MEDREG

CROSS-BORDER COORDINATION FOR INTERCONNECTION CAPACITY DEVELOPMENT

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Empowering Mediterranean regulators for a common energy future

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Gas Working Group (GAS WG)

ABSTRACT

This report acts as a stepping stone from the MEDREG's 2020 GAS WG report on "Design mechanism for gas market to foster energy transition," which initiated the debate and discussion on the future role of natural gas in the energy transition by providing further flexibility to the energy market and system.

This report will enrich the previous one with an in-depth analysis of the cross-border interconnection in the region, giving an overview of whether more physical interconnections might be necessary, and assessing current the role of LNG and its potential development as a strategy to diversify sources. Furthermore, the report opens the discussion on topics like biogases and hydrogen and assesses how countries would ideally develop their infrastructures and adapt their regulatory framework to help ease the rollout of these future gases to head towards decarbonisation.

The role of natural gas is growing at a fast pace, and it's important to start assessing how the regulators can provide a stable, transparent, and competitive regulatory framework to unlock the full potential of the contribution of natural gas in achieving a smooth energy transition while also maintaining the security of supply and access to energy in terms of quality and price.

AKNOWLEDGMENTS

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DISCLAIMER

This publication was produced with financial support from the European Union. The contents are the sole responsibility of MEDREG and do not necessarily reflect the views of the European Union.

ABOUT MEDREG

MEDREG is the association of Mediterranean energy regulators, bringing together 27 regulators from 22 countries across the European Union (EU), the Balkans, and MENA region.

MEDREG acts as a platform for facilitating information exchange and assisting its members, in addition to fostering capacity development activities through webinars, training sessions, and workshops. Mediterranean regulators work together to improve the harmonisation of regional energy markets and legislations, seeking a progressive market integration in the Euro-Mediterranean Basin.

Through constant cooperation and information exchange among members, MEDREG aims at fostering consumer rights, energy efficiency, infrastructure investment, and development by employing safe, secure, cost-effective, and environmentally sustainable energy systems.

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1
INTRODUCTION

1.1. Report Objective

The aim of the report is to provide an update on the recent development of the gas markets and infrastructure in the countries in the Mediterranean area, and eventually on the interconnections and potential new infrastructure to satisfy future gases.

The report could be considered a continuation of the GAS WG 2020 report on "Design mechanism for gas market to foster energy transition," which initiated the debate and discussion on the future role of natural gas for a successful energy transition by providing further flexibility to the energy market and system. Hence, the report will provide an overview of the status of the gas markets in the Mediterranean region, assessing factors like unbundling, third party access (TPA), capacity allocation mechanisms, and more.

Furthermore, this report includes a synopsis of the gas strategies in the Mediterranean region, as well as the security of supply strategies, given the urgency of the topic due to the current market and geopolitical circumstances. The report also features in-depth coverage of the interconnections between the countries, showcasing potential new physical interconnections. Lastly, this report provides a summary of the strategies that the Mediterranean countries have for biogases and hydrogen, considering their potential uses per country and the obstacles that some countries are facing or are going to face in developing an infrastructure for the future gases.[1]

1.2. Methodology

The report is based on the replies of the MEDREG members to a benchmarking carried out by the GAS Working Group chairs in collaboration with the MEDREG Secretariat.

This benchmarking template communicated by the WG members and chairs contained 4 parts as shown below:

1. Overview of existing gas market and infrastructure
2. Gas strategy in the Mediterranean region
3. Cross-border interconnections
4. Challenges of developing new infrastructure: Hydrogen and biogases perspective

The MEDREG Secretariat collected the data and other information from the members and formulated the following report jointly with the GAS WG chairs.

National Regulatory Authorities (NRAs) from Albania, Algeria, Egypt, France, Greece, Italy, Jordan, Lebanon, Portugal, Spain, and Türkiye submitted responses. Libya, Malta, Montenegro, Morocco, The Palestinian Authority, and Tunisia were not included in this survey since they either do not have an NRA that regulates gas, or do not have a functioning gas market. Cyprus does not have a functioning gas market and hence

[1] *MEDREG – RES WG – Future Role of Renewable Gases, 2022*

was not able to submit a comprehensive reply; however, Cyprus did provide input and feedback towards some of the topics discussed in the report.

Figure 1 - MEDREG Country Replies

Any extra information or data that have been added to this report have been cited and reviewed by the respective MEDREG member.

2

ASSESSMENT OF THE EXISTING GAS MARKET AND INFRASTRUCTURE

The countries in the Mediterranean basin are generally diverse in terms of their dependence on natural gas and their gas market structure. Amongst the indicators of the maturity of a gas market, one can consider market opening, third party access, capacity allocation mechanisms, Interoperability, and other market aspects that relate to materialising of interconnection capacities.

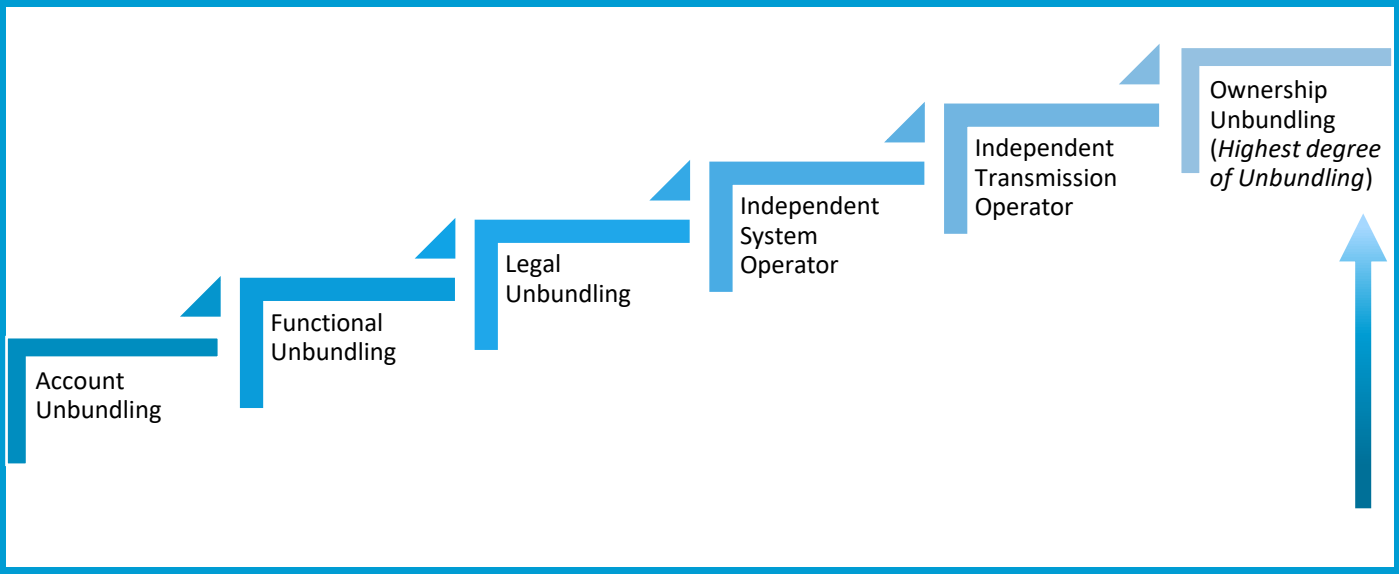
This chapter provides an overview of the gas market in the Mediterranean region.

2.1. Unbundling and Third-Party Access (TPA)

In both the Gas and Electricity markets, *unbundling* is the separation of activities for which there could be competition, like production and supply, from activities where there is naturally no competition, as in transmission and distribution systems, which are considered as a regulated monopoly. Unbundling comes in levels, as seen in the diagram below.

The different unbundling regimes can be defined as follows:

Figure 2 - Levels of Unbundling



Account unbundling, which is considered the lowest and most primary level of unbundling, is when companies are obliged to separate bookkeeping from its various constituent activities, highlighting the costs and revenues that derive from each of them.

A company is **Functionally unbundled** when it is obliged to reorganise its internal structure and attribute responsibility for its network and competitive activities to different units that must take decisions autonomously.

Legal unbundling is implemented to preclude any discrimination. In legal unbundling, a separate legal organisation is established and tasked with network activities, and hence management is capable of functioning more autonomously.

Having an **Independent System Operator** is when the system operator, tasked with operating and expanding existing infrastructure, is not owned by a vertically integrated company. However, in such a scheme, the assets may remain as a property of the integrated company.

Independent Transmission Operator(ITO) is a scheme which must comply with some conditions (mainly related to independent decision-making capacity). In this model energy supply companies may still own and operate gas networks, but must do so through a subsidiary. All important decisions must be taken independently of the parent company. In the ITO model, transmission ownership and transmission system operation remain part of a vertically integrated undertaking, but are strongly ring-fenced within it.

Ownership unbundling, which is the highest form of unbundling, is when a company that operates a network cannot have any interests in any company involved in the supply chain or in any other company involved.

The early steps of unbundling schemes, like account unbundling, are usually not enough to guarantee fair competition in the market. Even though TPA (third party access) rules might be applied at a regulated level, a firm controlling a network can benefit from a skewed playing field; for example, by hindering expansion of the gas network to limit the size of the competitors at the expense of congesting the network.

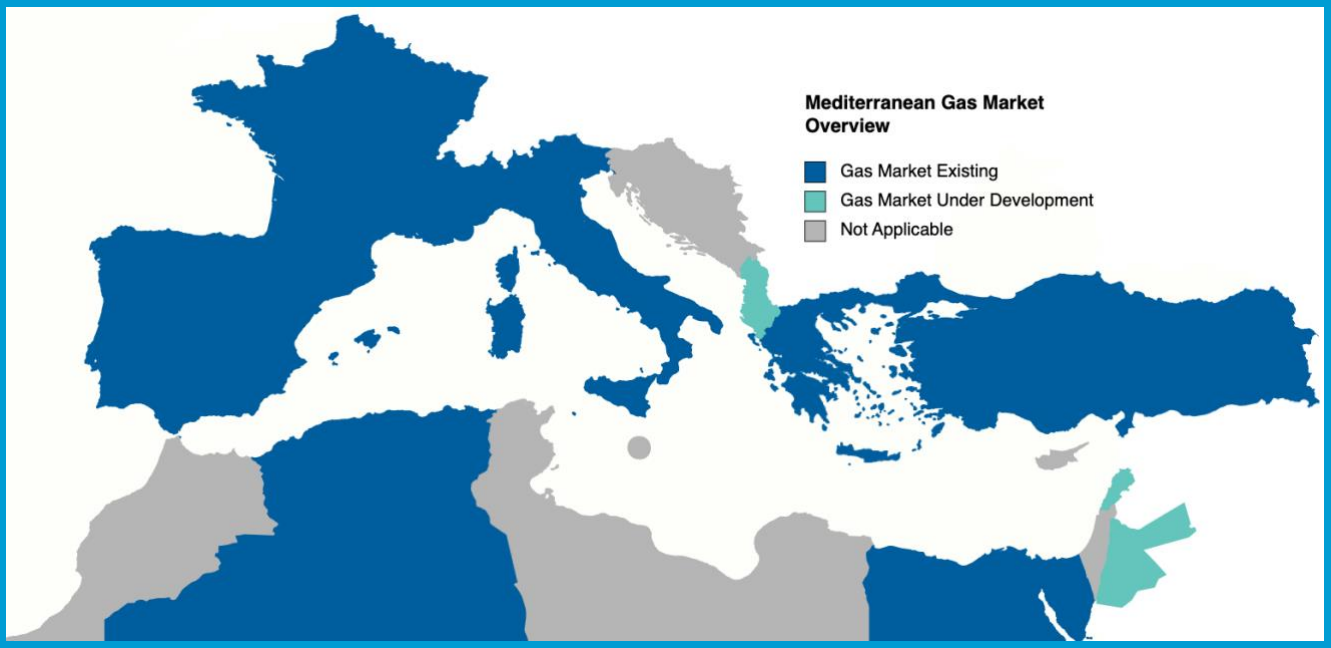
2.1.1. MEDREG's work on TPA

In the past, MEDREG had developed a set of recommendations on TPA in 2014, later provided an update on the state of play in 2018, and still monitors its application in the Mediterranean region. TPA is considered as a critical step in the liberalisation of the gas market. TPA means that there should be a completely non-discriminatory and legally enforceable right of access to the gas infrastructure, regardless of the circumstances.

The objective of the TPA in the gas networks is to optimise gas penetration in the market and to reach an adequate level of market liberalisation.

As far as the Mediterranean region is concerned, there seems to be a widespread acceptance and adaption of unbundling schemes and TPA rules. The biggest contrast can be seen between the **north** and **south shores** of the Mediterranean region, where the north shore countries usually adopt the highest forms of unbundling schemes. In the south shore countries, there appear to be some countries who already have a gas market, while others are currently building a gas market. The figure below shows the three different zones.

Figure 3 - Overview of the Status of the Mediterranean Gas Market



2.1.2. Countries with an Existing Gas Market

Regarding the TSOs, **Algeria** has a single TSO following a legal unbundling regime, and hence declares the transmission network to be running as a natural monopoly. **Egypt** on the other hand is following one of the highest forms of TSO unbundling among the south shore countries, where Egypt's one and only TSO, GASCO, follows an ISO model, with some slight changes related to investment management and corresponding links with the network owner.

Apart from the TSOs in the above countries, the **Algerian** distribution networks are a natural monopoly, also following legal unbundling. The distribution system is run by one public company that manages 56 concessions spread over 6 regions.

In **Egypt**, account unbundling is the regime that is being followed in the natural gas distribution system. Egypt is currently in the process of liberalising the market, where the gas market design has been released and the implementation is currently in progress, tariff structure for gas transport has been issued, the network code has been approved, and transmission system capacity management rules and procedures have been released. Egypt has set a milestone regarding developing the gas market design, whereby it has been set at a minimum of 10 years, broken down into multiple stages, which are currently under evaluation by the Ministry of Petroleum and Mining and the Egyptian Cabinet, to achieve the highest degree of liberalisation and release around 50% of gas from the incumbent.

Regarding TPA rules outside the EU, **Algeria** applies TPA rules to the transmission and distribution gas system as per their introduction by the law n°02-01 of 5 February 2002 on electricity and gas distribution by pipes. The TPA rules are fixed by the 02-01 law and the implementing legislation. The NRA approves the procedure related to processing the application.

As for **Egypt,** TPA rules have been applied since 2019 by issuing tariff rules, architecture, and methodology, in addition to network code approval in 2020. The TPA rules are approved by the NRA.

In the EU, where the gas market has been fully liberalised, companies are rather obliged to follow the highest forms of unbundling; in **France**, for example, the two TSOs, GRTgaz and Téréga, follow an ITO (Independent Transmission Operator) model and ownership unbundling regime, respectively. TSOs in **Spain** follow the OU (Ownership Unbundling Operator) and ISO (Independent System Operator) models. The TSOs of **Greece**, **Italy**, and **Portugal** too follow at least an ISO model. Besides the TSOs, DSOs in the EU countries are required to follow a legal unbundling regime. In **Türkiye** the transmission network and system operator has been fully separated and unbundled from the supply business. It is noteworthy to mention that, apart from the EU, **Türkiye** is the only country that possesses a fully liberalised gas market.

Regarding TPA, in the EU countries, TPA rules are established, published, in place, and approved by the respective NRAs. In Türkiye regulated TPA is granted to all segments of the natural gas network.

Focusing on each country and its specificities, **France** appears to separate supply and distribution and treats them as two distinct activities within the gas supply chain since the opening of competition in the year 2000. The French natural gas market was fully opened to competition by July 2007, and since then consumers have been free to choose their energy supplier. As a result of this process, suppliers other than the incumbent operator, who are known as “alternative” suppliers, entered the retail natural gas market, and consumers are now able to choose between two different types of offers:

- Market products, where the prices are set freely by the suppliers.
- Regulated sale tariffs, where prices are set by the government and proposed by the incumbent operators (ENGIE and the 22 local distribution companies). Regulated gas tariffs are scheduled to end on July 1, 2023.

Furthermore, regarding TPA, since 2003, Commission de Régulation de l’Energie (CRE) guarantees all market operators non-discriminatory, fair, and transparent access to gas infrastructures. CRE contributes to the determination of access rules. CRE also determines the rules and tariffs for access to the natural gas transmission and distribution networks, as well as to underground natural gas storage facilities and LNG terminals, which are regulated.

In **Greece**, newcomers into the market are required to follow an ownership unbundling regime. It is important to highlight that some independent natural gas system operators are exempted from ownership unbundling regimes and are certified as ISO. TPA rules are in place and approved by the NRA through the Network Code. However, recently, some DSOs got privatised and there has been a reaction to some of the set conditions regarding the certification decisions, following which the law has reverted to legal unbundling.

In **Italy,** TPA rules are in place and approved by the NRA according to the European Energy Packages.

Delving into it in greater detail, in **Portugal**, most of the effective gas market players, including for LNG, in terms of reception, storage, regasification, distribution, and supply, follow legal and account unbundling

regimes. An exemption is granted to the autonomous regions of the Azores and Madeira with regard to legal unbundling of gas transport, distribution, and supply activities. TPA access to all infrastructure was established by Decree-Law no. 30/2006 of 15 February (primary legislation). TPA rules were approved by the NRA in September 2006. All the TPA is on a regulated basis, with regulated tariffs, based on an Entry-Exit scheme.

In **Spain**, regasification terminals develop regulated activities and are obliged to adopt functional and accounting unbundling. Furthermore, transmission and distribution entities are obliged to apply legal unbundling (and therefore functional unbundling). Regarding TPA, the Law 34/1998 of 7 October relating to the hydrocarbon sector, and the Royal Decree 949/2001 of 3 August (both developed by the Ministry of Ecological Transition and Demographic Challenge) were the relevant legislations applicable in Spain for TPA until 2020, when these competencies were assigned to the NRA. Royal Decree 949/2001 became inapplicable and was substituted by Circular 8/2019, developed by CNMC, which introduced substantial changes in the Spanish access model, especially related to LNG terminals. In Spain, fully regulated TPA to all natural gas infrastructure has been applicable since 1998.

In **Türkiye**, legal unbundling is present among the distribution system operators and in distribution and retail activities. Functional unbundling is in force for the transmission, storage, and wholesale activities of the incumbents.

Quick Look:

The **French** Regulator (**CRE**) welcomed the **Egyptian** Gas Regulator (**GasReg**) for a Study Visit on Third Party Access (TPA) and Gas Regulatory Aspects.

GasReg met with CRE, who provided an overview of the specificities of gas market design and the independent regulation of the sector through an immersive exchange of expertise.

The study visit focused on the role played by the regulator in implementing and monitoring TPA rules and addressing tariff structure and methodologies for access to the gas infrastructures. In addition, the experts discussed capacity allocation mechanisms, congestion management procedures, and other topics related to the evolvement of regulations in France.

2.1.3. Countries in the Process of Building a Gas Market

There remain some countries in the Mediterranean region that are developing their internal gas networks to have a gas market. Among them are countries that are currently using gas in their system and energy mixes. **Jordan** for instance uses gas as a main source of electricity generation, where gas makes up 80% of the energy mix, as per the MEDREG task force on "Price Surge and Security of Supply."[2]

Jordan follows no unbundling model in their gas market; on the contrary, Jordan has a build-own-operate-transfer (BOOT) scheme company. However, unbundling is planned to take place in the future preparatory to liberalising the natural gas market and opening the market for investment. In addition, TPA rules are expected to be rolled out in the year 2023.

A gas market is yet to be established in **Albania**, although they are preparing for its opening. The Albanian Energy Regulatory Authority (ERE) has completed all secondary legislations and cooperated with the Ministry of Energy and Infrastructure for the construction of the gas infrastructure. The market is expected to open in around two years.

The natural gas market in **Cyprus** is under development. The laws of 2004 to 2021 regulating the natural gas market contain the key provisions for the imminent introduction of natural gas in the energy balance of the country. In 2019, the Council of Ministers determined the operating framework of the natural gas market for the effective period of the emerging market and appointed the operators.

Lebanon appears to be a unique case, where the country lacks infrastructure. With a total network length of just 32 km, there is no possibility of having a functioning gas market and hence no unbundling or TPA rules. However, the Lebanese Petroleum Administration (LPA) supervises and manages the upstream petroleum sector in Lebanon's offshore areas by undertaking all necessary preparations related to licensing rounds, including communicating with companies, managing the prequalification process, evaluating the offers, and providing recommendations regarding the award of blocks.

Regarding TPA rules in the countries with no existing gas market, the NRA in **Albania** has approved "rules for ensuring the access of third parties to the transmission system and transparency in the natural gas sector"[3].

[2] *MEDREG – ELE WG – Task Force on Price Surge and Security of Supply, 2022.*

[3] *Decision no. 81, dated 6 April 2018*

2.2. Capacity Allocation Mechanisms

In **Albania,** the board of the regulator approved the regulation related to the capacity allocation mechanisms; namely, the transposition of regulation 2017/459, by decision no.2018 / 06 / PHGL-ENC, and the establishment of the network code for capacity allocation mechanisms in the gas transmission system, through decision no.103 dated 26 June 2019. Once the market opens, Albania expects to have this mechanism ready for application.

In **Algeria**, bilateral contracts are concluded between the gas transmission system users (power plant, distribution company, and industries) and the transmission system operator (TSO) based on the energy supply mechanism.

Meanwhile, in **Egypt,** for the internal market entry-exit system, the allocation is based on pro rata mechanism and priority conditions as set in the Booking Chapter of the Egyptian Gas Network Code. Allocation of capacity at the interconnection points (IPs) is based on bilateral long-term contracts.

In **France, Greece, Italy, Portugal, and Spain,** the European Network Code on Gas Capacity Allocation has been adopted in 2013 and has been binding since 2015. It was amended on 16 March 2017 to allow the development of new capacity when the market shows a need.

The Code aims to facilitate gas trade by creating standardised allocation rules between the different European market areas. Capacity at interconnectors is allocated through auctions according to uniform modalities in Europe: joint allocations on both sides of the interconnectors, standardised capacity products, quotas of capacity reserved for short-term maturities, etc.

The Ascending Clock algorithm applies to all auctions (monthly, quarterly, and yearly), except for the daily ones. The products offered are annual, quarterly, monthly, daily, and intraday.

In **Türkiye,** the pro rata rule is applied for the long-term imports and exports via the interconnection points. Pro rata is also applied for storage facilities. Regarding the LNG terminals, first come first served (FCFS) is applied. Capacity auctions are applied for the spot import via the interconnection points where spot import capacity is available.

Quick Look

Portuguese Case Study: The Allocation of Capacities

For interconnection points the capacity is allocated according to the CAM Network Code (Commission Regulation (EU) 2017/459 of 16 March 2017 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems and supplementing Regulation (EC) 715/2009 of the European Parliament and of the Council).

The allocation of capacity at the national natural gas system's (beside interconnection points) infra-structures results from processes of annual, quarterly, monthly, and daily scheduling and assignment regarding the transmission system and distribution grids, the LNG terminal, and the underground storage infrastructures. In this assignment process the available capacity products are:

- Annual assignment: Yearly standard capacity products and quarterly standard capacity products
- Rolling quarterly assignment: Quarterly standard capacity products
- Rolling monthly assignment: Monthly standard capacity products
- Rolling day ahead assignment: Daily standard capacity products
- Rolling intraday assignment: Intraday standard capacity products

Standard capacity products include firm and interruptible capacity. It is important to stress that not all products are available for each infrastructure. Capacity allocation rules use auctions whenever capacity requests exceed the available capacity. These auctions are performed through an IT platform. Furthermore, it is noteworthy that congestion management procedures are in place to promote optimal use of physical capacity. The prices for all products are established by NRA, and there are different prices for each product.

2.3. Interoperability and Data Exchange

Interoperability and data exchange rules align the technical agreements used by network operators, to facilitate commercial and operational cooperation between countries and adjacent system operators. These guidelines address important matters in the framework of interconnection agreements, units, gas quality, odorization, and data exchange. These rules are fully applied and fully functional in the EU, and hence the freedom of gas trade and transport across the transmission systems takes place in the EU as per the Interoperability and Data Exchange Commission Regulation (EU) 2015/703, adopted on 30 April 2015. It establishes the network code on interoperability and data exchange which has been binding since 1 May 2016. This Commission regulation is also applied by the network operators of the Energy Community and their EU neighbouring operators.

Within the code, there exists a set of rules regarding flow control, measurement principles for gas quantities and qualities, matching process, allocation of gas quantities, communication procedures in the case of exceptional events, and the settlement of disputes arising from interconnection agreements.[4]

As mentioned, in the EU, TSOs are obliged to follow the interoperability and data exchange rules as per the Commission regulation. Indeed, in **France**, **Greece**, **Italy**, **Portugal,** and **Spain**, the provisions of the European Commission Regulation (EU) 703/2015 are applied. This information is the responsibility of operators, not the regulator.

Quick Look

Spanish Case Study: Data Exchange

Regarding interoperability and data exchange in Spain, Regulation (EU) 2015/703, which approves the European network code on interoperability, is applied on interconnections with European countries (Portugal and France). The Spanish Network Code also contains provisions on interoperability and data exchange at national level, which are aligned with the aforementioned regulation. The Spanish Network Code is currently under revision: a proposal was submitted for public consultation till 31 May, and the final version is expected to be approved in November this year. The proposal can be accessed at https://www.cnmc.es/consultas-publicas/energia/gestor-tecnico-sistema-sobre-programaciones

It is worthy of mention that CNMC's scope is not only limited to the energy sector; CNMC also holds responsibilities in competition law enforcement and regulation, market monitoring and access conflict settlement in certain markets and sectors, including electronic communications, audio-visual, electricity and natural gas, postal, airports, and railways.

Energy Community countries are entitled to follow the EU Commission regulation, just like the EU countries, if they are to ensure freedom of trade with their European counterparts. In **Albania** though, since the gas market is still under development and not in operation, the regulator has approved the construction of information technology tools to record access to data measurement of quality performance standards by the natural gas network operators and any licensees in the supply activity of natural gas (Decision No.31, dated 28.02.2022).

Lebanon also currently has no gas market. As per the Petroleum Administration Decree 7968/2012, the LPA (Lebanese Petroleum Agency) is responsible for establishing and developing a common digital equipment to store data, cover the needs of the administrative units, and facilitate the data reception,

[4] MEDREG GAS WG has developed a report on the flexibility and interoperability of energy systems. Available here.

exchange, and promotion across the companies and academic centres, under the cooperation agreements, while considering the applicable provisions on data confidentiality.

Regarding the south shore countries with an existing gas market like **Algeria**, **Egypt,** and **Türkiye,** rules on interoperability and data exchange are applied as follows:

In **Algeria,** interoperability rules are mainly regarding the composition and calorific value of purchased gas and are fixed by regulation and bilateral contracts.

In **Egypt,** interoperability and data exchange codes are still under development. In the meantime, for the system operators' coordination, the network code has already set some rules in terms of reliability and security of grid operation. Regarding the shipper–TSO relationship in terms of interoperability and data exchange, the issued capacity management rules have defined the main coordination information regarding active entry–exit capacity information, network planning, and development information.

In **Türkiye**, Regulations for full compliance with REMIT are currently being prepared by the NRA.

3

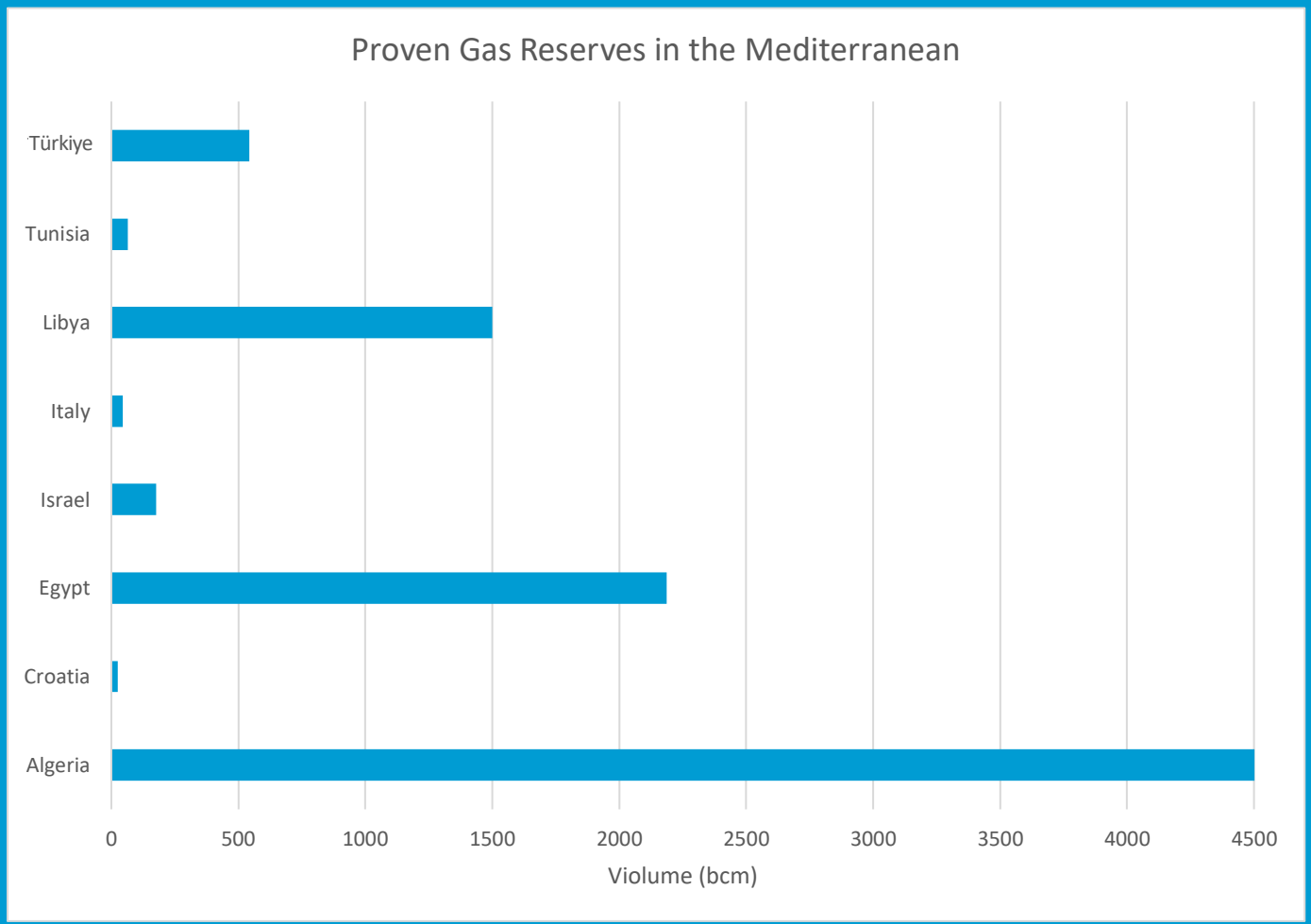
THE ROLE OF NATURAL GAS

This chapter focuses on the role of natural gas in the Mediterranean region, which is dissected and analysed further to understand the countries' strategies regarding using natural gas and LNG. Moreover, it is interesting to know how the nature of a country in terms of climate and the status of their gas imports and exports and their energy mix could affect the whole scenario.

3.1. Gas Reserves

Natural gas reserves refer to large deposits of natural gas which, based on geological surveys and engineering studies, are thought to exist to a very high degree of certainty. In addition to the knowledge of their existence, these reserves are also accessible and economically viable to extract. In that regard, the Mediterranean region is not considered the richest region in terms of proven natural gas reserves. However, some countries of the region have reserves that are not yet quantified and not fully discovered.

Figure 4 - Proven Natural Gas Reserves in the Mediterranean Region



From the figure above, which provides a brief of the status of the gas reserves in the Mediterranean region, once can see a pattern.[5] [6] The southern shore countries of the Mediterranean appear to hold a massive share compared to the rest of the region, especially Algeria, Egypt, and Libya, who are all currently considered as net exporters. Recent significant finds in Türkiye have also been considered as a game changer in the region.

Egypt has the second largest natural gas reserves in the Mediterranean, apart from being the third largest gas producer in Africa, following Algeria and Nigeria; Egypt's proven gas reserves are at 2,2 trillion cubic metres (tcm), according to BP's Statistical Review of World Energy 2021. These reserves are equivalent to around 1,6 billion tonnes of LNG.

Such significant developments in gas discovery and exploration augur well for the fast track development of Egypt towards becoming a net gas exporter of LNG and satisfying the nation's vision of becoming a potential gas hub in the Mediterranean region.

Quick Look

Algerian Case Study

MEDREG Secretariat organised a courtesy meeting between the Algerian Regulatory Authority of Hydrocarbon (ARH) and the Italian energy company, ENI, to discuss the technical aspects of the upstream oil and gas. During the meeting, the Secretariat Deputy Director highlighted the important role that the MEDREG southern shore countries can play in diversifying the energy sources for the EU countries.

Additionally, in April 2022, Italy signed an agreement with Algeria, whereby it would boost imports by around 40%. Algeria has now become Italy's second largest gas supplier. The Transmed pipeline connecting Algeria, Tunisia, and Italy has a maximum transportation capacity of 110 mcm per day but is currently running at 60 mcm per day. ENI on their part have acquired BP's shares in Algeria, in an attempt to further fortify gas supply security from Algeria.[7]

As is known, the EU countries and other countries of the north shore have limited to no significant natural gas reserves. **France**, **Greece**, **Portugal,** and **Spain** are amongst the countries with no proven gas reserves. **Italy** on the other hand does have some proven gas reserves; however, these are not considered significant, as the total reserves amount to only 45 bcm.

[5] *US Energy Information Administration*

[6] *BP's Statistical Review of World Energy 2021*

[7] *ENI as reported by Reuters. 11 April 11 2022*

Besides the biggest players in terms of production and proven natural gas reserves, there exist some other countries too which appear to have reserves, but due to a slow rate of exploration these are still not confirmed, and production has not actually started.

One among them is **Albania**, a country with both gas and oil reserves. Several foreign companies are continuing their exploration, including Shell, who have already discovered significant natural gas reserves. As soon as production starts, the gas will be used in Albania and some of it will be injected into the TAP pipeline.

Regarding recent natural gas activities in **Cyprus,** the exclusive economic zone (EEZ) has revealed significant natural gas reserves. Cyprus is in the process of exploring and exploiting its natural gas potential and thus contributing to regional and European cleaner energy sources and energy security. Based on the field development plan submitted by the relevant operator, the Aphrodite gas field, estimated around 4,5 tcf, is scheduled to start operating in 2027. Other natural gas fields in Cyprus are Calypso, Glaucus, and Cronos.

Lebanon, on the other hand, has not yet started effective exploitation works in their identified fields of the Mediterranean Sea. However, according to preliminary studies, the potential reserves can have a substantial impact on the Lebanese electricity sector and economy and might allow Lebanon to play a regional role in gas export in the future.

Quick Look

Turkish Case Study: Türkiye's Potential as a Gas Exporter

Türkiye has discovered an estimated 540 bcm of gas resources in the Black Sea. The Sakarya gas field could supply up to 30% of the Turkish demand as soon as production starts in 2023, with an estimated 10 million cubic metres per day (mcm/d); the expected maximum production could be 4 times as much, reaching around 40 mcm daily, but this is forecasted to happen around 2028. This major discovery gives Türkiye the possibility to weigh its different options from a financial perspective. Capital expenditure saved by reducing gas imports could be redirected towards gas field development costs and even further exploration. In addition to that, Türkiye could play a massive role in Europe's mission to diversify its energy supplies. Furthermore, if the forecasted peak production is realised, Türkiye may consider investing in an LNG export terminal.[8]

[8] *https://www.mei.edu/publications/Türkiye-new-emerging-gas-player-resources-and-infrastructure*

3.2. Use of Natural Gas in the Mediterranean Region

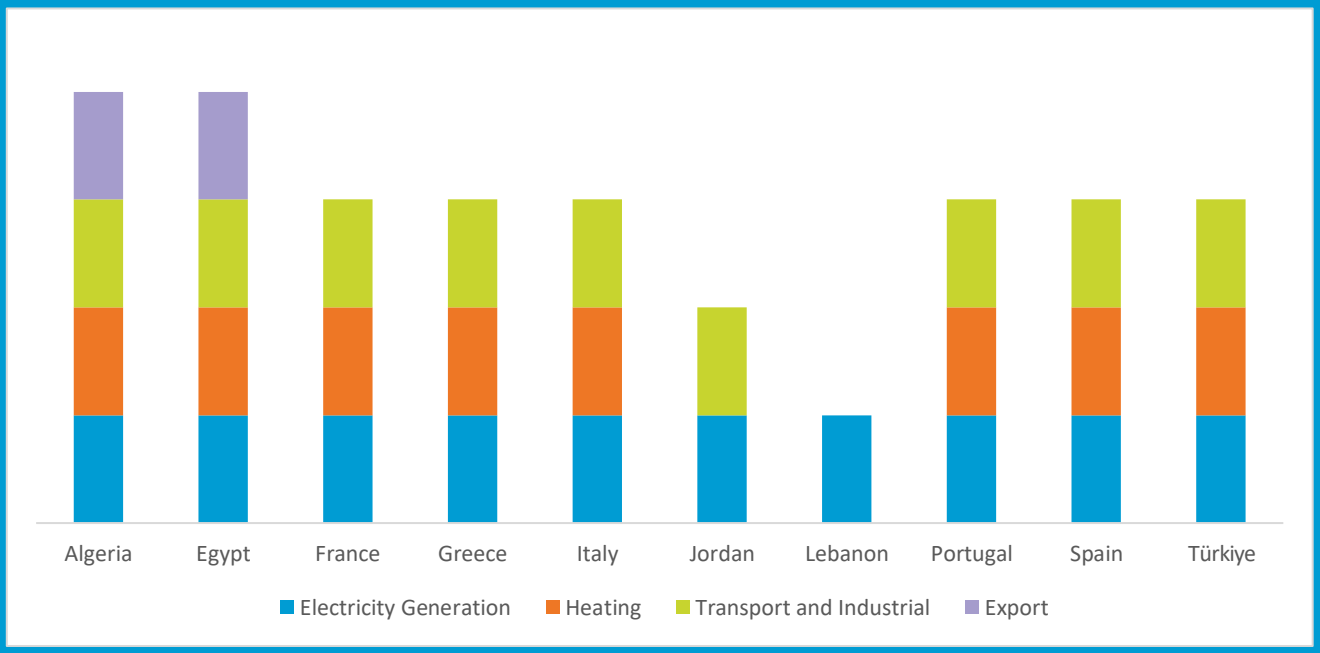
The wide spectrum of countries in the Mediterranean region appear to have different strategies when it comes to the use of natural gas.

Even though used at variable percentages depending on the national strategy for the energy mix, almost all countries use natural gas for electricity generation; in fact, natural gas appears to be the backbone of some countries when it comes to electricity generation. The figure below depicts the applications of natural gas in the Mediterranean countries.

Furthermore, it is worth mentioning that besides using natural gases for electricity generation, heating, and transport and industrial purposes, some countries export their surplus. **Egypt** and **Algeria** are among these countries.

The most common ways to export natural gas are either using pipelines or by shipping it in the form of LNG.

Figure 5 - Natural Gas Applications per Country



In addition to the ways natural gas is used by the Mediterranean countries, it is also very significant to understand the strategies of the respective countries in terms of plans for natural gas and its share in their energy mix in the short and long term. These strategies could vary from investing in the infrastructure within a country's borders to prepare for the opening of the market all the way to slowing down investments in physical interconnections and focusing on LNG.

The replies received show interesting variations.

Albania has invested in the construction of a pipeline between the connection point of the Trans Adriatic Pipeline (TAP) to the power plant of Vlora. The implementation project is over, and it is now expected to go

operational. Also, among the future natural gas projects is the Ionian Adriatic Pipeline (IAP). The IAP will run from the TAP Connection Point in Fier all the way to Croatia, and hence is considered as a regional project that will gasify the entire region. Furthermore, in terms of storage, a feasibility study for an underground storage facility in Dumrea salts has recently been completed.

In **Algeria**, the transmission and distribution sectors of the market will keep working on developing gas networks to meet the growing gas demand, ensure the integrity of the network, enhance the quality of supply, develop the rest of the gas industry from a petrochemical perspective, enhance gas export, and overall to reduce gas consumption in the energy mix by rolling out renewables.

Meanwhile in **Egypt**, gas will play a key role in the energy mix in the short, medium, and long terms, as Egypt is one of the few major producing countries in the region. Furthermore, gas plays a key feedstock to lots of industries, particularly petrochemicals. Egypt is considered a net exporting country; the surplus gas production is exported after transforming it to LNG through its LNG stations. However, like most countries, and driven by concerns about climate change, Egypt is expanding its renewable energy production to reach 47 % by 2035, which means that the electricity grid might receive more electricity through RES and consequently even more gas will be available for export.

In France, the last French Multiannual Energy Planning (energy policy steering tool) set the following objectives: a reduction of the consumption of (fossil) natural gas by 13% by 2023 and by 25% by 2028 compared to 2017 consumption levels, meanwhile increasing the share of biogas to 10% of gas consumption by 2030.

In **Greece,** an update of the National Energy and Climate Plan is expected by the end of the year, which will update the national strategy on natural gas. Until today, natural gas is considered an intermediate fuel, its use to be gradually abandoned after 2030. Greece is keen to develop their natural gas infrastructure; however, new developments will have to be hydrogen ready.

Italy developed the Italian Integrated National Energy and Climate Plan in 2019. This plan assumes that in the gas sector the main objective is to ensure that the overall system is more secure, flexible, and resilient and able to deal with a market situation which is, by nature, increasingly uncertain and volatile, as well as supporting the robust development of non-programmable renewable sources, by ensuring that energy demand is met, above all in relation to peaks in demand that coincide with low production levels from renewable sources.

Quick Look

Italian Case Study: The Italian Natural Gas Strategy

These objectives may be achieved by, i) increasing the diversification of sources of supply, by optimising the use of existing infrastructure and developing the LNG market, and increasing the share of renewable gas (biomethane, synthetic methane, and eventually hydrogen) in the network; ii) improving the flexibility of the national system with respect to sources of supply by means of updating the gas transport network, including for the purpose of increasing its security and control standards, in accordance with the provisions of the 10-year development plans for transport companies; iii) improving the security margin in the event of large peaks in demand; iv) coordinating the national emergency plans with those of the other countries along the same physical supply corridors, as provided for by European Regulation 2017/1938.

In **Portugal**, the energy strategy ensures continuity of gas supply, a transition to a decarbonised economy, and action against any obstruction of the gas network. To do so, the incorporation of gases of renewable origin and low carbon into the gas system (biomethane and hydrogen, generated from renewable energy sources such as biomass or by water electrolysis) will be considered, respecting the technical and physical constraints of the national gas system.

Meanwhile, in **Spain**, there are no new natural gas projects in the works. Projects are oriented more towards developing green gases (biomethane/biogas and hydrogen).

The goals of many of these projects are to contribute to the decarbonisation of the energy system and to increase the security of supply according to the biogas and hydrogen roadmaps approved by the Ministry of Ecological Transition and Demographic Challenge.

Meanwhile, in **Türkiye,** the focus of the most important projects is on the production infrastructures for the newly discovered Black Sea natural gas. Other projects for diversification of natural gas supply sources such as increasing LNG gasification capacity via new terminals or increasing the capacities of the active terminals as well as new gas interconnections are also being given the highest priority.

Quick Look

Lebanese Case Study: The Rise of the Lebanese Gas Market

Lebanon, which does not yet have a functioning gas market, has sound strategies for the short term regarding the use of natural gas. The nation plans to import gas through the Arab Gas Pipeline (AGP). A 10-year agreement with Egypt (with a clause allowing its extension for another five years) has been finalised with the help of the World Bank and the Egyptian authorities, to supply the existing power plant in Deir Amar with natural gas through the AGP. The gas will be channelled through the pipeline at a rate of around 650 million cubic metres per year, allowing the generation of an average of approximately 400 MW in Deir Amar. This solution will ramp up Deir Amar's capacity and increase daily supply. However, the gas import agreement with Egypt is yet to be secured by WB Financing.

In the medium term, Lebanon plans to build an extra gas-fired combined cycle power plant at Zahrani. To cover the natural gas needs of the existing power plant at Zahrani, the Ministry of Energy and Water intends to competitively procure natural gas through a Floating Storage and Regasification Unit(s) (FSRU) infrastructure/gas access allowing fuel-switching of Zahrani I in 2023 and supply of liquefied natural gas (LNG), unless a dedicated extension of AGP implemented to link Zahrani in the south is built in the future.

Over the long term, Lebanon plans to decommission the old plants that use HFO-fired steam turbines that cannot be switched to natural gas and build more gas-fired combined cycle power plants.

3.3. LNG

Besides natural gas that could be pumped in pipelines across borders, LNG serves as a crucial means of natural gas trade. The demand for LNG has reached an all-time high, given the current geopolitical circumstances. The political situation in Ukraine has not only alarmed countries with regard to ensuring their supplies at whatever cost, but has also put countries in a position where they must diversify their sources. With most countries currently opting for LNG and open to trading at spot market price to make sure they can meet their respective demands, the LNG market has never been tighter. This tightness is due to a lack of LNG oriented investments in recent years, and the market is expected to remain constrained until the year 2024/25.[9]

The shift towards LNG has transformed the shape of the market, where currently the United States of America and several countries in Africa (most importantly Nigeria) are showing on the radar as potential suppliers to the region, right next to Qatar, which has always seemed to have massive influence in the Mediterranean LNG market. This interesting shift and the entry of new market players, in addition to the price increases in the global gas market, especially in the European hubs, have completely reshaped the natural gas market dynamics.

Net importing countries and net exporting countries have tackled the issue of investing in LNG from various perspectives. Among the importing countries, some have opted to not invest in LNG regasification facilities and remain with their current facilities. Meanwhile, other countries depending on their geographical position either opt to remain with their current LNG regasification capacity or invest heavily in LNG regasification, including FSRUs that are much more preferred by the market due to lower costs, speed in schedule, commercial flexibility, and dependability.

On the other hand, exporting countries find themselves in a tricky position. The ideal solution would be to boost the liquefaction capacities, to both act as potential hubs and benefit from the current high prices in the gas market. However, the question remains: would the exporting countries be able to break even, given

[9] *LNG Trading and Shipping Post Pandemic: Development of New Supply. Patrick Dugas. Gastech 2022*

the climate objectives set by the Third Energy Package and other legislations? As a matter of fact, the problem for the exporting countries revolves around whether there will be security of demand.

Dependence on LNG can then be measured through several factors. To name a few, factors include a country's demand for natural gas through the percentage of natural gas in the energy mix, which depends on the nature of the climate of the respective country as well as previously set political and national directions, where many countries have opted to shift towards using more natural gas since it is considered as a clean source of energy, while others are aiming at heading towards complete decarbonisation and simply require gas as a secondary source of energy.

3.3.1. Net Importing Countries' Perspective

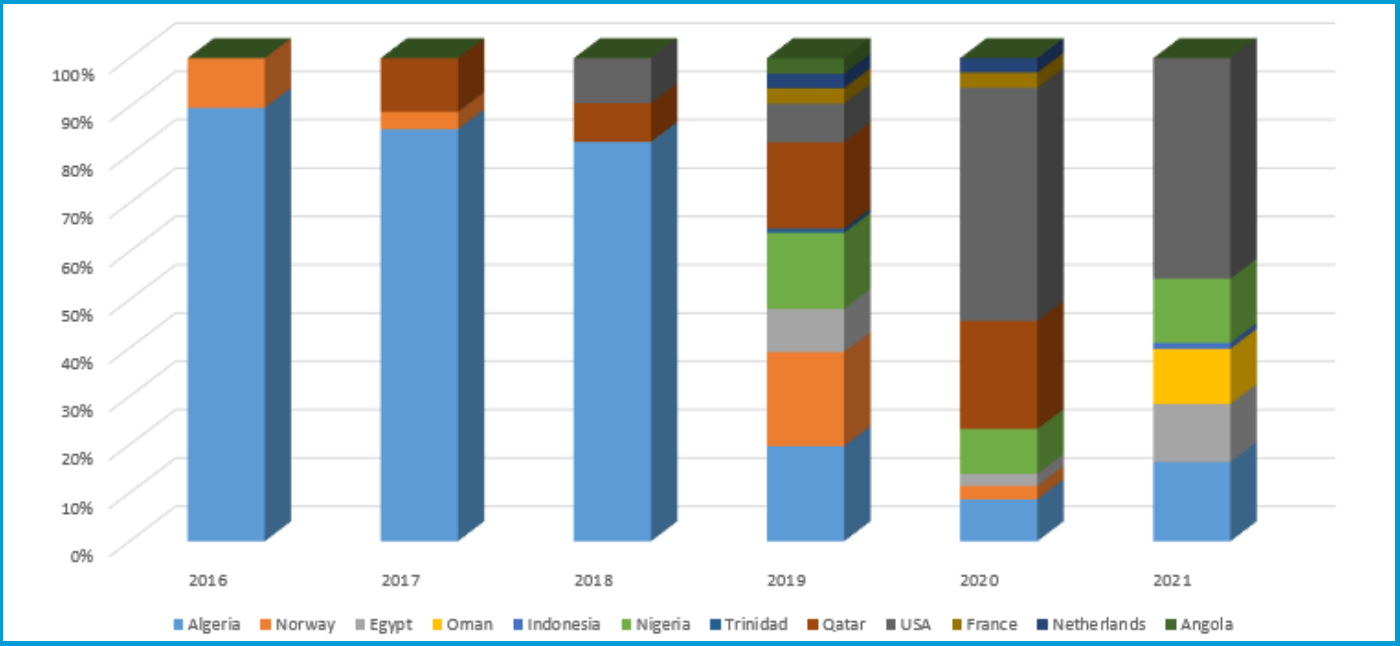
Albania is a country that depends heavily on hydropower in its energy mix. However, feasibility studies have shown that constructing an LNG Terminal would be ideal. Hence, the construction of an LNG terminal in the city of Vlora is expected to happen very soon. This 5 bcm/year terminal will be a collaboration between ExxonMobil and Exxelerate, to be overseen by OVERGAS of Bulgaria, which has signed an MoU with Albgas and the government of Albania.

In **Cyprus**, there is an ongoing FSRU project (PCI 7.5 - CyprusGas2EU), estimated to be operational by 2023.

France has 4 LNG terminals and a long-standing strategy regarding LNG. In recent years, the share of LNG imports has represented a third of the French gas imports. Due to the current situation in Ukraine and the doubts about the continued supply of Russian gas to Europe, France's strategy is to increase its LNG imports. At this stage, the priority for CRE is to push for an increase in capacity to accommodate LNG. Initially, this will involve increasing the capacity of the Fos LNG terminal by 17TWh (in addition to the existing 100TWh) through a combination of technical measures and an optimisation of the unloading program negotiated with the terminal's users. The Dunkerque LNG terminal will also offer available capacity to the market and could increase its send-out capacity in the short term (from 520 to 580 GWh/d) by combining flows to France and Belgium. In the slightly longer term (at least 2 years), a floating LNG import terminal (FSRU) should be operational in Le Havre.

In the past couple of years in **Greece**, LNG has become the most import source of natural gas. Especially during the ongoing crisis, it is crucial for security of supply reasons. Greece has achieved considerable success in terms of their diversification attempts with LNG, as seen in the following figures and as presented in the MEDREG report on "Design Mechanism for Gas Market Able to Foster Energy Transition." It is worth mentioning that the LNG import compared to natural gas imports increased from one year to the next, starting from 2016 till 2021.

Figure 6 - Greece's Diversification Attempts in LNG Imports



Since Greece does not have a storage facility and is interconnected only to Bulgaria for the import of Russian gas and to Italy only through TAP's reverse flow, LNG is the most trustworthy source of gas. Greece's interest in LNG projects is very high, hence leading to investments in FSRUs, where there is one FSRU under a final investment decision, which will commence operations in November 2023; meanwhile, four more FSRUs have been licensed.

In **Italy,** there are three LNG terminals and a small-scale LNG service (OLT Offshore LNG Toscana) that are operative. Furthermore, there are three FSRUs under evaluation in the Adriatic Sea and in the Mediterranean off the shores of Tuscany and Sardinia.

Meanwhile, in **Lebanon**, as a part of the Ministry of Energy and Water plans, the use of LNG has attracted interest and been studied, wherein it was found that the technology can be implemented in two ways. The first option would be to install an FSRU that supplies itself with the LNG. The second option would be to import international LNG from Jordan directly and channel it to Deir Amar.

In **Portugal**, the LNG Terminal of Sines is strategically located on the European Atlantic coast and integrates all the infrastructure for the reception and dispatch of vessels, storage, and LNG regasification for the transport network, as well as LNG loading in tanker trucks, in particular facilitating the following:

a) Reception and unloading of vessels: The installation includes a dock for ships, articulated discharge arms and discharge lines, recirculation and return of LNG steam, whose discharge capacity is 10000 m3/h of LNG for vessels with volumes between 40 000 and 216 000 m3 of LNG.
b) LNG Storage: LNG is stored in tanks, whose storage capacity is 2 569 GWh, corresponding to two tanks of 120 000 m3 of LNG and one tank of 150 000 m3 LNG.

c) Regasification for Natural Gas Transport Network: Regasification is a physical process of LNG vaporisation that uses the thermal exchange of gas with seawater in atmospheric vaporisers, for which the liquified natural gas terminal has 7 atmospheric vaporisers with a unit capacity of 64 GWh/day (equivalent to 225 000 m3(n)/h). The nominal emission capacity is 321 GWh/day (equivalent to 1 125 000 m3(n)/h), with a tip capacity of 1 350 000 m3(n)/h).
d) LNG filling bays: TGNL allows the loading of LNG tanker trucks, enabling supply to autonomous regasification units (UAG) located in areas of Portugal that cannot be supplied by the high-pressure natural gas network, and for the Autonomous Region of Madeira through ISO containers, for which TGNL has 3 filling bays, with a total capacity of 195 m3/h of LNG.
e) Loading of vessels: TGNL infrastructure also enables gas-in, cooling, and full or partial loading of vessels, using the same port facility and ship unloading equipment. The capacity for this activity is 1500 m3/h of LNG.

Spain has built seven LNG terminals, six of which are in operation till date, while the seventh is complete and is expected to come into operation by early 2023.

Lastly, in **Türkiye,** LNG imports are one of the most important aspects of source diversification and daily regasification capacity, which is currently more than 120 mcm/day. This is planned to be increased via a new FSRU in years to come.

3.3.2. Net Exporting Countries' Perspective

Egypt in recent years has witnessed unprecedented development in natural gas discoveries, exploration, and production. Egypt has become a net gas exporter through LNG after reaching self–sufficiency in gas supply and an abundance of gas discoveries and production in recent years. Egypt is one of the fastest-growing Arab exporters of LNG, according to a report released by the Organization of Arab Petroleum Exporting Countries (OAPEC) on 16 August 2021.[10]

Egypt contributed about 5% of the Arab countries' total LNG exports, which amounted to 28,3 million tonnes in the second quarter of 2021. Despite Egypt's relatively small contribution to the total, it represented the largest percentage (47%) of the growth of Arab LNG exports during the second quarter of 2021, which were up from 25,3 million tonnes in the same period a year earlier.

In 2022, Egypt's natural gas exports were at full capacity of about 1,6 billion cubic feet per day (bcf/d) from its two natural gas liquefaction terminals, as the country seeks to benefit from a surge in international gas prices while simultaneously maintaining the production levels.

[10] *More info can be found here: Link (Arabic)*

4

CROSS-BORDER INTERCONNECTIONS AND SECURITY OF SUPPLY

The following analysis focuses on the role of the cross-border interconnections in achieving security of supply, harmonised gas regimes & integrated gas markets, and affordable energy prices. Also described is the role of the regulators in terms of developing and monitoring the cross-border interconnections. The chapter further explores the stance of the Mediterranean countries on security of supply, given its priority at the moment.

4.1. Interconnection Plans with Neighbours

Physical interconnections serve as the most common form of natural gas trade. Although not as flexible as trade through LNG, physical interconnections are cheaper in the long term, provided that the pipelines remain operational over a prolonged period. Furthermore, by ensuring the presence of physical interconnection points, exporting countries can ensure a long-term demand that they will have to meet; meanwhile, the importing countries can ensure a secure source of supply.

The advantages of having physical interconnection can also be viewed as a disadvantage. Currently, the EU is suffering from disruptions in Russian supply, and has even found itself in a vulnerable position given the situation in Ukraine.

Different countries in the Mediterranean region have different perspectives on physical interconnections, especially investing in new ones. It is noteworthy that the responses gathered in this report were gathered by the middle of 2022, and hence the responses in this sub-chapter represent the status at that period. Given the dynamic situation of the energy market, there still exists uncertainty as to whether the stated plans, as per the countries' replies, would be adopted within their respective strategies. This applies to all countries, especially those in the EU, where there is a common interest in optimising flow paths and satisfying demand across the continent. Indeed, some projects of common interest are currently being negotiated between countries and are still pending legislation. Nevertheless, the priority in the EU is to optimise existing capacities and, in some cases, make it possible to reverse flows when necessary.

In **Albania**, besides the successful TAP project, the country seeks to connect to its Balkan neighbours using the IAP project. This pipeline would flow through Montenegro and into Croatia. Further extensions are projected to extend into Kosovo.

Egypt's aspirations currently revolve around having an offshore gas pipeline that connects Egypt to Cyprus as a part of Egypt's gas hub strategy. Such a pipeline, besides being eligible to be connected to the potential East med pipeline, will allow exploitation of the liquefaction capability of Cypriot gas, enabling its export to different market destinations. The project has been accepted by both parties, being endorsed by the respective parliaments, while its implementation is still under evaluation.

CRE believes that in **France** the existing capacity is sufficient, while there is considerable uncertainty about the future of gas consumption. The development of any new capacity should only be considered if there is a proven market interest, and the project is supported by robust cost-benefit analyses. A fair sharing of costs between countries, reflecting the distribution of benefits, should also be ensured.

Italy also shares France's perspective when it comes to building new physical interconnections with neighbouring countries, with the last physical interconnection being the TAP project with Albania. At the same time, Italy is designing new gas supply flows from west to east and from south to north, mainly due to the current geopolitical situation in Ukraine.

In **Greece** on the other hand, there are still some ongoing market tests for building a physical interconnection with North Macedonia. Furthermore, the East med pipeline connecting Israel with Cyprus and Greece is a PCI project; however, it is still immature.

In **Lebanon**, the Ministry of Energy and Water has initiated advanced negotiations on a Gas Purchase Agreement with Egypt, on Gas Transport and Swap Agreements with Syrian, Jordanian, and Egyptian counterparts, and has pursued efforts to resolve obstacles. Lebanon is currently seeking to connect its local natural gas network to regional networks that would enable it to export supplies from potential finds into the European markets.

Portugal and **Spain** would support new natural gas physical interconnections if they are built ready for use for hydrogen in the near future and they are considered necessary and supported by a positive cost-benefit analysis.

Meanwhile, in **Türkiye**, plans on building new interconnections are carried out by the ministry. However, in the context of finding alternative gas supply to Europe through physical interconnections, an Israel-Türkiye pipeline is being discussed as a European substitute to Russian natural gas, besides serving as a path for EU's strategy to diversify sources.[11]

Quick Look

Albanian Case Study: Climate Change and Albania's Energy Mix

Albania's energy mix depends mostly on hydropower, where 99% of the generated electricity comes from hydropower, while the remaining 1% comes from solar energy, as per the MEMO+ report.[12]

The summer of 2022 appeared to be very challenging for Albania, where the rainfall was much less than normal, hence leading to the need to import electricity. Climate change has led to unfavourable weather conditions, so that accelerating physical gas interconnections has never been of such importance. By restarting operations in the thermal power plant in Vlora, Albania aims to have a more flexible energy system. Combined with the expected LNG projects in the same area, Albania could become a gas hub in the Balkan countries, besides ensuring the security of supply.

[11] *As reported by Reuters, March 2022.*

[12] *MEDREG - ELE WG - MEMO+ Report, 2022*

4.2. Role of the Regulators in Interconnections

According to EU legislations, NRAs have a key role to play in the materialisation of interconnections. Not only are they the ones who review the codes and ensure everything is in place legally, but they should attempt to dig deep into whether investment should be made in the first place, supervise the TSO's work when it comes to analysing the time and budget needs, as well as monitor the license issuing and permit processes.

In **Albania,** the position of the regulator is laid down in the Law no. 102/2015, which gives government the right to build and manage, leaving the regulator to monitor and regulate the market.

In **Egypt,** GasReg takes all the required actions to manage the licensing requirements of any projects and activities that will be implemented in the Egyptian gas market, as well as setting the rules through approving codes, developing tariffs, issuing licenses, and developing any other relevant procedures.

France, **Greece**, **Italy**, **Portugal,** and **Spain** follow the EU energy legislation, which leaves it up to the State to decide the competent authority to approve new infrastructures. The role that is commonly practiced by the NRAs in the EU countries is evaluating investment plans submitted by the operators and providing a non-binding opinion that could be considered when the ministry takes its final decision. Furthermore, NRAs in the EU practice the regular competencies such as approving codes and developing tariffs and other such matters. For example, in **Spain** the regulator has the role of providing the Ministry of Ecological Transition and Demographic Challenge with a non-binding report on the technical characteristics and necessity for its authorisation and to initiate actions regarding the development of all natural gas infrastructures, although the ministry is the competent authority to approve the investment. Meanwhile, in **Portugal,** the regulator is consulted by the Government regarding the general approval of the investment planning of all infrastructures, following a joint proposal by all infrastructure operators. The regulator can then draw up reports identifying special needs regarding investments or any other issue related to infrastructure, competition, or quality of service.

In **Türkiye,** like in the case of **Egypt**, the NRA sets the tariffs of the new interconnection points according to the legislation in force, after reviewing the investments. TPA to the newly built infrastructure including the IPs is regulated by the NRA.

Lebanon, even though still lacking a gas or energy regulator, foresees that any potential regulator will have a massive role in terms of managing and monitoring the cross-border interconnections.

Quick Look

French Case Study: The Role of CRE in Cross-Border Interconnections

According to EU legislation, regulators have a role to play in the development and management of cross-border interconnections.

New interconnections are expensive and complex projects. Historically, CRE considers that investment decisions should be taken, as far as possible, based on subscription commitments from market players in the framework of open seasons. This principle is taken up by the incremental capacity process provided for in the network code relating to the allocation of cross-border capacities. CRE considers that investment decisions must be based on solid cost-benefit analyses.

Every year, the French TSOs (GRTgaz and Téréga) must draw up/review a ten-year network development plan which must include each interconnection project. CRE examines this plan and verifies that it is in line with the European Ten-Year Network Development Plan (TYNDP).

CRE supervises the TSOs in the implementation of interconnection projects, with particular attention to cost and schedule control. It may introduce incentive regulation based on compliance with the target budget, control of project completion times, and the interconnection utilisation rate. The terms and conditions are defined in the methodology for calculating the tariff for the use of natural gas transmission networks (ATRT tariff).

In terms of access to interconnections, the regulatory authorities must monitor the interconnection access rules drawn up by the transmission system operators. As for the rules for allocating interconnection capacity, these are being harmonised under the 3rd European package.

To ensure that the mechanisms in force are effective, CRE monitors the use of interconnection capacities: in particular, it analyses the interconnection utilisation rates and the level of price convergence, and regularly publishes a report on interconnections.

4.3. Security of Supply

Security of Supply has always been of significance to all nations worldwide. However, due to the current geopolitical situation in Ukraine, the huge price surge and the threats, countries, especially net importing countries, have put security of supply as the number one priority. **Türkiye,** even though in a strategically good place, has put security of supply as their highest priority.

The ways to ensure security of supply in the current period would be to boost the rollout of renewable energy sources, at a financial cost and the cost of having a less flexible energy system. Other ways to ensure security of supply could be still using natural gas; however, by diversifying sources and using FSRUs. The

ways to ensure one's security of supply are numerous, although every country has a unique perspective towards the matter, given their peculiarities.

As **Albania** prepares to enter the gas market, the country's strategy includes the expected production of natural gas, the construction of the Vlore LNG terminal, the construction of the IAP line, and the development of the underground storage facility in Dumrea salts, all of which would fortify the country's energy security.

In **Algeria,** by law, according to the 02-01 law of 5 February 2002 on electricity and gas distribution by pipes, the Electricity and Gas Regulatory Commission (CREG) is in charge of elaborating, annually, the domestic gas demand forecast for the next 10 years.

For **Egypt**, as a gas producing country, security of supply is a strategic mandate of the ministry of petroleum. Security of supply is implemented in Egypt on different domains that extend from the unprecedented discoveries and exploration of offshore gas to the development of its wide-ranging infrastructure (TSO, DSO, LNG, FSRU, across-countries pipelines). The country is developing policies to become a gas hub by establishing the EMGF organisation and returning to the LNG market as a major exporter to different markets. In addition, there is a focus on the development of the domestic gas market by adopting high-end energy reform programs and establishing the gas regulatory authority to look after the development of local gas market aspects as per international practices.

Egypt has taken into consideration all aspects since the energy market reform to develop a dynamic gas market which has all the functional aspects as per the international practices. Part of such reform is to establish the gas regulatory authority—GasReg—with the main responsibility of establishing a secure, reliable, and efficient gas market, designing a market structure that can afford gas supply for domestic consumption, promoting different investments in the gas market segment, and positioning Egypt as a gas hub with potential benefits to all surrounding markets. One thread in such a strategy is to develop a strong and sustainable upstream sector, which is reflected in gas production that has been growing steadily since December 2017, with commencement of operations of the Zohr gas field, which is the largest gas discovery ever in the Mediterranean, containing an estimated 30 trillion cubic feet of gas, in addition to other discoveries soon to enter the production line.

Meanwhile, in **France,** security of supply is part of France's energy strategy. Historically, France has developed a robust gas system through a strong diversification of supplies and its gas storage facilities. The gas system has been designed to respect the 2% risk. The tools for ensuring security of natural gas supply can be divided into three broad categories:

- Obligations on gas players, in particular suppliers.
- Tools for sizing the gas system in a forward-looking manner.
- Safeguard measures in the event of a gas crisis.

France has developed an appropriate sizing of its gas infrastructures. Over the last decade, the gas system has been significantly strengthened to facilitate natural gas flows. The gas system now has seven main interconnections and LNG terminals located on three maritime fronts providing access to diversified

sources of gas: Norway, Russia, Netherlands, Algeria, and more generally the international liquefied natural gas (LNG) market. Within mainland France, gas flows are ensured through transmission and distribution networks, operating in a variety of ways and in synergy with natural gas storage facilities.

In addition, France has reformed and regulated its storage in 2018, imposing an 85% obligation of filling the storages facilities before the winter period. This was well before such a reform was even considered at European level.

Greece's security of gas supply is the most important pillar in the national strategy, as almost 60% of the natural gas is used for power production. It is therefore crucial in the country's energy mix. The N-1 is still very low, at 55%, which is expected to increase once the new FSRU projects are realised. A tender for the construction of an underground storage facility at the site of a depleted reserve is underway, but it is not expected to be completed before 2028. During the current energy crisis, RAE—as the Competent Authority for security of supply—has imposed an obligation on large suppliers to store gas in underground storages in Italy and on power producers to store LNG at an FSRU that has been leased for 1 year to increase the storage capacity of the LNG terminal of Revithoussa, according to the recent amendment of regulation (EU) 2017/1938.

Italy. Regulation (EU) 2017/1938 imposed the obligation on Member States to adopt the necessary measures to meet the maximum daily gas demand, even if the flow from the main gas supply infrastructure for the country, namely the infrastructure with the highest supply capacity according to what is known as the 'N – 1 formula' (for Italy, the pipeline for imported Russian gas), is completely interrupted. The results of the N – 1 formula in the most recent risk analysis document submitted by Italy to the European Commission in 2017 contain a value that is very close to the minimum threshold below which the infrastructural standard of the country is deemed inadequate to ensure the necessary levels of security for the country. This result is caused by both the increase in peak gas demand recorded over the last few years and, above all, the decrease in flows, already recorded or legitimately foreseeable, from certain important import gas pipelines in operation, caused by technical issues linked to the functionality of the gas pipeline and the decrease in volumes of import contracts being renegotiated with other exporters. The most detailed current simulations, relating to what might happen in the event of the main source of supply being interrupted in coming winters, highlight risks for the system, which in certain scenarios might be unable to meet gas demand for connected users. The results of the simulations show a less than optimum supply situation for natural gas in Italy in the event of periods of crisis that might occur in coming winters, a situation that will be brought back in line with the minimum threshold value by optimising entry flows.

Currently in **Lebanon** there is a large gap between supply and demand in the electricity sector, and the first policy objective of the Ministry of Energy and Water is ensuring reliable, affordable, and sustainable (24/7) electricity services across Lebanon in an efficient, fiscally balanced, and environmentally friendly manner. This goal should be achieved while accelerating the transition to a sustainable energy future for Lebanon that prioritises affordable renewable energy solutions, enabled by accelerated transition of baseload generation from liquid fuels to cheaper, cleaner natural gas.

Portugal. DGEG (General Directorate for Energy and Geology) sets out in the Regulation on Security of Supply and Planning the obligations of the National Gas Transmission Network operator in terms of security of supply and planning. DGEG shall submit to the member of the government responsible for energy, up to 15 July of each year, an SSMR (Supply security monitoring report), which should include the measures adopted and a proposal for the adoption of measures to enhance the security of supply of the NGS.

Just like France, strategic reserve obligations can be met by storing gas in underground storage facilities or LNG facilities. In this context, the underground storage of Carriço is the main infrastructure for the constitution of the security reserves.

Meanwhile, due to **Spain's** geographical location, security of supply has always been a basic strategy for Spain. Spain has counted on regulation to guarantee security of supply since 2004, which imposes on users obligations of diversification and maintenance of strategic and operative gas reserves, which served as a reference for the European Regulation on security of supply developed in 2010.

5

CHALLENGES OF DEVELOPING NEW INFRASTRUCTURE

CHALLENGES OF DEVELOPING NEW INFRASTRUCTURES

The following paragraphs present the main challenges that the regulators are facing in terms of developing new infrastructure or monitoring the existing ones. Furthermore, they dilate the future challenges that may come with the development of biogases and hydrogen.

In the attempt to have a net zero energy market, countries aim to incorporate future gases into their energy strategies. It is challenging to think of incorporating such gases into the current energy system.

Energy transition is already a challenge; coupling that with the current geopolitical situation in the region, which has led to both a tremendous price surge and a fear of running out of energy supply, the problems are graver than originally expected.

Firing up alternative fuels is of the utmost importance. The energy industry's focus is currently on the whole supply chain of future gases development and use in countries' respective energy systems. Numerous businesses are already investing in producing hydrogen and so on. The importance of the future gases has reached a point where policy makers are taking bold steps towards incorporating them. A clear example of the commitments can be seen in the EU, where the European Commission president announced the creation of a European Hydrogen Bank, to capitalise on the rapidly developing hydrogen economy. The bank is to invest 3 billion euros to help build a future market for hydrogen, stating that "Hydrogen can be a game changer for Europe."[13]

The south shore of the Mediterranean is also showing promising signs in terms of the production of these renewable gases, where countries like Egypt and Morocco are seeking to be energy hubs in the Mediterranean, using their renewable energy capacities to develop green hydrogen.

Egypt has signed around 9 MoUs in the Suez Gulf Economic Zone, some of which have developed and flourished, where a company like Scatec from Norway has shown great interest, to a point where off takers have already been announced. Even though it is not yet a mature market and future gases are not yet fully regulated, some of the countries in the Mediterranean have already announced that they have strategies to incorporate these future gases as a part of their energy strategy, whether they will be producers only, or users, importers, and so on.

This chapter considers biogases and hydrogen in all its forms (i.e., not only focusing on green hydrogen).

It is worthy of mention here that strategies may change over time. The current energy market is dynamic; meanwhile, the responses gathered for this section were collected in mid-2022. The strategies and challenges regarding the use of future renewable gases and developing sufficient infrastructure are all subject to uncertainty, where the stated plans might change in the years to come.

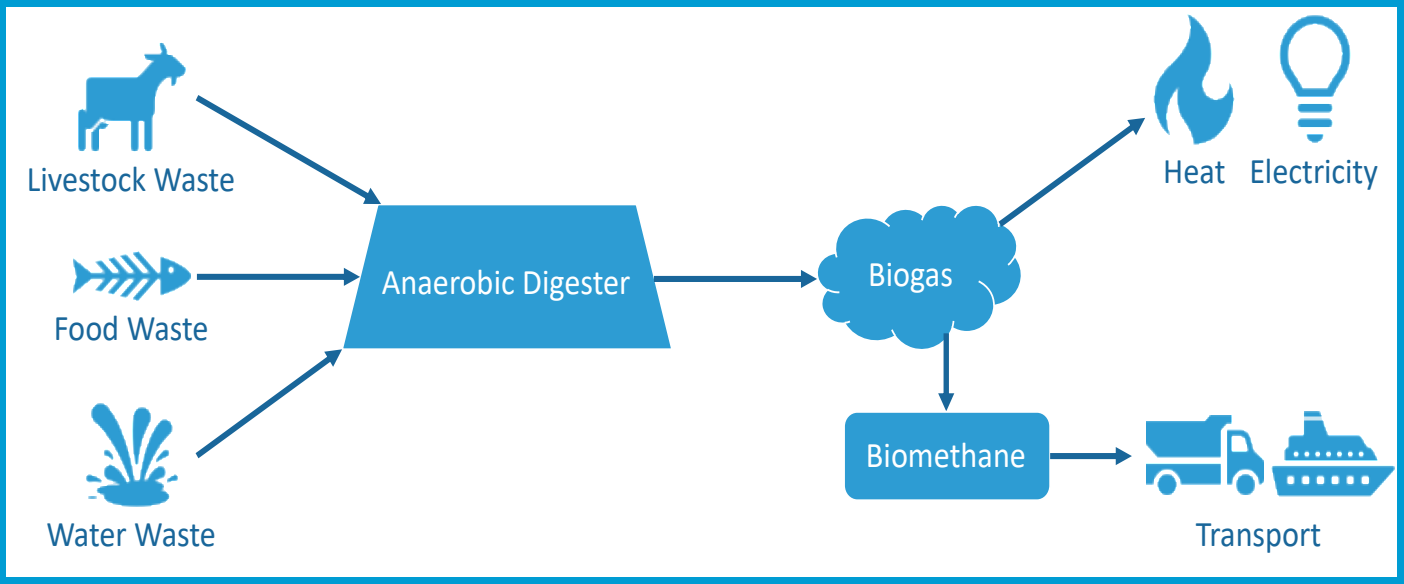
[13] *https://hydrogen-central.com/e3bn-europe-hydrogen-bank-announced/*

Furthermore, the Environment, Renewable Energy Sources and Energy Efficiency Working Group (RES WG) of MEDREG is developing a report on the "Future Role of Renewable Gases,"[14] where this chapter of the report and the said RES WG report complement each other in terms of the strategies and challenges.

5.1. Strategies for Biogases and Hydrogen

The diagram below shows how waste can be transformed into biogases, which can then be used for heating purposes, electricity generation, or even developed in biomethane, which can be used for transportation purposes.

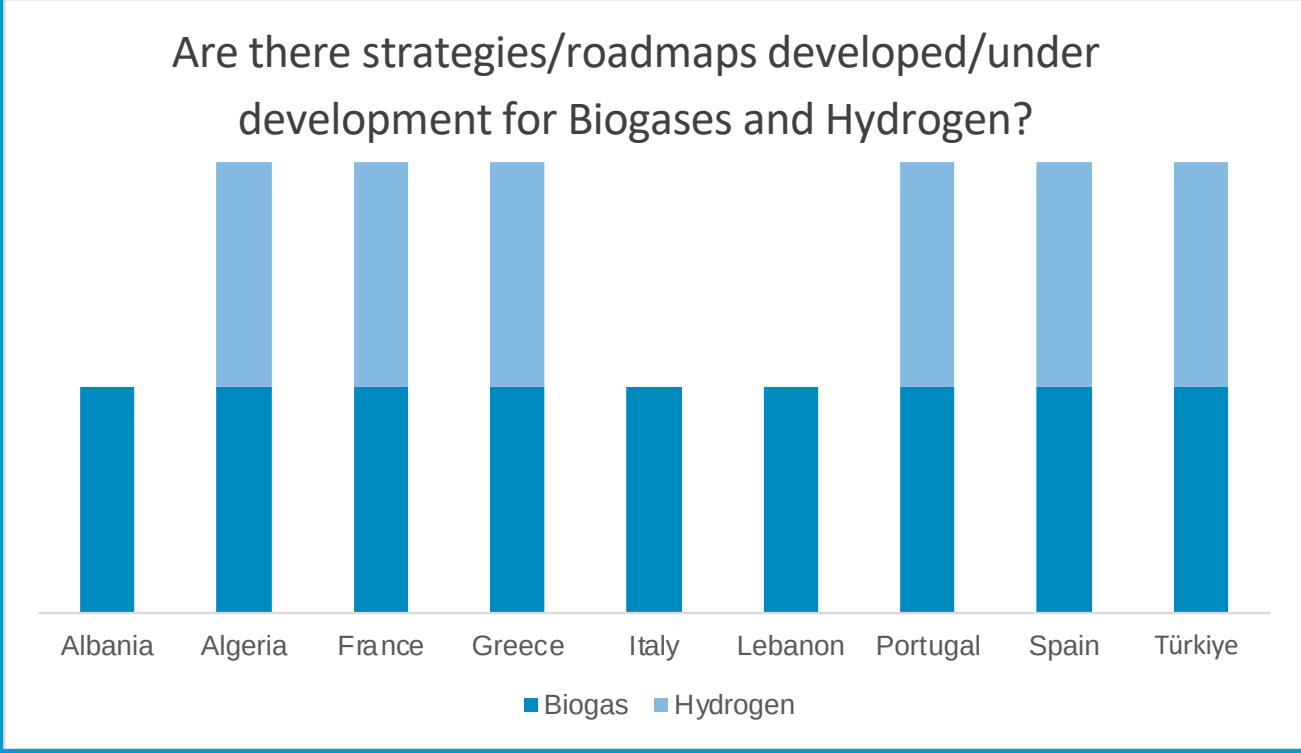
Figure 7 - Biogas Processing



As per the figure 8, most countries have a definite strategy when it comes to using biogases. Even though it leads to methane emissions, the fact that waste is used to produce biogases makes it an attractive solution. All countries produce waste and hence, theoretically, it is feasible that every country can generate their own share of biogases.

[14] *MEDREG – RES WG – Future Role of Renewable Gases, 2022*

Figure 8 - Presence of Biogases and Hydrogen Strategies



The production of hydrogen is slightly trickier. Should the generated hydrogen be green hydrogen, there will need to be an abundance of water, desalination plants, if necessary, as well as an abundance of renewable energy capacities Countries of the south shore have a massive advantage over their north shore neighbours, where solar energy is of extreme significance.

Looking at the figure above, it is noteworthy that **Egypt** does not have an actual strategy/roadmap for the use of future green gases. Egypt plans to use future gases; however, they have not formally published these intentions in their energy strategy. Meanwhile, Greece has drafted the strategy for the use of hydrogen and biogases, although a decision is still to be taken.

5.1.1. Biogases

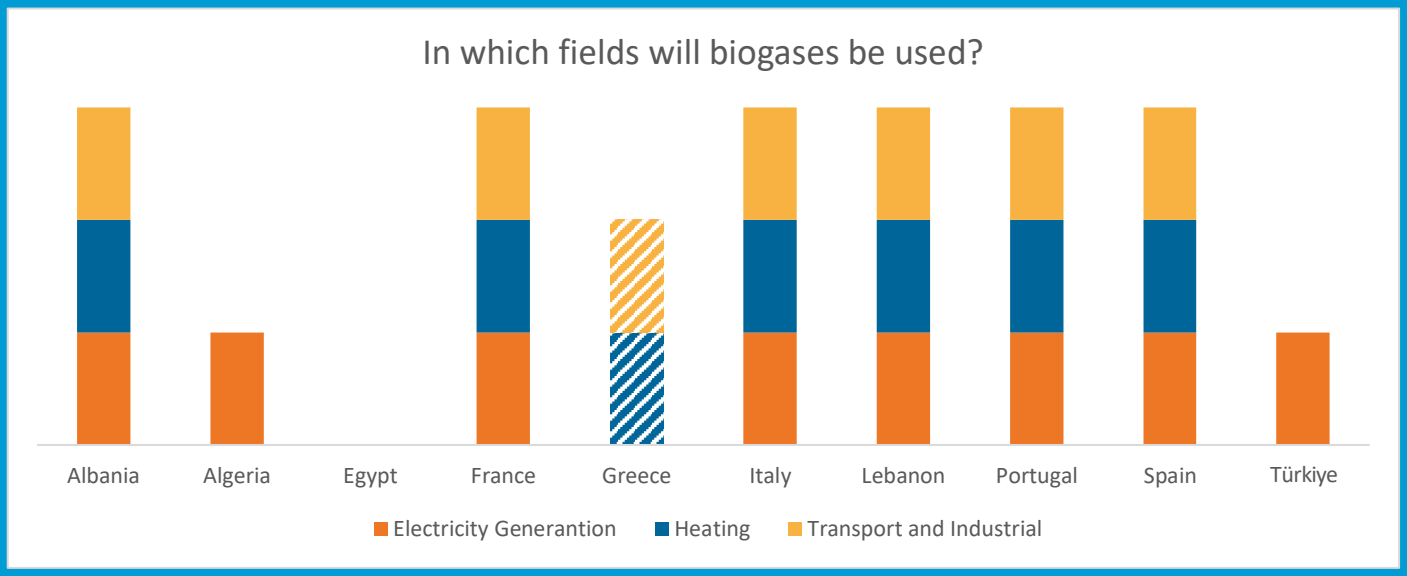
As evident from the figure 9, when it comes to using biogases in the energy mix, almost all countries will be using this product for electricity generation. This is probably because since methane is the main ingredient, there will be no issue as to powering the current thermal plants with a mixture of biogas and the ordinary natural gas.

Furthermore, one can point out from the figure below that all countries with colder winters and a heating infrastructure would also use the biogases for heating.

Even though **Egypt** does not appear to use biogases on the national level, there exists some slight production and consumption in the rural areas, where biogases are produced and consumed in an

unregulated, localised manner. Meanwhile, as mentioned previously, **Greece** plans on using biogases and the country is planning to feature these as a part of their energy strategy.

Figure 9 - The Use of Biogases per Country



It is also significant that all the EU countries in the chart are intending to use biogases for all three purposes: electricity generation, heating, and for transportation and industrial purposes, as per Figure 9 above.

One can also refer to Figure 10 below to see the distribution of the use of biogases in countries across the Mediterranean region.

Figure 10 - Biogas Usage in the Mediterranean Region

5.1.2. Hydrogen

> *"Hydrogen should not be considered a technology, but a means to enable it. It is a kind of 'internet of energy', which can connect all sectors of the economy and society to stimulate competition and innovation between sectors and geographical areas, making energy more affordable, available, and abundant for an ever-growing global population."*
>
> Marco Alvera, Rivoluzione idrogeno, Mondadori, 2020.

As expected, countries do not seem to have a common ground on the use of the hydrogen in their energy systems. The use of hydrogen is mixed up with numerous constraints, most of which are technical, followed by financial ones. All this leads to the fact that policy makers do not have a solid ground on how they would like to use it in their energy mix.

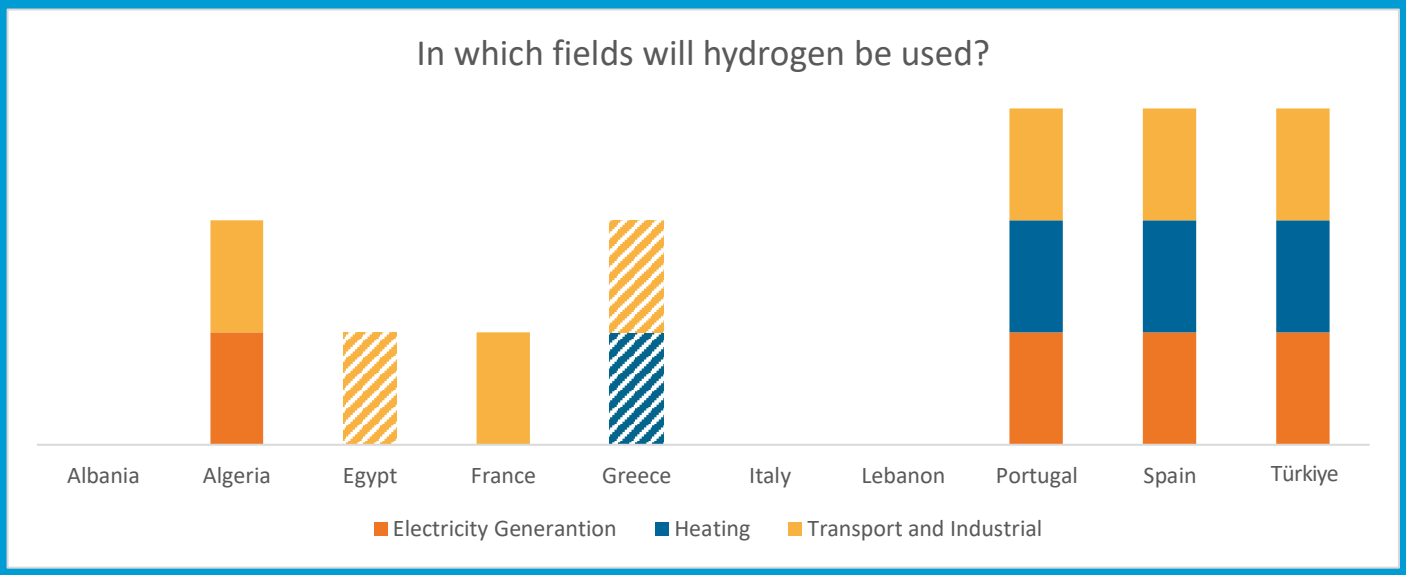
Among the most common practices for using hydrogen is to blend it with natural gas. This blending consists of the integration of concentrations of the H2 molecule into an existing gas pipeline, to foster the hydrogen market, or a significant and nice environmental impact, where less hydrocarbons would be burnt to provide a similar calorific output. However, since this has not been implemented on a wide scale, questions have risen whether in the big picture it will be viable.

In a success story regarding blending, a pasta factory in rural south-west **Italy** (Orogiallo factory in Contursi Terme) created a small slice of history when they cooked pasta using a blend of hydrogen and natural gas that had been injected into the Italian gas transmission grid.[15]

Even though there are some success stories originating from blending, there are still studies being carried out regarding the economic feasibility of blending. In **France,** for instance, CRE considers that, from an economic perspective, while low-carbon hydrogen is still very expensive to produce, injecting it into the networks would constitute a loss of economic value for hydrogen and a degradation of the quality of use of the networks. Hydrogen would no longer be usable and would degrade the quality of methane, thereby contributing to a loss of calorific value.

Looking at the Mediterranean region, and the countries' respective strategies for using hydrogen as can be seen in the figure below.

Figure 11 - Use of Hydrogen per Country

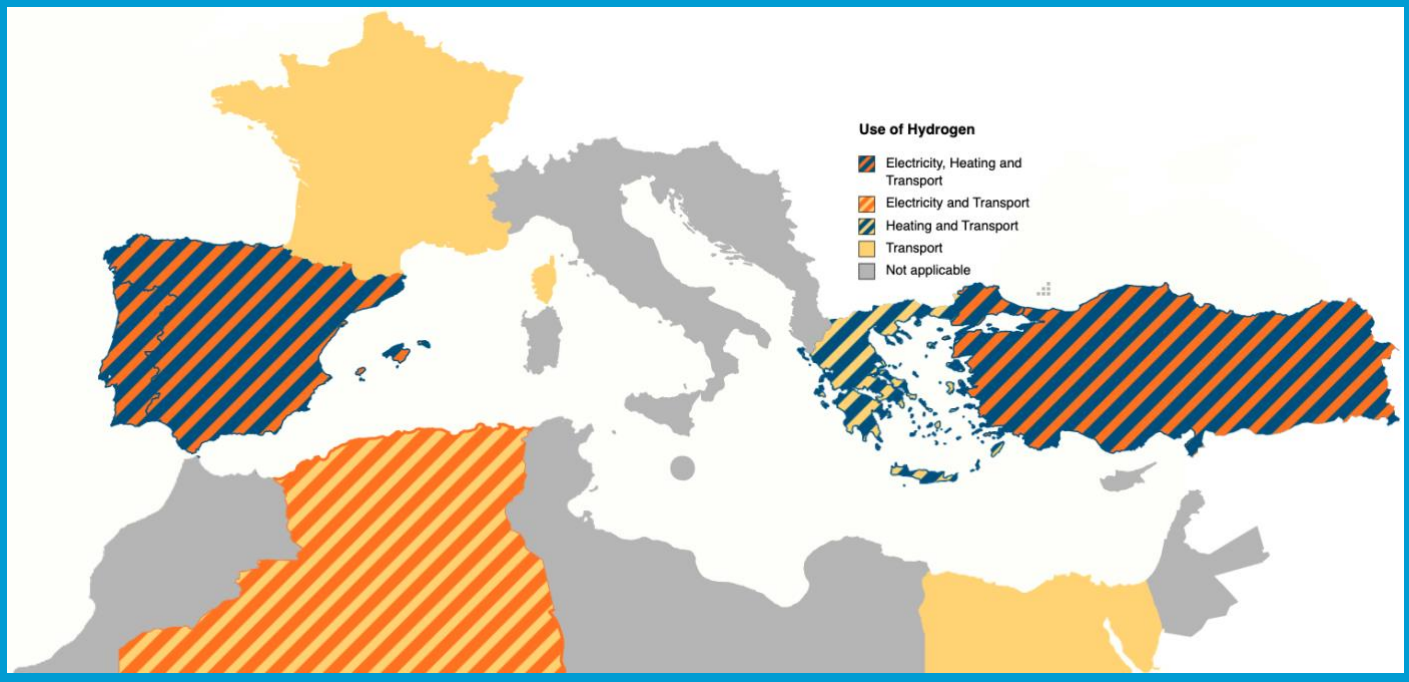


It is worth highlighting once again that since **Egypt** and **Greece** do not have a solid energy strategy in place featuring the future gases—hydrogen and biogas—while also planning to use them in their energy mix scenarios, their approach seems to be slightly different from that of the other countries.

One can also refer to the figure below to see the distribution of the use of hydrogen over the Mediterranean region.

[15] NYTimes. Updated July 13, 2021

Figure 12 - Hydrogen Usage in the Mediterranean Region



Quick Look

Greek Case Study: Greece as a European Hydrogen Hub

Even though Greece plans on using future gases in their energy mix, their energy strategy is currently under public consultation. However, that has not stopped this European country from aspiring to exceed expectations. Besides the strategy of using hydrogen in the energy mix, Greece is a contender to becoming a new hub for hydrogen in Europe with the White Dragon project. The use of hydrogen might allow Greece to transform from being an energy importer into a self-sufficient, energy autonomous country.

In addition to that, and surpassing the Portuguese potential, Greece would be the European feed point of Middle-Eastern and North-Eastern African hydrogen, making it potentially crucial in the Mediterranean energy market. Saudi Arabia on its part is interested in partnering with Greece to ensure its role in supplying the EU with hydrogen, after launching the first major hydrogen project that would meet the demands of industrial producers.

Depending on the development of the hydrogen market, if the need emerges, interconnections will be set up. These developments will also depend on the orientations adopted in the gas package currently being negotiated at European level.[16]

5.2. Challenges of the New infrastructure and Targets

With the rolling out of the future green gases, one can only imagine the efforts being taken to prepare an already working energy system to accommodate a new source of energy. Besides the integration issues of renewable energy sources with the general energy system, the gas infrastructure will have to be able to accommodate the said future green gases.

The question remains, should the existing infrastructure in terms of pipelines and compressors be upgraded, or should a hydrogen dedicated infrastructure be made from scratch? The answer to this question would lie in the strategies countries adopt with respect to biogases and hydrogen.

Meanwhile, countries in the Mediterranean region have shared their viewpoint.

In **Albania** and **Lebanon**, heavy investments will be needed to benefit from the future gases' potential, especially considering that neither country still has a fully functioning gas market.

[16] *https://hydrogen-central.com/greece-becoming-new-hub-hydrogen-europe-hydrogen-europe/*

Greece, **Portugal, Spain,** and **Türkiye**, besides the investment issues, worry about the integration of new gases into the already existing infrastructure. Greece has even questioned whether a new hydrogen dedicated infrastructure should be laid out. The answer to this question would be, as stated earlier, based on Greece's ability to become a hydrogen hub.

Portugal on its part sees that the main challenges for injecting the biogases and hydrogen into the gas network include setting gas quality minimum requirements, stepping up gas quality monitoring in every node of the network, and creating operational tools to control gas flows at injection points. Another challenge, particularly for hydrogen, is to ensure that hydrogen percentage in the gas mix remains below maximum levels in every node of the network.

Spain added that the challenges include adaptation of natural gas networks and equipment, adaptation of the equipment of the final customers, gas quality issues, costs of adaptation and building of new infrastructure, possible safety issues, the low technical efficiency of the electrolyser, and the development of the necessary regulations.

Egypt and **Greece** still do not have an approved hydrogen or biogas strategy, and hence the forecasted investments are still unknown, pending the elaboration, development, and approval of the final strategy.

Furthermore, the lack of regulations regarding the use of hydrogen and biogases in the region's energy markets is a major obstacle in terms of scaling of future gases projects.

5.2.1. Biogas Specific Challenges and Targets

In **Albania,** over the next 10 years, 500 million euros will be invested into biogas and incinerators. For the time being, since there have been no plans mentioned regarding the use or production of hydrogen, there are no forecasted investments in that regard.

In **Algeria**, the existing infrastructure is designed to supply only natural gas. The renewable energy development plan provides that the electricity produced from alternative fuels as biogases is and will continue to be used to directly generate electricity. Regarding investing in a hydrogen infrastructure, Sonatrach has signed an agreement with ENI to produce green hydrogen using RES and an electrolyser. The preliminary contract is valued at 30 million dollars.

The forecasted investments in **Lebanon** for the power sector projects are around 20 million USD. The Renewable Energy Outlook for Lebanon includes a strategy for bioenergy as part of the Remap 2030, covering the building, transportation, and power sectors.

France has laid out a specific framework to promote biogas development. As for the origins of the integration of biogas, it stems from a political will to support biomethane. Moreover, in view of future developments in the gas sector, both DSOs and TSOs were in favour of developing biomethane in their networks. Biomethane and biogas are still very expensive for public finances. The French government is trying to develop them and to set profitability criteria. In France, it seemed important that biomethane producers have access to the wholesale market.

Indeed, biogas production benefits from different public support mechanisms. The main support mechanism at national level is the feed-in tariff for biomethane injected into the gas networks and electricity produced from biogas, the guarantee of origin system ensuring the traceability of biomethane, a “right to injection," and the reduction of connection costs.

Producers of biomethane injected into natural gas networks benefit from a purchase obligation, accessible through an open window or a call for tenders depending on production capacity. That is around 100 €/MWh, modulated according to the inputs and the size of the project. The goal is to reach a target price of 75 € / MWh in 2023, and 60 € / MWh in 2028. This tariff is established over a period of 15 years and varies according to the maximum injection capacity of the installations and the inputs used. It does not exceed the normal profitability of the projects. It is foreseen that the open window system which was instituted in 2011 for installations of less than 300 Nm3/h will be replaced by a tender system for those exceeding this threshold.

According to the **Italian** National Recovery and Resilience Plan of 2021, the development of biomethane obtained by maximising the energy recovery of organic residues is strategic for the enhancement of a circular economy based on reuse and is a relevant element to achieve the European decarbonisation targets. The investment line aims to do the following:

i. convert and improve the efficiency of biogas plants’ existing agricultural products towards the total or partial production of biomethane to be used both in the sector of industrial and residential heating and cooling as well as in the tertiary and transport sectors.
ii. support the construction of new plants to produce biomethane (through a contribution 40% of the investment), always with the same destinations.
iii. promote the dissemination of ecological practices in the biogas production phase (minimum soil tillage sites, systems’ low-emission innovative products for digestate distribution). Through this intervention, it will be possible to increase the power of biomethane from reconversion and allocate approximately 2,3–2,5 billion cubic metres of gas for the greening of the gas network.

Spanish Biogas Strategy sets a minimum target of producing biogas of 10,41 TWh/year by 2030. In the transport sector, biogas and biomethane will contribute to achieving the Spanish objective of 28% utilisation of renewable energies in transport in 2030 and the EU objective of 3,5% advanced biofuel use in transport in 2030. There are different EU and Spanish financial instruments and programs that promoters can apply to for helping develop biogas and biomethane projects; their description is included in the biogas roadmap. A system of guarantees of origin for renewable gases and others for hydrogen are being developed.

5.2.2. Hydrogen Specific Challenges and Targets

Meanwhile, in **France**, the development of hydrogen is taking place at local level with production and consumption developing in parallel in the same areas. If the market develops sufficiently and the need emerges, it will envisage linking the different production areas. CRE does not consider that a conversion of gas infrastructures for the transport of hydrogen will necessarily have to be promoted. The network for hydrogen will certainly have a different capillarity, as the consumers are not the same. Moreover, the capacities of the current gas infrastructures appear to be oversized. France also adopted in 2020 a Strategy for the development of Hydrogen.

For hydrogen, according to the **Italian** National Recovery and Resilience Plan of 2021, administrative simplification will be made that defines technical safety standards on production and transport, simplifies administrative procedures for the construction of green H_2 production plants, adds the participation of H_2 plants in network services, and guarantees of origin for renewable H_2. Italy will also be taking measures to promote the competitiveness of hydrogen, like tax incentives to support the production of green H_2 and measures for the diffusion of green H_2 consumption in the transport sector through the transposition of the European Directive RED II. REpower EU sets a target of 10 Mtonne of H_2 production by 2030 and additional €200 million funding to accelerate hydrogen projects. Five supply corridors may be considered the key to supplying hydrogen in Europe: Corridor A will decarbonise existing industries along the route in Italy and Central Europe as well as in Germany; Corridor B will decarbonise regional industry and transport clusters in Portugal, Spain, France, and Germany; Corridor C will meet demand from industrial clusters and ports in the UK, the Netherlands, Belgium, and Germany; Corridor D will serve numerous new green steel, e-fuel, fertiliser, and green chemicals projects in the Nordics as well as decarbonising existing industry in the Nordics, Baltics, Poland, and Germany; and Corridor E will deliver hydrogen to off-takers in Central Europe and Germany.

Regarding corridor A (hydrogen Import from North Africa), its production will unlock lowest cost H_2 supply for Italy through existing infrastructure, and the existing pipelines (see the TMPC) will enable the energy transition through the progressive repurposing of the necessary pipelines according to the European H_2 import needs.

Hydrogen import from North Africa will be needed to cope with high Hydrogen IT demand foreseen in the scenario, equal to 23 TWh @ 2030 and 127 TWh @2040 (scenarios F55 and GA2040).[17]

The Italian Hydrogen Backbone could be defined by ~ 2800 km of H_2 network to bring production from North Africa and southern Italy to consumption areas; 75% of the km of this network is the result of

[17] *Source: Five Hydrogen supply corridors for Europe in 2030*

repurposing and 50 MW for compression stations, to ensure suitable pressure on the H_2 network backbone.[18]

In **Portugal,** the Council of Ministers Resolution no. 63/2020 of August 14 has approved the National Hydrogen Strategy (EN-H2). This strategy aims to contribute to the EU's national and decarbonisation objective by introducing an element of incentive and stability for the energy sector, promoting the gradual introduction of hydrogen as a sustainable pillar, and integrated into a broader transition strategy to a decarbonised economy, as well as a strategic opportunity for the sector/country. It aims to promote and boost both supplies and consumption in the various sectors of the economy, creating the necessary conditions for a real hydrogen economy in Portugal. The objective is to ensure, in the long term (2050), a decarbonisation of the entire natural gas network and power plants and contribute significantly to the decarbonisation of the transport and industry sectors.

The **Portuguese** strategy for green hydrogen forecasts a mix of 10–15% of H_2 injection in the gas network by 2030. In addition to hydrogen incorporation targets, the strategy also sets other objectives that reveal its ambition by 2030, such as number of H_2 vehicles (passengers and goods).

The **Spanish** Hydrogen Strategy foresees an installed capacity of 4 GW electrolysers by 2030 and different milestones in the industrial, mobility, and electricity sectors for the period 2020–2030. An intermediate target (estimation) between 300–600 MW installed capacity of electrolysers for 2024 is set. In the 2030–2050 period the hydrogen technologies should reach maturity and be widely deployed. The consecution of the objectives for 2030 will facilitate the deployment of 8,9 billion euros in investments to implement the hydrogen projects (private sector with public sector support when needed).

Quick Look

Egyptian Case Study: Hydrogen Potential in the SCZone

Egypt has been making moves to capitalise on the investment momentum ahead of COP27 by escalating and positioning the Suez Canal Economic Zone (SCZone) with reference to its capabilities like its geographical location and pivotal ports overlooking the Red and Mediterranean seas.

Global companies like SCATEC, EDF, MASDAR, TOTAL, MERSIC, AMEA power, and others have signed more than 10 billion USD worth of preliminary agreements for green hydrogen and green ammonia projects within the SCZone, to establish industrial facilities and complexes in the Sokhna area to produce green fuel and use it for ship bunkering services with clean fuels or export to foreign markets as part of Egypt's

[18] *Nicola Battilana, SNAM, MEDREG Workshop Renewable Gases: Commercial and Regulatory Aspects and the Effect of COP26 Decisions September 29, 2022, Milan*

strategic plan 2020–2025. Binding agreements are yet to be signed, but the scale of interest is a good indicator of just how attractive the SCZONE is for international players. All companies are currently conducting detailed feasibility studies for projects to sign and announce contracts, in conjunction with Egypt's hosting of the COP27 Climate Change Summit.

The government is finalising the national hydrogen strategy that will cover the whole hydrogen value chain: supply, demand, and infrastructure, and will include a roadmap for regulation, feasibility studies, and an assessment of market viability with support from the European Bank for Reconstruction and Development (EBRD). The government is also working to update its 2035 energy strategy to integrate hydrogen plans and different scenarios into its renewable energy strategy. The strategy is being finalised and will be launched during COP27. It is noteworthy that the SCZone's strategic location offers competitive production cost and the most comprehensive market access program in the MENA region and beyond, as well as being one of the best global locations for transit operations, which will help in facilitating the movement of imports and exports. SCZone is relatively close to Cairo and is in the main international maritime route "Suez Canal", which connects Europe and East and North Africa via the Suez Canal with Asia passing through the Arabian Gulf, serving most of the global trade.

6
CONCLUSION

CONCLUSION

Starting from the challenges of the new infrastructure analysed in the earlier chapter, it could be useful to remember that these infrastructures are intended to be spread to try to achieve what has been mentioned in the Paris Agreement and the targets and pledges made during the COP Summits.

On the other hand, the EU's idea of transforming the economy to mitigate climate change[19] could be seen as the first reason for an economic and financial depreciation of the investments in fossil fuel infrastructures in Europe. The freezing demand deriving from the COVID-19 pandemic was the second reason for raising the "stop" sign on such investments.

The previous picture has totally changed after the impressive recovery of Asian energy demand and the change in the European gas scenarios in the wake of the Ukraine crisis.[20]

Consequently, gas prices reaching record levels has boosted the process of investing further in fossil fuel in the short run. For example, Italy has switched back to coal and Germany has been fast-tracking the construction of two LNG terminals while extending the life of its coal and nucleal power plants.[21]

Security of supply has become much more important than before in the discussion of any energy scenario, and given that more markets in the region are able to strengthen importing countries' energy security, new cross-border interconnections are being designed and investments are being made to increase the existing capacity (see TAP from 10 bcm/year to 20 bcm/year). [22]

On the other hand, gas shipping infrastructure is constantly increasing, especially in Europe, resulting from the fears of piped gas supply disruptions. This period has also witnessed a rapid growth in the numbers of FRSU terminals. This growth has been due to parameters like lower costs, speed in schedule, commercial flexibility, and dependability.[23]

It is important to distinguish between measures and investments realisable in the short term and over the long term and to divide up the economic and financial resources for trying to achieve both goals. According to the idea of minimising the climate change effects in the long run, no fossil fuel investments should be scheduled, but it is also crucial to establish a reliable, affordable, and sustainable energy system. In this regard, the "peak shaving" method to flatten the gas demand curves especially must be covered by a base-load fuel non-dependent on the conditions.

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[19] "Brussels, 11.12.2019 COM (2019) 640 final COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

[20] See Andreas Schoeder Independent Commodity Intelligence Services (ICIS) Gastech Conference Series Programme 2022

[21] See Minh Le Rystard Energy Gastech Conference Series Programme 2022

[22] https://interfax.com/newsroom/top-stories/78791/

[23] Anna Apostolopoulou Lloyd's Register Gastech Conference Series Programme 2022

CONCLUSION

As previously mentioned, among the MEDREG members, we would like to recall that Albania is depending on water for producing power, and hence due to water shortages, especially during the previous summer, power generation dropped significantly. This example prompts us to reconsider fossil fuels also in the long run, but possibly in a novel manner. In fact, the question to be posed is not whether fossil fuels should be used or avoided, but to identify the "damage" factor of fossil fuels from a climate change perspective and to develop possible knowledge and technologies that allow limiting this change in the climate. A pivotal example along this path is the deployment of carbon capture, utilisation, and storage technologies at a scale essential to reduce greenhouse gas emissions in line with the Paris Agreement and the subsequent targets established through the COP process.

In this context, the NRAs' role is to deploy a stable regulatory framework, which will foster investments for new technologies, but also to guarantee fast-track permits and secure funding, to enable stability and clarity of the tariffs and final prices perceived by the consumers in a reliable and affordable energy framework. This should be done through a gradual approach to the regulation also in terms of unbundling, TPA, CAM, interoperability, and data exchange, in line with market and infrastructure development and considering the dire need for a flexible and gradual region-wide regulatory regime as previously explained and demonstrated by the European energy regulators.[24]

[24] *https://acer.europa.eu/Official_documents/Position_Papers/Position%20papers/ACER_CEER_WhitePaper_on_the_regulation_of_hydrogen_networks_2020-02-09_FINAL.pdf*

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