

The Commercial Challenges Facing Eastern Mediterranean Gas

Ana Stanič and Sohbet Karbuz

The East Mediterranean region holds enormous natural gas reserves. This has sparked interest from international energy majors and made the region one of the favourites for future gas exploration. However, in order to exploit and export these resources numerous technical and commercial, security, legal and political challenges need to be overcome.

Focussing on the commercial challenges which will need to be overcome for the region to become a significant producer and exporter of gas this article is divided in five sections. Section 1 assesses the region's natural gas resource endowment and shows that it is comparable to that of the North Sea. Section 2 provides a brief overview of gas exploration and production activities in the region to date while Section 3 discusses the possible routes for the export of East-Med gas. Section 4 highlights the key commercial challenges facing gas production in the region. Finally, Section 5 concludes that, although Turkey would be the best outlet for the gas in the region there are legal and political obstacles which stand in the way to securing the future of gas production in the East Mediterranean.

1. HOW MUCH GAS DOES THE EASTERN MEDITERRANEAN HOLD?

More than 50 years have passed since the discovery of the first gas field in the Eastern Mediterranean.¹ As at December 2018, the natural gas reserves discovered in the region amounted to 4880 billion cubic meters (bcm).² This exceeds the volume of natural gas discovered in Norway (see Figure 2).

In addition, the two geological surveys by the United States from 2010 (USGS 2010a, USGS 2010b)³ – one for the Nile Delta and Mediterranean Sea sectors of Egypt and the other for the

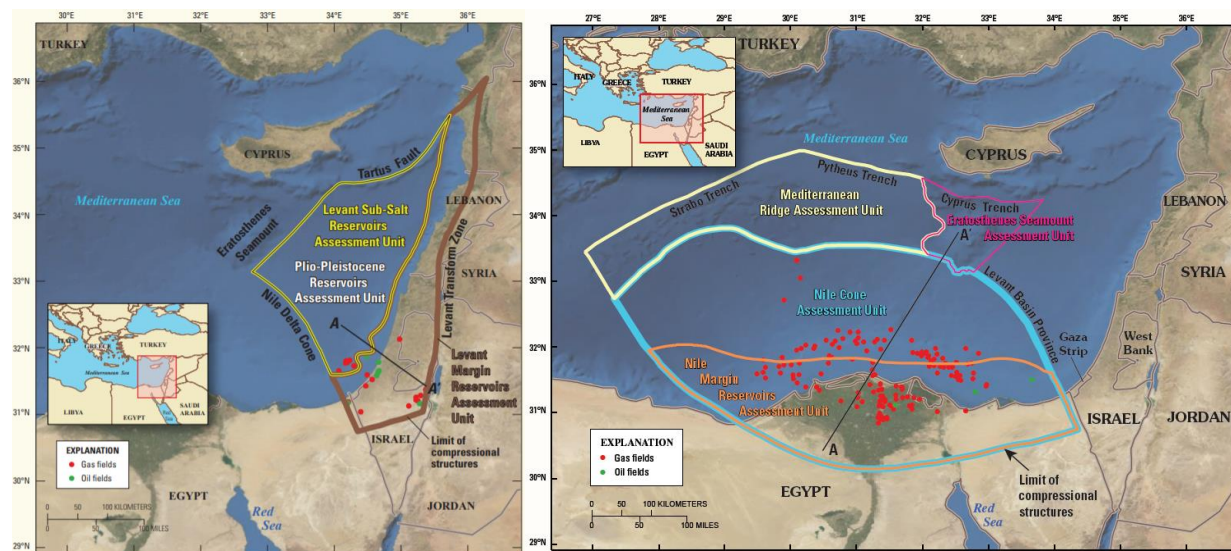
¹ The region of the “Eastern Mediterranean” (“East -Med” for short) for the purposes of this article includes Egypt, Palestine, Israel, Lebanon, Syria, Cyprus, and Turkey. Unless stated otherwise, the term “Cyprus” in this article refers to the island of Cyprus. Cyprus is *de facto* partitioned between the Republic of Cyprus (“RoC”) in the south of the island, which has *de jure* sovereignty over the entire island and is a member of the European Union; and the self-declared Turkish Republic of Northern Cyprus (“TRNC”) in the north of the island, which is only recognized by Turkey. RoC is not recognized by Turkey and is referred to by Turkish officials as the Greek-Cypriot Administration. The EU has recognized that the government of RoC does not exercise effective control over the north of the island in Corrigendum to Council Regulation (EC) No 866/2004 of 29 April 2004 on a regime under Article 2 of Protocol 10 to the Act of Accession, available at <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:206:0051:0056:EN:PDF>, last accessed 4 May 2020.

² Sohbet Karbuz (2019), Doğu Akdeniz’de ne Kadar Doğal Gaz Var, Bilkent Enerji Notları No.12, Bilkent University Energy Policy Research Center, Ankara, available at <https://drive.google.com/open?id=1DLMx9kmHcB2P2cTz73jp7yEmooehSDj9>, last accessed 4 May 2020.

³ USGS (2010a) Assessment of Undiscovered Oil and Gas Resources of the Levant Province, Eastern Mediterranean, Fact Sheet 2010-3014 March, The United States Geological Survey, available at <https://pubs.usgs.gov/fs/2010/3014/pdf/FS10-3014.pdf>, last accessed 4 May 2020. USGS (2010b), Assessment of

Levant Basin Province – estimate the undiscovered technically recoverable gas resources of these two areas at nearly 9800 bcm.

Figure 1: The areas included in the USGS assessments in the Eastern Mediterranean



Source: USGS.

According to RoC's officials around 1000 bcm of undiscovered gas resource potential is also estimated to exist in the blocks that do not overlap with the above-mentioned areas.⁴

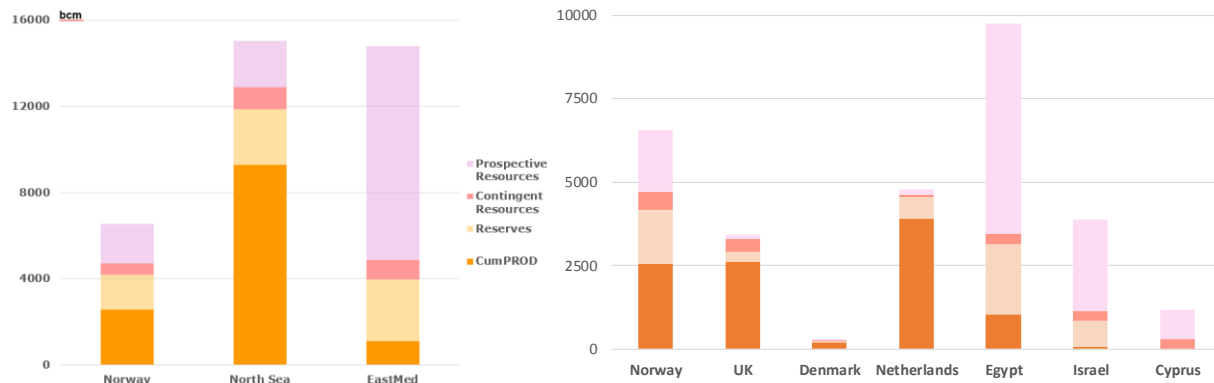
As far as the authors are aware a comparison of gas resources in the Eastern Mediterranean with other regions in the world using the unified methodology is not been published, at least not in a publicly available document. A recent study by Karbuz compared the gas resources of the East Mediterranean with that of North Sea.⁵ As Figure 2 shows that if the total volume of gas discovered and the undiscovered resources (i.e. prospective resources) are added together then the gas reserves of the Eastern Mediterranean region are on a par with those of the North Sea region as a whole, that is of Norway, the UK, the Netherlands and Denmark put together. And yet, and for the reasons discussed in Section 4, the Eastern Mediterranean remains one of the world's most under-explored regions in the world.

Undiscovered Oil and Gas Resources of the Nile Delta Basin Province, Eastern Mediterranean: U.S. Geological Survey Fact Sheet 2010-3027 May. The United States Geological Survey, available at <https://pubs.usgs.gov/fs/2010/3027/pdf/FS10-3027.pdf>, last accessed 4 May 2020.

⁴ Shaul Zemach (2016), Toward an Eastern Mediterranean Integrated Gas Infrastructure?, Foreign and Security Policy Paper, 2016 No. 20, The German Marshall Fund of the United States, page 3, available at: <http://www.gmfus.org/file/8217/download&usg=AOvVaw06WghYLnrx6zXZuWWXEaFV>, last accessed 4 May 2020.

⁵ See footnote 2

Figure 2: Comparison of East Mediterranean Gas Resources with Norway's and the North Sea's as a whole



Source: See footnote 2.

Notes: The categories in Figure 2 correspond to the resource classification used by the Society of Petroleum Engineers. The sum of the cumulative production, reserves and contingent resources represents total discoveries. Prospective resources refer to yet to be discovered resource potential.

2. AN OVERVIEW OF GAS EXPLORATION AND PRODUCTION ACTIVITIES IN THE REGION

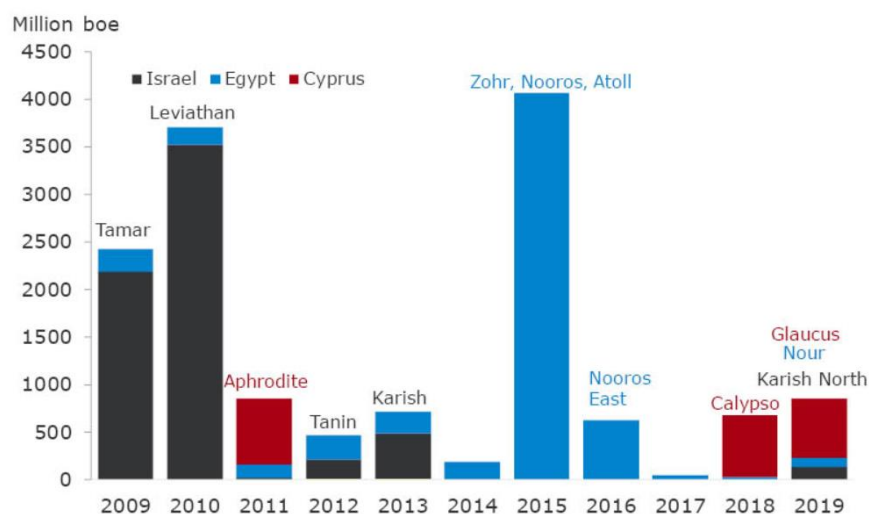
The Abu Madi field was the first gas field identified in the Eastern Mediterranean. It was discovered onshore in the Nile Delta in Egypt in 1967. In 1969, the Abu Qir gas field was discovered offshore Egypt in the Mediterranean Sea. Following numerous other discoveries since then Egypt became an LNG gas exporter in 2003. It started exporting natural gas by pipeline to Jordan in 2003, to Syria and Israel in 2008 and to Lebanon in 2009. Due to political instability in Egypt, no hydrocarbons exploration bid rounds took place between 2011 and November 2013. After 2013 Egypt launched several bid rounds and signed over 100 concession agreements for the exploration and production of gas. Successful bidding rounds and amendments to pricing policy have led to numerous discoveries. Of these, the most important is the discovery of the Zohr field, whose recoverable reserves are estimated between 651.4 bcm and 736.3 bcm making it the largest gas discovery ever made in Egypt and in the Mediterranean Sea.⁶

⁶ From the exploration perspective, the discovery of Zohr is a game changer. It has a completely new reservoir structure of Miocene reef carbonates, contrary to conventional sandstone formations observed in the discoveries made so far in the region. Gas production from the field began in December 2017. The other significant discoveries in the past 5 years include Baltim SW, Nour, Atoll, Nooros, Qattameya Shallow, South Disouq, among others. See M. Ouki (2018), Egypt - a return to a balanced gas market?, OIES Paper NG 131, June 2018, available at <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/06/Egypt-a-return-to-a-balanced-gas-market-NG-131.pdf>, last accessed 4 May 2020; and Egyptian Natural Gas Holding Company, EGAS Annual Report 2018/2019, available at <https://www.egas.com.eg/annual-reports/2019>, last accessed 4 May 2020.

Several bid rounds, covering onshore and offshore Egypt, are expected to be launched in the near future. Of these, the western offshore zone of Egypt's Mediterranean waters, a frontier area which is under-explored, may offer significant discoveries. It appears that Egypt will award the eight blocks in the Western Mediterranean on an *ad hoc* basis, instead of holding a bid round since December 2019 ExxonMobil was awarded a block (North Marakia) in the area without a bidding round.

There was little gas exploration in other parts of the Eastern Mediterranean until 2009. By the end of 2018 more than 2400 bcm of gas was discovered in the region. This is equivalent to the total gas reserves of Azerbaijan. Some of these discoveries, namely of the Tamar field in 2009, the Leviathan field in 2010 in Israel, and the Zohr field in 2015 in Egypt were among the world's largest deep-water gas discoveries in the world in the 2000s. These discoveries sparked international interest in the region.

Figure 3: Natural gas discoveries in Eastern Mediterranean in the past decade



Source: Aditya Saraswat⁷

Two giant gas fields were discovered offshore Israel in 2009 and 2010: the Tamar and the Leviathan fields.⁸ Gas production started in the Tamar field in March 2013. Since 2016, Israel held two international bidding rounds for exploration areas offshore, and has awarded several blocks to foreign companies.⁹ By January 2017 Israel started exporting small quantities of gas to Jordan from the Tamar field. Due to numerous political and regulatory obstacles and numerous legal challenges¹⁰, gas production from the Leviathan field only started at the end of 2019, nearly

⁷ Aditya Saraswat (2019), Fun in the Sun for Club Med Upstream Oil and Gas Operators, GEOExPro, June 2019, available at <https://www.geoexpro.com/articles/2019/06/fun-in-the-sun-for-club-med-upstream-oil-and-gas-operators>, last accessed 4 May 2020. Note: 1 million barrels of oil equivalent corresponds to 0.17 bcm of gas.

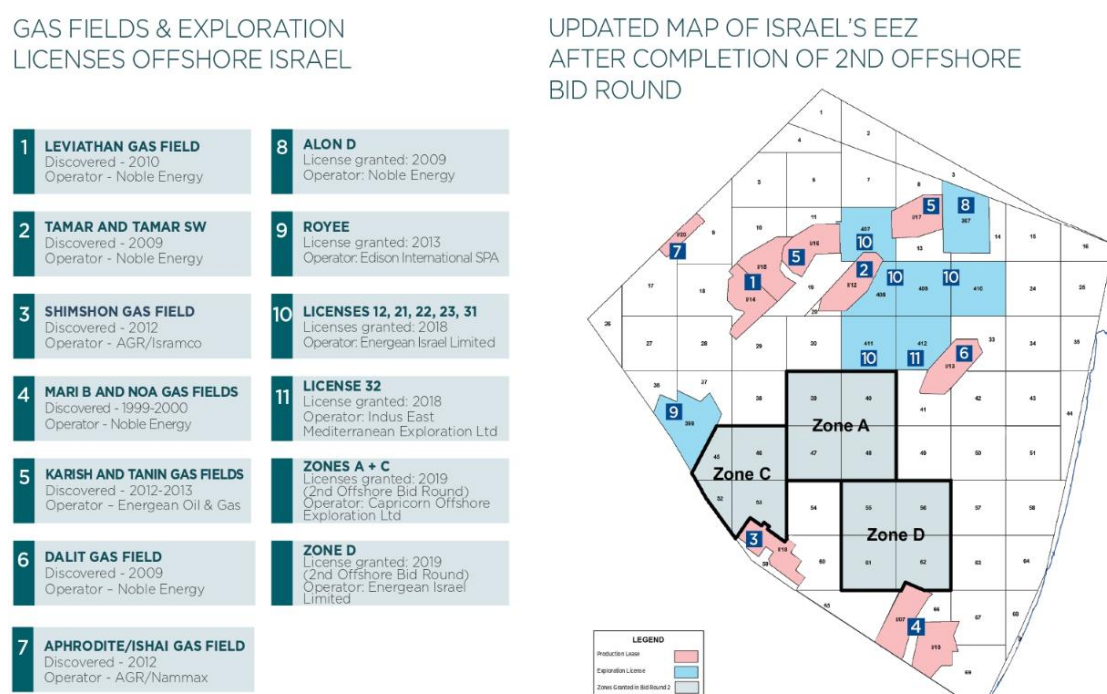
⁸ The Tamar field has estimated reserves of 337 bcm (2P). The Leviathan field has estimated resources of 613 bcm (2P+2C). For more information see Delek Group, Periodic Report for 2018, 31 March 2019, available at <https://ir.delek-group.com/static-files/600b0cf1-d4c3-4973-9a90-ff4e99a67f35>, last accessed 4 May 2020.

⁹ For more information see <http://www.energy-sea.gov.il/>, last accessed 4 May 2020.

¹⁰ Including the recent unsuccessful attempt by environmental groups and municipalities located near where the pipeline comes on-shore tried to have the production platform built further out to sea. See Reuters, Update 1- Israel court lifts injunction against Leviathan gas field operation, December 2019, available at

a decade after its discovery. In addition to supplying the Israeli market, gas from the field started to flow to Jordan on 1 January 2020, and to Egypt on 15 January 2020. Production from the other significant Israeli gas discoveries, namely the Karish and Tanin fields, is expected to commence in the near future: Karish in the first half of 2021 and Tanin soon thereafter. The approval by the Israeli parliament of the new gas sector framework in 2015 and 2016¹¹ paved the way for a resurgence of exploration activity.

Figure 4: Exploration and production licences offshore Israel



Source: Israeli Ministry of Energy.¹²

RoC held offshore hydrocarbons exploration licensing rounds in 2007, 2012 and 2016 and has awarded nine blocks to international energy companies.¹³ Noble Energy's discovery of the Aphrodite offshore gas field in December 2011 was hailed as the gamechanger for gas exploration in Cyprus.¹⁴ However, the field has not yet been developed primarily because of the lack of gas infrastructure from the field, the failure to agree a unitisation agreement with Israel,¹⁵

<https://www.cnn.com/2019/12/19/reuters-america-update-1-israel-court-lifts-injunction-against-leviathan-gas-field-operation.html>, last accessed 4 May 2020.

¹¹ For details see Israeli Ministry of Energy, Policy and Government Decisions, available at <http://www.energy-sea.gov.il/English-Site/Pages/Regulation/Policy.aspx>, last accessed 4 May 2020.

¹² Israeli Ministry of Energy, available at https://www.gov.il/BlobFolder/news/os_300719/he/gas_fields.pdf, last accessed on 4 May 2020.

¹³ For further details of the rounds, see Cypriot Ministry of Energy, Commerce and Industry, Licensing Rounds, available at http://www.mcit.gov.cy/mcit/hydrocarbon.nsf/page18_en/page18_en?OpenDocument, last accessed 4 May 2020.

¹⁴ When discovered the field was estimated to contain 140 bcm to 200 bcm of gas. In 2014, its estimated resource base was revised downwards to 128 bcm.

¹⁵ A small part of the Aphrodite field straddles the border with Israel. In 2012, the holders of the license in the Ishai field on the Israeli side of the border drilled a well and discovered negligible quantities of gas. In 2015 the Israeli

and delays in approval from the government for the development plans for the field. In 2018 the Calypso gas field was discovered by Total and Eni. In February 2019 ExxonMobil discovered in-place natural gas resource of approximately 142 bcm to 227 bcm of gas in the Glaucus field.¹⁶

In 2020 and early 2021 several drilling operations are scheduled offshore Cyprus. These include drilling campaigns by ExxonMobil in Block 10, by Eni in Block 6, and by Noble Energy in Block 12. These campaigns will most likely be delayed as companies will be forced to slash their capital expenditures due to Covid-19. For instance, ExxonMobil and Total and Eni have already announced the postponement of their drilling campaign by a year or so.¹⁷ The final investment decision for the Aphrodite field, which was planned to be taken by 2022, could also be negatively affected. Should this happen, the first gas production, currently scheduled for 2025, could be further delayed.

Figure 5: Offshore exploration licences granted by RoC and gas discoveries to date



Source: Authors' elaboration.

The TRNC signed a production sharing agreement in 2011 with Turkey's state-owned Turkish Petroleum Corporation (TPAO) for one onshore and six offshore blocks around the island of

energy ministry classified it as a commercial discovery. For further information see for instance Mona Sukkarieh (2018), Aphrodite's blues, Newsmedia, 6 June 2018, available at <https://www.executive-magazine.com/economics-policy/aphrodites-blues>, last accessed 4 May 2020. Discussions on the terms of a unitisation agreement started in 2010. In summer 2016 expectations were that an agreement was imminent. In late 2018 it seemed that the countries had reached an agreement to refer the dispute as to their percentage shares of the gas field to international arbitration. No progress has been made since then.

¹⁶ According to ExxonMobil this was the world's third biggest natural gas discovery in two years. See ExxonMobil, ExxonMobil makes natural gas discovery offshore Cyprus, 28 February 2019, available at https://corporate.exxonmobil.com/News/Newsroom/News-releases/2019/0228_ExxonMobil-makes-natural-gas-discovery-offshore-Cyprus, last accessed 4 May 2020.

¹⁷ See MEES, Vol. 63. No. 1617 April 2020. See also Elias Hazao, Eni and Total Drilling Officially on hold for one year available at <https://cyprus-mail.com/2020/05/04/eni-and-total-drillings-officially-on-hold-for-one-year>, last accessed 5 May 2020.

Cyprus. Although onshore and offshore drilling has so far not identified any significant resources, TPAO continues to perform seismic surveys and drilling operations around the island.

In Palestine gas exploration activities have been very limited to date. A small offshore field, the Gaza Marine field, was discovered by British Gas (now Shell) in 1999. It is estimated to hold 28 bcm of recoverable gas reserves.¹⁸ In 2000, British Gas commenced exploratory discussions for the sale of the gas to the Israel Electric Corporation. However, these discussions were blocked by Ariel Sharon, the Prime Minister of Israel at the time, in spring 2001.¹⁹ The renewed discussions in 2007 and 2011 failed. Given the continued blockade of Palestine's access to the gas field by Israel and the political divisions amongst Palestinians the field remains undeveloped.²⁰

To date, Lebanon has launched two offshore licensing rounds. The first round, launched in 2012, was postponed five times. Two blocks were awarded in December 2017.²¹ In the second licensing round, launched in 2019, five blocks are on offer. The deadline for submitting bids is 1 June 2020.²² Drilling of Lebanon's first offshore well (Byblos 1, in Block 4) started on 27 February 2020 and was completed two months later. Although initial drilling showed the presence of gas at different depths in the geological layers, no commercial reservoir was found. The drilling activities in Block 9 are scheduled for 2021.²³

¹⁸ Simon Henderson (2014), Natural Gas in the Palestinian Authority: The Potential of the Gaza Marine Offshore Field, The German Marshall Fund of the United States Policy Brief, March 2014, available at <https://www.washingtoninstitute.org/uploads/Documents/opeds/Henderson20140301-GermanMarshallFund.pdf>, last accessed 4 May 2020.

¹⁹ See Anaïs Antreasyan (2013), Gas Finds in the Eastern Mediterranean: Gaza, Israel, and Other Conflicts, *Journal of Palestine Studies*, Vol. 42, No. 3 (Spring 2013), 29, at 32.

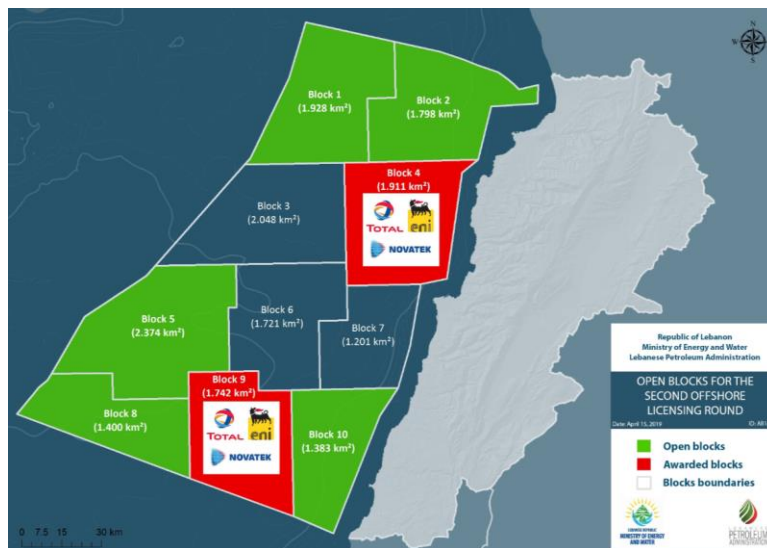
²⁰ C. Ellinas, H. Tzimitras, and J. Roberts (2016), Hydrocarbon Developments in the Eastern Mediterranean: The Case for Pragmatism, Washington DC: Atlantic Council, Global Energy Center and Dinu Patriciu Eurasia Center, available at <https://www.atlanticcouncil.org/in-depth-research-reports/report/hydrocarbon-developments-in-the-eastern-mediterranean/>, last accessed 4 May 2020.

²¹ On 14 December 2017 the Council of Ministers approved the awards of two exclusive petroleum licenses for exploration and production in blocks 4 and 9 for the consortium composed of Total S.A, Eni International BV and JSC Novatek.

²² The deadline for submission of the licensing round applications was initially set to 31 January 2020. It was later postponed to 30 April 2020. However, due to the coronavirus pandemic, the new deadline to submit bids is now 1 June 2020, as indicated in the Lebanese Petroleum Administration website available at <https://www.lpa.gov.lb/english/licensing-rounds/second-licencing-round/timeline1>, last accessed 4 May 2020.

²³ See <https://www.lpa.gov.lb/english/news-amp-media/news/minister-of-energy-and-water-holds-a-press-conference-announcing-the-completion-of-drilling-activities-in-block-4>, last accessed 4 May 2020.

Figure 6: Open and awarded blocks offshore Lebanon



Source: Lebanese Petroleum Administration.²⁴

Syria's offshore exploration is in its early stages. No licences were awarded after the first offshore licensing round was held in 2007. The second offshore exploration licensing round for three blocks was held in 2011 but no bids were submitted as war broke out in the country soon thereafter. In December 2013, whilst the war was still in full swing, the Syrian government signed a 25-year agreement with SoyuzNefteGaz (a Russian company) for the exploration of Block 2. As at the date of this article, drilling activities had not started. With conflict still raging in the country, any significant development of upstream activities seems unrealistic in the near future.

To date, TPAO has drilled more than a dozen wells in Turkey's Mediterranean Continental Shelf. In 2017 Turkey announced a more active engagement in offshore oil and gas exploration and outlined its seismic studies and drilling operations in its National Energy and Mine Policy.²⁵

3. POSSIBLE GAS EXPORT ROUTES

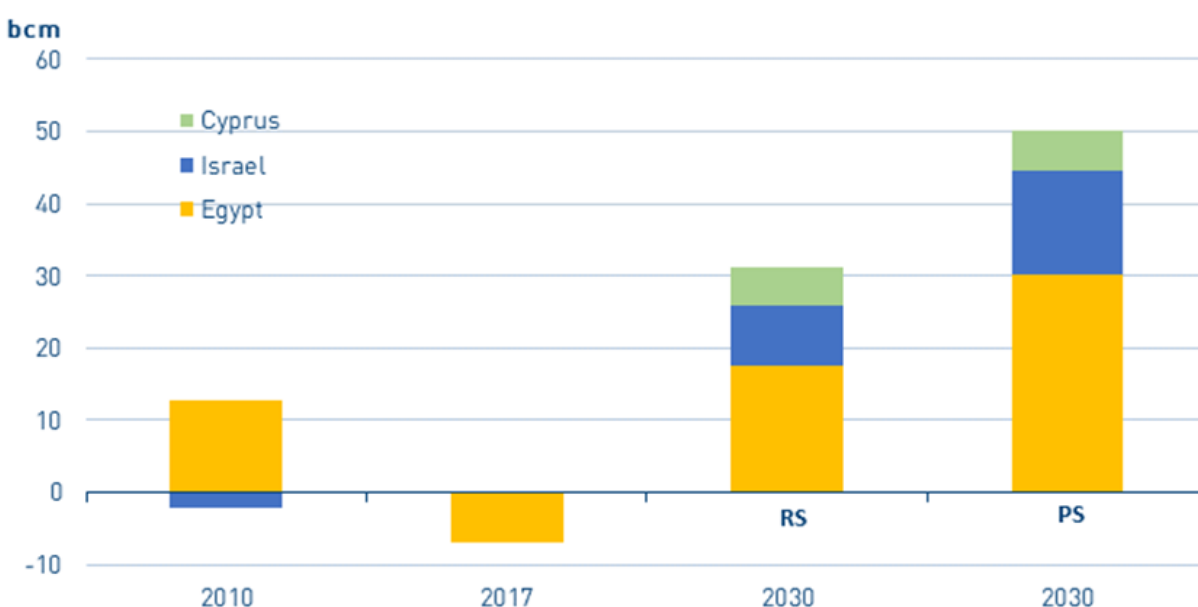
According to OME's reference scenario (RS), the total gas export potential of East Mediterranean will increase to 30 bcm/yr in 2030 (see Figure 7), of which at least 19 bcm could be exported by LNG. On a country by country basis, OME considers that it is likely that Egypt's export potential will approach 20 bcm by mid-2020s. The gas export potential of Israel is expected to peak in the late 2020s at less than 10 bcm/yr in the reference scenario.

²⁴ Available at <https://www.lpa.gov.lb/english/licensing-rounds/second-licencing-round/open-blocks1>, last accessed 4 May 2020.

²⁵ E.T. Karagöl, I. Kavaz, S. Kaya and B.Z. Özdemir (2017), National Energy and Mining Policy of Turkey, SETA Analysis No.75, SETA, July 2017, available at <https://setav.org/en/assets/uploads/2017/08/Analysis35.pdf>, last accessed 4 May 2020.

In the alternative scenario (PS), which assumes that the countries in the region implement aggressive energy efficiency measures and adopt ambitious renewable energy policies, OME estimates that the total gas export potential of the region could rise to 50 bcm/yr (see Figure 7). In this scenario, the export potential of Egypt would exceed 30 bcm, Israel's would peak in the mid-2030s at above 15 bcm/yr and Cyprus could add another 5 bcm/yr to the export potential of the region from the second half of the 2020s if the Aphrodite field is developed.

Figure 7: Gas export potential of the countries in the East Mediterranean



Source: OME, Mediterranean Energy Perspective 2018, Paris.

With the exceptions of Egypt and Israel, the countries in the region lack gas export infrastructure. Unless gas export infrastructure is built it will be difficult for significant quantities of gas to be exported out of the region. Without access to markets outside the region the commercialisation of gas in these individual countries will be difficult for reasons discussed in Section 2. As further outlined in Section 5, building export infrastructure is an obvious example of the type of projects which would benefit all countries in the region but which would require them to co-operate.

Egypt has a well-established gas export infrastructure, both pipeline and LNG. The Arab Gas Pipeline (“AGP”), with an annual capacity of 10 bcm, connects Egypt to Syria via Jordan.²⁶ Natural gas exports by pipeline commenced in July 2003 through AGP to Jordan. Egyptian gas *via* the AGP reached Syria in 2008 and Lebanon in 2009. The pipeline has, however, been idle

²⁶ The pipeline was built in four phases. The first phase (Arish-Aqaba section) was completed in 2003, the second phase (Aqaba to Rehab) in 2005, the third phase (Rehab to Jabber) in 2007, and the last phase (the Jordan-Syria borders to Homs in the North of Syria) in 2008.

since 2011 when its feeder pipelines were damaged during the unrest in Egypt. The section to Jordan became operational again in 2019.

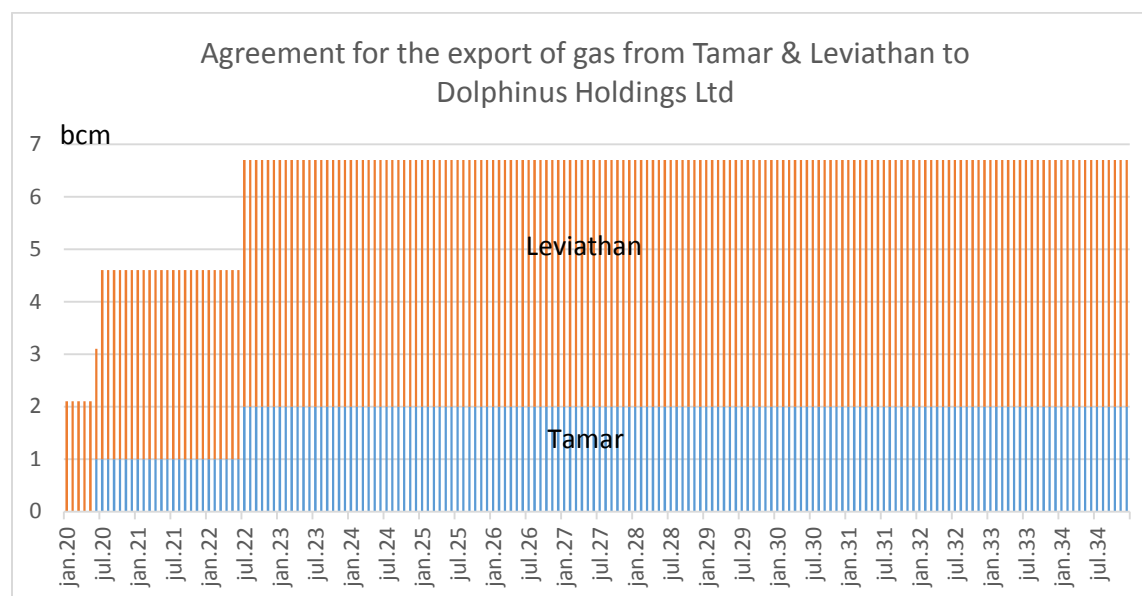
LNG exports started in 2004. The country's two LNG liquefaction plants located in Idku and Damietta have a combined annual capacity of 19 bcm. They had been idle since 2011. However, LNG exports from the Idku plant re-started in 2016. Exporting LNG *via* the terminal at Damietta is expected to commence in the second half of 2020 provided world LNG prices do not fall further and there is excess gas supply from the Zohr field.

The East Mediterranean Gas pipeline ("EMG"), a pipeline with an annual capacity of 7 bcm connecting the Israeli transmission system in the Ashkelon area with the Egyptian transmission system in El-Arish, was built to transport Egyptian gas to Israel. It became operational in 2008. The EMG pipeline was originally built so Egypt could export gas to Israel but deliveries were stopped in 2012 due the deteriorating relationship between the two countries as well as Egypt's need to meet its own growing gas demand. By reversing its flow, the EMG now serves as a transport route for gas from the Tamar and Leviathan offshore fields in Israel to Egypt. In October 2019, the partners in the Tamar and Leviathan fields concluded a contract with the privately-held Egyptian firm Dolphinus Holdings Ltd for the sale of 85 bcm of gas between January 2020 and December 2034 (see Figure 8). The imported gas is partly to meet the needs of the domestic Egyptian market and partly for re-export, possibly as LNG.²⁷ Leviathan field gas started flowing to Egypt through EGM at the beginning of 2020. Exports from the Tamar field to Egypt are expected to commence in the second half of 2020. Gas exports are expected to reach 7 bcm per year at plateau level.²⁸

²⁷ Delek Drilling, Engagement in binding agreements for the export of natural gas to Egypt, 2 October 2019, available at https://www.delekdrilling.com/sites/default/files/media/document/field_rp_pdf/Dolphinus%20report%202.10.2019.pdf, last accessed 4 May 2020.

²⁸ From the Tamar field: approximately 1 bcm/yr beginning on June 30, 2020 and ending on June 30, 2022, approximately 2 bcm/yr beginning on July 1, 2022 and ending on December 31, 2034. From the Leviathan field: approximately 2.1 bcm/yr beginning on January 1, 2020 and ending on June 30, 2020, approximately 3.6 bcm/yr in the period beginning on July 1, 2020 and ending on June 30, 2022, and finally approximately 4.7 bcm/yr in the period beginning on July 1, 2022 and ending on December 31, 2034. See Delek Drilling, Delek Drilling's announcement re. Engagement in binding agreements for the export of natural gas to Egypt, dated 2 October 2019, available at https://www.delekdrilling.com/sites/default/files/media/document/field_rp_pdf/Dolphinus%20report%202.10.2019.pdf, last accessed 4 May 2020.

Figure 8: Agreement for the export of gas from Tamar & Leviathan to Dolphinus Holdings Ltd



Source: Data obtained from Delek Drilling's announcement, see footnote 28.

Leviathan and Tamar partners have also signed contracts with companies in Jordan to export approximately 7 bcm of gas annually *via* the two above-mentioned pipelines. Exports from the Tamar field to the Arab Potash Company and the Jordan Bromine Company started in January 2017. Tamar partners are committed to deliver 1.8 bcm of gas annually to those companies for a period of 15 years. In January 2020, gas from the Leviathan field also started to flow to Jordan pursuant to an agreement the Leviathan partners signed in September 2016 with the Jordanian National Electric Power Company for the supply of 45 bcm of gas for a period of 15 years.²⁹ There are also on-going discussions for the export of up to 1 bcm/yr of gas by a pipeline from the Negev to Gaza, which could feed power plants.³⁰

Since Cyprus has no gas export infrastructure and the discoveries to date are not considered sufficient to make the building of an LNG plant at Vassilikos commercially viable³¹, at present there is much discussion about building a subsea pipeline (known as the “EastMed pipeline”) from the Aphrodite field to the EU or to Egypt.

²⁹ For more on the gas contracts with Jordanian customers see Delek Drilling, Tamar Gas Field, available at <https://www.delekdrilling.com/natural-gas/gas-fields/tamar>, last accessed 4 May 2020 and Delek Drilling, Leviathan Gas Field, available at <https://www.delekdrilling.com/natural-gas/gas-fields/leviathan>, last accessed 4 May 2020.

³⁰ Al Monitor, 31 January 2020, <https://www.al-monitor.com/pulse/originals/2020/01/palestinian-authority-israel-import-gas-gaza-field-power.html>, last accessed 4 May 2020.

³¹ On 26 June 2013 Nobel Energy, Delek Group and Avner signed a Memorandum of Understanding with RoC to build an LNG plant in Vassilikos. The intention was to build the plant by 2016 and start exporting gas by 2020; see Globes, Delek, Noble Energy sign Cypriot LNG plan MOU, 26 June 2013, available at <https://en.globes.co.il/en/article-1000857277>, last accessed 4 May 2020.

The EastMed s pipeline project aims to link Israel and Cyprus to Greece and Italy. The project has been a long time in the planning, with Israel, RoC and Greece setting up a working group back in 2012 to examine its viability. After several joint declarations reaffirming the political support for the project over the years, Israel, Greece and RoC finally signed an intergovernmental agreement to build the 1900 km EastMed pipeline in January 2020.³² This, the world's longest and deepest subsea pipeline, is expected to carry as much as 20 bcm of gas annually and cost between \$6 and 7 billion to build. The pipeline has had European Union (EU) backing since 2013 when it was listed as an EU Project of Common Interest.³³ It has received over €36.5 million of EU funding for feasibility and other studies³⁴. IGI Poseidon, which aims to extend the EastMed pipeline from Greece to Italy, is currently undertaking permitting and routing studies. The final investment decision is expected sometime in 2022 and the pipeline's completion is envisaged for 2025. To date only Energean has formally shown an interest in supplying gas to the pipeline.³⁵ The project received United States government backing in late December 2019 with the adoption of the Eastern Mediterranean Security and Energy Partnership Act 2019.³⁶

A 300 km pipeline project to export 8 bcm of gas per year from Cyprus to Egypt to meet Egyptian domestic demand or for re-export *via* the Idku LNG plant in Egypt has been under discussion since 2014. RoC and Egypt signed an inter-governmental agreement concerning the subsea pipeline project on 19 September 2018.³⁷ This pipeline project is projected to cost \$1 billion and to be completed by 2025.³⁸ However, no concrete actions have been reported as having been taken to realise this project.

³² Israeli Ministry of Energy, Press Release: The EastMed Gas Pipeline Accord has been signed at a Trilateral Summit between PM Netanyahu, Greek PM Kyriakos Mitsotakis and Cypriot Pres. Nicos Anastasiades, 2 January 2020, available at https://www.gov.il/en/departments/news/ng_021220, last accessed 4 May 2020.

³³ Regulation (Eu) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R0347&from=en>, last accessed 4 May 2020.

³⁴ It was given €2 million for the pre front-end-engineering design (FEED) stage and €34.5 million for the FEED stage of the project. For further information see European Commission, Eastern Mediterranean Natural Gas Pipeline – Pre-FEED Studies, last modified April 2020, available at <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-energy/7.3.1-0025-elcy-s-m-15>, last accessed 4 May 2020; and European Commission, EastMed Pipeline Project – Development Phase, last modified April 2020, available at <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-energy/7.3.1-0023-cyel-s-m-17>, last accessed 4 May 2020.

³⁵ On 3 January 2020 DEPA, a majority Greek-state owned company and Energean signed a letter of intent regarding the sale of 2 bcm of gas per year from Energean's Karish & Tanin gas fields offshore Israel. See Depa, Energean and DEPA agreement paves the way for commercial operation of Eastmed pipeline, 2 January 2020, <https://www.depa.gr/energean-and-depa-agreement-paves-the-way-for-commercial-operation-of-eastmed-pipeline-athens-january-2nd-2020/?lang=en>, last accessed 4 May 2020.

³⁶ S. 1102, 116th Cong. available at <https://www.congress.gov/bill/116th-congress/senate-bill/1102/text>, last accessed 4 May 2020.

³⁷ Cyprus Press and Information Office, Press Release - Remarks by the Minister of Energy, Mr Y. Lakkotrypīs, at the signing of the agreement between Cyprus and Egypt for the submarine natural gas pipeline, 19 September 2019, available at <https://www.pio.gov.cy/en/press-releases-article.html?id=3772#flat>, last accessed 4 May 2020.

³⁸ H. Soliman and A. Scipione (2019), Egypt and Cyprus Launch a New Gas Route, About Energy, 30 July 2019, available at https://www.aboutenergy.com/en_IT/topics/Egypt-Cyprus-eng.shtml, last accessed 4 May 2020.

A third gas pipeline project is also being considered in the northern part of Cyprus. There have been several initiatives to build a gas pipeline and an electricity cable between TRNC and Turkey, in parallel to the existing water pipeline. In November 2019, statements in support of these project were made at ministerial level in Turkey for the first time. According to Turkish government officials, the pipeline is intended to bring gas from Turkey to the island. In the future the direction of the flow could be reversed and it could, should a solution to the Cyprus conflict be found, provide an export route for RoC's gas.³⁹

Since the discoveries of Tamar and Leviathan fields in Israel, several Turkish companies have shown interest in buying gas from the Israel. Over the years discussions to build a 8 bcm pipeline from the Leviathan field (and possibly with a link to the Tamar field) to the south-eastern Mediterranean coast of Turkey, either directly or indirectly (via southern Cyprus and northern Cyprus), and possibly from there onwards to Europe using BOTAS' existing pipeline network, have ebbed and flowed reflecting the continually changing nature of the Turkey-Israel relations. For a while the project had US government backing and was seen as a possible catalyst for resolving the Cyprus problem.⁴⁰ However, with Turkey/Israel and EU/Turkey relations now at their lowest point in over a decade this project has now been completely shelved.

As the discussion above reveals, connecting the gas fields in the East Mediterranean to the Arab Gas Pipeline would theoretically be the best option for exporting the gas within the region as well as from the region to Turkey. This 10 bcm/yr capacity pipeline could also take in gas from Lebanon and Syria if gas is found there. However, the current conflict in Syria and political disputes in the region make this export route currently unviable.

Exporting LNG via the two existing LNG plants in Egypt is currently the most practical option. However, as discussed in Section 4, the cost of liquifying regional gas and transporting it to distant markets *via* LNG compared to currently very low international LNG, oil and natural gas prices means that this export route is commercially unviable in the short and even medium term.

Exporting LNG *via* a dedicated floating liquefied natural gas facility (FLNG) has been considered in the past as an alternative export route. However, after the non-binding memorandum of understanding between the Leviathan partners and Woodside was terminated in 2014, the FLNG option was put on hold.⁴¹ It has been reported that the Leviathan partners are seeking partners to examine the possibility of constructing an FLNG facility in order to enable them to increase production from the Leviathan field. In July 2019 the Leviathan partners signed two separate interim agreements with technology and FLNG service providers, Golar LNG and

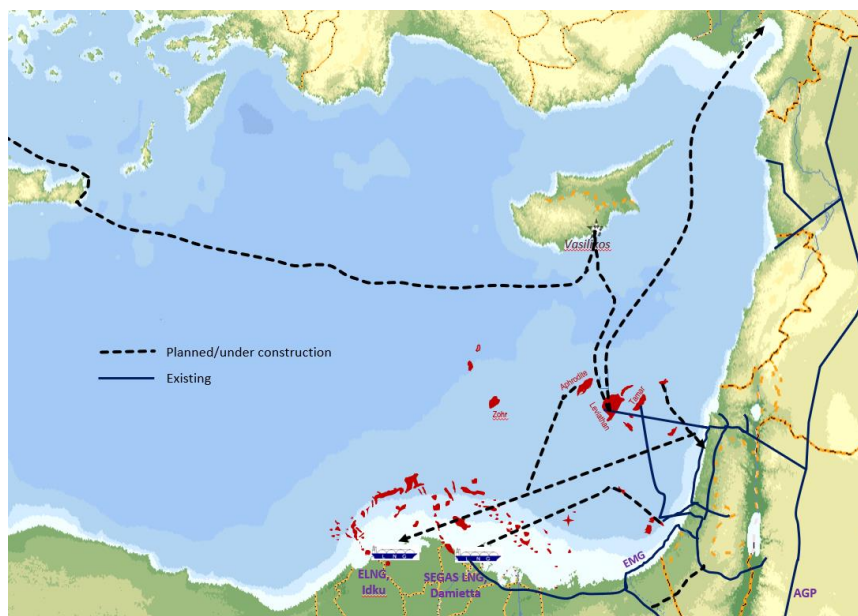
³⁹ CNNTurk, KKTC'den doğalgaz boru hattı açıklaması, 23 November 2019, available at <https://www.cnntrk.com/ekonomi/kktcden-dogalgaz-boru-hatti-aciklamasi>, last accessed 4 May 2020; and Anadolu Agency, Türkiye-KKTC doğal gaz boru hattı Doğu Akdeniz'de jeopolitik dengeleri değiştirecek, 24 December 2019, available at <https://www.aa.com.tr/tr/analiz/turkiye-kktc-dogal-gaz-boru-hatti-dogu-akdenizde-jeopolitik-dengeleri-degistirecek/1682833>, last accessed 4 May 2020; and E. Andreou (2019), Gas pipeline to connect the north with Turkey under discussion, Cyprus Mail, 22 November 2019, available at <https://cyprus-mail.com/2019/11/22/gas-pipeline-to-connect-the-north-with-turkey-under-discussion>, last accessed 4 May 2020.

⁴⁰ See further discussion in Section 5 below.

⁴¹ Noble Energy, Press Release, 20 May 2014, available at <http://investors.nbleenergy.com/news-releases/news-release-details/noble-energy-announces-termination-leviathan-mou-woodside>, last accessed 4 May 2020.

Exmar.⁴² The huge costs associated with construction of FLNG and the present low LNG prices environment means that at the time of writing it seems unlikely that this project is commercially viable.

Figure 8: Gas export infrastructure in East Mediterranean



Source: Authors' elaboration.

4. COMMERCIAL CHALLENGES TO GAS PRODUCTION IN THE REGION

All the drilling, licensing and production activities indicated above might suggest that things bode well for the exploitation and commercialisation of the gas reserves in the region. Companies generally carry out costly exploration and field development only if they expect to commercialise their discoveries by selling the gas produced to domestic and/or international markets. However, the current market realities and the expectations for the near future suggests otherwise. In particular, the East Mediterranean faces the following four challenges.

First, is the price challenge. The price of gas in contracts for the export of gas from Israel's Tamar and Leviathan fields to Egypt and Jordan are linked to Brent oil prices and a floor price is set in the contracts. The cost of the gas is expected to be between \$4-\$5/MMBtu at the Leviathan well-head and the gas export price is reported to be \$6/MMBtu assuming a Brent oil price in the range \$60-\$70 per barrel.⁴³ As at the end of the last quarter of 2019, this price was too high for the gas to be absorbed in the Egyptian domestic market. This is because the Egyptian Cabinet set

⁴² Delek Group, Financial Statements as of September 30, 2019, available at <https://ir.delek-group.com/static-files/a59b480f-e026-4064-9d2c-5039222a3f13>, last accessed 4 May 2020.

⁴³ Charles Ellinas (2019), Challenges to Israel's gas exports, Cyprus Mail, 15 September 2019, available at <https://cyprus-mail.com/2019/09/15/challenges-to-israels-gas-exports>, last accessed 4 May 2020.

natural gas prices in October 2019 to \$5.5/MMBtu for iron, steel, aluminium, copper, ceramics, and porcelain industries and \$6/MMBtu for the cement industry.⁴⁴

Even though oil prices, as of the end of April 2020, have more than halved from what they were at the beginning of 2020 as a result of both supply and demand shocks, triggered by the Russia/Saudi price war and the coronavirus pandemic, it is too early to speculate whether these market conditions will continue for long enough to enable gas imported from Israel to be sold at a profit in Egypt. The decision of the Egyptian government to further reduce gas prices for industrial use to \$4.50/MMBtu in March 2020 to combat the coronavirus and the expectation that it will announce a further reduction in gas prices in the near future complicate the situation further.⁴⁵

The second challenge, which is related to the first, concerns the competitiveness of the region's gas at export destinations outside the region. When liquefaction and shipment costs are added to the cost of imported gas from Israel, the landing price of LNG from the Idku or Damietta LNG plants in Europe (perhaps even in Asia) is likely to be much higher than the price of gas imported from any other country in the world. In particular, it is likely to be much higher than Russian gas and significantly higher than the hub prices in Europe.⁴⁶ Hub prices in Europe (e.g., TTF) are forecast to stay below \$4/MMBtu in the short term and remain within the \$4-\$8/MMBtu range in the longer term (2030).⁴⁷ Although it is too early to assess the quantitative impact of the Russia/Saudi oil price war and the coronavirus pandemic on the international gas markets, it is clear that oil and gas prices are under heavy pressure. Taking the glut in the world LNG markets into account as well, it is highly unlikely that importers of gas into Europe will be willing to pay a premium for East Mediterranean gas, which would enable Egypt to re-export Israeli gas at a profit, just for the sake of supply security.

The third challenge concerns the risk of oversupply of gas as producers in the region may find themselves unable to find a market for their surplus gas. This has already happened in Egypt. The surge in domestic gas production, the tapering of domestic gas demand, and the very low LNG prices have forced Egypt to cap production in 2019 to avoid exporting LNG at discount prices. LNG exports from the Idku LNG plant in Egypt were stopped in mid-March 2020 (until the end of July when the next scheduled cargo is due) due to extremely low LNG prices.⁴⁸ However, constraining domestic production capacity is unlikely to be a viable strategy for keeping the country's upstream sector attractive. Considering the fact that Egas pays \$2.65/MMBtu for the bulk of onshore production and around \$4-5/MMBtu for most offshore

⁴⁴ Egypt Oil and Gas Newspaper, Issue 156, December 2019, 6, available at <https://egyptoil-gas.com/wp-content/uploads/2019/12/EOG-Newspaper-December-2019-Issue-.pdf>, last accessed 4 May 2020.

⁴⁵ Offshore Technology, Egypt reduces energy prices for industrial users during Covid-19, 20 March 2020, available at <https://www.offshore-technology.com/comment/egypt-covid-19/>, last accessed 4 May 2020.

⁴⁶ In Turkey, where gas import prices are believed to be higher compared to other countries in Europe, the gas import price from Russia is estimated at over \$8/MMBtu in the first quarter of 2020. This price is expected to decline to around \$6 if the Brent oil price remains around \$25-30/barrel, according to Energy IQ Weekly (No.384, 22 April 2020). This would make Turkey arguably the most attractive gas market for East Mediterranean gas.

⁴⁷ Rystad Energy, Press Release: Global oil & gas prices in 2020 set to fall short of earlier forecasts as coronavirus spreads, 27 February 2020, available at <https://www.rystadenergy.com/newsevents/news/press-releases/global-oil-gas-prices-in-2020-set-to-fall-short-of-earlier-forecasts-as-coronavirus-spreads/>, last accessed 4 May 2020.

⁴⁸ MEES, Vol. 63. No. 15, 10 April 2020.

output,⁴⁹ in the short term it could in fact be more profitable for Egypt to import LNG, whose spot price declined to below \$3/MMBtu in April. In addition, there is growing concern that the private Egyptian firm Dolphinus will not be able to take the full quantities of gas from the Tamar and Leviathan fields since Egypt has a surplus of gas. The sales contract with Dolphinus give it an option to reduce by up to 50% the contracted quantity of gas it offtakes in a year in which the average daily Brent price is lower than \$50 per barrel. The Leviathan partners will likely, therefore, need to look to the Israeli domestic market for further gas sales deals. Although Israeli gas demand will continue to grow as coal-fired power plants switch to gas, the main problem is that the rapidly growing solar sector is eating into gas' potential market share. Further, there is likely to be an oversupply of gas to Israel with the Greek company, Energean Oil&Gas, slowly but steadily increasing its share of the Israeli gas market. The company's Karish field will supply approximately 5.6 bcm per year to the domestic market once it starts producing in 2021.

Furthermore, the main gas export market in the region, Jordan, may also not require additional gas imports, and particularly not the large quantities stipulated in the contracts signed with the Leviathan partners. In fact, the current oversupply of gas in Jordan is threatening key power generation start-ups. Jordan has currently three sources of gas supply – from Egypt and Israel *via* pipelines and by Shell *via* LNG. In addition, Jordan has committed to buying twelve LNG cargos from Shell in 2020.⁵⁰ This oversupply of gas, combined with the power generation capacity surplus⁵¹, is likely to force the government to introduce radical energy policy measures, such as delaying or freezing renewable projects and paying independent power producers not to generate electricity. All of this points to a significant oversupply of gas in the region.

The fourth challenge facing the region concerns the availability of LNG export capacity in Egypt. It is a generally held view in the gas industry that the export route for Israeli gas is the LNG facilities in Egypt on account of Egypt not having enough indigenous gas to meet its domestic demand. This view is based on Wood Mackenzie's projections for the gas supply-demand balance and is often relied upon in the presentations made by the Delek Group.⁵² According to Wood Mackenzie, gas production in Egypt will peak at around 80 bcm in 2025 after which it will remain below its domestic demand. On this analysis, Egypt will remain reliant on imports to avoid LNG facilities lying idle. In contrast, according to OME, Egyptian gas production will not peak until the mid-2030s. Should OME's projection prove correct, there will be no capacity available for Israeli gas in Egypt's LNG plants until the mid-2030s.⁵³ If so, Egypt will not be a route for Israeli gas until after the mid-2030s. Cyprus gas looks to face the same challenges as Israeli gas since Egypt is seen as its main regional market and the LNG facilities in Egypt as a key way to access international markets further afield.

⁴⁹ MEES, Vol. 63. No. 15, 10 April 2020.

⁵⁰ MEES, Vol. 62. No. 44, 1 November 2019.

⁵¹ This surplus is caused by a boom in electricity production from renewables after three tenders (two in 2015 and one in 2018), the oil shale to power project which is expected to come on line in mid-2020 and gas-fired power projects.

⁵² Delek Group, Investor Presentation, November 2019, available at <https://ir.delek-group.com/static-files/691d5197-6315-4313-ab09-c0189da51a75>, last accessed 4 May 2020.

⁵³ OME (Observatoire Méditerranéen de l'Energie), Mediterranean Energy Perspectives, Paris, 2018.

5. CONCLUDING REMARKS

Large-scale offshore hydrocarbon discoveries and the prospect of further discoveries in the East Mediterranean region have attracted the attention of international energy majors. There was hope in the early 2010s that the gas discoveries would act as a catalyst for peace in the region. However, as Tzimitras has said “the history of the East Mediterranean is a history of lost opportunities”. It is “the zero-sum competition for the gas bonanza” which is shaping into a complex political, security and defence conflict, which could easily run out of control. The actions taken by all the actors in the region are exacerbating rather than reducing tensions.⁵⁴ Security, economic and other alliances have hardened rather than softened opposing views.

Given the commercial challenges discussed in Section 4, domestic markets and the markets in the immediate neighbourhood like Jordan do not provide companies operating in the East Mediterranean region with sufficient long-term security of demand to make the significant capital investment needed to develop the gas resources in the region.

For the following three reasons Turkey, as the fifth largest gas market in the Euro-Mediterranean region, is arguably the best outlet for the gas produced in the region and thus for securing the latter’s mid to long-term future. First, because virtually all its gas demand is covered by imports. Second, because a large proportion of Turkey’s long-term gas purchase contracts, totalling around 20 bcm per year, is due to expire before 2025. Third, because the gas prices set by BOTAS, a state-owned company, are much higher than those in Europe, therefore enabling the gas producers from the region to secure higher prices than in Europe.

However, significant legal and geopolitical challenges stand in the way here as relations between Turkey and its neighbours in the region and between Turkey and the EU are at their lowest ebb in a decade. Unless these can be overcome, export markets will need to be found for Israeli and Cypriot gas if energy companies are to continue carrying on costly upstream and infrastructure projects. In particular, and for the reasons discussed in Section 4, it is unlikely that the exploitation of the Leviathan field will extend beyond the current phase. The same applies for the giant Tamar field, as well as the many other fields already under development or under planning.

It is estimated that the total gas export potential of East Mediterranean could be between 30 to 50 bcm/yr by 2030. Of this amount at least 19 bcm could be exported via LNG facilities in Egypt. Even if East Med gas finds home in the European and international gas and LNG markets for supply diversification reasons, the only way to secure that such exports continue in the medium and long-term is for East Med gas to become price competitive. With international natural gas and LNG prices hovering at record low levels, gas markets are becoming more liquid and transparent. Existing and potential gas exporters from the region will have to adapt to changing market conditions. This will require to move away from traditional oil-linked long-term gas contracts with take-or-pay clauses and removal of destination clauses in LNG contracts.

Finally, interdependencies will need to be created in order pave the way for cooperation in the region. One way to create such interdependencies is to conduct joint upstream and mid-stream projects. Another would be to build joint export pipeline infrastructure. There is an old African

⁵⁴ The Arab Weekly, Conflict expands in Eastern Mediterranean over gas riches, 19 January 2020, available at <https://thearabweekly.com/conflict-expands-eastern-mediterranean-over-gas-riches>, last accessed 4 May 2020.

proverb that says "If you want to go fast, go alone. If you want to go far, go together." For gas to secure the long-term future of the region, a geopolitical game-changer is needed – co-operation. Otherwise, the East Med gas bonanza will be remembered as short-lived hype.