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RESEARCH ARTICLE

OFFSHORE LNG COOPERATION [1]

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Abstract
Traditionally, offshore gas exploitation involved gas gathering pipelines to onshore facilities where it is processed and delivered to markets, by pipeline or liquefied onshore. So far, the Eastern Mediterranean has proved no different, with each country pursuing gas pipelines to their own shore. This article proposes that offshore floating production and liquefaction, for exports of LNG direct to markets, has many advantages, including being quicker and cheaper. It could lead to an offshore LNG hub and can be a route for regional cooperation. There are international examples, such as Senegal / Mauretania, Mozambique and indeed is being investigated for the East Mediterranean. Obvious markets for the LNG lie in Europe where gas prices remain considerably elevated over pre-Covid price levels.
Keywords: Offshore, LNG Coopertation, Pipeline

Introduction

The East Mediterranean (EastMed) region is fast growing as an exciting new play for gas development and commercialisation. Several gas fields have been found in the offshore basin. It is however in a region riven with political and religious divisions, from the ancient Greek Persian clashes to the various Moslem, Christian and Jewish groups.

Many countries, perhaps eight, have maritime jurisdiction or claims on the offshore gas resources in the East Mediterranean and several other regional players have an interest in the offshore resources. Several of the maritime claims are overlapping which can lead to further tension.

Traditionally, the way to develop offshore oil or gas resources is to install a fixed offshore subsea drilling and production platform, which then gathers oil or gas and pipes it to shore for refining or processing. Gas is drilled offshore and piped through gas gathering pipelines for processing onshore. The North Sea is a prime example of this with gas gathered offshore and piped to St Fergus (north of Aberdeen), Scotland or Stavanger, Norway for processing and then onward pipeline transportation to markets[1]

Offshore LNG Cooperatıon

The Eastmed Has Proved No Different

This is the approach that has been adopted in the EastMed so far. Exploitation was started by Egypt, with offshore gas piped to shore for processing and the export from the LNG liquefaction

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terminals at Damietta and Idku. The massive Zohr field is also likely to be sending gas by pipeline to the Egyptian shore for processinga.

Israel followed suit with a pipeline from its Tamar field to the Israeli coast. Also within the Israeli jurisdiction lies the Leviathan field. There are options to pipe gas for processing to Turkey, Egypt (to Damietta or Idku) or into the Tamar gas system and to Israel.

In the Cypriot section lies the Aphrodite field, from where gas could be piped to Greek Cyprus and on to Turkish Cyprus and Turkey. And then there is the EastMed pipeline to Europe. The East Mediterranean (EastMed) Gas Pipeline Project which is in development, plans to bring 10 billion cubic meters per year (bcma) (initially, rising to 16 bcma) of gas from the Leviathan gas basin offshore Israel to Cyprus, then on to Crete, mainland Greece and then joining the Poseidon gas pipeline crossing the Adriatic Sea to Otranto in southern Italy. It is a long distance, 1300 km or perhaps longer depending on the details of the route. EastMed has been designated as an EU Project of Common Interest (PCI) [4].

The project is being developed by Edison (an Engie company) and DEPA of Greece, with about Euros 35 million (€m) in EU funding as a PCI. Although the project has EU and government support, no international company or investor has yet expressed interest. EastMed is expected to take gas from the Israeli Leviathan gas field which could be ready to export gas from 2025 [5].

In addition to the gas production costs, Energy Markets Global estimate that pipeline capital costs could be around USD 7 billion ($bn) although that is likely to rise to $8-10bn at least (plus the gas development costs), which is approximately $3 / million British thermal units ($/mmbtu) or $100 / thousand cubic metres ($/Mcm), based on a $7bn capital cost discounted at 12% over 20 years (EMG estimates).

EastMed looks an ambitious and challenging project. There should be doubts about whether it can be viable and will actually proceed. We think the EastMed pipeline could be considered as a political project without a strong economic foundation, which could go the same way as Nabucco and eventually be abandoned[6], [10]

These pipeline routes for monetising EastMed gas are likely to be relatively expensive, will take a relatively long time to come to fruition and they are also more confrontational. Gas going by pipeline to one country means that it does not go to another, hence a scrabble for jurisdiction and for resources in a volatile region[7]

There is another approach, a better way. The EastMed gas fields are all within essentially one gas basin. Regional countries will need to cooperate to ensure efficient development and gas flows from adjacent fields. That cooperation should be extended.

The whole EastMed development could be carried out entirely offshore. Technology has moved on and there are many more opportunities for novel approaches now [8].

There can be Floating Production Storage and Offloading (FPSO) for oil, Floating Liquefied Natural Gas (FLNG) for gas and export directly to markets by LNG carrier from the FLNG. Subsea wells connect to an FLNG vessel which is moored to the seabed [9], [10]. LNG carriers take liquefied gas from the FLNG vessel where it had been stored as LNG and can then proceed directly to export markets. There is no need for gas to be landed at all, except when it arrives at market. again, gas imports can be landed through a Floating Storage and Regasification Unit (FSRU) vessel, again avoiding the need for expensive onshore facilities [2].

The waters around the fields in question (Aphrodite, Leviathan, Tamar, Zohr) are around 1500 metres deep and so are shallow enough for an economically viable operation.

There are many advantages of an entirely offshore EastMed gas development over a traditional gas gathering pipeline, for example:

Quicker
It can be much quicker to install (vessels can be leased and in place within months rather than years for an onshore operation with land acquisition, licensing, financing and then construction).

Lower cost
Costs can be substantially less (the onshore facility costs and pipeline costs are avoided).
Potential for an EastMed LNG Hub
There is talk of Turkey becoming a pipeline gas hub, which makes sense for various reasons, lying as it does between Middle Eastern and Central Asian gas resources and European markets. In addition, and complementary to that, an EastMed offshore LNG development would have the potential to grow into an LNG hub, and possibly the first one in the world[10].
With gas production from various fields feeding into one or more FLNG moorings, and LNG carriers from different buyer countries arriving to collect LNG from floating storage, once sufficient volumes are achieved, traders would start buying and selling LNG at the offshore site, and negotiating hub prices there. The EastMed could become a gas hub as TTF and NBP are pipeline gas hubs in NW Europe [3].

A Route to Peaceful Cooperation
Although the particular field and location for the FLNG would be within the jurisdiction of one of the countries involved, it would be close to other maritime jurisdictions. More importantly, without the need for a gas gathering pipeline to shore, there is no need for an overwhelming advantage of one country over all others. The benefits to each country in an offshore FLNG can be based on their participation in the equity financing. Benefits from and participation in the development is based on each partner's shareholding in the joint venture consortium which develops the gas resources and FLNG.
An offshore international joint venture can bypass the jurisdictional issues which has plagued the region for such a long time. Offshore gas and LNG is a route to peaceful international cooperation in the region[5].

Other International Examples of Offshore FLNG
There are international examples of a successful offshore FLNG and LNG export. Examples include Senegal / Mauretania, Mozambique, Australia (Prelude) and indeed possibly Leviathan in the EastMed. The first two are briefly presented as case studies.

Senegal / Mauretania: GTA
Greater Tortue Ahmayim (GTA-1) is a joint venture cooperation between Senegal and Mauretania for the development of offshore gas resources. BP (UK, Operator) and Kosmos (USA) are developing an FPSO and FLNG, with a Train One LNG capacity of 2.3 million tonnes per year (mtpa, 3.3 bcma), expandable to 10 mtpa. The expected start date is the end of 2023. The water depth is 2850 metres for the drilling wells, 120 metres for the FPSO and 30 metres for a close to shore liquefaction. The total estimated cost for the whole upstream and liquefaction is $4.6bn. The operators are also foreseeing the site becoming a potential LNG hub[3].

Mozambique: Coral Sur
ENI (Italy, Operator) and ExxonMobil have developed an FLNG offshore northern Mozambique, in the Romova Basin shared between Mozambique and Tanzania. The FLNG has a capacity of $7bn. It is linked to six subsea producing wells and is at a water depth of 2000 metres. LNG exporting started from late 2022.

EastMed Leviathan FLNG Study

The concept has already started being investigated. Chevron (USA) and NewMed Energy (Israel) are currently carrying out pre-FEED studies into an FLNG at the Leviathan field. This would be for a 4.6 mtpa production capacity facility, with production available for exports to Germany [2].

Conclusion

The advantage of LNG is that it can be delivered to profitable distant markets relatively quickly. Gas from the EastMed could be supplied to regional markets but surely, with the high prices Europe is offering now, the obvious markets for revenue strapped governments are LNG export markets. And why not with the high prices Europe is paying.

In the spring of 2019 (before Covid and before Russia/Ukraine), gas hub prices at the Title Transfer Facility (TTF) in the Netherlands were around Euros 15 / MegaWatt hour (€/MWh), equivalent to around $4.4/mmbtu. At the height of the gas crisis in 2022, at the end of 29 August 2022, TTF prices hit €320/MWh ($93/mmbtu, 21 times more). They have now fallen back considerably, supported by successful EU LNG buying, ample storage at the end of winter and an exceptionally mild winter, with gas prices on 17 March 2023 at €43/MWh = $13/mmbtu. Spring 2023 TTF surprisingly low prices are still three times more than the before price.

Despite European gas prices tumbling, they still remain orders of magnitude above pre Covid prices. The EMG view is that gas hub prices are unlikely to fall much further if at all, and are likely to stay high for several years at least.

In addition, SE Europe prices tend to be higher than TTF prices. European export markets, and regional SE Europe markets, therefore remain obvious export markets for EastMed offshore LNG.

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