Malta's Preventive Action Plan

Gas Security of Supply
Version: December 2019

Contents

Executive summary

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 for Energy and Water Management.

Natural gas in Malta is used solely for the generation of electricity, hence energy demand 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 on the facility.
- The only use for natural gas in Malta is the production of electricity. Therefore demand-side measures are focused on 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.
- At a daily level peak demand can be met by relying on all other sources of electricity including on-island PV (solar photovoltaic) generation.
- However, within-day energy supply and demand has also to be assessed. This demonstrated that whilst solar PV contributes in aggregate and in daylight hours, peak electricity demand in afternoons and evenings cannot be completely met without conventional fuels for electricity production.
- It was also noted that Solar PV is intermittent and provides no load or frequency management capability.

The Common Risk Assessments for Algeria and Libya confirmed that Malta is not at significant risk from disruption to gas supply from either country. The only source of natural gas in Malta is imported Liquified Natural Gas (LNG). This enables flexibility as to the choice of the country of origin, and to date LNG has not been sourced from Algeria or Libya. There is a plan underway to build a natural gas pipeline between Malta and Sicily which, subject to funding, could be completed by 2024. Should this project become operational, the risk to Malta in the context of these risk groups would change and the risk to gas security of supply will need to be reassessed.

Natural Gas backed generation comprises 40% of total available electricity sources; electricity is dispatched from local generation plants and the 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 all gas demand.

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

The Preventive Action Plan proposes actions to mitigate and remove the above risks. Actions are various and include nationwide measures to diversify sources of energy supply, such as the deployment of energy efficiency measures to reduce consumption, to initiatives by the Regulator for Energy and Water Services to provide the Competent Authority with collated information based on data received from operators on gas supply/demand and stock levels, to actions by the Distribution System Operator in establishing a formalised process for managing restricted electricity supply. An ongoing Electricity Supply Study commissioned by the Government is expected to present optimal solutions to meet the expected growth in electricity demand in the future.

Malta does not have household gas customers, or small/medium sized enterprises or essential services that are connected to the gas network or any gas-based district heating. Other than two electricity producers there are no other end-users of gas. Therefore, Malta has no gas "Protected Customers" or gas "Solidarity Protected Customers" as defined in the Regulation. The Competent Authority, the Regulator and the Distribution System Operator will adopt a definition of "Priority Customers" to cover vulnerable groups of electricity customers as part of its gas security of supply arrangements for the following reasons:

- Protected customers falling within the wider definition as included in the Regulation recitals (households, providers of essential services) are vulnerable if the supply of natural gas is restricted or stopped.
- These groups would not suffer from the loss of gas; however, the reduced availability of electricity has the potential to cause social and economic damage.
- To minimise the impact from a disruption to gas supply, Malta will maintain a formalized procedure for prioritising electricity supply to these customers in order of urgency.

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 would 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 for Energy and Water Management**. In line with the aforementioned article of the Regulation, 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, the technical and policy arm of the Ministry. To support the task of developing the three documents in line with the requirements of the Regulation, Ainsty Risk Consulting Ltd has been commissioned on behalf of the Competent Authority.

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 National Risk Assessment was completed and submitted to the European Commission in December 2018. 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 fully

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.

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.

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

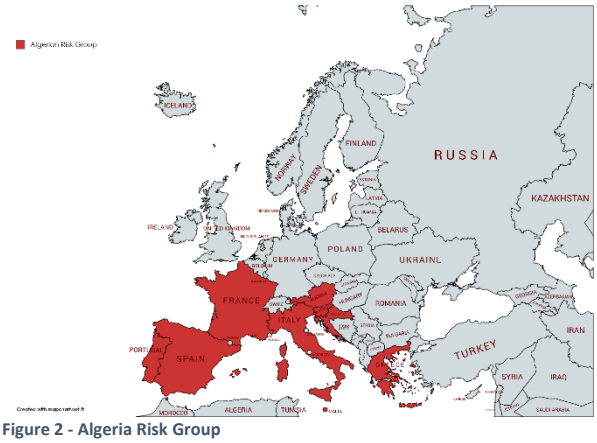


Figure 2 - Algeria Risk Group

Figure 1 - 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.

Algerian Risk Group

The Algeria risk group covers three gas interconnectors, which import a total of 1,960 GWh/d from Algeria: Tarifa and Almeria (Spain); and Mazara del Vallo (Italy). There are also 16 LNG regasification facilities; Algerian LNG accounted for 27% and 23% of total imports in 2016 and 2017, respectively.

The single largest infrastructure of the risk group is the Transmed Pipeline, with its entry point at Mazara del Vallo and a capacity of 1,200 GWh/d. The interconnection between Austria and Slovakia (via Baumgarten) has a larger capacity (2,300 GWh/d), however does not import Algerian gas.

The analysis (as of November 2018) highlighted that, if a total disruption to either the Baumgarten or Transmed interconnection occurred, both Austrian and Italian gas systems would be able to react swiftly and meet demand through alternative withdrawal capacity. Overall the Algeria risk group demonstrates high resilience in the unlikely event the Algerian gas supply should be disrupted.

Though part of the Algerian risk group, Malta was not included in the balance analysis due to its small-scale national network. 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. The Common Risk Assessment for the Algeria risk group caveated that if Malta does begin to import gas from Algeria, this will need to be revisited and addressed. If gas is

supplied from Algeria it will be necessary to ensure that steps are taken to limit restrictions on the operation of D-3 plant due to the different specification of Algerian sourced gas, specifically the Methane number and sulphur content.

Libyan Risk Group

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.

From the analysis, the Common Risk Assessment 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 is not yet connected to the European gas network and is the only Member State which does not also form part of the Ukrainian risk group. As such the Libyan Common Risk Assessment has been undertaken without meetings or direct exchanges with the relevant Member States. Rather, all necessary discussions between the effected Member States have taken place during the preparation of the Ukrainian Common Risk Assessment. As for the Algerian risk group, this approach would be revised should the planned Malta-Italy gas pipeline interconnection (the 'Melita TransGas Pipeline', PCI 5.19) be completed.

Malta's Gas System

Natural Gas consumption for 2018 totalled 0.35 bcm (~3,782 GWh, considering the average higher heating value). As there is no Natural Gas production in Malta, all gas is imported (currently as LNG). There are currently no pipeline interconnections, however a Final Investment Decision on the construction of the Melita TransGas Pipeline project (MTGP) between Malta and Sicily is expected to be taken by 2020 subject to sufficient funding. The gas pipeline project is further discussed in Section (7) Infrastructure Projects. Natural gas is used solely to produce electricity in Malta. A comparison of gas deliveries for 2017 and 2018 is shown in Table 1, below:

Table 1 – Gas Deliveries, 2017-2018

Gas deliveries	*bcm*[1]	*TJ*[2]	*GWh*
2017	0.27	10,776	2,993.24
2018	0.35	13,614	3,781.70

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

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:

- 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 5-years 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. As electricity generation is the only use for gas in Malta, Enemalta is the only gas customer.

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 a regasification facility with ancillary services and internal gas distribution pipework. The FSU has a total nominal capacity of 125,000m^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.

- **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 146MW_e when operating on natural gas.
    - 4 of the 8 are configured for dual fuel and can be run on gas oil, with an export capability of ~66MW_e
- **D-4** is a combined cycle gas turbine (CCGT) with a maximum continuous rated capacity of 215MW_e and is contracted to deliver 205MW_e.

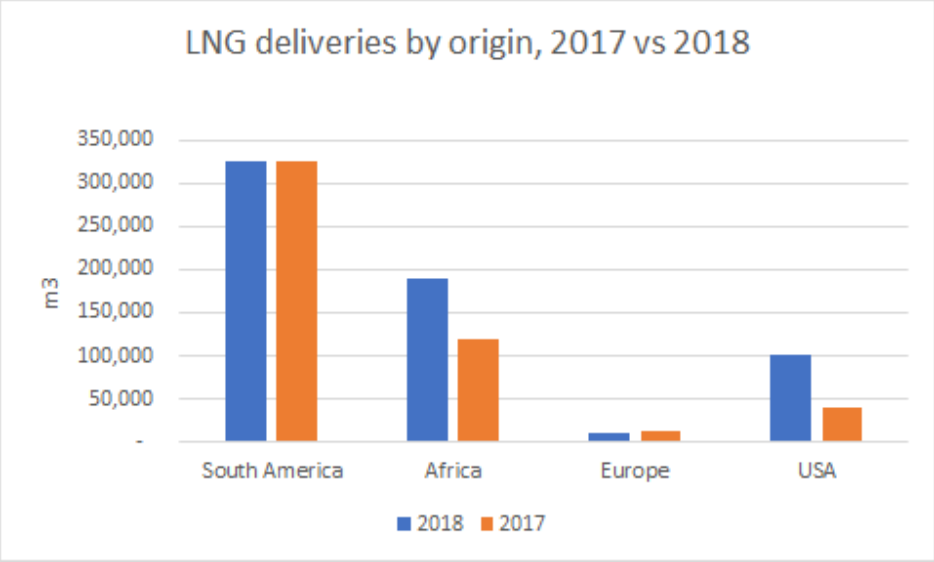
As LNG was first supplied in 2017, there is limited historical consumption and production data available. At present there is no gas pipeline interconnection to Malta, so all gas on Malta is derived from LNG. LNG is currently imported via marine carriers and held in the FSU supplying gas to the regasification plant and subsequently to D3 and D4. There are neither gas nor LNG storage facilities. A breakdown of countries of origin for LNG deliveries to date is shown in Table 2 - LNG deliveries by origin, below:

Table 2 - LNG deliveries by origin

LNG Deliveries	Country of origin	m^3
2017	Netherlands	13,525
	USA	39,982
	Equatorial Guinea	104,000
	Egypt	15,008
	Trinidad & Tobago	325,226

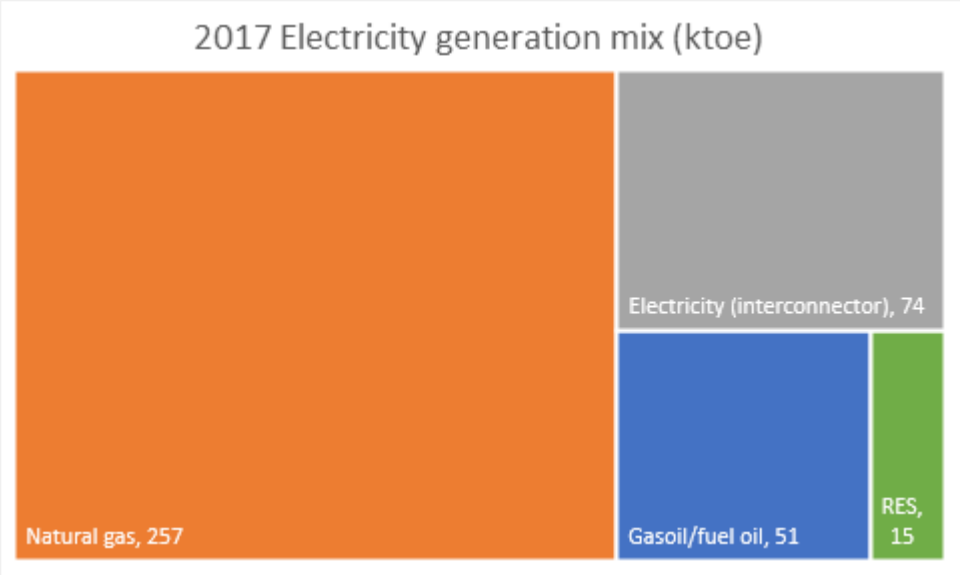
2018	Equatorial Guinea	101,470
	Trinidad & Tobago	228,844
	Peru	95,915
	Norway	10,047
	USA	100,060
	Nigeria	88,353

Figure 3 – LNG deliveries by region of origin in 2017-2018, m^3



In 2017, LNG constituted almost 65% of the local energy mix for electricity generation, with electricity imported over the interconnector and gasoil/fuel oil covering the remaining portion at 19% and 13% respectively. Figure 4 shows Malta's energy mix used for electricity generation in 2017.

Figure 4 – Electricity generation mix in 2017, ktoe



2 Summary of the Risk Assessment

The 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 Risk Assessment demonstrated that the available market-based demand-side measures in Malta can just meet the exceptional demand as required by the Regulation on a daily basis. The Risk Assessment concluded that current available market-based demand-side measures are not enough to meet variations in electricity demand seen within-day. The diurnal demand profile and the nature of the existing capacity means that the exceptional high demand may not be met in extreme circumstances due to the lack of alternative capacity when peak demand occurs. See Table 3 – Summary of Max Demand v. Available Capacity of Market-based Demand-side Measures, below.

Seasonal time of day		Max Demand		Available Capacity		Margin		Max Demand, D_{max}		Available Capacity, D_{eff}		Margin
		MW_eh	mcm	MW_eh	mcm	%		MW_eh	mcm	MW_eh	mcm	%
01:00-08:00	Jul-Aug-Sep	2947	0.49	3304	0.55	112%		**11,908**	**1.99**	**11,848**	**1.98**	**100%**
08:00-18:00		**5440**	**0.91**	**5240**	**0.87**	**96%**						
18:00-01:00		**3521**	**0.59**	**3304**	**0.55**	**94%**						
01:00-08:00	Rest-of-Year	2121	0.35	3304	0.55	156%		9287	1.55	11,628	1.95	125%
08:00-18:00		4030	0.67	5020	0.84	125%						
18:00-01:00		3136	0.52	3304	0.55	105%						
		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 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 market-based demand-side measures 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 and will be critical to this Preventive Action Plan and the Emergency plan.

Scenarios were selected based on the National Risk Assessment and adapted to apply to gas security of supply. Scenarios considered include:

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

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 on 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 on Malta a maximum demand (D_{max}) 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. 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, 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 maximum capacity and energy supplied, not allowing for utilisation rates, is therefore;

Interconnector	196 MW_e	= 4,704 MWh / day
D2 (gas-oil)	180 MW_e	= 4,320 MWh / day
D3 (gas-oil)	66 MW	= 1,584 MWh / day
GT9 (gas-oil)	~30 MW_e	= 720 MWh / day
Sub-Total		**= 11,328 MWh /day**
		= 1.90 mcm/day equivalent
Solar PV[3]	125 MW_e	= 520 MWh / day.
		= 0.09 mcm / day equivalent

Estimating D_{max}

The historical peak electricity demand during 2017 was 10,300 MWh (August 8th).

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 southern Europe to meet air conditioning demand during the late evenings in the hottest summer months (July-August-September). 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

[3] 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.

- 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 2017 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. This is summarised in Table 4 - STOD Demand Mean & Std Deviation below.

	Time of day	MW_eh per hour		
		Mean (P_{50})	Standard deviation	Peak demand ($P_{99.986}$)
Jul–Aug–Sep	01:00-07:59	286	37	421
	08:00-17:59	370	48	544
	18:00-00:59	352	41	503
Rest-of-Year	01:00-07:59	203	27	303
	08:00-17:59	289	31	403
	18:00-00:59	287	44	448

Table 4 - STOD Demand Mean & Std Deviation

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

	Hours per period	Peak demand ($P_{99.986}$) (MW_e)	**Peak Aggregate demand**	
			Electricity (MW_eh)	**Equivalent gas (mcm / day)[4]**
Jul-Aug-Sep	7	421	2,947	
	10	544	5,440	
	7	503	3,521	
	TOTAL DAILY (D_{max})		**11,908**	**1.99**
Rest-of-Year	7	303	2,121	
	10	403	4,030	
	7	448	3,136	
	TOTAL DAILY (D_{max})		**9,287**	**1.55**

Table 5 - Aggregate Total Daily Demand

By inspection, the highest daily energy demand case is the Jul-Aug-Sep period where D_{max} = 11,908MWh. For the same period D_{eff} is 11,328 + 520 (allowing for average summer solar PV) i.e. 11,848 MWh. Therefore, $D_{eff} \approx D_{max}$, with a margin of error of 0.5%* (D_{eff}/D_{max} = 99.5%) i.e. demand-side measures are likely to be just adequate to satisfy Article 5, Infrastructure Standard, if analysed on a daily basis.

*Given the limited data available from which D_{max} has been derived it is necessary to allow for a margin of error of at least 0.5%.

[4] Base[illegible]

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 two of these cases demand side measures are insufficient.

Season	Time-of-day period	Extreme period demand ($P_{99.986}$)	Available capacity of demand side measure					Demand-side measures / Extreme Period Demand
			Solar PV (P_{50})	I/C	D-2 Gas-oil	D3 Gas-oil	GT9 Gas-oil	
Jul–Aug–Sep	01:00-07:59	421	0	196	180	66	30	112%
	08:00-17:59	**544**	**52**	**196**	**180**	**66**	**30**	**96%**
	18:00-00:59	**503**	**0**	**196**	**180**	**66**	**30**	**94%**
Rest of year	01:00-07:59	303	0	196	180	66	30	156%
	08:00-17:59	403	30[5]	196	180	66	30	125%
	18:00-00:59	448	0	196	180	66	30	105%

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

Article 5 (Infrastructure Standard) when applied to Malta highlights the limited capability of demand side measures to meet extreme demand if the gas facility is "lost". 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 gas-oil, PV and interconnector sources to be available to cover demand. This means there is no capacity for any shortfall or for fluctuations due to PV generation dropping off to be accommodated.

Without the gas generation it is necessary to reduce the interconnector flow and D3 running so that system voltage and frequency fluctuations can be accommodated without tripping the whole system.

Malta has limited ability to balance electricity supply /demand fluctuations without on-island gas generation. Gas plays a fundamental part in supporting Maltese economy and can have a major social impact, on vulnerable groups of customers. Therefore, it is vitally important that effective preventive actions are taken, and emergency plans are in place to manage the potential social and economic disruption.

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 Relevant**.

[5] Derived from inspection of Enemalta solar PV generation data for period 01 Jan 2017 - 01 Jan 2018

[6] 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.

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 on Malta. There is no bidirectional capacity, therefore, **Not Applicable.**

4 Compliance with the Supply Standard (Article 6)

Since 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"[7]. 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 on 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.

[7] EC was notified in Jan 2018.

5 Preventive Measures

The table below describe each of the preventive measures in place, or to be adopted, that address risks identified in the risk assessment, including a description of:

Scenario Ref	Description of Risk	Preventive measure (details in place or to be adopted) [8]	Assessment & Acceptability	Actions required
(0)	Overall strategic risk - energy import dependency - Absence of gas or other indigenous energy sources - High population density - Energy dependent economy (finance, tourism, gaming, electronics, manufacturing) - Typical Mediterranean climate with hot / dry summers - Isolated island location.	Diversify sources of energy supply	In progress: Malta-Italy gas pipeline interconnection is planned to be operational in 2024 subject to sufficient funding. (EU Project of Common Interest 5.19, Melita TransGas Pipeline) Other initiatives include: increased RES and energy efficiency measures	MEW will continue to seek and assess opportunities to enhance other energy interconnections with neighbouring Member States. MEW to monitor progress of pipeline development & periodically assess impact of potential delay on gas security of supply.
		Exploit viable indigenous renewable energy sources ("RES)". See note 1) below.	Solar photovoltaic is the sole indigenous source of electricity.	Distribution system operator to support connection and utilisation of RES when technically and economically feasible. MEW to support measures that enable demand side flexibility that enable increased indigenous RES

[8] 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) [8]	Assessment & Acceptability	Actions required
			Further growth is possible but will add to grid stability issues.	MEW to ensure that technical system developments (e.g. battery are supported that mitigate the effect of intermittency)
		Reduce electricity demand growth. See note 2) below.	Due to increasing per capita energy consumption the potential for reducing primary gas demand is limited.	MEW to continue to deploy energy efficiency measures to reduce energy consumption.
(1a)	Delay or disruption to mid-term LNG shipments: • medium (1 to 3 months) and • long term (3 months +) Due to disruption in third countries or commercial dispute with suppliers resulting in disruption to planned deliveries.	Monitoring and reporting of gas supply/demand/stock levels & forecast use	There is limited visibility of midterm gas supply situation – Action is recommended that routine monitoring and reporting to MEW is introduced	REWS to provide MEW with periodic report addressing gas supply/demand/stock levels & forecast use from information provided by gas facility operator and the electricity system operator.
		Prolonged use of demand side measures	Increased vulnerability to secondary supply side issues, significantly increasing risk of maintaining energy supply	Introduce formalised process for managing restricted electricity supply capability through rotating disconnections & protection of vulnerable groups of electricity customers.
		Source LNG from diverse international sources		Gas facility operator to identify alternative regional LNG supply sources (including Algeria).

Scenario Ref	Description of Risk	Preventive measure (details in place or to be adopted) [8]	Assessment & Acceptability	Actions required
		Additional gas or other energy infrastructure	Acceptable – gas interconnector project (MTGP) underway	MEW will continue to seek and assess opportunities to enhance other energy interconnections with neighbouring Member States.
(1b)	Cancelation of near term (within month) LNG shipment	Short term use of market-based demand-side measures	Acceptable – However, within day demand may not be met on extreme summer demand day in day & evening.	MEW to establish principles and REWS to agree a formalised methodology for grid disconnections, including identification of priority supplies.
		Gas facility operator has identified & sourced alternative LNG supplies including regional sources e.g. Algeria.	Acceptable	Continue to review regional LNG availability (e.g. from Algeria). Review and ensure gas quality (e.g. Methane number & sulphur content) impact is communicated to D3 & D4.
(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 and periodic updates to operator security plans
		Wider national security measures	Acceptable	Ensure AFM and CPD continue to review security arrangements associated with the gas facility
(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 MEW by OHSA/CPD/ERA

Scenario Ref	Description of Risk	Preventive measure (details in place or to be adopted) [8]	Assessment & Acceptability	Actions required
	inadequate maintenance or operating procedures.	Regular engineering inspections of facilities by operator	Not transparent to the Competent Authority, and therefore requires proxy indicator	REWS to report on routine monitoring of plant efficiency (power out / gas in) by electricity system operator; Any material deterioration of overall performance shall be reported to MEW.
		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.	Acceptable	Gas facility operator to ensure standby electricity supply arrangements to restart supplies to gas facility are effective
(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 to carry out periodic testing of manual over-ride capability
		Cybersecurity measures for the FSU, regasification facility, D-3 and D4	Acceptable	Periodic penetration testing & independent review (e.g. by MITA)
				Gas facility operator to maintain effective firewall and physical security controls
				Gas facility operator to ensure software updates are maintained.

Scenario Ref	Description of Risk	Preventive measure (details in place or to be adopted) [8]	Assessment & Acceptability	Actions required
(6)	Damage or disruption to the FSU, Jetty or regasification facility following storm or other extreme weather conditions.	Ensure spare capacity available.	Acceptable – practicality of testing of FSU recovery capability to be periodically formally reviewed.	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)[9]	Acceptable - Risk assessment completed	Ensure periodic risk analysis is updated based on major threat scenarios, vulnerability of gas facility, and potential impact of its loss[10] and ensure any risks highlighted are addressed
		Move FSU off the jetty and onto storm moorings.	Acceptable - moving the FSU to storm moorings is a risky and disruptive process	1) Test procedure for uncoupling / recoupling. 2) Test procedure for FSU disconnection and moving to storm mooring and returning to service.
		Identify potential sources of replacement FSU	Acceptable	Gas facility operator to maintain schedule of location and availability of suitably configured replacements FSU

[9] Critical Infrastructure and European Critical Infrastructures (Identification, Designation and Protection) Order.

[10] 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) [8]	Assessment & Acceptability	Actions required
		Redundancy and resilience of the regasification facility	Acceptable	Gas facility operator to test and prove redundancy & resilience

Notes to table

1) **Renewable Energy Sources**
    a. 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.
    b. Additional local wind derived RES is limited due to
        i. Onshore – environmentally and socially acceptable sites that have "economically competitive potential" are severely restricted.
        ii. Offshore – economically viable sites are limited due limited areas <25m depth, Natura 2000 sites (covered by the Birds and /or Habitats Directives) and maritime access requirements.
    c. Solar photovoltaics is currently the sole indigenous source of electricity, with circa 132MW_e installed capacity (2018). Further increases are limited by spatial constraints and grid stability issues.

2) **Energy Efficiency Measures**
    a. Malta has the second lowest final energy consumption per capita in the EU due to a favourable climate and lack of energy-intensive industry.
    b. 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 also limited.
    c. Domestic / household electricity use - schemes are in place to provide grants for households to invest in double glazing, roof insulation, solar water heaters and water cisterns. Although heating requirements are on the lower end of the scale, there is potential benefit of increasing the number of heat pumps for heating and cooling purposes.
    d. Commercial / Industrial – tax credits for CHP and other investments are available but not considered sufficiently attractive. High energy users are targeted through regulations and voluntary agreements to encourage energy efficiency.

e. Public sector – rolling -out of energy efficient street lighting.
f. The energy efficiency measures deployed in Malta aim to decrease primary and final energy consumption and have an effect on electricity demand and thus indirectly on the gas consumption of D3 and D4 power stations. Measures designed to curb energy consumption linked with strengthened deployment of renewable sources of energy reduce the need for energy imports and improve Malta's security of supply.

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** the Regulator for Energy and Water Services ("REWS") is responsible for monitoring: [11]

- 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.**[12] These include establishing minimum quality and security standards to ensure public and private safety, and to regulating the supply and use of natural gas. REWS is not the competent authority for security of natural gas supply and is not responsible for the forecasting of gas demand. The competent authority in this respect is the Ministry for Energy and Water Management.

The **Emergency Powers Act** gives the legal right to the President of Malta, in accordance with the advice of the Prime Minister, to make regulations which are necessary or expedient for securing public safety, and maintaining supplies and services.[13] In an emergency this gives the authority on allocation and utilisation of gas resources to the Prime Minister.

The **Civil Protection Act** establishes the **Civil Protection Department** (CPD), responsible for preparing disaster and emergency contingency plans.[14] The CPD organises crisis and emergency plan co-ordination between relevant parties. This act also establishes the Civil Protection Council, which is responsible for formulating, directing and co-ordinating national civil protection policy and practice.

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

[12] "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):

[13] Emergency Powers Act (Chapter 178 of Laws of Malta): http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=8695&l=1

[14] 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 gas, is subject to **The Critical Infrastructures and European Critical Infrastructures (Identification, designation and protection) Order**.[15] 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.[16] 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**[17] 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.

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 to maintain LNG stocks above a minimum level, and
4. Undertaking independent inspections and testing.

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 is incentivised to maintain 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.

Under their contractual arrangements the gas facility operator is obliged to maintain a minimum stock of LNG of 20,000 m^3 (overall capacity 125,000m^3).

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[15] 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.

[16] 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.

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

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.[18] 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).

[18] 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 actively working on the development and implementation of the Melita TransGas Pipeline ("MTGP") from Delimara (Malta) to Gela (Italy) that would end its isolation by connecting the island to the trans-European Natural Gas Network. This would allow the transportation of gas from the Italian gas network necessary to meet Malta's gas demand for power generation and provide the basis for the development of an inland gas distribution market.

MTGP Project has been selected as a Project of Common Interest (PCI 5.19) under the priority corridor "North-South gas interconnections in Western Europe" in the 1st, 2nd & 3rd PCI lists. It poses a means to fulfil EU strategic energy policy goals on energy solidarity between Member States, the formation of an internal energy market, diversification of sources, reduced dependency on a single supply source and improved energy security.

In August 2018, Melita TransGas Company Limited ('MTG') was established as a public undertaking to succeed the obligations of the Ministry for Energy and Water Management (as the previous Project Promoter of PCI 5.19) for the implementation, construction and commissioning of the MTGP. The company would also be entrusted with the operation of the transmission infrastructure and has taken the role of the prospective Transmission System Operator.

The gas pipeline would replace the Floating Storage Unit of LNG which is currently being used for the supply of gas for electricity generation. This seeks to enhance Malta's energy supply security and economic competitiveness and to contribute towards the reduction of GHG emissions as the current need for liquefaction, shipping and regasification would be eliminated.

The Maltese Government fully supports the implementation of the MTGP, including it in all the plans and programmes aiming to ensure diversification of gas supply sources and increase security of supply by connecting Malta to European gas networks. The project features in the "National Energy Policy for Malta", "National Reform Programme" and the "National Energy and Climate Plan for 2021-2030").

MTGP has been repeatedly included in the national Ten-Year Network Development Plan (TYNDP) of the Italian TSO (SNAM Rete Gas) confirming that "is ready to implement the necessary measures to facilitate the connection to the national network, when the progress of the project will prefigure an effective commitment to its realization".

The project envisages a gas pipeline interconnection between Gela (Sicily-Italy) and Delimara (Malta) currently designed as a 22 inches (560mm) diameter, 159km length and with a bi-directional flow capacity of 2 bcm/y at standard conditions.

MTGP has already benefitted from the co-financing of studies through the TEN-E and Connecting Europe Facility (CEF) Programmes with more than €4.5 million in EU grants allocated for the preparatory studies, including those completed and the ones to be conducted in the next stages of the project implementation up to the end of 2020:

- the Pre-feasibility study and Cost-Benefit Analysis, completed in April 2015, determined that the project is feasible and identified the most economical project technical configuration;
- the Basic Design study completed in June 2017 identified the optimal 1.2km wide offshore route corridor, landfall areas, on-shore routes, connection points and sites and areas of the

terminal stations in both Delimara (Malta) and Gela (Sicily), and enabled the start of the permitting procedures in both Malta and Italy;

- in 2018 activities related to the environmental studies, a preliminary marine route survey and the front-end engineering design were commenced. The results from these studies will enable a Final Investment Decision, expected to be taken by the end of 2020.
- A cross-border cost allocation decision was issued jointly by the Maltese and Italian National Regulatory Authorities on the 4th of June 2019 which states that Malta should bear 100% of the costs of the MTGP project and as such, no monetary transfer is needed between Italy and Malta.

Subject to securing the project finance requirements including the award of sufficient funds for the construction, the MTGP implementation is scheduled to start in 2021 with the selection and award of the EPC contractor that will complete the installation and commissioning of the gas pipeline by the end of 2024.

Impact on Security of Supply

A physical connection to the European gas network would result in a more reliable, secure and energy efficient form of transport of natural gas as it will replace the LNG supply chain, which has both a limit in its technical capacity and its susceptibility to adverse weather conditions. MTG pipeline is being designed with bi-directional flow capability, and hence may provide for future reverse flow from Malta to Italy (European gas grid) in case of emergency gas disruption situations. This would facilitate the formulation and implementation of preventive, emergency and solidarity action plans at both national and EU regional levels as stipulated in Article 9, 10 and 13 of the Security of Gas Supply Regulation. In this respect, once the MTG pipeline is in operation, the impact of the gas pipeline on the security of the supply of gas in the Libyan and Algerian Risk Group regions will need to be considered. Future updates of Malta's National Risk Assessment, National Preventive Action Plan and Emergency Plan in line with the Security of Gas Supply Regulation will fully take into account future developments of the gas pipeline project.

Alignment with Union-wide TYNDP

At European level, MTGP (ENTSOG Project Code: TRA-N-031) has constantly been submitted and included in the Union-wide TYNDP of 2013, 2015, 2017 and 2018 elaborated by ENTSOG pursuant to the Regulation (EC) No 715/2009. Moreover, for its strategic importance, MTGP was identified as a PCI under the priority corridor "North-South gas interconnections in Western Europe" in 1st list of 2013 and was subsequently resubmitted and reconfirmed in the 2015 and 2017 PCI lists.

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.

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 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 will be benefitting from a fixed price for both electricity and gas for the first five years of supply. 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 safeguard the envisaged future gas interconnector with Sicily.

As part of the agreements EGM also agrees 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.[19]

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 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;

[19] Act has been repealed by Act XXXIV of 2014, Enemalta (Transfer of Assets, Rights, Liabilities and Obligations) Act, 2014

9 Stakeholder consultations

Agents of the Competent Authority for Malta, the EWA and their consultant, consulted with the following 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)
    - Melita TransGas Co. Ltd (Project Promotor of PCI 5.19 and prospective TSO for MTGP)
- b) Relevant organisations representing the interests of households
    - REWS (Regulator for Energy and Water Services)
- 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)

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. Then an initial meeting took place remotely 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 confirm the information was correct and request their endorsement. Stakeholders have reviewed the documents, confirmed the accuracy of and endorsed these sections.

	Stakeholders consulted	**Summary of outcomes with respect to**	
		Preventive Action Plan	**Emergency Plan**
a)	**ElectroGas Malta** ("EGM") – LNG supplier, facility operator and gas supplier.	Provision of storage levels, run rates and delivery schedules.	Provision and co-ordination of gas facility emergency response arrangements

	Stakeholders consulted	Summary of outcomes with respect to	
		Preventive Action Plan	Emergency Plan
b)	Organisations representing households. Not applicable in Malta as there are no household gas customers.	Refer to REWS meeting	
c)	**Electricity producers and system operator** (workshop held with EGM, D3PG and Enemalta)		Develop co-ordinated Delimara site emergency response plan
C	National Regulatory Authority - **"REWS"**	Competent Authority to: 1) Implement monitoring & early warning system of potential disruption to supply of LNG. 2) Establish responsibilities for reporting, monitoring & forecasting of: LNG deliveries, LNG storage levels, and actual / forecast gas use for power generation.	Competent Authority to: 1) Define priority criteria for electricity protected customers 2) Ensure distribution system operator implements operating guidelines and procedures that prioritises protecting electricity supplies to protected customers.
	OTHER STAKEHOLDERS		
	Critical Infrastructure Protection Directorate ("CIPD")	Ensure gas facility is classified with respect to designated essential services and provision of appropriate cyber security insight.	
	Civil Protection Department ("CPD")	1) Maintain training of personnel 2) Ensure availability and functionality of emergency response resources 3) Liaise with police to ensure that firework permits consider risk of Delimara site	1) Recovery process – establish methodology for determining when gas facility is "safe" to be handed back to operator following an incident. 2) Document & communicate methodology for allocation of emergency / standby generators

	Stakeholders consulted	Summary of outcomes with respect to	
		Preventive Action Plan	Emergency Plan
	Transport Malta (Transport Authority)	Assurance on the marine operations associated with the delivery of LNG	Measures taken to provide tug mounted emergency equipment for dealing with emergencies at the LNG facility
	Occupational Health and Safety Authority ("OHSA")	Audit COMAH sites annually	
	Environment and Resources Authority ("ERA")		Authority to deviate from IPCC limits in emergency
	Melita TransGas Co Ltd. (EU Project of Common Interest 5.19 project promoter)	Communicate forecast operational go-live date for Sicily-Malta gas pipeline to Competent Authority and Distribution System Operator	

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 future.

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. With a projected capacity of circa 260 MWe in 2030, rapid fluctuations due to cloud coverage would need unprecedented "online" back-up of circa 20-25% of Malta's peak demand in 2020. Given the limited options for cost-effective indigenous sources, Malta's reliance on energy imports persists and is expected to remain high in the foreseeable future.

The above factors magnify 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 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. 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 the MTGP gas pipeline become operational.

11 Regional N-1

The sections hereunder were jointly drafted within the relevant regional risk groups.

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] [20]

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,

[20] 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

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 transmission system operators 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 the development of the MTGP 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 are a preventive measure even though all their operation procedures can be considered emergency measures.

The ReCo Team East was launched in November 2017 and Open Grid Europe (a German TSO) was appointed as facilitator until November 2019. The role of the facilitator is to be the first TSO to contact in case of an emergency and to activate the communication flowchart.

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 only shall 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 non-comprehensive 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

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 the development of the MTGP gas pipeline project.

2. Algeria Risk Group

11.1 Infrastructure standard

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 2,306 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 1,203.3 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. The calculation does not take into account the loss of capacity of TENP pipeline system (reduced for survey activity due to corrosion phenomena) affecting southbound flows from Germany to Italy through Switzerland.

Results of the N-1 standard are well above 100%: decreasing from 125% in the winter 2018/2019 to 123% in the winter 2021/2022. 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 134% in winter 2018/2019 to 131% in winter 2021/2022. 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 - Data for 2018/2019 [mcm/d]

Member State	Ep_m	LNG_m	S 100%	S 30%	P_m	D_{max}		(I_m)
Austria	229	0	89	80	4	43		*Baumgarten* 198
Croatia	7	0	5	3	9	16		
France	164	109	205	143	0	346		
Greece	14	20	0	0	0	20		
Italy	213	49	247	161	15	423		*Mazara del Vallo* 198
Malta	0	14	0	0	0	1		

Portugal	0	20	11	6	0	22		
Spain	63	164	18	12	0,4	170		
Slovenia	0	0	0	0	0	4		
TOTAL	**690**	**376**	**576**	**406**	**28**	**1.044**		

Table 12 - Data for 2020/2021 [mcm/d]

Member State	Ep_m	LNG_m	S 100%	S 30%	P_m	D_{max}		(I_m)
Austria	229	0	89	80	4	43		*Baumgarten* 198
Croatia	7	0	5	3	9	18		
France	164	109	205	143	0	346		
Greece	19	20	0	0	0	23		
Italy	213	49	247	161	15	430		*Mazara del Vallo* 198
Malta	0	14	0	0	0	1		
Portugal	0	20	11	6	0	21		
Spain	63	164	21	13	0,4	182		
Slovenia	0	0	0	0	0	4		
TOTAL	**695**	**376**	**579**	**407**	**28**	**1.067**		

Table 13 - N-1 Index values

N-1 Index values		2018/2019	2020/2021
Baumgarten	**S 100%**	*141%*	*139%*
	S 30%	*125%*	*123%*
Mazara del Vallo	**S 100%**	*150%*	*147%*
	S 30%	*134%*	*131%*

11.2 Mechanisms developed for cooperation

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. The Spanish TSO Enagas was appointed as facilitator for the period March 2017-2019. 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 the development of the MTGP gas pipeline project.

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 non- 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.

11.3 Preventive measures

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.

In the context of Malta, this preventive measure will be considered in the future during the development of the MTGP 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.