



East Mediterranean gas: a triangle of interdependencies

1. Introduction

Recent years have seen Israel emerge as the dominant strategic player in the East Mediterranean gas picture. As a major producer and regional exporter, the country's exports are now critical to gas balances in Jordan and Egypt, the latter whose longstanding profile as a producer, exporter and consumer of gas had made it the preeminent force in the regional industry for decades.

However, the regional gas picture has always been overshadowed by complex, overlapping conflicts over upstream boundaries, export agreements and investment politics. The Israel-Gaza crisis that erupted in October 2023 when this paper was being framed, has sharpened the geopolitical challenges dramatically.

The impacts of the crisis on gas were almost immediate although minor: the Israeli Ministry of Energy requested Chevron shut down its offshore Tamar field while export flows of gas to Egypt through the offshore EMG pipeline were suspended.¹ Normal service resumed a month later but the crisis has made future investment plans more uncertain. While partners in the Leviathan and Tamar fields have both sanctioned expansion plans during Q1 2024 and the recently developed Karish field is approaching plateau, talks for BP-ADNOC to take a stake in Israel's NewMed, a major shareholder in the Leviathan field, have been suspended.

Egypt meanwhile has experienced declining domestic gas supply and rising demand, making the import of Israeli gas critical to its balances. Egyptian production dropped a substantial 11 per cent in 2023, with declines seen across most basins and in particular, the supergiant offshore Zohr field. Domestic gas demand could only be met by Egypt cutting its LNG exports and increasing imports from Israel, marking the emergence of a deep symbiotic relationship between the two countries.

At present, Egypt is Israel's single large export market opportunity, while Egypt needs Israeli imports to meet its domestic demand, even with output from its two LNG plants suspended. In 2023 imports from Israel covered 14 per cent of Egyptian demand. With Egypt reportedly seeking LNG imports for summer 2024, there is no shortage of demand for Israeli gas. The question for Israel's producers is just how much Egyptian market risk is acceptable.

¹ See Bowden, J (2023) 'East Med – Gaza crisis tightens regional gas balances', OIES Energy Comment, November 2023

Europe's efforts to realize gas supply options post-Ukraine are a further component of the regional picture. In June 2022 the EU signed a memorandum of understanding (MOU) with Israel and Egypt for a stable supply of LNG from Egypt. On Egypt's current trajectory, this MOU is now undeliverable for at least two to three years, after which it will be redundant as the global LNG market sees new capacity in the US and Qatar come onstream after 2026. On OIES assessments, global LNG export capacity from new projects which have taken a final investment decision (FID) will grow by just over 300 million tonnes between 2024-2030, a rise of over 50 per cent, and most of this will come on-stream in 2026-28.²

No single paper can do justice to the region's overlapping and interrelated geopolitical, economic and other issues. The focus is therefore the triangular relationship between Israel, Egypt and Cyprus and the markets into which Israel's looming gas surplus will be delivered. This involves the role of Egypt as a market, both for domestic consumption and as a secondary export option for gas feeding its LNG plants. Cyprus's gas discoveries could play an important role although persistent delays in governmental decision-making mean this element is unlikely to emerge as a strategic consideration until the end of the decade. Separate sections below deal with Israel, Egypt and Cyprus, together with a shorter one on Jordan, whose gas demand is largely met from Israel.

The paper's main conclusion is that with Israel's domestic market fully supplied, Israel's only growth market opportunity (beyond Jordan, a small market now mostly supplied by Israel) for its gas surplus at the moment is Egypt. Our base case projection sees Israel's gas surplus available for export nearly double from 11.6 Bcm in 2023 to 20 Bcm by 2028.

Unless it can quickly reduce its gas demand, Egypt's only recourse in the short-term is to import more Israeli gas and LNG while keeping its own LNG plants mothballed. Cairo has set out to build new exploration and development plans but these will take time to result in new production. Cyprus is hoping to begin offshore gas development with the clear gravitational pull for Cyprus being the Egyptian domestic market. Its own market will be far too small to support an upstream development, and no-one is looking to commit quickly to Cypriot LNG or export pipeline options, which anyhow would take several years to plan and build. In the next few years, Israel will have to make strategic decisions on its gas marketing strategy, while Cyprus will need to integrate its future production into the regional picture.

2. Israel

Israel has become a significant gas producer and exporter over the past four years, doubling the size of its gas value chain with offshore-produced gas flowing into the Israeli domestic market and exporting to Jordan and Egypt. These last few years have been a remarkable success story for Israel's gas industry. A value chain around the Israel resource base has been firmly established: Israel has become both a gas-based economy (in the sense that gas is the dominant fuel in the energy mix) and also, since 2020, a significant exporter. In many ways, however, it has been a quiet story.³

It has been quiet mainly because Israel has no direct link to the international gas market. Essentially, this new value chain operates in a regional market independent of the global market. That would change, of course, if a direct link to the EU were created through a pipeline or Israel finds a way to place its gas directly into the Egyptian LNG plants or build its own LNG or FLNG facilities as part of its gas expansion plans. However, neither a pipeline to Europe or an FLNG scheme is likely to be in place before 2030 because of the complexity and size of such projects. The only one which could be completed earlier, by say 2027-8, would be a direct pipeline to the existing Egyptian LNG plants, or a contractual way to ensure gas could be delivered into those plants rather than the Egyptian authorities

² OIES internal projections of global LNG project inventory coming on-stream in next 5 years to 2030.

³ As a small illustration of the quiet emergence of Israel, the BP Stats Review 2022 and its successor now published by the Energy Institute do not list Israel as a gas producer, although they do identify Israel as a gas consumer. See <https://www.energyinst.org/statistical-review/resources-and-data-downloads>

deciding how to allocate gas between the domestic market and the LNG liquefaction plants. In the event that these plants do secure reliable gas supply, however, they would be increasing utilization rates just at a time when the global LNG market is already having to accommodate a major expansion as 300 million tonnes of new capacity comes on-stream mainly between 2026-28. But at least it would achieve exposure to another market.

The establishment of a working value chain has also stimulated other initiatives. First, it has attracted more corporate attention and changes to the ownership landscape. For instance, Chevron, through its acquisition of Noble Energy in 2020, obtained operatorship of both Leviathan and Tamar (and also Cyprus' Aphrodite), and BP and ADNOC together are trying to acquire a stake in NewMed (currently discussions are formally suspended). Secondly, it has encouraged Cyprus to try at last to build what should be a second value chain around Aphrodite or its Block 6 discoveries. Thirdly, it has put the East Med firmly on the EU radar as a potential source of gas for the EU in its pursuit to replace its Russian volumes. Lastly, it is perhaps reviving the idea of a pipeline to Europe or even long-distance gas-by-wire or renewables-by-wire.

While deeply respecting the hard geopolitics of the region which obviously affect all aspects of industrial and energy policy at all levels, the intention here is to focus on country and regional supply/demand fundamentals – the resource base, demand, and the flow patterns. From this, it should be possible to identify the pinch points when further resource monetization might require major decisions to be made on infrastructure expansion or creation.

a) Energy balance to 2022 – rising share of gas

Gas is, relatively speaking, a newcomer into the Israeli energy mix. Israel has now been 'doing gas' for under 25 years; most of the EU has been 'doing gas' for over 50 years. First discoveries were the Noa and Mari-B offshore fields in 1999-2000, with production starting in 2004.⁴ Supply was then supplemented with imports from Egypt over the 2005-11 period. Tamar was discovered in 2009 and was on-stream from 2013. By 2013 gas was supplying 26 per cent of Israel's energy demand.

The key feature of energy demand overall over the last 10 years is how stable it has been. Total energy demand has remained in the 22.0 – 23.0 million tonnes oil equivalent area over this period; in 2022 it was 23.5 Mtoe. This energy stability was despite an economy averaging an impressive 4.7 per cent per annum growth over the period 2013-22.⁵ However, the overall demand stability masks major changes within the energy mix. A significant reduction in coal consumption has been achieved through gas substitution. Coal consumption has halved in these years, from 7.2 Mtoe in 2013 to 3.8 Mtoe in 2022 while the share of gas in the domestic energy mix has risen from 26 per cent in 2013 to 44 per cent by 2021 and 44 per cent again in 2022. For perspective, the share of gas in the EU mix in recent years has been around 24 per cent.

Table 1: Israel energy demand 2022 and import dependencies

Israel energy demand 2022 (in millions toe)		
Coal	3.8	all imported
Crude oil	12.4	98% imported
Oil products	4.2	net exports
Gas	10.4	all domestic production

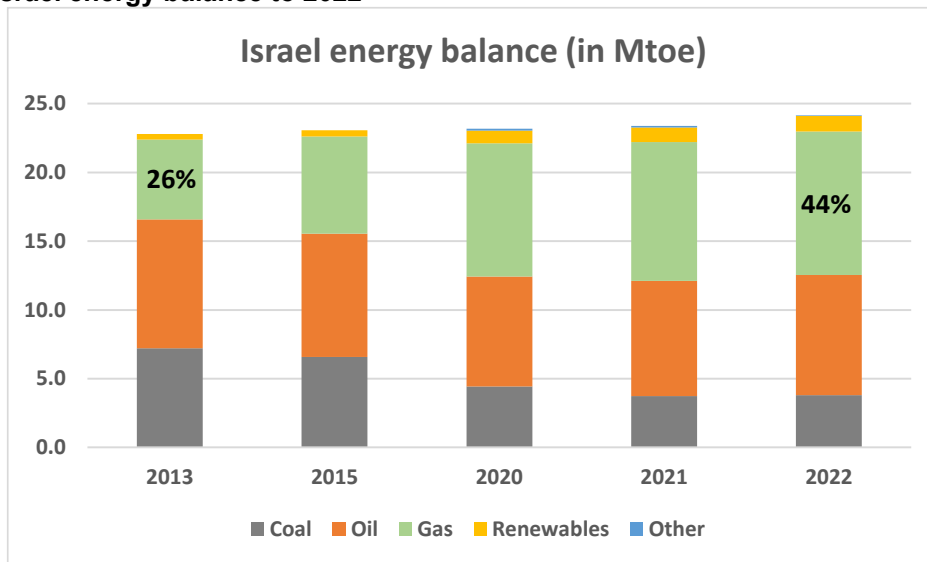
Source: Israel Central Bureau of Statistics

⁴ See NewMed Annual report (Periodic Report) 2022, pages A-75-76 on Yam Tethys

⁵ IMF at <https://www.imf.org/external/datamapper/PPPPC@WEO/ISR?zoom=ISR&highlight=ISR> The 4.7% pa is GDP per capita, purchasing power parity basis.

The ready availability of domestically produced gas has meant several things. Firstly, volumes of gas now available and being deployed into the domestic market means a continuing and reliable supply of gas is now critically important for the domestic economy. A major feature of energy policy is that exports are not licensed until the Government can be confident that the resource base is able to cover 25 years of domestic demand. Secondly, Israel can now meet around half of its total energy needs from domestic gas and renewables, giving it a high degree of energy security. Today, its main energy imports are crude oil and coal, and coal consumption is on a downward trend. Substituting out the last 3.8 Mtoe of coal would require just over 3 Bcm/a gas.

Figure 1: Israel energy balance to 2022

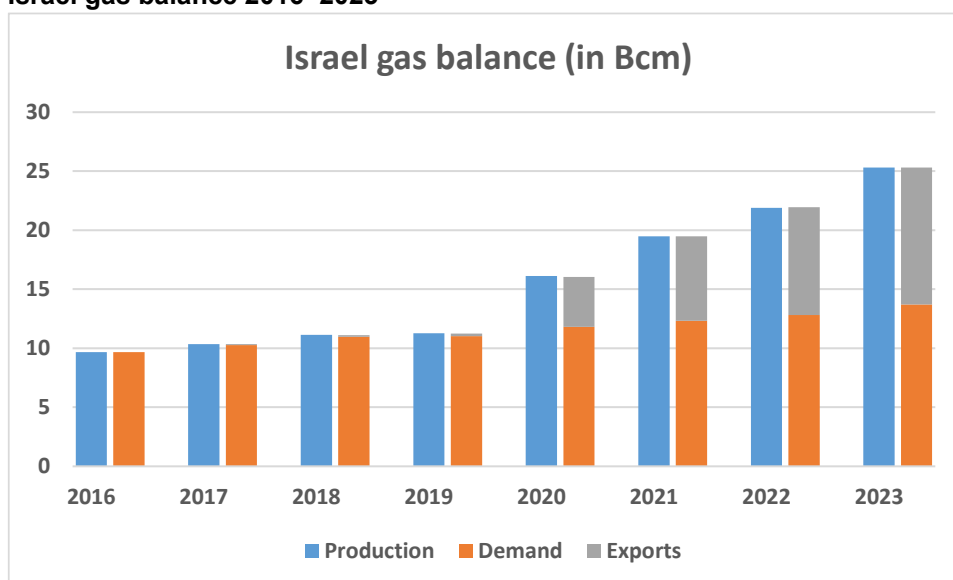


Source: Israel Central Bureau of Statistics at https://www.cbs.gov.il/he/publications/doclib/2022/24.shnatonenergy/st24_01x.pdf

Figure 2 plots the increase in gas production to 21.9 Bcm and up a further 16 per cent to 25.3 Bcm in 2023 as the Karish field ramped-up. 46 per cent of the 2023 total output was exported: 2.9 Bcm to Jordan and 8.7 Bcm to Egypt.⁶ For comparison, output is now substantially higher than any EU producer, the largest in 2022 being the Netherlands (15.1 Bcm) and Romania (8.8 Bcm). The share of gas going to the domestic market and to exports is now approaching a 50:50 split.

⁶ NewMed Energy Periodic Report 2022 para 6.8, at https://newmedenergy.com/wp-content/uploads/2023/03/NM_FS31122022ENG.pdf and Israel's Ministry of Energy & Infrastructure royalties report for 2023 at <https://www.gov.il/he/departments/news/revenue-260224> and Israel Ministry of Energy & Infrastructure annual gas report 2022 page 7 at <https://www.gov.il/he/departments/publications/reports/ng-2022>

Figure 2: Israel gas balance 2016–2023



Sources: Israel Ministry of Energy & Infrastructure annual gas report 2022 page 7 at <https://www.gov.il/he/departments/publications/reports/ng-2022>, and NewMed 2022 Periodic Report

b) Development to 2022-2023 – production from Karish starts

Over the last two years Israel has consolidated the position of gas both within its domestic energy balance and as a critical source of gas for Jordan and Egypt. Production from Leviathan, Tamar and, from late 2022 Karish, combined totalled 25.3 Bcm in 2023, up by 3.4 Bcm or by 15 per cent. Of this volume, 46 per cent was exported to Jordan and Egypt. Table 2 summarises further developments in the gas balance in 2023.

Table 2: Israel gas flows snapshots for 2022 & 2023

Israel gas flows snapshot 2022-23 (in Bcm)								
Supply	2022	2023	increment	:	Demand	2022	2023	increment
Leviathan	11.4	11.2	-0.2	:	Domestic market	12.7	13.7	1.0
Tamar	10.2	9.2	-1.0	:	Exports			
Karish	0.3	4.9	4.6	:	Jordan	2.9	2.9	0.0
				:	Egypt	6.3	8.7	2.4
	21.9	25.3	3.4			21.9	25.3	3.4
Routes to export markets								
EMG offshore pipeline Israel-Egypt							4.6	
Jordan north (Jordan and into Arab Gas Pline)							4.4	
Jordan south							0.2	
Total exports							9.2	11.6

Sources: Israel Ministry of Energy annual gas report 2022, page 7 at <https://www.gov.il/he/departments/publications/reports/ng-2022> and https://www.gov.il/BlobFolder/reports/income_reporte/he/revenue-report-2022.pdf 2023 numbers are taken from NewMed 2023 Periodic Report

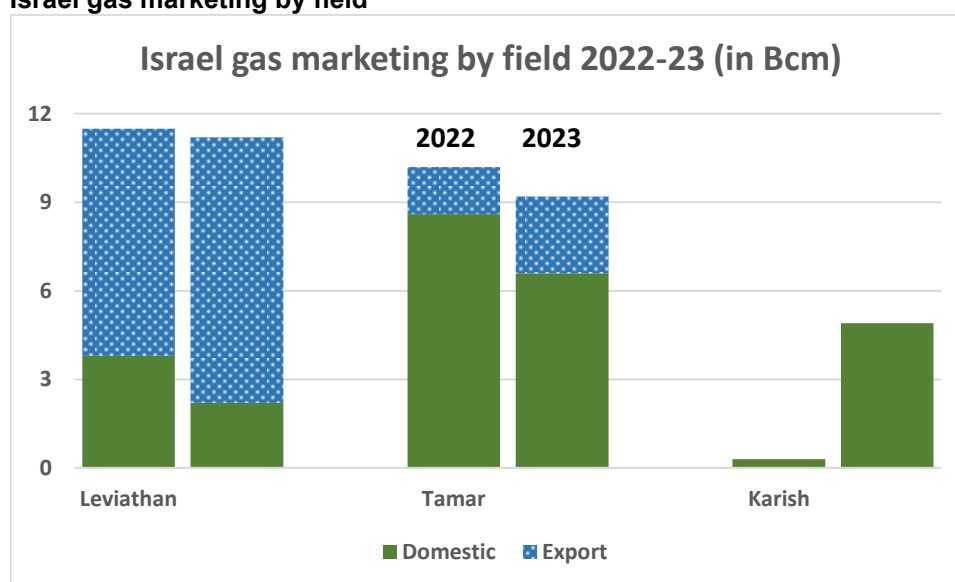
During 2023 the main supply event was the ramp-up of production at Karish towards its planned 8 Bcm/a plateau. Despite the shut-down of Tamar for a month in October because of war security concerns, over the year total country output was up 3.4 Bcm, and all this increase was due to Karish ramping up. Karish was accommodated basically by the demand increase of 1 Bcm and the increase in exports by 2.4 Bcm. However, it was not Karish gas which was exported; all Karish production was consumed domestically. It was Leviathan which accounted for most of the increase in exports. Overall, it has been Leviathan which accounts for most of Israel's gas exports (nearly all the volume going to Jordan and over 70% of the volume to Egypt is from Leviathan).

Table 3: Leviathan production, gas sales and average prices achieved

Leviathan - production, gas sales and gas price achieved					av price
	Israel	Jordan	Egypt	total Bcm	\$ per MMbtu
2021	4.6	2.7	3.4	10.7	5.1
2022	3.8	2.7	4.9	11.4	6.2
2023	2.0	2.7	6.3	11.2	6.2
2023 Israel total Bcm	13.7	2.9	8.7	25.3	
Leviathan share 2023	15%	94%	72%	44%	

Source: NewMed Energy 4Q and FY 2022 and 2023 financial results presentations

Figure 3: Israel gas marketing by field



Sources: NewMed and Energean annual reports

c) Upstream – Leviathan, Tamar, Karish and expansion plans

Israel's upstream comprises three producing fields: Leviathan, Tamar and Karish. Initial gasification of Israel began on the back of two small discoveries by Delek Drilling (now NewMed Energy) and Noble Energy (acquired by Chevron in 2020): Noa in 1999 and Mari-B in 2000. Both came on-stream in 2003, supplying gas into Israel. Volumes were small, 1.2 Bcm in 2004, 3.8 Bcm in 2008, but they established a platform for more exploration and market creation in Israel. Both are now depleted. Tamar was discovered in 2009, Leviathan one year later, and both by Noble. Tamar came on-stream in 2013 and Leviathan in 2019.

i) Leviathan – operator Chevron (40%), also NewMed (45%), Ratio Energies (15%)

Leviathan is located within the Israeli Exclusive Economic Zone (EEZ) some 130 kms offshore of Haifa. Discovered in 2010, FID for a 12 Bcm/a project was taken in 2017 and first production was at end-2019. The resource base is gas in place 33 Tcf (930 Bcm), recoverable 23 Tcf (650 Bcm). Production is from

4 subsea wells, tied back to near-shore platform where the gas is processed.⁷ Output in 2023 was 11.2 Bcm, or 44 per cent of Israel's production.

ii) Tamar – operator Chevron (25%), also Isramco (28,75%), Tamar Petroleum (16.75%)⁸

Tamar is 90 km offshore and in water depth of 1700 metres. Discovered in January 2009, a first gas production scheme was completed rapidly to compensate for cessation of imports from Egypt. First gas was in March 2013. Reserves are estimated at 13.7 Tcf; ie, it is 40 per cent the size of Leviathan.⁹ In 2017 exports to Jordan started, increasing to 0.23 Bcm by 2020. First Tamar exports to Egypt were in July 2020.¹⁰

iii) Karish - Energean

The Karish and Tanin fields were discovered by Noble in 2011 and 2013. Regulatory concerns around upstream concentration forced their divestment, and in 2016 Energean acquired both Karish and Tanin. In March 2018 it took FID on Karish, and a development plan was built around a floating production, storage and offloading facility (FPSO), with gas treatment capacity of 8 Bcm/a. Karish and Tanin are some 40 km apart, in water depth similar to Tamar of 1700 metres, and they lie just north of Tamar at around 110 km offshore. Relative to Leviathan and Tamar, Karish itself is fairly small with reserves of 1.4 Tcf, but when combined with Karish North (discovered by Energean in 2019 and 1.1 Tcf) and Tanin (just under 1 Tcf) reserves, it has materiality.¹¹

Production is through an FPSO the *Energean Power*, the ship built in China and the topsides in Singapore. After some Covid-related delays, and vessel arrived in Israeli waters in June 2022, and in October 2022 first gas from Karish was produced.¹² In early 2023 Energean said it was on track for 4.5 -5.5 Bcm in 2023, and this was delivered, Karish producing 4.9 Bcm, and by end-2023 it was producing at a rate of 6.5 Bcm/a. In February 2024 Karish North came on-stream, which enabled the FPSO to be utilized at its maximum gas capacity (which presumably means at an annualized rate of around 8 Bcm/a).¹³

The Karish-Tanin area contains other gas prospects, and in May 2023 Energean announced the Katlan discovery lying between Karish and Tanin.¹⁴ In its half-year results for 2023 Energean said it expected to take FID on Katlan by end-2023, but as of April 2024 it had not done so.¹⁵

iv) Production expansion plans

Israel's gas production was 25.3 Bcm in 2023. Expansion plans have recently been announced by both Leviathan and Tamar, which would take total output to around 38 Bcm by 2030.

In March 2024 Leviathan partners took FID on expansion centred around a third pipeline from the field to the production platform and enhancements to that platform, which will enable output to rise from 12 Bcm/a to 14 Bcm/a from mid-2025 at a capex of \$568 million.¹⁶ Ultimate production planned is 21 Bcm/a, but this is not sanctioned or designed as yet. Plans here could involve a FLNG scheme, or probably a quicker and cheaper project, a direct pipeline to Egypt's existing LNG liquefaction facilities.

⁷ <https://israel.chevron.com/en/our-businesses> and <https://newmedenergy.com/operations/leviathan/>

⁸ <https://israel.chevron.com/en/our-businesses> Other shareholders are Mubadala Energy 11%, Tamar Investment 2 11%, Dor Gas 4% and Everest 3.5%.

⁹ Tamar field details from Tamar Petroleum at <https://www.tamarpetroleum.co.il/en/tamarreservoir/>

¹⁰ https://www.tamarpetroleum.co.il/wp-content/uploads/2021/06/Annual_Report_2020.pdf

¹¹ Energean operations, at <https://www.energean.com/operations/israel/tanin/>

¹² On Karish history see NewMed 2022 Periodic Report para 7.5.3 and also Energean at <https://www.energean.com/media/5399/2022-full-year-results.pdf>

¹³ Energean press release on Karish North at <https://www.energean.com/media/5742/karish-north-and-second-gas-export-riser-online-and-new-gspa-signed.pdf>

¹⁴ <https://www.gov.il/en/departments/news/news-310523>

¹⁵ <https://www.energean.com/media/5526/results-for-half-year-ended-30-june-2023.pdf> and <https://www.energean.com/media/5767/2023-full-year-results.pdf>

¹⁶ Platts European Gas Daily 20th March 2024 and a full description from NewMed announcement 19th March 2024 at <https://newmedenergy.com/wp-content/uploads/2024/03/Leviathan-Reserve-Report-19.03.2024-שגוגמ-merged.pdf> In the cash flow tables presented, there are no forecasts on production beyond a 14 bcma rate.

In June 2023 and again in December 2023, partners submitted an in-principle application to the Petroleum Commissioner for export approvals, either via existing and regional pipeline or via an FLNG.¹⁷ The development to the ultimate 21 Bcm/a, NewMed says, 'is expected to include a significant liquefaction component that will expand Leviathan's customer base beyond the Eastern Med to Europe and the Far East. To that end, commercial negotiations are being held with two existing liquefaction facilities in Egypt, while an option for liquifying natural gas on a floating facility anchored in the Israeli EEZ is being explored.'¹⁸ Note, there is nothing here suggesting that a liquefaction in Cyprus option is being pursued or considered.

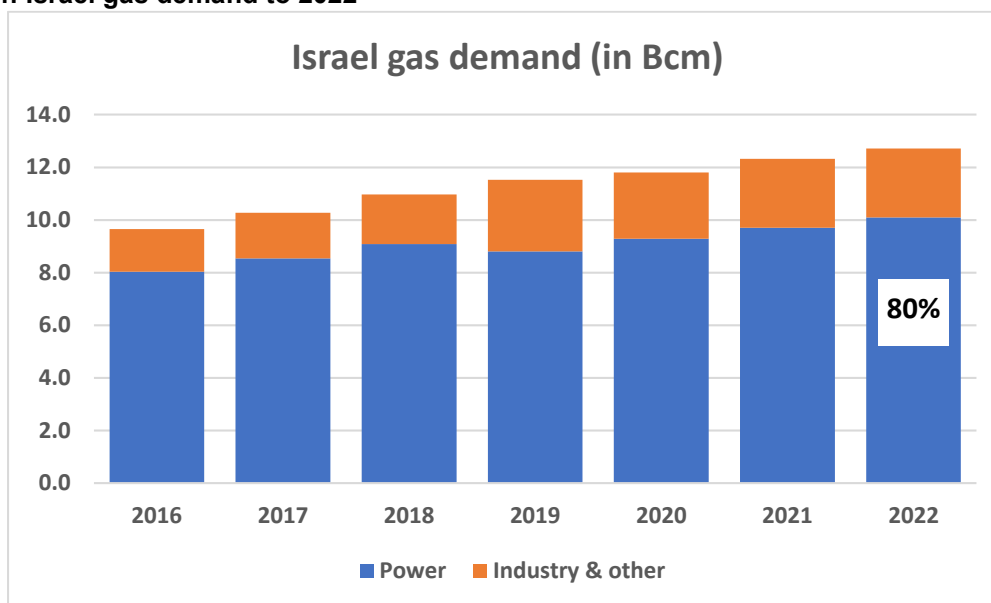
Tamar also approved expansion plans during Q1 2024. In February it took FID on expanding capacity from the current 1.1 Bcf/d to 1.6 Bcf/d (ie from around 11 Bcm/a to 16.5 Bcm/a), which will make it a larger producer than Leviathan. Expansion also includes a third pipeline to its near-shore platform, and work is scheduled for completion by end-2025.¹⁹

Energean's focus appears to be firmly on filling its *Energean Power* FPSO and maintaining it at capacity through to 2040 and beyond. To that end, it will bring-on fields in the Katlan area (Athena, Zeus, Hera, Apollo), which are close to Karish, progressively in order to maintain an 8 Bcma plateau for the next 20 years.²⁰

d) Gas demand

Demand in 2023 reached 13.7 bcm, making the Israeli market roughly similar in size to Belgium (14.6 bcm in 2022). While a full energy balance for 2023 is not available yet, this probably increases the share of gas in the domestic energy mix to something close to 50%. Most demand is from the power sector: currently around 80% of gas demand in Israel is for power generation.

Figure 4: Israel gas demand to 2022



Source: NewMed Periodic Report 2023, page A-15 para 6.7

¹⁷ NewMed Periodic Report 2022, pages A-50-52

¹⁸ <https://newmedenergy.com/operations/leviathan-phase-b/>

¹⁹ Platts European Gas Daily 19th February 2024

²⁰ See the Energean Full-Year 2023 results presentation slide 16 at <https://www.energean.com/media/5768/energean-full-year-2023-results-presentation.pdf>

In November 2019, the Ministry of Energy updated its coal substitution policy and policy goals were approved by Government Resolution 465 in October 2020. Under this, two coal units at the 'Orot Rabin' station and four coal units at the 'Rotenberg' station will be modified to operate on gas (although it is not clear what investments need to be made to do this). By the end of 2025 the expectation is that the use of coal for electricity generation will be discontinued completely.

i) Israel gas demand projection

Israel's Ministry of Energy and Infrastructure identifies the main drivers of future demand growth from phasing out of coal-fired stations by 2026, sustained growth in demand for electricity by households and industry, and significant growth in the electrification of transportation.²¹ NewMed's assumption, which it takes from a BDO Consulting Group report, is for demand rising to 18.8 Bcm in 2028.²² Energean's projection is also based on the BDO work and sees demand doubling by 2045, from the current 14 Bcm/a to something between 25-30 Bcm/a by 2045. For 2030, Energean sees demand at around 20 Bcm.²³ For the supply/demand balance projection below, as a base case we have assumed demand at 20 Bcm for 2030.

The development of renewables adds a layer of complexity to the gas demand projections. Installed renewables capacity has been rising relatively fast, and in 2022 reached 4.8 GW, accounting then for some 10 per cent of total electricity output and just over 20 per cent of total installed capacity.²⁴ Clearly a further acceleration in renewables investment could moderate the gas demand projection.

Table 4: Israel total power generation capacity and renewables capacity

	2020	2021	2022
Installed capacity (GW)	20.2	21.1	22.1
renewables capacity (GW)	2.7	3.7	4.8
% of renewables in total capacity	14%	17%	22%

Source: Israel Electricity Authority's Renewables Report for 2022

e) Export infrastructure

A critical issue is the availability of infrastructure to bring the offshore gas to market. With upstream production on a rapid upward trajectory, the question is the synchronisation of supply with demand, or in other words, will be pipelines and perhaps FLNG be available at the right time to enable production expansion to be monetised.

Government is heavily involved, and decisions will be as much as political as by companies. Priority for Israel remains ensuring supply for the Israel domestic market, even today with the upstream offering what looks like enduring and reliable surpluses. Minister Katz said in August 2023 on Tamar exports "after ensuring the supply of gas to the Israeli domestic market, I have now signed a permit for additional natural gas exports to Egypt from the Tamar reservoir. This is an important step that will increase state revenues and bolster diplomatic ties between Israel and Egypt." This is an unequivocal statement that Israeli Government is heavily involved in export decisions.²⁵

Current infrastructure for exports to Egypt and Jordan from the Tamar and Leviathan fields is through three pipelines: one in the north of Israel, connecting to the Arab Gas Pipeline in Jordan; another connecting directly to Jordanian industrial facilities on the eastern side of the Dead Sea; finally the EMG offshore pipeline connecting to the Egyptian transmission system. Total export capacity from these

²¹ <https://www.energy-sea.gov.il/home/domestic-demand/>

²² NewMed 19 March 2024 Statement, footnote 6, at <https://newmedenergy.com/wp-content/uploads/2024/03/Leviathan-Reserve-Report-19.03.2024-שוגג-merged.pdf>

²³ Energean 2023 results presentation 21 March 2024, slide 17, at <https://www.energean.com/media/5768/energean-full-year-2023-results-presentation.pdf> In its 2023 Annual Report, Energean confirms the BDO work and cites 22 Bcm demand in 2035 – see 2023 Annual Report page 34

²⁴ Israel Electricity Authority press release at https://www.gov.il/he/pages/doch_mithadshot_2022

²⁵ <https://www.energy-sea.gov.il/home/news-publications/additional-exports-to-egypt-approved-as-part-of-tamar-expansion/>

three pipelines is around 13 bcma, while planned expansion of them would bring total capacity to around 19 bcma.²⁶

The main new project is the Nitzana – INGL line, promoted by Israel Natural Gas Lines (INGL), for a new 65km onshore line connecting Ramat Hovav to the Egyptian border at Nitzana. This will allow a further 6 Bcm exports to Egypt for an estimated capex of around \$300 million, and was approved in May 2023.²⁷ With this in place, Israel's transportation capacity to existing export markets to handle the projected gas surplus in 2030 looks to be adequate.

f) Corporate landscape

The proven size of Israel's upstream has attracted wider international corporate interest. Initial discoveries of Noa and Mari-B in 1999-2000 was by a partnership of Israel's Delek Drilling and the US Noble Energy. BG discovered Gaza Marine in 2000, which has not been developed. Major integrated oil company (IOC) interest was visible from 2020 when Chevron acquired Noble, and it was Noble Energy which made the Tamar and Leviathan discoveries.²⁸ In 2022 Delek Drilling was renamed Newmed Energy. Further IOC interest was evident from March 2023 when BP and ADNOC made a joint offer to acquire 50 per cent of NewMed. Talks on progressing that stalled after October 2023 events, and have now been officially put on-hold: it was announced that the parties 'have agreed.... to suspend discussions', with no time given for when talks might resume.²⁹

Israel's 4th offshore bid round concluded in late 2023 when 12 exploration licenses were awarded to two groups: an ENI-led one containing Dana and Ratio; a SOCAR-led one containing BP and NewMed.³⁰ Significant cross-border relationships have now been established from this activity: for instance, ENI is very active in Cyprus and well as Egypt; BP has a long presence in Egypt; Chevron is in Egypt too. Building on the major flow of gas from Israel to Egypt, if further significant flows of gas are to be established between Israel-Egypt-Cyprus, then they should be facilitated by these mutual cross-border corporate interests able to coordinate cross-border physical and commercial project development.

g) Israel gas balance to 2030 and exports

In Table 5, the gas balance is a base case projection constructed to indicate what the export surplus might look like towards 2030. On the production side, expansions which have been announced for Leviathan and Tamar are assumed to happen on schedule. On the demand side, the BDO forecast (cited above in the demand section) has been taken and not overruled. Our assumption is that much of the demand increase (around 3 Bcm/a) comes as a result of the complete removal of coal and its substitution by gas.

Of note, production increases are from expansions to *existing* fields and their production facilities. No new fields are assumed to be coming on-stream by 2030. There may be new entrants, such as the BP-ADNOC partnership, assuming that the suspended talks resume and conclude. Exploration from the 4th Licensing Round in 2023 will probably not result in a new-field production before 2030 even in a success case.³¹ Under its Phase 1B development plan Leviathan is planning for additional wells and facilities expansions to take Leviathan up to 21 Bcm/a.³² But there is no FID on this yet and as it would

²⁶ <https://www.energy-sea.gov.il/home/export/>

²⁷ <https://www.energy-sea.gov.il/home/news-publications/new-export-pipeline-to-egypt-approved-by-government/> and also

²⁸ On the early history, see Nie, S. and Mills, R. (2023). 'Eastern Mediterranean Deepwater Gas to Europe: Not Too Little, But Perhaps Too Late'. Columbia/Sipa, CGEB,

²⁹ <https://newmedenergy.com/wp-content/uploads/2024/03/NewMed-IR-10.3.24-מנגוּש.pdf> The tone of the press release could be interpreted as a temporary suspension, although it does also say 'There can be no certainty that discussions will resume or that an agreement will be reached in the future...'

³⁰ Platts European Gas Daily 7 March 2024

³¹ In October 2023 results of the 4th Round were announced by the Israeli Energy Ministry. Two groups were awarded 6 licenses each: an ENI group including Dana Petroleum and Ratio; and a Socar group including BP and NewMed. See Platts European Gas Daily 30 October 2023.

³² NewMed Periodic Report 2023, pages A - 48-49

require considerable planning and commercial work, it would represent an upside to this base case and has not been included here.

The projection in Table 5 below should be treated as directional rather than a forecast. It envisages production growing to 38 Bcm, and demand to 20 Bcm, leaving an exportable surplus rising from 11.6 Bcm in 2023 to 21 Bcm in 2027, falling slightly to 18 Bcm by 2030 as domestic demand rises while production has (temporarily perhaps) plateaued. The overall shape of the balance remains unchanged, in that the share of domestic demand and exports remains approximately the same as today, with an almost 50-50 split.

Table 5: Israel gas balance projection to 2030

	Israel gas balance to 2030 (in Bcm)										
	2020	2021	<< actual		projection >>>						
			2022	2023	2024	2025	2026	2027	2028	2029	2030
Production											
Tamar	8.2	8.6	10.3	9.2	10	11	14	16	16	16	16
Leviathan	7.3	10.7	11.4	11.2	12	13	14	14	14	14	14
Karish			0.3	4.9	8	8	8	8	8	8	8
Other											
Imports		0.2									
Total	16.1	19.5	22.0	25.3	29.5	32.0	36.0	38.0	38.0	38.0	38.0
Israel demand	11.8	12.3	12.7	13.7	14	15	16	17	18	19	20
demand as % of production	73%	63%	58%	54%	47%	47%	44%	45%	47%	50%	53%
Exports											
Jordan	2.1	2.9	2.9	2.9							
Egypt	2.2	4.2	6.3	8.7							
Total exports / surplus	4.3	7.1	9.2	11.6	15.5	17.0	20.0	21.0	20.0	19.0	18.0
exports as % of production	26%	37%	42%	46%	53%	53%	56%	55%	53%	50%	47%

Source: authors' estimates based on Company statements on project development described above in section c (iv).

Clearly with so many moving parts throughout the projection, there are many areas of uncertainty. Some points highlighted from the projection include:

- With exports to Jordan kept constant at around 3 Bcm/a, a 20 Bcm total export surplus means 17 Bcm will need to go to Egypt. At its present demand of around 60 Bcm/a, that would give Israel an almost 30 per cent market share, or Egypt a 30 per cent dependency on Israel. The question arising from this is - does Egypt want this level of dependency, and equally, does Israel want this level of Egyptian domestic market risk?
- If Cyprus production does start up before 2030, and with Israel not having built another export scheme by 2030 (FLNG or pipeline to Europe are potential routes to market, but if selected, both are extremely unlikely to be ready before 2030), and Cyprus gas monetisation is centred around a connection to the existing Egyptian offshore facilities, then Cyprus could become a competitor to Israel for Egyptian market space.
- Israel probably does not need any more upstream expansion before 2030 unless it can quickly work out more export options.
- The likely main feasible medium-term solution is for both Israel and Cyprus to secure direct access to the two existing Egyptian LNG plants, whose total demand for feed gas at full capacity operations is 19 Bcm/a.

A major uncertainty is whether Egyptian production can be stabilised and then rise within the next three to five years, and whether its demand levels can be held flat or reduced. Here, the delivery speed of its ambitious renewables plan becomes very important.

h) Gas pricing

Pricing is not fully disclosed, but from the various company financial statement a variety of price indications are given. In general, there is no direct linkage to any international gas price or European liquid hub such as any reference to TTF. Given that Leviathan volumes go directly to exports, the price NewMed publishes is likely to reflect an export price, whereas Energean exports nothing from Karish so the price it gives must be a domestic price. The Leviathan price achieved was just over \$6 MMBtu in both 2022 and 2023. Energean reports that its gas average realised price in 2023 was \$5 per Mcf (approx. \$5 per MMBtu) and as most of its sales volumes came from Israel operations, this must reflect its Israel price achieved.³³ Further, the Ministry of Energy publishes the quarterly average price in Israel and according to the Ministry, the average price in 2023 was around 4.6 per MMBtu.³⁴

On other aspects of pricing and price composition, NewMed says its price reference does include a Brent linkage, and in future may include full or partial linkage to the electricity production tariff and the ILS-US dollar exchange rate.³⁵ Energean sells all its gas into the Israeli market, most of it under long-term contract. It currently has 19 long-term sales agreements with Israeli customers (mostly in the power sector), and most contain floor and ceiling and take-or-pay provisions, and an indexation component, which is not Brent-related. It also has nine spot sales agreements into Israel.³⁶

There is a question of market and price risk when these regional markets are disconnected from the international market. With the lack of direct physical connections beyond the region, price impacts from larger supply/demand forces do not apply, except to the extent there is a Brent component in export prices to Jordan and Egypt. On the other hand, there is some security from gas being sold under long-term contracts. But overall, there is, therefore, an issue of exposure to alternative markets and price influences, and also one of market risk from dependency on a very limited pool of market opportunities. In particular, there is no exposure to the global LNG market since Israel (or rather the Leviathan partners) has no control over where gas exports to Egypt go. That being said, at present (H1 2024) LNG prices in Europe and the Mediterranean are relatively low. Platts is now publishing an East Med DES LNG assessment, and for April 2024 this was hovering around the \$7.5 MMBtu level. At this price, then Leviathan achieving \$6 MMBtu cannot be far adrift from LNG parity given the additional costs of liquefaction and shipping.

3. Egypt

On the back of a major onshore and offshore resource base, Egypt has developed into a major gas market.³⁷ It is today a 60 bcma consumer: in a European context that would make it the fourth largest market after Germany (77 Bcm), UK (72 Bcm) and Italy (65 Bcm).³⁸ Gas is today hugely important to the Egyptian economy, accounting for between 55 – 60 per cent of domestic total energy needs (the number fluctuates year-to-year) and about 80 per cent of its total electricity generation. Around 55-60 per cent also of its total gas demand comes from its power sector. In this respect, the shape of Egypt's and Israel's domestic energy balances is similar – a very high percentage of gas in the mix (Egypt around per cent, Israel approaching per cent. and in both countries power is the dominant demand sector).

For many years, Egypt has had a gas surplus, and this surplus has fed the two LNG liquefaction plans on the Mediterranean coast, the Shell-operated Idku and ENI-operated Damietta plants. However, synchronisation of growing supply and growing demand has not always been achieved, and this has

³³ Energean Full-year 2023 results presentation on 21 March 2024, slide 24.

³⁴ : <https://www.gov.il/he/pages/average-ng-prices>

³⁵ NewMed announcement on Leviathan 19 March 2024, page 6 para 3(b), at <https://newmedenergy.com/wp-content/uploads/2024/03/Leviathan-Reserve-Report-19.03.2024-שגוגל-merged.pdf>

³⁶ Energean Annual Report 2023, page 41

³⁷ BP Statistical Review of World Energy 2021. For end-2020, the Review puts Egypt's proven reserves at 75.5 Tcf. Note, demand numbers *exclude* gas for the LNG plants. Egypt population in 2022 – 103.6 million

³⁸ Energy Institute Statistical Review of World Energy 2023, formerly the BP Statistical Review. Demand numbers are for 2022.

affected LNG production and exports. Between 2015-18 Egypt was an LNG importer as domestic demand outstripped supply. Then the discovery and rapid development of the supergiant 30 Tcf offshore Zohr field, discovered by ENI in 2015 and impressively on-stream just two years later in 2017, gave substantial relief to the gas balance and enabled LNG exports to resume.

The economy has been growing in recent years, with 4 per cent expected for 2023, but has been slowing since early 2022 because of global food price rises and high domestic inflation. There are multiple problems: balance of payments pressure; high core inflation hovering around 30 per cent in 2022 and 2023; and high public debt – 96 per cent of GDP in mid-2023.³⁹ On top of that, there is now additional pressure from rising gas imports and much lower Suez Canal receipts.

However, 2023 saw a completely unexpected perfect storm of significant production decline together with greater summer demand from higher than usual temperatures, all against a background of a weakening economy. LNG exports stopped for much of the summer, and Egypt only achieved overall gas balance because of its gas imports from Israel. These imports were a record 8.7 Bcm, accounting for around 14 per cent of Egypt's demand, up from 11 per cent in 2022.

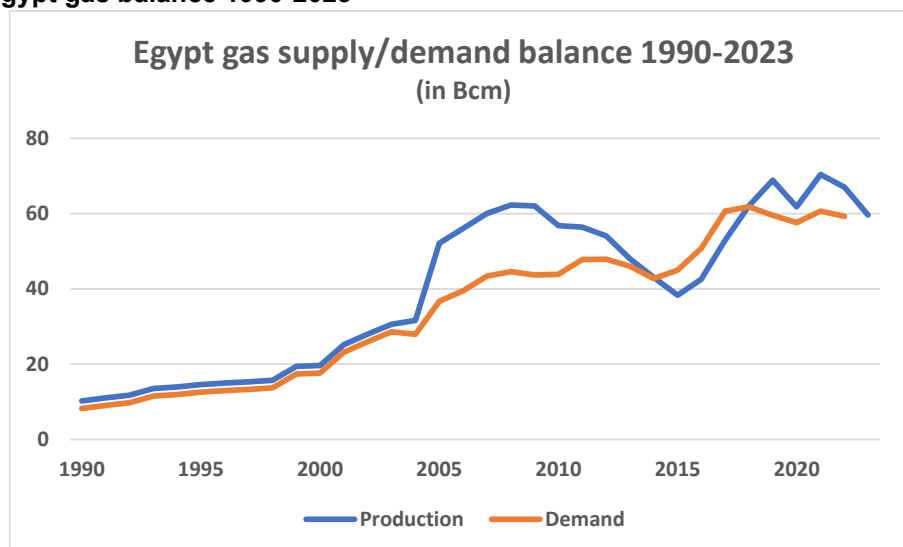
There are two key implications from the 2023 gas balance problems, and these will not be resolved quickly. Firstly, there must now be serious doubts about the deliverability of the June 2022 MOU with the EU to deliver stable gas supplies to the EU. Secondly, the gas relationship between Egypt and Israel has become mutually important: Egypt needs Israeli gas to meet its domestic demand, while Israel needs the Egyptian market as its own gas surplus has no alternative market.

a) Egypt gas supply/demand balance

i) supply/demand balance evolution

Figure 5 below plots the long-term evolution of the Egyptian balance. Until around 2003 supply and demand moved in step, but production then moved substantially ahead, allowing exports to Jordan and then Israel from the EMG pipeline, and then LNG exports also.⁴⁰ The pipeline exports ceased in 2011 until the line was reversed in 2020 to enable Israeli exports to Egypt.

Figure 5: Egypt gas balance 1990-2023



Source: IEA

³⁹ OECD iLibrary at <https://www.oecd-ilibrary.org/sites/83ed1efa-en/index.html?itemId=/content/component/83ed1efa-en> and IMF economic data at https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/EGY?zoom=EGY&highlight=EGY
⁴⁰ Alami, R. (2006) 'Egypt's domestic natural gas industry', OIES NG12 April 2006, and Ouki, M. 'Egypt – a return to a balanced gas market?' OIES NG131, June 2018

In 2020 imports from Israel started and have grown to become a significant item in the Egyptian balance. But the 2023 upstream decline has shown once again that the gas balance can change its shape very quickly and dramatically.

b) Egyptian LNG

Egypt has two LNG plants, with combined capacity of 12.2 Million tonnes pa. To operate these plants at full capacity would require around 19 Bcma feed gas.⁴¹ Combined output in 2022 was 7.2 million tonnes, and approximately 30 per cent of this volume went short-haul to Turkey.

Table 6: Egypt LNG – plants, output, imports

Egypt LNG plants and output				
Plant	Capacity Million tonnes pa	Operator	Output 2022 in Mtes LNG	Output 2023 in Mtes LNG
Idku	5.0	Shell	3.2	1.6
Damietta	7.2	ENI	4.0	1.7
Total	12.2		7.2	3.3

Egypt LNG imports	
	in Bcm
2015	3.6
2016	10.0
2017	8.1
2018	3.0
2019	0.0

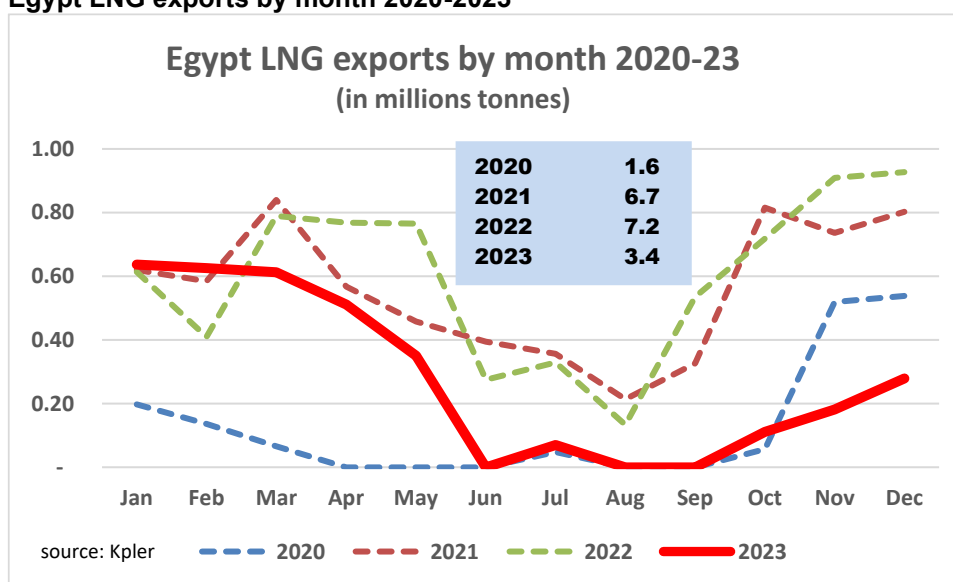
Sources: MEES; Kpler

Operations over the years have been inconsistent, with gas supply to the plants clearly a residual after domestic demand had been satisfied. From 2015-18 Egypt was an LNG importer as its gas production faltered. With Zohr on-stream from 2017 the need for imports diminished, and by 2020 there was sufficient gas in the system to begin LNG exports once more. Exports increased to over 7.2 Bcm in 2022, but then collapsed again in 2023 as the supply/demand imbalance developed as the year progressed. The pace of the decline was surprising, and it would have certainly surprised the Oil Minister Tarek El-Molla, who in February 2023 was quoted as saying ‘We expect average exports in 2023 to be about the same level of exports in 2022 – about 7.5 million tonnes, give or take’.⁴² In the event 2023 exports were down over 50 per cent to 3.4 million tonnes, with virtually no exports at all during the summer. Figure 6 below plots monthly LNG exports over the last 4 years.

⁴¹ NewMed Periodic Report 2022, page A-114. ENI has Damietta capacity higher at 5.2 million tonnes pa, see <https://www.eni.com/content/dam/enicom/documents/eng/reports/2022/Fact-Book-2022-eng.pdf>, page 17. Damietta output in 2022 at 4 million tonnes from ENI at <https://www.eni.com/en-IT/media/news/2023/02/kick-off-the-programme-semakenya-ii.html#:~:text=During%20year%202022%2C%20Damietta%20LNG.energy%20hub%20in%20the%20Mediterranean> MEES, Egypt Gas – special report, 23rd February 2024 for 2023 output data in Table 6 above.

⁴² Platts European Gas Daily, 13 February 2023

Figure 6: Egypt LNG exports by month 2020-2023



Source: Kpler

In April 2024, it was reported that Egypt had already bought two cargoes for summer 2024, to be delivered into Jordan's Aqaba FSRU, and could be in the market for as many as 15-20 cargoes over the whole year. Assuming the reporting is accurate, then this development is a clear confirmation that the Egyptians recognise that the supply/demand balance has shifted dramatically, and that it can't be corrected in the short-term. Platts added "We estimate that summer LNG imports will likely be needed through 2027, depending on the pace of commercial agreements aimed at bringing new Israeli and Cypriot gas developments to the Egyptian market."⁴³

c) Gas production

Egypt is a major producer, with output widely-distributed across several onshore and offshore fields in the Western Desert, Nile Delta, Gulf of Suez. Zohr is the flagship and accounted for 40 per cent of the country's output in 2021. The problem in 2023 was not just a large fall in Zohr output (reportedly due to unexpected water incursion) but an across-the-board decline throughout the production pool. Zohr itself has continued to fall and has now declined some 30 per cent from its Q1 2021 peak of almost 3.0 Bn cf/d (around 30 Bcm/a) to a current 2.0 Bn cf/d. Western Desert was down 7 per cent. In volume terms, the overall fall in 2023 was around 7 Bcm.

There is now an intensive drilling campaign on-going, with much activity across several basins. Zohr is getting substantial attention. Elsewhere early results are not all positive: reportedly ENI's Orion-1X well in the offshore Nile Delta Hap'y license area was dry.⁴⁴ In any event, even with the benefit of extensive processing and pipeline-to-shore infrastructure already in place, a successful campaign would take two or more years to show through into the gas balance.

d) Supply / demand balance in 2023

The speed and magnitude of the change in the gas balance in 2023 seems to have surprised everyone, although warning signs on production decline were already coming through towards the end of 2022. Table 7 below summarises (in round numbers) how Egypt managed to achieve balance in 2023. Looking at incremental changes, from reduced domestic production (minus 7 Bcm) and slightly

⁴³ Platts European Gas Daily 4 April 2024

⁴⁴ Oil & Gas 17th Oct 2023 at <https://www.oilandgasmiddleeast.com/exploration-production/exploration/egypts-1-8b-drilling-spreed-led-by-eni>. The campaign cost is \$1.8bn spread over 35 wells.

MEES 15 March 2024, 'Egypt drilling: Orion flops as Shell kicks off six-well WDDM campaign'

increased demand (plus 1 Bcm) it needed to find 8 bcm, and this was done through reduced LNG exports and increased imports from Israel.

Table 7: Egypt gas balance incremental change 2022–2023

Egypt gas balance incremental change in 2023 vs 2022			
	Bcm		Bcm
Production decline	-7	Lower LNG (- 3.8 Mtes)	5.9
Demand	+1	Israel imports	2.5
Gas to be sourced for domestic market	8	Increase in gas supply	8

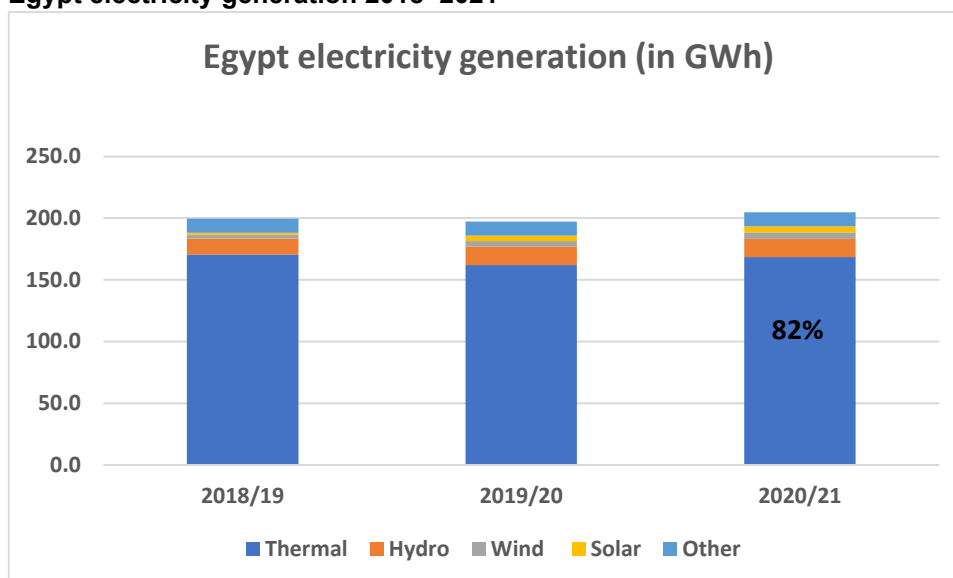
Source: authors' estimates from supply/demand analysis in sections above

e) Renewables

Egypt has an ambitious renewables target of 42 per cent of generation by 2030. The question is whether this can be achieved and free-up gas for export in a near and medium-term timeframe to assist Europe in securing reliable non-Russian supplies.

Egypt's electricity generation system is overwhelmingly based on thermal plants, fuelled mostly by gas. In the year 2020-21 82 per cent of electricity was generated from the thermal plants. The combined share of wind and solar in total generation has been growing, but was still only five per cent in 2020-21. Total installed capacity is 60 GW, of which around 10 per cent is total renewables (or 5 per cent wind and solar capacity combined of 3 GW)⁴⁵. To grow from a 5 per cent share in 2020 to over 40 per cent by 2030 would be a hugely impressive achievement.

Figure 7: Egypt electricity generation 2018–2021



Source: Egyptian State statistics – Central Agency for Public Mobilisation & Statistics CAPMAS at https://capmas.gov.eg/Pages/StaticPages.aspx?page_id=5034

The speed of wind and solar capacity construction has been fast, from 890 MW in 2016/7 to 3 GW by 2020/21, or 35 per cent pa over these four years but from a very low base. Within this, the respective

⁴⁵ Egyptian Electricity Holding Company Annual Report 2020/21 page 13, at www.moee.gov.eg/english_new/EEHC_Rep/REP2021-2022en.pdf

shares of wind and solar have been almost equal. If wind projects already under way are completed, then by end-2025 wind capacity will have almost doubled to 2.8 GW, and then by 2026 further to 4.1 GW.⁴⁶ Thereafter there are many projects, but these are more at the concept stage for a further 28 GW. There is some funding from lenders such as the European Bank for reconstruction and Development (EBRD) and also partnerships with UAE's Masdar and Saudi's ACWA renewable power project developers. If this all can be achieved, together with the 4.8 GW Dabaa Russian technology nuclear station, then the 42 per cent target could be achievable, but it will require everything to work smoothly and on-schedule.

f) Egypt-Israel-EU gas MOU June 2022

As part of its search for gas supply to replace Russian volumes, the EU in the first half of 2022 signed several MOUs with gas suppliers, including Azerbaijan and other countries, including one with Egypt and Israel in June 2022. This was signed by Egypt (Minister of Petroleum & Mineral Resources Tarek El Molla), Israel (Energy Minister Karine Elharrar) and the EU Energy commissioner Kadri Simson. Of these three, Simson and El Molla are still in their posts.

The MOU is fairly long, and it is worth examining on what it says, and equally what it doesn't say, in some detail.⁴⁷ The following are quotes taken from it:

- Sides will endeavour to work collectively towards enabling a stable delivery of natural gas to the EU (Section 1)
- Any shipment of gas from Egypt and Israel to the EU may be shipped inter alia via the use of the LNG infrastructure in Egypt (Section 1).
- Gas ... will originate either from Egypt, Israel or any other source in the East Med region, including EU Member States (Section 1. This seems to mean Cyprus, but it is strange that Cyprus is not mentioned by name)
- Endeavouring to encourage European companies to invest in natural gas exploration and production in Israel and Egypt (Section 2 – note, nothing here on transportation)
- Duration of MOU – three years, and renewed automatically for two successive three-year periods (Section 9).

The language here is uniformly vague and non-committal. There is no talk of volumes, infrastructure expansion, nothing specifically on Cyprus, nothing on a pipeline from the region to Greece or Italy. The intent behind it seems to be purely to deliver the MOU through the existing Egyptian LNG plants.

That would be fine if the Egyptian gas balance was relatively stable. But given developments in its gas balance in 2023, the MOU would appear to be undeliverable within the near and perhaps even medium-term time frame for replacing Russian gas as quickly as possible. Further, in the Strategic and Comprehensive Partnership declaration of March 2024 signed by EU President von der Leyen and President Sisi, while there is high level talk of Egypt-EU energy cooperation across many issues, there is only scant talk of gas and none on this MOU.⁴⁸ However, curiously and in a way changing the subject, it does mention the GREGY power interconnector Greece-Egypt project for a 950km three GW submarine cable.⁴⁹

⁴⁶ MEES 26 January 2024 article 'Egypt's next gen wind megaprojects gather pace with EBRD funding'.

⁴⁷ The MOU is at https://energy.ec.europa.eu/document/download/c9e9d864-1e30-48ec-a0c3-b4de89873b65_en?filename=MoU%20EU%20Egypt%20Israel.pdf and <https://energy.ec.europa.eu/system/files/2022-06/MoU%20EU%20Egypt%20Israel.pdf>

⁴⁸ <https://euobserver.com/migration/158236> and https://ec.europa.eu/commission/presscorner/detail/en/statement_24_1513 - see section 'On Investments'

⁴⁹ <https://www.copelouzos.gr/en/service/gregy-interconnector/>

g) Summary

The energy and supply/demand numbers described above frame the decision-making areas for Egyptian policy makers. In short, supply of gas is critical for the working of the economy, and reliability of this supply is an intensely political issue. Transforming the power generating system from gas to operating a major renewables sector will be a huge task within the planned 2030- time horizon. Meanwhile, policy makers have, and will continue to, prioritize domestic gas needs over supply to the LNG plants, and turning round the upstream will not be a rapid exercise. In the meantime, it is vital for the supply/demand balance that imports from Israel remain substantial and reliable. It looks like the near-term outlook for Egyptian LNG exports is that levels will be very low and very seasonal.

4. Cyprus

After years of policy dithering and a project track record of endless delays, is Cyprus finally about to enter the gas world? Two things happened in January 2024 which could signal its impending arrival. First, in the upstream the Cronos-2 discovery in the ENI and TotalEnergie's Block 6 has added materiality to Cronos reserves and should encourage an acceptable development plan for either Cronos or the several fields together within Block 6, and well as for Aphrodite. Secondly, the handover ceremony of the FSRU for Cyprus LNG by Cosco in Shanghai took place, meaning Cyprus should be able to import LNG later in 2024 once the vessel has arrived and is installed. Cyprus at present remains the *only* EU member state where most of its power generation is from oil-fired thermal power plants.

In addition, there is the new geopolitical context which will unfold from the Gaza hostilities, although what form this will take is much too early to call. Is it possible that in de-risking its own projects, including potential concerns about Egyptian market risk, Israel and its gas partners might look again at a Cyprus monetization option for building an LNG plant? Already the idea of a long-distance power connection linking Israel-Cyprus-Greece appears to be gaining some momentum, which might also encourage re-visiting the LNG option.

a) Introduction

Cyprus is the EU's second smallest energy market (smallest is Malta). Total energy demand in 2021 was 2.4 million tonnes oil equivalent, and virtually all this was imported oil. The mix comprised 90 per cent oil and 10 per cent domestic renewable electricity; there is no gas in the mix. The shape and size of the market is roughly the same today.⁵⁰ The main change recently is that Cyprus has moved closer to importing LNG, which could happen from late 2024 / 2025. For the moment, however, it remains the most single-fuel dependent EU member state, with oil used primarily for power generation and in the transport sector.

Cyprus has several features which will define its energy and gas outlook. It has a small resident population of around 0.9 million, boosted by a major tourist population. Pre-pandemic, annual tourist numbers in 2018-2019 were running at around four million, and there is significant seasonality to this – 85 per cent of tourists visit over the seven months April-October and peaked at around 0.5 million per month during June-September, taking the population up to around 1.4 million.

This has a major impact on electricity demand, which shows a double hump profile, a smaller one over December-January, and then a larger summer one correlating well with the main summer tourist arrivals.⁵¹ This seasonal demand pattern could have an impact on plans to bring gas into the mix, either

⁵⁰ South East Europe Energy Outlook 2021/2022, Institute of Energy for SE Europe - IENE, Athens 2021. See the Cyprus chapter for a comprehensive overview of the Cyprus market, its energy institutions and energy policy goals. EU Energy in Figures, statistical pocketbook 2023 edition, table 2.1.4 has 2021 total demand.

⁵¹ Statistical Service of Cyprus (Cystat), Statistical Abstract 2020-21, tables G.2.1 and B.2.1 at <https://www.cystat.gov.cy/en/PublicationList?s=32&pclD=1> and also Cystat Cyprus in Figures 2022, at https://library.cystat.gov.cy/NEW/CYPRUS_IN FIGURES-2022-EN-200423.pdf for the demographic and tourist data.

from LNG imports or a pipeline from the offshore discoveries, as gas demand fluctuations would need to be accommodated, although in the larger scheme of things this seasonality will be small.

Development of the offshore gas discoveries and gasification of the domestic market were inter-twined policy aims during the 2010s, with various pipeline to shore and LNG export schemes being floated. These have come to nothing. Aphrodite was discovered in 2011 and the development plan is still being defined. With other discoveries made over the last five years, the resource base stands at between 13-18 Tcf (excluding what can be added from Cronos-2). In its recent checklist of upstream events to look for in Europe in 2024, Wood Mackenzie included the investment decision on Aphrodite as critical if first gas in 2027 is to be achieved. If it is not taken, then it thinks one outcome could be a Chevron exit to prioritize on its other upstream opportunities in the region in Israel and Egypt.⁵²

Gas progress has been frustrated by a combination of a very small domestic market, wider regional geopolitics and internal politics. The result is that the offshore and domestic gasification paths have split. Current plans for the offshore are now focused on taking the gas south to tie into existing Egyptian offshore facilities where there is spare capacity and then putting the gas either into the big domestic market there and / or into its existing two and underutilized LNG plants. The gravitational pull from Egypt has now intensified with Egypt about to resume LNG imports from events described in Section 3.

Meanwhile, and separately, port facilities at Vasilikos are being prepared to get gas to the power plants through LNG imports. As for the FSRU ship, the *Etyfa Prometheas* is ready: its handover ceremony took place in Shanghai on 16th January 2024 at the Cosco yard. LNG commercial operations could start in late 2024, or perhaps more realistically in 2025, depending on completion of jetty facilities.

b) Energy balance characteristics

The purpose of this section is to describe the supply/demand fundamentals: the oil balance, the potential for gas to come into the mix, the upstream potential. The complex geopolitics with Turkey and the region generally are well recognized; they provide the backdrop for investment decisions, but these considerations are not considered in detail here.

Cyprus basically has a mono-fuel energy mix, completely dominated by imported oil products. There is no gas or coal in the mix, but renewables generation is growing. Thermal power generation plant is all oil-fired.

i) Oil

Oil consumption has fallen since 2010 but from 2015 has been fairly stable in the 2.3 – 2.5 million tonnes per annum range. In 2022 it was 2.5 Mtes. However, if excluding aviation kerosene and the marine bunker fuels, which are imported and then mostly fly or sail back out of the country, then current Cyprus internal demand is closer to 2.0 mtpa. Of this, just under one mtpa is used for power generation, equivalent to around 1.2 Bcma gas.

The table in Appendix 1 shows oil demand by products since 2005 and also separately oil demand in the power generation, the marine bunkers and aviation kerosene sectors.

ii) Power generation

Total installed capacity is 1.9 GW, split 1.5 GW thermal, 0.16 GW wind and 0.3 GW solar.⁵³ The Electricity Authority of Cyprus operates the island's three thermal power stations. The main baseload plant is the 0.9 GW Vasilikos station, which comprises a mix of three steam units operating on light fuel oil (LFO) and two CCGTs running on gasoil. Dhekalia at 460 MW has six small steam turbines running

⁵² Wood Mackenzie Insight 11 December 2023, Continental Europe upstream:4 things to look for in 2024,. WoodMac puts the Cyprus discovered gas resource base here at 14 Tcf, <https://www.woodmac.com/reports/upstream-oil-and-gas-continental-europe-upstream-4-things-to-look-for-in-2024-150184596/>

⁵³ EU Energy in Figures, energy statistical pocketbook 2023 edition, table 2.6.1, pp 90-91, either hardback or available at https://energy.ec.europa.eu/news/eu-energy-figures-main-eu-energy-data-your-pocket-2023-10-09_en

on LFO, and the Moni station is basically used as reserve capacity.⁵⁴ The full thermal generation inventory is shown in Appendix 1. The initial gas demand anchor would be the Vasilikos power station.

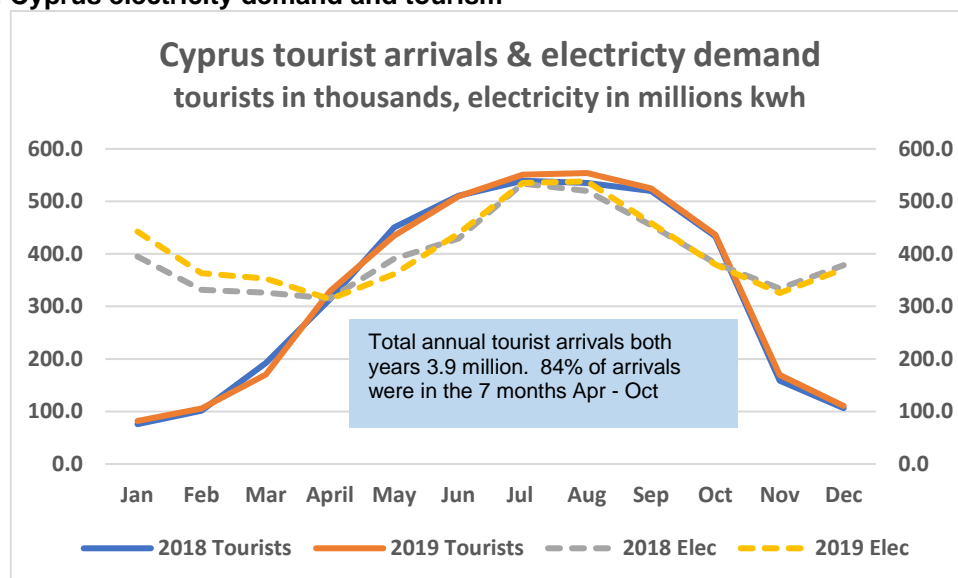
Renewables capacity has been expanding slowly and now stands at 490 MW and in 2022 accounted for 17 per cent of power generated. Appendix 1 shows electricity generated and summary thermal and renewables generation plant capacity numbers.

All the thermal power is oil fired, and 83 per cent of power came from the oil-fired plant in 2022.

It is the only EU country to have such oil domination. Overall in 2021, in the EU in aggregate just 1.6 per cent of generation was from oil: in other words basically oil is used for occasional peak use. Next highest oil share was in Greece, where 8.5 per cent of power came from oil.⁵⁵ Cyprus stands out as the EU's only member state where oil is the principal generator of electricity.

Electricity demand is seasonal and double-humped, with the main peak in the summer which coincides with the main arrival of tourists. Figure 8 shows electricity demand and also tourist arrivals by month, and highlights the seasonality of both tourism and electricity demand.

Figure 8: Cyprus electricity demand and tourism



Source: Cystat

c) Cyprus gas resource base and market gasification

i) Resource base

Gas resource estimates range between 13 Tcf and 18 Tcf from the aggregate of the five fields discovered from Aphrodite in 2011 and then Calypso, Glaucus, Cronos and Zeus all discovered between 2018 and 2022. Aphrodite lies near the maritime boundary with Israel and is not far from Leviathan, whereas the four others are all closer to the Egyptian boundary and in particular to the Zohr field.

⁵⁴ <https://www.eac.com.cy/EN/EAC/Sustainability/Pages/ElectricityProduction.aspx>

⁵⁵ EU Energy in Figures, statistical pocketbook 2023 edition, EU table 2.6.2,

Table 8: Cyprus gas resource base

Cyprus gas resource			
discovery resource est			
		tcf	
Aphrodite	2011	4.5	Chevron 35% Shell 35% New Med 30%
Calypso	2018	2	ENI 50% Total 50%
Glaucus	2019	3 - 4	Exxon 60% Qatar Energy 40%
Cronos	2022	2 - 5	ENI 50% Total 50%
Cronos-2	2024		
Zeus	2022	2 - 3	ENI 50% Total 50%
Total (tcf)		13.5 - 18.5	

Sources: Center on Global Energy Policy (March 2023), 'Eastern Mediterranean Deepwater gas to Europe: not too late, but perhaps too little', Columbia University. Estimates of Cyprus gas reserves keep being revised as data is improved and reworked. Platts European Gas Daily 15th February 2024 reported that the total resource base from discoveries could now be as high as 26 Tcf.

Drilling continues. In late 2023 ENI and Total started drilling Cronos-2 in Block 6 (Block 6 contains Calypso, Cronos and Zeus) and latest reports include a flaring test during January from the *Transocean Barents* rig and positive comments on productivity from ENI.⁵⁶

ii) Monetization – perfection vs practicality

Schemes for developing and monetizing this resource base have evolved and changed over time since the Aphrodite discovery in 2011, with iterations from onshore liquefaction to various pipeline proposals with a goal of trying to combine resource development and exports with domestic gasification. The problem has been a combination of Cyprus perhaps attempting to over-perfect the development plan instead of promoting an early 'proof of concept' approach to get the industry established, Turkey as a blocker, and then industry ownership changes – for instance Chevron's entry in 2020 after it acquired Noble. This is developed further in Section (e).

The current policy is development of a floating storage and regassification ship (FSRU) at Vasilikos for importing LNG for the Cyprus power sector, and a development plan being worked with Chevron and partners for Aphrodite focusing on gas exports south to Egypt. These are being pursued separately and independently.

iii) Aphrodite development plan

Across the whole East Med upstream there are several common partnerships in the various projects, which should assist in the development of cross-border arrangements. Aphrodite partners are Chevron (operator and 35%), NewMed (30%) and Shell (35%). Chevron is also the operator of Leviathan (39.66% stake) and Tamar (25%), while NewMed has 45.3% of Leviathan. Shell is absent in Israel, but very active in Egypt. ENI is the Cyprus Block 6 operator (50%, with TotalEnergie the other 50%) with

⁵⁶ Cyprus Business News 19 Jan 2024 at <https://www.cbn.com.cy/article/2024/1/19/754279/gas-flaring-carried-out-at-cronos-2-target-in-cyprus-eez/> and Platts European Gas Daily 15 February 2024

discoveries in the block of Calypso, Cronos and Zeus, and ENI is the operator of Zohr, under 100 km away.

In the past there has been talk of an Aphrodite link with Leviathan, but the current development plan is being built around a 340 km pipeline south to Shell's West Delta Deep Marine (WDDM) facilities. There have been active talks between Aphrodite partners and Cyprus in recent months, and the current extension agreed by Cyprus was for a revised plan to be submitted by March 2024.⁵⁷ The recent plan was for five production wells and a floating production unit at the field and then the pipeline connection to WDDM for processing, gas then going to the Egyptian domestic market and/or the Idku LNG plant. The revised partners' plan was built around three wells and no floating production unit. Cyprus rejected this on grounds of Aphrodite later-life production levels. None of these plans envisages a physical pipeline connection to Cyprus.

Clearly Cyprus needs an Aphrodite agreement this year if it is to see first gas from the field by 2027. Meanwhile, industry speculation is growing that unless there is agreement soon, then development could be overtaken by Block 6, where there is the additional incentive of enabling ENI to replace declining volumes from Zohr and, again, addressing the Egyptian gas short.

iv) Vasilikos FSRU & gas for the power station by end-2024? Anchor demand for gasification

The gasification plan is now built around an FSRU and port facilities at Vasilikos to bring gas initially to the Vasilikos power station. The FSRU vessel *Etfya Prometheas* converted at the Cosco shipyard in China completed its sea trials in November 2023 and on 16th Jan 2024 a hand-over ceremony took place at the shipyard.⁵⁸ Work on the jetty facilities is progressing. This is a €300mn project, of which 40 per cent is supported by the EU's Connecting Europe Facility CEF.⁵⁹

DEFA (Cyprus Natural gas Public Company) notes in its mission statement that the gas network will initially consist of three pipelines connecting the three thermal power plants with the FSRU facility: a short 0.6 km pipeline to Vasilikos, a 65 km pipeline to Dhekalia and a 12 km pipeline to Moni.⁶⁰ The cost of this it estimates at €60 million, and a €10mn grant contribution funding has been secured from the European Economic Programme for Recovery.

Recent announcements are that a summer 2024 start-up is now scheduled.⁶¹ But plans have a track-record of disappointing delivery. Even today (H1 2024) the Electricity Authority of Cyprus web site still says 'All stations use heavy fuel oil for the steam turbine units and gasoil for the gas turbine units. The combined cycle units use gasoil as fuel until the arrival of natural gas in Cyprus, which is expected to be available on the island in 2016. Also, in 2016 the 3 steam turbines at Vasilikos power station will shift from the use of heavy fuel oil to the use of natural gas'⁶². Then there is a long list of annual start-date announcements for Vasilikos FSRU from 2021.⁶³ All this is a salutary reminder of missed deadlines, but the FSRU vessel is completed. Latest news is for an end-2024 start-up, but delays on completing the jetty have resulted from problems with the Chinese contractor. At time of writing (May 2024) the *Etfya Prometheas* is still in Shanghai.

v) Potential gas demand by early 2030s

Cyprus gas demand will never be a material size within the EU context. Demand potential is concentrated in the power sector, where conversion of many of the generating units could offer a rapid

⁵⁷ MEES 27 Jan 2023; Platts European Gas Daily 21 November 2023 & 11 December 2023

⁵⁸ <https://lngprime.com/asia/coscos-yard-completes-cyprus-fsru-conversion-job/102389/>

⁵⁹ <https://www.offshore-energy.biz/new-milestone-for-cyprus-lng-terminal-as-fsru-wraps-up-sea-trials/> and

⁶⁰ <https://defa.com.cy/en/mission.html>

⁶¹ <https://www.offshore-energy.biz/new-milestone-for-cyprus-lng-terminal-as-fsru-wraps-up-sea-trials/>

⁶² <https://www.eac.com.cy/EN/EAC/Sustainability/Pages/ElectricityProduction.aspx>

⁶³ <https://www.offshore-energy.biz/cyprus-starts-work-on-first-lng-import-terminal/> , <https://cyprustimes.com/economytimes/the-majestic-lng-project-in-vassilikos-exclusively-in-cyprus-daily-representative-of-the-chinese-giant/> , <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/071020-cyprus-enters-lng-era-with-fsru-groundbreaking-at-vassilikos>

ramp-up in demand. There is little industry on the island, and the probability of any kind of gas grid being built to bring gas to the commercial and residential sectors is remote.

Gasoil and kerosene demand for heating is currently around 100 thousand tonnes pa, and substitution of these is much more likely to be to electricity. The vehicle fleet in 2022 comprised 601,000 cars and 120,000 vans and light trucks.⁶⁴ Conversion of this fleet to electricity will clearly increase power demand, but that process will be slow as the fleet renewal will take many years.

In the power sector, conversion of the current almost 1 million tonnes of oil demand to gas would give gas demand of around 1.2 Bcm/a. But this will not happen all at once. The initial anchor market will be the 900 MW Vasilikos power plant and its two existing CCGTs. Thereafter, progressive demand ramp-up would see the commissioning of the new 160 MW CCGT at Vasilikos, plus its steam turbines switched over, and then the conversion of Dhekalia once a pipeline is built to serve it.

Electricity demand growth would come from substitution into the heating oil market (i.e. the gasoil and some kerosene), and then the gradual conversion of the car, van and light truck fleet to EVs. All this potential additional load on the thermal plants would be offset by expansion of renewables generation. Adding these factors together, a gas market of between 1.5 – 2.0 Bcma by the early 2030s could be envisaged.

d) Gas and power connections to Europe

Cyprus is basically an energy island, its only connection currently being with the international oil market for imported oil products. A second connection with the international LNG market will come once LNG imports start, perhaps by the end of 2024.

Three physical connections are possible. First, there is a pipeline from Aphrodite or the Cyprus offshore generally to the Cyprus mainland, but that is not on the agenda of current field development plans, which are based around taking the gas south to Egypt. Secondly, the EastMed gas pipeline project has been around for some years, but appears to be making little headway. Thirdly, there is a possible electricity connection from the EuroAsia power interconnection project.

Within this list, the market is talking about Cyprus gas going to Egypt and also power linkages to the EU, in contrast to EastMed pipeline which has gone relatively quiet. A pipeline from Cyprus to the Egyptian offshore facilities, where there is spare capacity, could be laid relatively quickly, within say two to three years. In contrast, both a pipeline to Europe and a power interconnection are major projects requiring mobilization of major technical, financial and commercial resources, putting them both into the post-2030 category. Both projects are described below, and that they are discussed here should not be taken to suggest that they will happen.

i) EastMed gas pipeline to Europe

The East Med-Poseidon gas pipeline project is a 2000 km line from Israel to Italy via Cyprus and Crete, with capacity of 11-20 Bcm/a. The promoter is IGI Poseidon, which is a joint venture (JV) between Edison (50%) and DEPA(50%). Strategic rationale is moving the East Med surplus to a Europe seeking non-Russian supply, where the EU's RePowerEU plan is looking for long-term partnerships with reliable suppliers to diversify the EU's gas supply sources.⁶⁵ The pipeline was on the EU's 5th PCI (projects of common interest) list, and again on the new 6th List issued in November 2023.⁶⁶

⁶⁴ <https://www.cystat.gov.cy/en/PublicationList?s=32> See Cystat / statistics / related links – cross-sectional statistics / Statistical Abstract 2022 (published March 2024), Table G.1.4 for licensed motor vehicles 1990-2022.

⁶⁵ Detailed project review by Edison, at <https://www.edison.it/en/eastmed-poseidon-project>

⁶⁶ EU 5th PCI list, project number 7.3 at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0564&qid=1663087079030> and the November 2023 list as project 15.2 at https://eur-lex.europa.eu/resource.html?uri=cellar:8343d7e8-8de6-11ee-8aa6-01aa75ed71a1.0007.02/DOC_2&format=PDF

Project FID was anticipated for 2022.⁶⁷ Frequently during 2023 Edison executives were quoted as saying FID was expected. For instance 'We expect to take the final investment decision by the end of this year. With an FID in 2023, the project would be realized by 2027,' Fabrizio Mattana, Edison's executive vice president for gas assets, told Reuters in an interview' in March 2023.⁶⁸

ii) Power connections - EuroAsia

EuroAsia is an initial 1 GW capacity interconnector between Israel-Cyprus-Greece, with commissioning scheduled for 2028-29, for total capex of €2.5 billion.⁶⁹ Construction is estimated at

24-48 months (other similar but smaller projects elsewhere suggest 48 months is the more likely). Distance would be 1200 km (Cyprus-Israel 310km; Cyprus Greece (Crete) 898 km). It on the PCI list (project 3.10, and on the new 6th list as project 2.6) and has been approved €658mn from Connecting Europe facility (CEF) grant, and also €100mn from the European Recovery & Resilience Fund. Project promotion moved from EuroAsia Interconnector Ltd to the independent power transmission operator of Greece – IPTO, in October 2023, which could be a positive sign of activity.⁷⁰

One advantage of a power interconnector for Cyprus would be to contribute to managing electricity demand seasonality. In a power generating system moving from oil to LNG imports, there could be an issue of gas supply occasionally struggling to meet peak demands. Power interconnectivity would resolve both this and also supply imbalances created from growing renewables sectors in all countries around the region.

Experience of long-distance sub-sea power interconnectors in Europe is accumulating rapidly, with several projects either operational or sanctioned. Several have involved the UK and continental Europe. There are two connections between the UK and France, and long-distance bi-directional connections are now operational between UK and Norway and Denmark. The 1.4 GW 765 km *Viking* interconnector UK-Denmark began commercial operations in December 2023, having taken four years to lay the line and build the two converter stations;⁷¹ this link following on from the similar 1.4 GW 720 km Norway-UK *North Sea Link* which started operations in 2021.

In the Mediterranean, the Italy-Tunisia *ELMED* line will be the first power link between North Africa and Europe, a 220 km (200 km sub-sea) 600 MW cable in 800 metres water depth. Finance arranged for this €850 mn project includes €300 mn from CEF, \$268 mn from the World Bank, and also contributions from EBRD, EIB and KfW. It will be the first project under CEF to get funding for an electricity project between a Member State and a third country.⁷² Construction work is due to start in 2024 and be completed in 2028.⁷³ The four year construction period is the same as that for *Viking*.

At several of the regular meetings between the Energy Ministers of Israel and Cyprus (Eli Cohen and George Papanastasiou) the subject of gas and power connections have been noted. In January 2024

⁶⁷ See Pipeline & Gas Journal 13 June 2022, at <https://pgjonline.com/news/2022/june/dnv-confirms-feasibility-and-maturity-of-eastmed-gas-pipeline>, which the Edison site above has a direct link to.

⁶⁸ <https://www.ekathimerini.com/economy/1207051/edisons-final-decision-on-eastmed-by-year-end/>

⁶⁹ During the research for this Section, project promotion has transferred to the Independent Power Transmission Operator of Greece - IPTO. Project details here were taken from the EuroAsia website, but this website is now no longer available; it was at <https://euroasia-interconnector.com/at-glance/project-timeline/>. This site did say (<https://euroasia-interconnector.com/at-glance/the-big-picture/official-support/>) that '4. The construction of the Cyprus-Israel part of the EuroAsia interconnector is planned to be completed by the end of 2023 and the Cyprus-Crete part by 2023.' In July 2023, Nexans won the €1.43bn contract for the cable for Cyprus-Crete section of the interconnector <https://www.reuters.com/business/energy/nexans-wins-143-bln-euro-contract-euroasia-interconnector-2023-07-19/>

⁷⁰ <https://www.admie.gr/en/nea/deltia-typoy/ipto-new-project-promoter-greece-cyprus-israel-interconnection>

⁷¹ <https://www.viking-link.com/news/national-grid-announces-commercial-operations-of-viking-link-the-world-s-longest-land-and-subsea-interconnector/> and https://en.wikipedia.org/wiki/North_Sea_Link#Technical_description

⁷² <https://elmedproject.com/#sezione-progetto> Terna (Italian transmission grid operator) press release 28th Nov 2023. Also https://commission.europa.eu/news/eu-invests-over-eu-1-billion-energy-infrastructure-support-green-deal-2022-01-26_en It is on the PCI list – project 2.33, and https://cinea.ec.europa.eu/system/files/2023-11/CEF-Energy-2023_Latest%20achievements%20and%20way%20forward-web_en.pdf page 11

⁷³ <https://elmedproject.com/#sezione-tappe>

support for this power link was given in that this project should be “accelerated”, whereas the gas pipeline link was merely “discussed”.⁷⁴ When they met again in March 2024, both projects were again discussed, with the power connection mentioned first.⁷⁵

e) Why has Cyprus gas not happened?

Aphrodite was discovered in 2011, but no development scheme has been sanctioned despite further discoveries and many discussions between companies and the Cyprus authorities. Of course, such a time delay is not unusual. In Romania, the offshore Neptun Deep was discovered in 2012, but the development project did not get FID until January 2023. But the imperatives of diversifying the energy mix and stimulating economic development should have been the accelerating factors for Cyprus.

Breaking the question down, there are several elements to consider. Upstream, there are complications in that Aphrodite is compartmentalised. The development concept has gone through several iterations: number of wells; location of processing facilities (semi-submersible over the field or using existing Egyptian facilities, or even tie-back to Leviathan). This has not been helped by changes in the corporate landscape, in particular with Chevron acquiring Noble. Market option selection for the gas has not been easy. Neptun Deep is facing a well-developed Romanian market, whereas Cyprus has no gas market, Israel is well supplied, and Egypt was adequately supplied – until last year. Other factors include maritime borders, with Aphrodite needing a unitisation deal as a small part of the field extends into Israeli waters. Geopolitics are complex, in particular with Turkey, although with Turkey’s focus perhaps now on getting the Black Sea Sakarya done, where much political capital has been sunk on a project currently progressing much more slowly than planned. Then there are State and corporate interests to be reconciled. Yet having mixed all these factors together, there remains a sense that this could be a case of ‘perfection is the enemy of progress’.

Most recent news (May 2024) is that the Cyprus authorities have rejected the latest Aphrodite development proposals. In a formal notification, NewMed said “the operator in the Project received a letter from the Minister of Energy in the Cypriot government, according to which the proposals for approval of an optimal development plan for the reservoir, in lieu of the Original Development Plan (of 2019), which were presented by the Partners to representatives of the Cypriot government on 28 March 2024, are not acceptable to the Cypriot government.”⁷⁶ Further, in this letter to the Aphrodite partners, the Cyprus authorities added that Partners are required to promptly confirm in writing their *unconditional consent* (our emphasis) to start FEED work within six months; that is, by November 2024.

A start date for Aphrodite gas of 2027 looks to be a receding prospect, but apart from that where this leaves the project is a guess. It could be somewhere in a range between license revocation and another round of negotiations leading to eventual commitment to go to FEED and FID. Potential litigation would probably be in no-one’s interest. But it could also be that the door is now wide open for ENI to come forward with a development plan for taking Block 6 gas (Cronos et al) to Egypt.

Breaking news on the various Cyprus projects came from an interview with Energy Minister Papanastasiou on 17 May 2024.⁷⁷ On Aphrodite, he said that the Chevron development plan had not been rejected, but that Cyprus required more solid details and that ‘we are asking for a sound commitment for Aphrodite and a proper timetable’, which he expected by the end of 2024. If that is the case, then a 2027 start-up looks to be a stretch target. On Cronos, Papanastasiou said three options are being considered: an pipeline to the Zohr facilities; aggregation with other fields to bring gas to an on-shore Cyprus LNG plant; an FLNG project. Lastly, on the Vasilikos FLNG project, he said ‘there is

⁷⁴ Press release 29 January 2024 from Israel’s Ministry of Energy & Infrastructure at <https://www.gov.il/en/pages/cyprus-290124>

⁷⁵ Press release 27 March 2024 from Israel’s Ministry of Energy & Infrastructure at <https://www.gov.il/en/pages/news-270324>

⁷⁶ NewMed communication to the Tel Aviv Stock Exchange 1 May 2024 at <https://newmedenergy.com/wp-content/uploads/2024/05/NewMed-IR-Aphrodite-1.5.2024-מנגיש.pdf>

⁷⁷ Platts European Gas Daily 17 May 2024

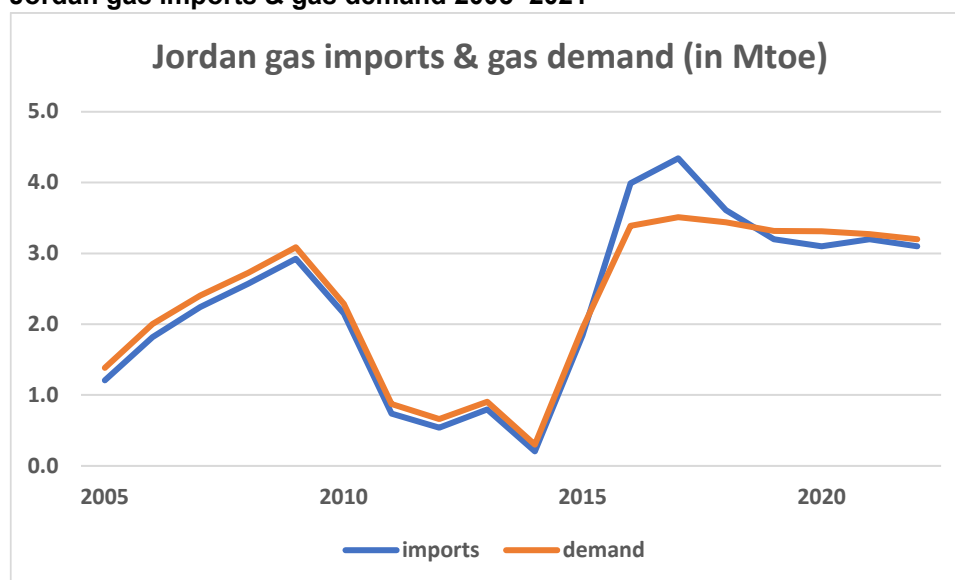
no progress on the jetty'. If this is correct, then it means that there is now no prospect of a start-up in LNG imports in 2024.

5. Jordan

Jordan (2021 population 11.1 million) is very heavily dependent on imports of all fuels. There is small gas production, but in effect practically all its oil and gas is imported.⁷⁸ Jordan's energy demand currently (2021 data) is 8.7 million tonnes of oil equivalent, of which gas accounts for 37 per cent. Essentially, this is an economy running on imported oil and gas, but with a slowly growing contribution from domestic renewables. A notable feature in the energy balance in recent years has been the rise of renewables, which now account for 14 per cent of energy demand.

A major problem has been securing a constant and reliable source of gas. Initially, supply was through the Arab Gas Pipeline (AGP) from Egypt, which started flowing gas to Jordan in 2003. But a tightening Egyptian balance caused exports to fall, then cease, then resume. Jordan then constructed an LNG regas terminal at Aqaba: in mid-2015 the *Golar Eskimo* FSRU arrived and operations quickly started. For a few years 2016-18 small LNG flows through Aqaba were even exported back to Egypt down the AGP.

Figure 9: Jordan gas imports & gas demand 2005–2021



Source Jordan Ministry of Energy & Mineral Resources at https://www.memr.gov.jo/ebv4.0/root_storage/en/eb_list_page/jordan_energy_balance.pdf

Table 9: Jordan gas imports 2019–2023

Jordan gas imports (in Bcm)					
	2019	2020	2021	2022	2023
LNG	2.1	1.3	0.0	0.1	0.15
Israel	0.2	2.1	2.9	2.9	2.9
Total imports	2.3	3.4	2.9	3.0	3.1

Sources: Kpler; NewMed annual report 2022 para 7.12.2 (c) and Ratio Energies Annual Reports

⁷⁸ Domestic gas production was 0.16 Mtoe in 2021, covering just 5% of total gas demand

Since 2019 Jordan has been receiving gas from Israel, and increasing Israeli exportable volumes meant all demand could be met by imports from Israel from 2021, when LNG imports fell to zero, although one or two cargoes have been delivered into Aqaba since then.

Most of the gas demand is for the power sector, and 75 per cent of Jordan's power is gas generated. As to future demand, NewMed in 2022 saw demand rising to 3.8 Bcm in 2023 and then settle at around the 3.8 -4.2 Bcm/a level for the rest of the decade.⁷⁹

6. Conclusion

Israel has emerged in the last four years as a major regional gas player, its developed resource base transforming it into a gas-based economy and as a significant exporter into Jordan and Egypt, and attracting a wide pool of major international energy companies, either to join existing projects (BP-ADNOC) or acquire exploration licenses.

On the other hand, Egypt has suddenly regressed into supply/demand uncertainty, relying on gas imports from Israel and severely cutting its LNG exports in order to achieve gas balance. A panic exploration round is underway, but this will not solve its supply/demand problems overnight. The renewables plans would allow gas demand to be reduced if they can be achieved. However, given the country's economic context and the sheer scale of moving from a small renewables contribution now to 40 per cent of total power from renewables by 2030 looks overly ambitious.

Cyprus might be on the brink of becoming a gas player also, although the jury remains out as slippage continues to be the story. A few months ago, it did seem that before the end of 2024 it could be importing LNG and agreeing to upstream development plans, either for Aphrodite or for Block 6, or conceivably both. Because the Vasilikos jetty is not complete, LNG imports have slipped into 2025, and timing on any upstream commitment could be doing the same too.

If there is a single image from the last few years, then it is that a gas triangle of interdependencies has emerged: Israel needs to move its surplus to Egypt; Egypt is deficit gas and needs Israeli imports; Cyprus' first monetisation route is likely to be gas to Egypt. Moving outside this triangle will require investment in major infrastructure, either LNG, FLNG or large capacity pipeline. In resolving this, Chevron, ENI, and NewMed will probably be the primary designers and facilitators, with a backing cast of Energean, Shell and perhaps BP-ADNOC.

As for Europe, in the short-term there will be no gas to Europe beyond an occasional winter LNG cargo when Egyptian demand is lower. In the medium term there might be LNG available from increased output from the Egyptian LNG plants, but by then EU will be enjoying a long LNG market. On pipe and power connections and new LNG plants, while these have political support, assembling all the pieces needed for a major project puts them all beyond 2030.

⁷⁹ NewMed Periodic Report 2022 para 7.11.2 (c), https://newmedenergy.com/wp-content/uploads/2023/03/NM_FS31122022ENG-1.pdf

Appendix 1: Cyprus oil demand 2005–2022 and Cyprus electricity balance 2000–2022

Total oil demand in 2022 was 2.5 million tonnes was up 5 per cent on 2021, but around the same level as in 2015. In other words, for the last 10 years oil demand has been fairly stable in the 2.3 – 2.5 mtpa range. If aviation fuel and marine bunkers are excluded, then domestic demand was around two million tonnes in 2022. Of this, around one-half was oil for power generation.

The table below details the oil balance by oil products, and highlights oil used for power generation and also marine bunkers and aviation. Aviation kerosene demand in 2022 recovered to pre-pandemic levels. Of note also here is the switch from what is labelled heavy fuel oil to light fuel oil, which we take to mean the shift from high sulphur to low sulphur fuel oil, which has occurred in most European markets over the last 10 years.

Table 10: Cyprus oil demand: total demand; power sector demand; bunkers and aviation demand

Cyprus oil demand (in thousands tonnes)						
	2005	2010	2015	2020	2021	2022
Gasoline	303	390	345	285	305	310
Kerosene	307	285	270	108	166	270
Gasoil	630	687	542	904	858	894
Light fuel oil (LFO)	66	1083	874	778	840	841
Heavy fuel oil (HFO)	1331	162	173	9	10	10
Other	328	278	208	171	177	160
Total oil demand	2965	2885	2413	2255	2356	2484
of which for:						
a) power generation						
Gasoil	16	158	89	342	289	320
LFO	0	1053	858	603	680	659
HFO	1104	0	0	0	0	0
total oil for power generation	1120	1211	947	945	969	979
b) marine bunkers and aviation						
Aviation kerosene	291	271	257	93	153	256
Marine gasoil	110	53	75	119	113	123
Marine LFO	10	2	0	158	141	165
Marine HFO	215	134	169	1	0	0
total bunkers & aviation	626	460	500	370	406	544

Source: Statistical Service of Cyprus, Statistical Abstract 2022, published March 2024
Section H - Energy & Environment, Table H.1.1b

Total electricity generation in 2022 was up 2 per cent to 5.1 TWh. Within this, the share of renewables continued to rise, reaching 17 per cent of total gross power generated in 2022.

Table 11: Cyprus electricity balance and generating capacity

Cyprus electricity balance (in TWh)							forecast range
	2000	2010	2015	2020	2021	2022	2030
Gross output	3.4	5.3	4.5	4.8	5.0	5.1	6.0 - 6.2
Net output	3.2	5.0	4.3	4.6	4.8	4.9	
Demand	3.0	4.8	4.0	4.3	4.5	4.5	
Renewables gross output		0.1	0.4	0.6	0.8	0.9	
Renewables share of total gross		1%	9%	12%	15%	17%	
Thermal capacity							
Vasilikos					868		
Dhekalia					460		
Moni					150		
Total thermal (MW)					1478		
Renewables capacity (MW)							
		2010			2021		
Wind		82.0			157.5		
Solar		5.6			317.8		
Biomass		7.2			12.1		
Total RES (MW)		94.8			487.4		

Source: Statistical Service of Cyprus, Statistical Abstract 2022, published March 2024, Tables H.1.8b; H.1.9 Forecast from Cyprus Energy Regulatory Authority, Annual Report 2021 page 86

Appendix 2: Jordan energy demand 2014-2022

The table below catalogues the components of Jordan's energy balance.

Several points stand out:

- Total demand has been relatively stable within the 8.5 – 10.0 Mtoe range. Latest data from the Ministry of Energy & Mineral Resources (MEMR, data for 2022) shows total demand of 9.4 Mtoe in 2022.
- Gas is the largest component in the energy mix, accounting for 37% of total energy demand in 2021 and again in 2022.
- Given the dominant role of gas in the energy mix, and that most of the gas is imported from Israel (there is very small domestic production), gas imports from Israel accounted for 35% of Jordan's energy demand in 2022.
- The increase in renewables and other category includes shale oil for the new 570 MW Attarat shale oil power station.⁸⁰

Table 12: Jordan energy demand 2014–2022

Jordan energy demand (in Mtoe)									
	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crude oil & oil products	7.5	6.3	5.3	5.7	5.2	5.2	4.1	4.0	2.6
Coal & coke	0.4	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.3
Gas	0.3	1.9	3.4	3.5	3.4	3.3	3.3	3.3	3.5
Electricity, renew ables & other	0.3	0.3	0.5	0.5	0.8	1.0	1.0	1.3	3.0
Total energy demand	8.5	8.9	9.6	10.0	9.8	9.7	8.6	8.7	9.4
gas share in demand	4%	22%	35%	35%	35%	34%	39%	37%	37%

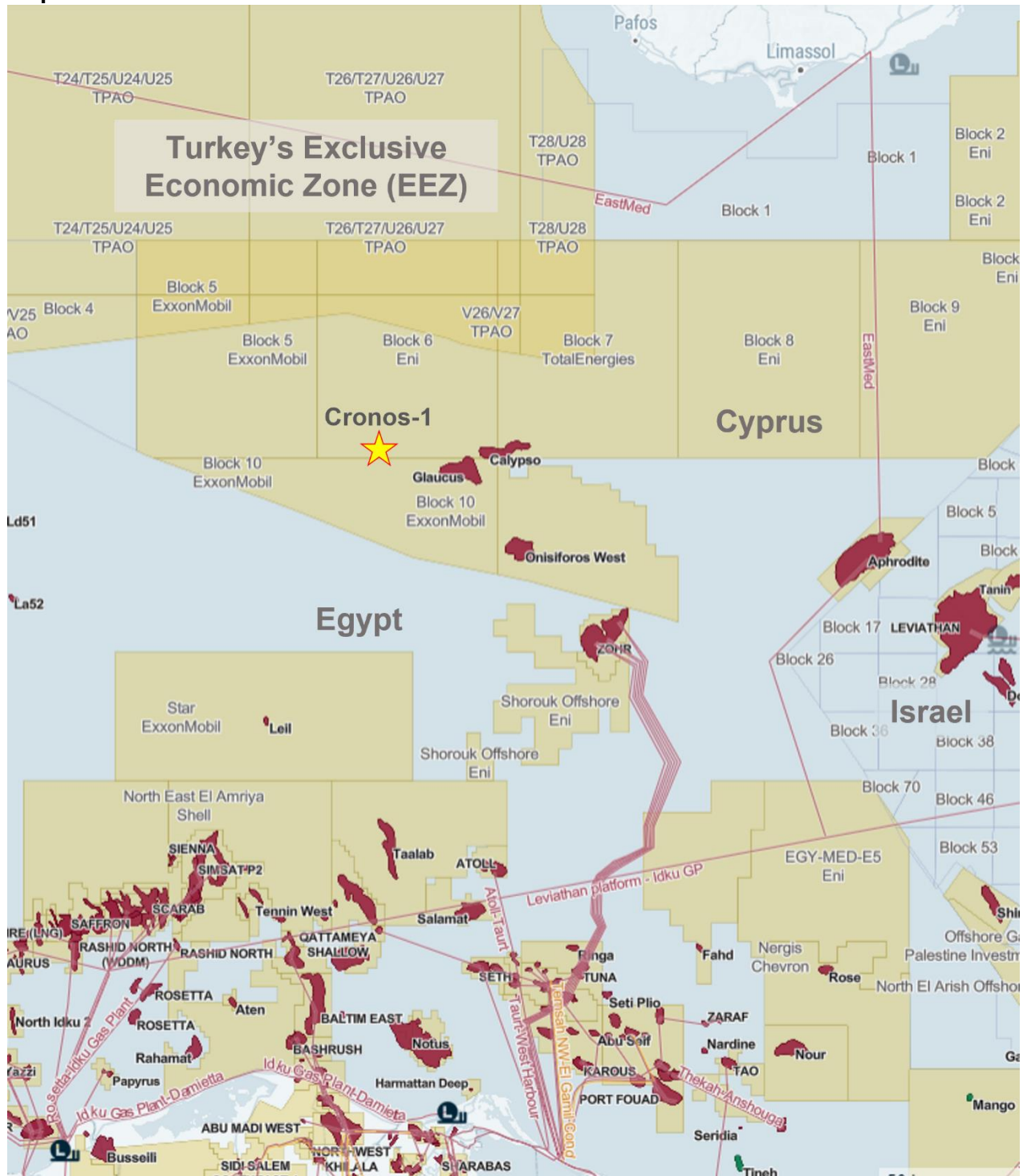
Sources: Jordan Ministry of Energy & Mineral Resources, at

https://www.memr.gov.jo/ebv4.0/root_storage/en/eb_list_page/bruchure_2019.pdf

https://www.memr.gov.jo/ebv4.0/root_storage/ar/eb_list_page/memr_facts_&_numbers_2021-28.08.2022.pdf

⁸⁰ <https://attaratpower.com.jo/attarat-journey/> and <https://apnews.com/article/china-jordan-mideast-oil-shale-power-energy-d80f4801e61560a897cc5ef3b4524ac3>

Map 1: East Med



Source: MEES

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