410 | 35 |
| *Montoir de Bretagne LNG Terminal (France)* | 337 | 29 | 337 | 29 | 337 | 29 | 337 | 29 |
| *Revythoussa LNG Terminal (Greece)* | 229 | 20 | 230 | 20 | 230 | 20 | 230 | 20 |
| *Adriatic LNG Terminal (Italy)* | 290 | 25 | 290 | 25 | 290 | 25 | 290 | 25 |
| *Panigaglia LNG Terminal (Italy)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *FSRU OLT Offshore LNG Toscana (Italy)* | 168 | 14 | 168 | 14 | 168 | 14 | 168 | 14 |
| *Delimara LNG Terminal (Malta)* | 165 | 14 | 165 | 14 | 165 | 14 | 165 | 14 |
| *Sines LNG Terminal (Portugal)* | 229 | 20 | 229 | 20 | 229 | 20 | 229 | 20 |
| *Bilbao LNG Terminal (Spain)* | 223 | 19 | 223 | 19 | 223 | 19 | 223 | 19 |
| *Barcelona LNG Terminal (Spain)* | 543 | 47 | 543 | 47 | 543 | 47 | 543 | 47 |
| *Cartagena LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Huelva LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Mugardos LNG Terminal (Spain)* | 115 | 10 | 115 | 10 | 115 | 10 | 115 | 10 |
| *Sagunto LNG Terminal (Spain)* | 278 | 24 | 278 | 24 | 278 | 24 | 278 | 24 |
| *Krk LNG Terminal (Croatia)* | 80 | 7 | 80 | 7 | 80 | 7 | 80 | 7 |
| **Im (Baumgarten)** | **2.081** | **179** | **2.081** | **179** | **2.081** | **179** | **2.081** | **179** |
| **Dmax** | **12.081** | **1.039** | **12.161** | **1.046** | **12.183** | **1.048** | **12.238** | **1.052** |
| *Austria* | 588 | 51 | 588 | 51 | 588 | 51 | 588 | 51 |
| *Croatia* | 159 | 14 | 164 | 14 | 166 | 14 | 169 | 15 |
| *France* | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 |
| *Greece* | 308 | 26 | 375 | 32 | 391 | 34 | 396 | 34 |
| *Italy* | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 |
| *Malta* | 13 | 1 | 13 | 1 | 13 | 1 | 13 | 1 |
| *Portugal* | 278 | 24 | 271 | 23 | 262 | 23 | 252 | 22 |
| *Spain* | 1.945 | 167 | 1.961 | 169 | 1.972 | 170 | 2.029 | 174 |
| *Slovenia* | 68 | 6 | 68 | 6 | 68 | 6 | 68 | 6 |
| **Deff** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **% N-1** | **128%** | | **127%** | | **127%** | | **127%** | |

## Table 12 - N-1 formula: failure of Baumgarten with SM 100% filled

| | winter 2022-2023 | | winter 2023-2024 | | winter 2024-2025 | | winter 2025-2026 | |
|---|---|---|---|---|---|---|---|---|
| | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d |
| **Epm** | **7.941** | **683** | **7.946** | **683** | **7.946** | **683** | **7.990** | **687** |
| *Tarifa (Spain) ** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Almería (Spain)* | 338 | 29 | 338 | 29 | 338 | 29 | 338 | 29 |
| *Mazara del Vallo (Italy)* | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 |
| *Gela (Italy)* | 546 | 47 | 546 | 47 | 546 | 47 | 546 | 47 |
| *Passo Gries (Italy)* | 695 | 60 | 695 | 60 | 695 | 60 | 695 | 60 |
| *Melendugno (Italy)* | 487 | 42 | 487 | 42 | 487 | 42 | 487 | 42 |
| *Baumgarten (Austria)* | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 |
| *Oberkappel (Austria)* | 246 | 21 | 246 | 21 | 246 | 21 | 246 | 21 |
| *Überackern (Austria)* | 114 | 10 | 114 | 10 | 114 | 10 | 114 | 10 |
| *Kulata (BG) / Sidirokastron (Greece)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *Kipi (Greece)* | 49 | 4 | 49 | 4 | 49 | 4 | 49 | 4 |
| *Nea Mesimbria (Greece)* | 53 | 5 | 53 | 5 | 53 | 5 | 53 | 5 |
| *Dravaszerdahely (Croatia)* | 78 | 7 | 78 | 7 | 78 | 7 | 78 | 7 |
| *Obergailbach (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Taisnieres (France)* | 770 | 66 | 770 | 66 | 770 | 66 | 770 | 66 |
| *Dunkerque (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Pince (Slovenia)* | 0 | 0 | 5 | 0 | 5 | 0 | 49 | 4 |
| **Pm** | **247** | **21** | **247** | **21** | **247** | **21** | **247** | **21** |
| *Austria* | 27 | 2 | 27 | 2 | 27 | 2 | 27 | 2 |
| *Croatia* | 18 | 2 | 18 | 2 | 18 | 2 | 18 | 2 |
| *France* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 191 | 16 | 191 | 16 | 191 | 16 | 191 | 16 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Spain* | 11,1 | 1,0 | 11 | 1,0 | 11 | 1,0 | 11 | 1,0 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Sm (100 % filled)** | **6.731** | **579** | **6.686** | **575** | **6.686** | **575** | **6.686** | **575** |
| *Austria* | 1.083 | 93 | 1.038 | 89 | 1.038 | 89 | 1.038 | 89 |
| *Croatia* | 61 | 5 | 61 | 5 | 61 | 5 | 61 | 5 |
| *France* | 2.389 | 205 | 2.389 | 205 | 2.389 | 205 | 2.389 | 205 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 2.824 | 243 | 2.824 | 243 | 2.824 | 243 | 2.824 | 243 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 129 | 11 | 129 | 11 | 129 | 11 | 129 | 11 |
| *Spain* | 245 | 21 | 245 | 21 | 245 | 21 | 245 | 21 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **LNGm** | **4.456** | **383** | **4.457** | **383** | **4.457** | **383** | **4.457** | **383** |
| *Dunkerque LNG Terminal (France)* | 520 | 45 | 520 | 45 | 520 | 45 | 520 | 45 |
| *Fos Tonkin LNG Terminal (France)*<br>*Fos Cavaou LNG Terminal (France)* | 410 | 35 | 410 | 35 | 410 | 35 | 410 | 35 |
| *Montoir de Bretagne LNG Terminal (France)* | 337 | 29 | 337 | 29 | 337 | 29 | 337 | 29 |
| *Revythoussa LNG Terminal (Greece)* | 229 | 20 | 230 | 20 | 230 | 20 | 230 | 20 |
| *Adriatic LNG Terminal (Italy)* | 290 | 25 | 290 | 25 | 290 | 25 | 290 | 25 |
| *Panigaglia LNG Terminal (Italy)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *FSRU OLT Offshore LNG Toscana (Italy)* | 168 | 14 | 168 | 14 | 168 | 14 | 168 | 14 |
| *Delimara LNG Terminal (Malta)* | 165 | 14 | 165 | 14 | 165 | 14 | 165 | 14 |
| *Sines LNG Terminal (Portugal)* | 229 | 20 | 229 | 20 | 229 | 20 | 229 | 20 |
| *Bilbao LNG Terminal (Spain)* | 223 | 19 | 223 | 19 | 223 | 19 | 223 | 19 |
| *Barcelona LNG Terminal (Spain)* | 543 | 47 | 543 | 47 | 543 | 47 | 543 | 47 |
| *Cartagena LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Huelva LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Mugardos LNG Terminal (Spain)* | 115 | 10 | 115 | 10 | 115 | 10 | 115 | 10 |
| *Sagunto LNG Terminal (Spain)* | 278 | 24 | 278 | 24 | 278 | 24 | 278 | 24 |
| *Krk LNG Terminal (Croatia)* | 80 | 7 | 80 | 7 | 80 | 7 | 80 | 7 |
| **Im (Baumgarten)** | **2.081** | **179** | **2.081** | **179** | **2.081** | **179** | **2.081** | **179** |
| **Dmax** | **12.081** | **1.039** | **12.161** | **1.046** | **12.183** | **1.048** | **12.238** | **1.052** |
| *Austria* | 588 | 51 | 588 | 51 | 588 | 51 | 588 | 51 |
| *Croatia* | 159 | 14 | 164 | 14 | 166 | 14 | 169 | 15 |
| *France* | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 |
| *Greece* | 308 | 26 | 375 | 32 | 391 | 34 | 396 | 34 |
| *Italy* | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 |
| *Malta* | 13 | 1 | 13 | 1 | 13 | 1 | 13 | 1 |
| *Portugal* | 278 | 24 | 271 | 23 | 262 | 23 | 252 | 22 |
| *Spain* | 1.945 | 167 | 1.961 | 169 | 1.972 | 170 | 2.029 | 174 |
| *Slovenia* | 68 | 6 | 68 | 6 | 68 | 6 | 68 | 6 |
| **Deff** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **% N-1** | **143%** | | **142%** | | **142%** | | **141%** | |

## Table 14 - N-1 formula: failure of Mazara del Vallo with SM 30% filled

| | winter 2022-2023 | | winter 2023-2024 | | winter 2024-2025 | | winter 2025-2026 | |
|---|---|---|---|---|---|---|---|---|
| | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d |
| **Epm** | **7.941** | **683** | **7.946** | **683** | **7.946** | **683** | **7.990** | **687** |
| *Tarifa (Spain) ** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Almeria (Spain)* | 338 | 29 | 338 | 29 | 338 | 29 | 338 | 29 |
| *Mazara del Vallo (Italy)* | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 |
| *Gela (Italy)* | 546 | 47 | 546 | 47 | 546 | 47 | 546 | 47 |
| *Passo Gries (Italy)* | 695 | 60 | 695 | 60 | 695 | 60 | 695 | 60 |
| *Melendugno (Italy)* | 487 | 42 | 487 | 42 | 487 | 42 | 487 | 42 |
| *Baumgarten (Austria)* | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 |
| *Oberkappel (Austria)* | 246 | 21 | 246 | 21 | 246 | 21 | 246 | 21 |
| *Überackern (Austria)* | 114 | 10 | 114 | 10 | 114 | 10 | 114 | 10 |
| *Kulata (BG) / Sidirokastron (Greece)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *Kipi (Greece)* | 49 | 4 | 49 | 4 | 49 | 4 | 49 | 4 |
| *Nea Mesimbria (Greece)* | 53 | 5 | 53 | 5 | 53 | 5 | 53 | 5 |
| *Dravaszerdahely (Croatia)* | 78 | 7 | 78 | 7 | 78 | 7 | 78 | 7 |
| *Obergailbach (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Taisnieres (France)* | 770 | 66 | 770 | 66 | 770 | 66 | 770 | 66 |
| *Dunkerque (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Pince (Slovenia)* | 0 | 0 | 5 | 0 | 5 | 0 | 49 | 4 |
| **Pm** | **247** | **21** | **247** | **21** | **247** | **21** | **247** | **21** |
| *Austria* | 27 | 2 | 27 | 2 | 27 | 2 | 27 | 2 |
| *Croatia* | 18 | 2 | 18 | 2 | 18 | 2 | 18 | 2 |
| *France* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 191 | 16 | 191 | 16 | 191 | 16 | 191 | 16 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Spain* | 11 | 1,0 | 11 | 1,0 | 11 | 1,0 | 11 | 1,0 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Sm (30 % filled)** | **4.915** | **423** | **4.915** | **423** | **4.915** | **423** | **4.915** | **423** |
| *Austria* | 1.083 | 93 | 1.083 | 93 | 1.083 | 93 | 1.083 | 93 |
| *Croatia* | 61 | 5 | 61 | 5 | 61 | 5 | 61 | 5 |
| *France* | 1.669 | 143 | 1.669 | 143 | 1.669 | 143 | 1.669 | 143 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 1.880 | 162 | 1.880 | 162 | 1.880 | 162 | 1.880 | 162 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 71 | 6 | 71 | 6 | 71 | 6 | 71 | 6 |
| *Spain* | 152 | 13 | 152 | 13 | 152 | 13 | 152 | 13 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **LNGm** | **4.456** | **383** | **4.457** | **383** | **4.457** | **383** | **4.457** | **383** |
| *Dunkerque LNG Terminal (France)* | 520 | 45 | 520 | 45 | 520 | 45 | 520 | 45 |
| *Fos Tonkin LNG Terminal (France)*<br>*Fos Cavaou LNG Terminal (France)* | 410 | 35 | 410 | 35 | 410 | 35 | 410 | 35 |
| *Montoir de Bretagne LNG Terminal (France)* | 337 | 29 | 337 | 29 | 337 | 29 | 337 | 29 |
| *Revythoussa LNG Terminal (Greece)* | 229 | 20 | 230 | 20 | 230 | 20 | 230 | 20 |
| *Adriatic LNG Terminal (Italy)* | 290 | 25 | 290 | 25 | 290 | 25 | 290 | 25 |
| *Panigaglia LNG Terminal (Italy)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *FSRU OLT Offshore LNG Toscana (Italy)* | 168 | 14 | 168 | 14 | 168 | 14 | 168 | 14 |
| *Delimara LNG Terminal (Malta)* | 165 | 14 | 165 | 14 | 165 | 14 | 165 | 14 |
| *Sines LNG Terminal (Portugal)* | 229 | 20 | 229 | 20 | 229 | 20 | 229 | 20 |
| *Bilbao LNG Terminal (Spain)* | 223 | 19 | 223 | 19 | 223 | 19 | 223 | 19 |
| *Barcelona LNG Terminal (Spain)* | 543 | 47 | 543 | 47 | 543 | 47 | 543 | 47 |
| *Cartagena LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Huelva LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Mugardos LNG Terminal (Spain)* | 115 | 10 | 115 | 10 | 115 | 10 | 115 | 10 |
| *Sagunto LNG Terminal (Spain)* | 278 | 24 | 278 | 24 | 278 | 24 | 278 | 24 |
| *Krk LNG Terminal (Croatia)* | 80 | 7 | 80 | 7 | 80 | 7 | 80 | 7 |
| **Im (Mazara)** | **1.227** | **179** | **1.227** | **179** | **1.227** | **179** | **1.227** | **179** |
| **Dmax** | **12.081** | **1.039** | **12.161** | **1.046** | **12.183** | **1.048** | **12.238** | **1.052** |
| *Austria* | 588 | 51 | 588 | 51 | 588 | 51 | 588 | 51 |
| *Croatia* | 159 | 14 | 164 | 14 | 166 | 14 | 169 | 15 |
| *France* | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 |
| *Greece* | 308 | 26 | 375 | 32 | 391 | 34 | 396 | 34 |
| *Italy* | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 |
| *Malta* | 13 | 1 | 13 | 1 | 13 | 1 | 13 | 1 |
| *Portugal* | 278 | 24 | 271 | 23 | 262 | 23 | 252 | 22 |
| *Spain* | 1.945 | 167 | 1.961 | 169 | 1.972 | 170 | 2.029 | 174 |
| *Slovenia* | 68 | 6 | 68 | 6 | 68 | 6 | 68 | 6 |
| **Deff** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **% N-1** | **135%** | | **134%** | | **134%** | | **134%** | |

## Table 13 - N-1 formula: Failure of Mazara del Vallo with SM 100% filled

| | winter 2022-2023 | | winter 2023-2024 | | winter 2024-2025 | | winter 2025-2026 | |
|---|---|---|---|---|---|---|---|---|
| | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d | GWh/day | mcm/d |
| **Epm** | **7.941** | **683** | **7.946** | **683** | **7.946** | **683** | **7.990** | **687** |
| *Tarifa (Spain) ** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Almería (Spain)* | 338 | 29 | 338 | 29 | 338 | 29 | 338 | 29 |
| *Mazara del Vallo (Italy)* | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 | 1.227 | 106 |
| *Gela (Italy)* | 546 | 47 | 546 | 47 | 546 | 47 | 546 | 47 |
| *Passo Gries (Italy)* | 695 | 60 | 695 | 60 | 695 | 60 | 695 | 60 |
| *Melendugno (Italy)* | 487 | 42 | 487 | 42 | 487 | 42 | 487 | 42 |
| *Baumgarten (Austria)* | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 | 2.081 | 179 |
| *Oberkappel (Austria)* | 246 | 21 | 246 | 21 | 246 | 21 | 246 | 21 |
| *Überackern (Austria)* | 114 | 10 | 114 | 10 | 114 | 10 | 114 | 10 |
| *Kulata (BG) / Sidirokastron (Greece)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *Kipi (Greece)* | 49 | 4 | 49 | 4 | 49 | 4 | 49 | 4 |
| *Nea Mesimbria (Greece)* | 53 | 5 | 53 | 5 | 53 | 5 | 53 | 5 |
| *Dravaszerdahely (Croatia)* | 78 | 7 | 78 | 7 | 78 | 7 | 78 | 7 |
| *Obergailbach (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Taisnieres (France)* | 770 | 66 | 770 | 66 | 770 | 66 | 770 | 66 |
| *Dunkerque (France)* | 570 | 49 | 570 | 49 | 570 | 49 | 570 | 49 |
| *Pince (Slovenia)* | 0 | 0 | 5 | 0 | 5 | 0 | 49 | 4 |
| **Pm** | **247** | **21** | **247** | **21** | **247** | **21** | **247** | **21** |
| *Austria* | 27 | 2 | 27 | 2 | 27 | 2 | 27 | 2 |
| *Croatia* | 18 | 2 | 18 | 2 | 18 | 2 | 18 | 2 |
| *France* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 191 | 16 | 191 | 16 | 191 | 16 | 191 | 16 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Spain* | 11,1 | 1,0 | 11 | 1,0 | 11 | 1,0 | 11 | 1,0 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Sm (100 % filled)** | **6.731** | **579** | **6.686** | **575** | **6.686** | **575** | **6.686** | **575** |
| *Austria* | 1.083 | 93 | 1.038 | 89 | 1.038 | 89 | 1.038 | 89 |
| *Croatia* | 61 | 5 | 61 | 5 | 61 | 5 | 61 | 5 |
| *France* | 2.389 | 205 | 2.389 | 205 | 2.389 | 205 | 2.389 | 205 |
| *Greece* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Italy* | 2.824 | 243 | 2.824 | 243 | 2.824 | 243 | 2.824 | 243 |
| *Malta* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Portugal* | 129 | 11 | 129 | 11 | 129 | 11 | 129 | 11 |
| *Spain* | 245 | 21 | 245 | 21 | 245 | 21 | 245 | 21 |
| *Slovenia* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **LNGm** | **4.456** | **383** | **4.457** | **383** | **4.457** | **383** | **4.457** | **383** |
| *Dunkerque LNG Terminal (France)* | 520 | 45 | 520 | 45 | 520 | 45 | 520 | 45 |
| *Fos Tonkin LNG Terminal (France)*<br>*Fos Cavaou LNG Terminal (France)* | 410 | 35 | 410 | 35 | 410 | 35 | 410 | 35 |
| *Montoir de Bretagne LNG Terminal (France)* | 337 | 29 | 337 | 29 | 337 | 29 | 337 | 29 |
| *Revythoussa LNG Terminal (Greece)* | 229 | 20 | 230 | 20 | 230 | 20 | 230 | 20 |
| *Adriatic LNG Terminal (Italy)* | 290 | 25 | 290 | 25 | 290 | 25 | 290 | 25 |
| *Panigaglia LNG Terminal (Italy)* | 118 | 10 | 118 | 10 | 118 | 10 | 118 | 10 |
| *FSRU OLT Offshore LNG Toscana (Italy)* | 168 | 14 | 168 | 14 | 168 | 14 | 168 | 14 |
| *Delimara LNG Terminal (Malta)* | 165 | 14 | 165 | 14 | 165 | 14 | 165 | 14 |
| *Sines LNG Terminal (Portugal)* | 229 | 20 | 229 | 20 | 229 | 20 | 229 | 20 |
| *Bilbao LNG Terminal (Spain)* | 223 | 19 | 223 | 19 | 223 | 19 | 223 | 19 |
| *Barcelona LNG Terminal (Spain)* | 543 | 47 | 543 | 47 | 543 | 47 | 543 | 47 |
| *Cartagena LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Huelva LNG Terminal (Spain)* | 376 | 32 | 376 | 32 | 376 | 32 | 376 | 32 |
| *Mugardos LNG Terminal (Spain)* | 115 | 10 | 115 | 10 | 115 | 10 | 115 | 10 |
| *Sagunto LNG Terminal (Spain)* | 278 | 24 | 278 | 24 | 278 | 24 | 278 | 24 |
| *Krk LNG Terminal (Croatia)* | 80 | 7 | 80 | 7 | 80 | 7 | 80 | 7 |
| **Im (Mazara)** | **1.227** | **179** | **1.227** | **179** | **1.227** | **179** | **1.227** | **179** |
| **Dmax** | **12.081** | **1.039** | **12.161** | **1.046** | **12.183** | **1.048** | **12.238** | **1.052** |
| *Austria* | 588 | 51 | 588 | 51 | 588 | 51 | 588 | 51 |
| *Croatia* | 159 | 14 | 164 | 14 | 166 | 14 | 169 | 15 |
| *France* | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 | 3.828 | 329 |
| *Greece* | 308 | 26 | 375 | 32 | 391 | 34 | 396 | 34 |
| *Italy* | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 | 4.893 | 421 |
| *Malta* | 13 | 1 | 13 | 1 | 13 | 1 | 13 | 1 |
| *Portugal* | 278 | 24 | 271 | 23 | 262 | 23 | 252 | 22 |
| *Spain* | 1.945 | 167 | 1.961 | 169 | 1.972 | 170 | 2.029 | 174 |
| *Slovenia* | 68 | 6 | 68 | 6 | 68 | 6 | 68 | 6 |
| **Deff** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **% N-1** | **150%** | | **149%** | | **149%** | | **148%** | |

Considering the current geopolitical situation, it has been appraised appropriate to study, to the possible extent, the impact that a total cessation of supplies from Russia could have on the members of the Risk Group. The likelihood of this scenario depends, essentially, on the Russian decision to suspend the supply by gas pipeline but also by LNG to European consumers and/or the imposition of sanctions on Russia that prohibit or reduce the entry of Russian gas into the European Union system.

Due to the lack of information about the impact that a total disruption of Russian supply may have on the different Member States of the Algeria Risk Group, each country evaluated the impact on its own. The Risk Group is not able to evaluate the impact of Russian gas disruption as a whole since the interactions with other Member States outside the Risk Group are unknown.

## 11.2 Mechanisms developed for cooperation

### 11.2.1 Regional Coordination System for Gas (ReCo System for Gas)

As explained in this section under the Libyan Risk Group, Article 3(6) of The Gas Security of Supply Regulation (EU) 2017/1938 highlights the role of the Regional Coordination System for Gas (ReCo System for Gas). Most members of the Algerian Risk Group are part of the ReCo Team South, which was launched in March 2017. Considering its geographical situation and lack of interconnections with the rest of the TSOs, Malta is currently not included in the ReCo system. However, this does not preclude the possible future involvement of Malta in the ReCo system during and following the development of the MTGP hydrogen-ready gas pipeline project.

In the ReCo Team South the Italian TSO Snam is appointed as facilitator. The role of the facilitator is to be the first TSO to be contacted in case of an emergency and to activate the communication flowchart.

### 11.2.2 New and permanent procedure of exchange of relevant information between Competent Authorities within the Risk Group

Similarly to the Libyan Risk Group in order to improve coordination, **if a Competent Authority of the Algeria Risk Group declares any crisis level, the rest of members will be informed at the same time as the Commission**.

Furthermore, **if a Competent Authority within the Algeria Risk Group identifies a potential disruption affecting the gas supply from Algeria, the rest of Competent Authorities will be informed as soon as possible before any level of crisis**. A no fully comprehensive list of risk triggers for the Algerian Risk Group includes:

- Non-availability of importing pipelines (Transmed, GME, Medgaz).
- Massive cancellation of LNG cargos in the Algerian ports or massive deviation of LNG arrivals to EU terminals from Algeria.
- Non-availability, partial or totally, of Algerian liquefaction plants.

A contact list of Competent Authorities will be updated yearly by the Competent Authority acting as Risk Group Facilitator as well as by the Competent Authority, which experiences any change in its contact details.

## 11.3 Preventive measures

### 11.3.1 Interconnection agreements

As already explained within the Libyan Risk Group, the regulation of interconnection agreements between adjacent TSOs is established by the Chapter II of the Commission Regulation (EU) 2015/703 establishing a network code on interoperability and data exchange rules. Article 3 lays down the points necessarily covered by an interconnection agreement. These interconnection agreements deliver a unified language to exchange information and procedures to detect imbalances and invalid control variables.

### 11.3.2 Solidarity mechanisms between Member States

Following the publication of Regulation (EU) 2022/2576 of the Council of December 19, 2022, which reinforces solidarity through better coordination of gas purchases, reliable price references and cross-border gas exchanges, it has been modified the solidarity mechanism established in Regulation (EU) 2017/1938 of the European Parliament and of the Council, of October 25, 2017, on measures to guarantee the security of gas supply and repealing Regulation (EU) no. 994/2010.

With the new regulation, solidarity measures will not only apply to Member States directly connected to the Member State requesting solidarity, but also to Member States with LNG facilities, provided the necessary capacity in the relevant infrastructure, including the LNG vessels and carriers, is available. Additionally, it is established that, in the absence of bilateral agreements on solidarity measures, default rules established in Article 27 of the aforementioned regulation will apply.

Whilst Malta due to the nature of its energy system (e.g. using all of its LNG volumes for critical gas-fired generation) and its isolated position cannot fully contribute to the goals of Regulation (EU) 2022/2576 and provide solidarity to other Member States during an emergency by supplying other Member States with gas, it is nevertheless doing its utmost to utilise existing and new measures focusing on the reduction of electricity (and gas) consumption while ensuring that its electricity system is able to switch to alternative sources, such as gasoil, when the need arises.

In the context of Malta, the above preventive measures will be considered in the future during the development of the MTGP hydrogen-ready gas pipeline project. Should the MTGP pipeline become operational, the risk to Malta in the context of the Risk Groups will change and be reassessed accordingly. The pipeline would facilitate a new range of regional measures and cooperation mechanisms for the prevention and mitigation of a disruption of gas supply, including solidarity arrangements between neighbouring and interconnected Member States and interconnection agreements between adjacent TSOs.

# Annex A: Assessment of impacts of Preventive measures

In line with Article 9(1) of the Gas Security of Supply Regulation Member States are also required to include information on the economic impact, effectiveness and efficiency of the measures contained in the plan (point f), a description of the effects of measures on the functioning of the EU internal energy market as well as Malta's national energy market (point g), as well as a description of the impact of measures on the environment and on customers (point h).

As described in previous sections of the Plan, Malta does not have a gas distribution network and no end-use customers of natural gas. Natural gas is used only for the production of electricity. In view of this, the assessed impact of preventive measures on customers goes beyond the scope of gas and also looks at electricity customers.

This Annex summarizes the impacts of the preventive measures listed in Section 5 of this Plan in a qualitative manner and presents them in a table format. It is recommended that this section is read in conjunction with Section 5. The impacts of individual measures are based primarily on expert judgment.

| **Scenario Ref** | **Preventive measure listed in Section 5** | **Summary of actions required under each measure[27]** | **Economic impact** | **Impact on functioning of EU internal market and MT energy market** | **Impact on environment** | **Impact on customers** |
|---|---|---|---|---|---|---|
| (0) | **Diversify sources of energy supply** | Planned Malta-Italy hydrogen-ready gas pipeline Project of Common Interest ;<br><br>Monitor development of a hydrogen/renewable fuels market in Europe. | The MTGP project seeks to enhance Malta's energy supply security, sustainable development and economic competitiveness. Indeed, in the Cost Benefit analysis submitted in 2019 | The realization of the hydrogen-ready MTGP would also allow the use of renewable gases not solely for energy generation | The MTGP will contribute to the Maltese National Energy and Climate Plan 2030 and EU Green Deal objectives. Indeed, its capability to transport renewable gases including up to | There are no end-use customers of gas in Malta.<br><br>MTGP project could provide basis for the possible development of an inland gas/hydrogen distribution market. |

[27] As listed in table in Section 5.

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | Second electricity interconnector between Malta and Italy.<br><br>Continue to assess opportunities to enhance energy interconnections with neighbouring countries; | to the Maltese and Italian NRAs within the Investment Request and CBCA decision, the following benefits have been quantified:<br>1. Save Cost of Supply – 661M€ in discounted terms, thanks to the lower prices of natural gas imported from Italy compared with the LNG<br>2. CO2 savings – 11M€ in discounted terms, thanks to the replacement of the FSU and elimination of the LNG chain of liquefaction, shipping and regasification | purposes but for future inland uses It shall also contribute to the acceleration of hydrogen production in Sicily and North Africa and the development of an EU hydrogen backbone<br><br>The development of a 2nd electricity interconnector between Malta and Italy would strengthen electricity interconnectivity with the EU electricity network, allow for increased imports of electricity, optimise the use | 100% of hydrogen, the pipeline will enhance the future Decarbonisation of the local power generation. In addition, it will reduce the GHG emissions as current need for liquefaction, shipping and regasification would be eliminated.<br><br>The 2nd electricity link is a project which forms part of the Government's future energy strategy in meeting the 2030 climate and energy targets and longer-term decarbonisation objectives. The project will allow | 2nd electricity link with Italy would increase security of electricity supply. It would also allow further integration of additional RES in the system, including small-scale rooftop PV and hence increase the role of prosumers. |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | | 3. Reduction in Exposure to Curtailed Demand – 105M€ in discounted terms, thanks to the higher availability of the pipeline compared with the FSU and regasification plant.<br><br>The CBA is being updated to reflect a hydrogen-ready pipeline. | of local power generation, whilst allowing the increase in local renewable energy production through the enhancement of grid stability and balancing of intermittent renewables. | increased imports of renewable electricity from the EU market as well as allow for increased RES production locally, thus decreasing the need for fossil fuel-based generation. | |
| | **Exploit viable indigenous renewable energy sources** | DSO to support connection of RES when technically and economically feasible;<br><br>Explore viability of innovative renewable energy sources, in | Apart from security of supply considerations, Malta also needs to be in line with obligations under the Renewable Energy Directive and Governance | Contributing to the EU share of renewable energy sources in gross final energy consumption. Increasing RES also decreases energy import | Significant positive environmental effects linked to decreasing Malta's reliance on fossil fuel imports, decreasing GHG emissions of the energy system and | Deployment of RES allows customers to become prosumers and thus not only consume the electricity but produce it (i.e. rooftop solar PVs). This leads to a reduction in electricity bills. |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | particular offshore wind.<br>Support measures enabling demand side flexibility to increase indigenous RES, such as energy storage.<br><br>Support technical system developments (e.g. battery storage to mitigate the effect of intermittency) | Regulation and seek to achieve a decarbonisation pathway for its energy system by 2050 in line with the European Green Deal. In view of this, the Government seeks to fully exploit all technically and economically feasible indigenous renewable sources, for example through government schemes and operating aid. | dependency. Intermittency of RES poses new challenges to Malta's energy system, such as grid stability and therefore solutions to increase flexibility of the system, such as energy storage, will be required. | decreasing air pollution as a result of increasing deployment of renewables. Possible long term negative impact due to the generation of significant volumes of WEEE. | |
| | **Reduce gas and electricity demand growth** | Continue to deploy energy efficiency measures to reduce energy consumption<br><br>Implement electricity and gas demand reduction measures adopted in line with | Energy efficiency measures generally have a positive economic impact in terms of reducing energy costs for the end user and thus allowing them to invest in other areas | Positive impact on Malta's energy market via decrease in energy consumption | Positive impact through a reduction of reliance on fossil fuel imports and overall decrease in GHG emissions | Energy savings by end-use electricity customers allowing them to invest saved expenditure on improving quality of life. |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | emergency Council Regulations (EU) 2022/1369 and (EU) 2022/1854 | resulting in a positive economic impact. Malta also needs to fulfil its obligations under the Energy Efficiency Directive. Reduces investment requirements in additional generation capacity. | | | |
| (1a) | **Monitoring and reporting of gas supply/demand/stock levels & forecast use** | Periodic reporting addressing gas/demand/stock levels & forecast use from information provided by operators is operational since the development of Malta's first PAP and EP | Monitoring and reporting allows Crisis Manager and competent authorities to take informed decisions prior to, during and following a crisis, with the aim of mitigating any possible negative impacts, including those of economic nature. | Monitoring and reporting allows Crisis Manager and competent authorities to take informed decisions prior to, during and following a crisis, with the aim of mitigating any possible negative impacts, including any negative cross-border impacts and | Monitoring and reporting allows Crisis Manager and competent authorities to take informed decisions prior to, during and following a crisis, with the aim of mitigating any possible negative impacts, including any adverse environmental impacts. | Enhances existing reporting obligations on energy operators and government entities focusing specifically on gas and electricity security of supply. Monitoring and reporting contributes to maintenance of secure supplies and ensures that residential and non-residential electricity customers do |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | | | impacts on the functioning of the EU internal market. Given Malta's size and isolated position, impacts on the EU internal market are expected to be rather limited. | | not face electricity rationing. |
| | **Prolonged use of alternative electricity generation sources, including maximisation of electricity imports** | Introduce:<br>- formalised rota disconnection process;<br>- protection of designated critical sites and vulnerable groups of electricity customers; | Ensuring that available supplies of electricity in a supply emergency are shared as equitably as possible to minimise economic impact while prioritizing essential services and critical infrastructure. | In the event of an emergency, in particular in cases of limited or disrupted LNG supply, Malta's reliance on the electricity supplied through the Malta-Italy interconnector to meet demand would significantly increase. | No impact | Ministry responsible for energy to oversee the DSO setting up a formalised process for managing restricted electricity supply capability through rotating disconnections and protection of critical sites and vulnerable electricity consumers. This will ensure that supplies of electricity are shared as equitably as possible while prioritizing |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | | | | | essential services and critical infrastructure. |
| | **Source LNG from diverse international sources** | Gas facility operator to identify & source alternative LNG supplies in line with existing contractual obligations | Existing contractual agreement with gas supplier ensures gas security of supply via minimum yearly delivery volumes and therefore limits any potential negative economic impact. Price stability is ensured through indexation of price of gas to the international price of oil. | No impact | No impact | No impact |
| | **Additional gas or other energy infrastructure** | Continue to assess opportunities to enhance energy interconnections with neighbouring MS;<br><br>Oversee the successful completion of ongoing | Refer to impacts under ref scenario (0) | Refer to impacts under scenario ref (0) | Refer to impacts under scenario ref (0). Any additional gas or electricity infrastructure would have to be complementary to the long-term objective of | Refer to impacts under scenario ref (0). |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | transmission infrastructure projects in the area of electricity and gas. | | | decarbonisation of the energy system | |
| (1b) | **Short term use of alternative electricity generation sources** | Introduce:<br>- formalised rota disconnection process;<br>- protection of designated critical sites and vulnerable groups of electricity customers; | Ensuring that available supplies of electricity in a supply emergency are shared as equitably as possible in order to minimise economic impact, while prioritizing essential services and critical infrastructure. | In the event of an emergency, in particular in cases of limited or disrupted LNG supply, Malta's reliance on the electricity supplied through the Malta-Italy interconnector to meet demand would significantly increase. | No impact | Ministry responsible for energy to oversee the DSO setting up a formalised process for managing restricted electricity supply capability through rotating disconnections and protection of critical sites and vulnerable electricity consumers. This will ensure that supplies of electricity are shared as equitably as possible while prioritizing essential services and critical infrastructure. |
| | **Gas facility operator to identify & source alternative LNG supplies in line with** | Continue to review global/regional LNG availability and gas quality | Existing contractual agreement with gas supplier ensures gas security of supply via minimum | No impact | No impact | No impact |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | **existing contractual obligations** | | delivery volumes and therefore limits any potential negative economic impact | | | |
| (2) | **Physical security arrangements in place** | Continued vigilance on behalf of port authorities and asset owners/operators, incl. periodic updates to operator security plans | Measure increases risk aversion and therefore limits any potential negative economic impact. | Measure increases risk aversion and therefore limits any potential impact on the functioning of EU internal market | No impact | Measure increases risk aversion and therefore limits any potential negative impact on customers |
| | **Wider national security measures** | AFM, CIPD and CPD to continue to review security arrangements associated with critical energy infrastructure.<br><br>Ministry responsible for energy to ensure coordination with civil protection entities prior, during and following an | Measure increases risk aversion and therefore limits any potential negative economic impact. | Measure increases risk aversion and therefore limits any potential impact on the functioning of EU internal market | No impact | Measure increases risk aversion and therefore limits any potential negative impact on customers |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | emergency, where necessary. | | | | |
| (3) | **Periodic COMAH inspections and reporting to appropriate on-island authorities** | Issues identified to be notified to Ministry responsible for energy by OHSA/CPD/ERA | Measure increases risk aversion and therefore limits any potential negative economic impact. | Measure increases risk aversion and therefore limits any potential impact on the functioning of EU internal market | Measure aims to prevent major accidents and limit the consequences, which could potentially be detrimental to the environment surrounding the site. | Measure increases risk aversion and therefore limits any potential negative impact on customers |
| | **Regular engineering inspections of facilities by operators** | REWS report to Ministry responsible for energy and relevant stakeholders on routine monitoring of plant efficiency. Any material deterioration of overall performance shall be reported to Ministry responsible for energy<br><br>DSO and facility operators to report | Measure increases risk aversion and therefore limits any potential negative economic impact | Measure increases risk aversion and therefore limits any potential impact on the functioning of EU internal market | Measure aims at minimising impact on the environment by ensuring plant runs at full potential. | Measure increases risk aversion and therefore limits any potential negative impact on customers |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | on outcome and lessons learned from emergency tests carried out. | | | | |
| | **Operators following good operational & maintenance procedures** | | Measure increases risk aversion and therefore limits any potential negative economic impact | Measure increases risk aversion and therefore limits any potential impact on the functioning of EU internal market | Measure aims at minimising impact on the environment by ensuring plant runs at full potential. | Measure increases risk aversion and therefore limits any potential negative impact on customers |
| (4) | **Commercial risk of disruption of gas supply is aligned with responsibility for provision of electricity** | Gas facility operator to ensure standby electricity supply arrangements to restart supplies to gas facility are effective.<br><br>Gas facility is identified as critical infrastructure. | Measure increases risk aversion and therefore limits any potential negative economic impact | Supports resilience of Malta's energy system | Switching local power generation to standby gas-oil-fired plants would increase GHG emissions for a limited period. Balancing loss of gas with electricity imports would decrease local GHG emissions. | Ensures the continuity of electricity supply to end-use customers to ensure no adverse impact is felt |
| (5) | **Gas facility has manual override capability** | Gas facility operator to carry out periodic | Measure increases risk aversion and therefore limits any | Supports resilience of | No impact | Measure increases risk aversion and therefore limits any potential |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | testing of manual over-ride capability | potential negative economic impact | Malta's energy system | | negative impact on customers |
| | **Cybersecurity measures for the FSU, regasification facility, D3 and D4** | Periodic penetration testing & independent review (e.g. by MITA)<br><br>Gas facility operator to maintain effective firewall and physical security controls and ensure software updates | Measure increases risk aversion and therefore limits any potential negative economic impact | Supports resilience of Malta's energy system | No impact | Measure increases risk aversion and therefore limits any potential negative spill-over impact on customers |
| (6) | **Temporary use of alternative electricity generation sources. Ensure spare capacity available** | Gas security of supply monitoring framework is operational. Competent Authority to monitor short-medium-long term availability of capacity versus demand forecast and assess acceptability of capacity margin. | Relevant entities periodically monitor available capacity to ensure no adverse economic impacts are felt. | Relevant entities periodically monitor available capacity to ensure there are no adverse impact on the functioning of the market. | Switching local power generation to standby gas-oil-fired plants would increase GHG emissions for a limited period. Balancing loss of gas with electricity imports would decrease local GHG emissions. | No direct impact on end-use customers. Costs related to spare capacity could be reflected in the electricity tariff. |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | **Gas facility identified and designated as "critical infrastructure" (SL 460.24)** | Ensure periodic risk analysis is updated based on major threat scenarios, vulnerability of gas facility, and potential impact of its loss[28] and ensure any risks highlighted are addressed | Measure increases risk aversion and therefore limits any potential negative economic impact | No impact | No impact | Measure increases risk aversion and therefore limits any potential negative spill-over impact on customers |
| | **Move FSU off the jetty and onto storm moorings** | Technical and operational capability of this procedure, which involves high risk exposure, has already been confirmed. | Minimal economic impact, although dependent on the overall disconnection period. During time when FSU is on storm moorings, Malta would rely on electricity imports and gas-oil fired emergency back-up. | During unavailability of gas, Malta's reliance on the internal EU electricity market would increase. | Moving FSU onto storm moorings would require switching local power generation to gas-oil, which would increase GHG emissions during the testing period | During period when FSU is in storm mooring position, continuity of electricity supply to end-use customers would be sustained via alternative electricity generation sources and electricity imports |
| | **Identify potential sources of replacement FSU** | Gas facility operator to maintain schedule of location and | Gas facility operator is incentivised to maintain | Identification of replacement FSU | Identification of replacement FSU | Continuity of electricity supply to end-use customers would be |

[28] Article 7, Critical Infrastructure and European Critical Infrastructure (Identification, Designation and Protection) [Subsidiary legislation 460.24]

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | availability of suitably configured replacements FSU | contingency arrangements should the FSU be required to leave the berth. This includes the ability to accommodate alternative LNG delivery vessels, thus limiting any potential negative economic impact. | aims to limit any negative impact.<br><br>Replacement of FSU may increase short-term reliance on alternative electricity generation sources and electricity interconnector with Sicily during the replacement period. | aims to limit any adverse impact.<br><br>Replacement of FSU may require switching local power generation to gas-oil, which may increase GHG emissions during the replacement period | ensured via alternative electricity generation sources and electricity imports |
| | **Redundancy and resilience of the regasification facility** | Gas facility operator to test and prove redundancy & resilience | This is already within the scope and responsibility of the current facility operator. Measure increases risk aversion and therefore limits any potential negative economic impact. | No impact | No impact | Measure increases risk aversion and therefore limits any potential negative spill-over impact on customers. |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| (7) | **Ensuring operational capability of alternative electricity generation sources, electricity interconnector and LNG deliveries within long-term gas supply contract** | Gas (LNG) supply is covered by a take-or-pay long-term gas supply contract. | Long-term gas supply contract acts as a form of price hedging and therefore minimises the impact of international gas price volatility on Malta's electricity market for approximately 70% of electricity demand which is covered by gas-fired power generation. | Existence of long-term gas supply contract reduces Malta's reliance on electricity imported from the EU internal electricity market. | No impact | Measure increases long-term security of gas supply and price certainty, thus minimising any potential negative impacts on customers from a security of supply and affordability point of view. |
| (8) | **Ensuring operational capability of alternative electricity generation sources, electricity interconnector and LNG deliveries within long-term gas supply contract** | Supply of electricity is intrinsically vulnerable to losses of any single asset (N-1). Loss of IC would increase Malta's reliance on gas-fired power generation and the gasoil-fired back-up. Requirement for additional infrastructure e.g. 2nd | Refer to impacts under ref scenario (0) for the 2nd electricity interconnector | Refer to impacts under ref scenario (0) for the 2nd electricity interconnector | Refer to impacts under ref scenario (0) for the 2nd electricity interconnector | Refer to impacts under ref scenario (0) for the 2nd electricity interconnector |

| Scenario Ref | Preventive measure listed in Section 5 | Summary of actions required under each measure[27] | Economic impact | Impact on functioning of EU internal market and MT energy market | Impact on environment | Impact on customers |
|---|---|---|---|---|---|---|
| | | interconnector with Italy, additional on-island generation, or energy storage solutions. | | | | |