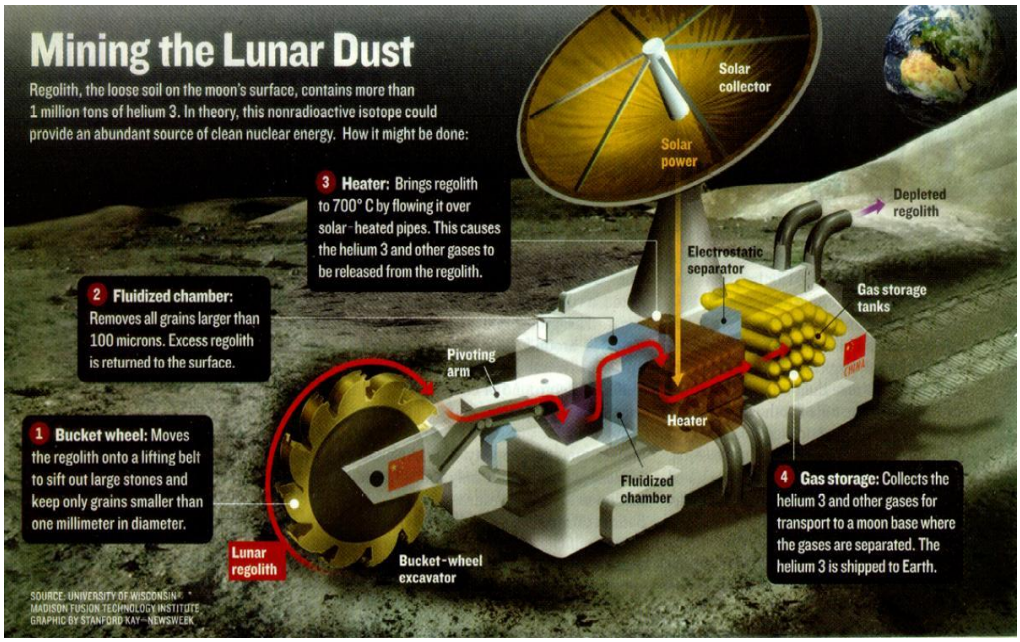

Above: Energy may well move into the space age. *Photo: File*

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Peak oil plays hide and seek with proponents *Photo: File*

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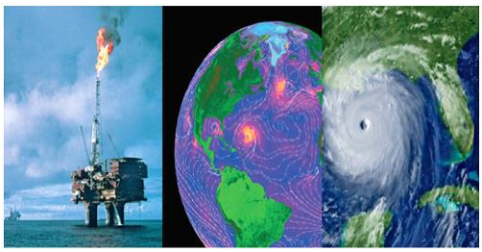

A safer world, even as global energy struggles abound *Photo: File*

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To infinity and beyond: energy resources from space

Orbiting solar panels, transmitting power to receiving stations on Earth via microwave beams, would receive much higher light intensity, not filtered by the Earth's atmosphere, and they could be in daylight 99 per cent of the time. *By Robin Mills*

"There is no place on earth as desolate as what I was viewing in those first moments on the Lunar Surface," said Buzz Aldrin, the second man to set foot on the Moon. By comparison, Mars with its thin atmosphere, polar ice caps and red soil, seems almost inviting. Yet it is still far more alien and hostile than anywhere in the deserts of the Empty Quarter or the Sahara.

On July 16, the UAE announced its ambition of launching a mission to Mars by 2021, and setting up the national space agency. Coming amid renewed global interest in space exploration, this programme will hopefully inspire a new generation of Emirati scientists and engineers.

These goals contrast with grander plans elsewhere. At a time of hyperbole over energy and resources shortages on Earth, people are inspired to scan the infinity of space for solutions.

One concept is to mine the Moon for helium-3, which is gradually deposited in lunar soil by the solar wind. This isotope could be used in fusion reactors to generate zero-carbon energy with almost no nuclear waste - just 140 tonnes of helium-3 could power the world for a year, the equivalent of 13 billion tonnes of oil.

But the Moon's helium-3 is present only in tiny quantities, which would require mining almost 3 billion tonnes of lunar rock per year – the size of the entire Chinese coal industry. The world's most advanced fusion reactor pilot, ITER in France, is not expected to start operations until 2027, and it runs not on helium-3, but on isotopes of hydrogen easily extracted from seawater.

Space-based solar power has also attracted attention. Orbiting solar panels, transmitting power to receiving stations on Earth via microwave beams, would receive much higher light intensity, not filtered by the Earth's atmosphere, and they could be in daylight 99 per cent of the time.

Such solar systems suffer, though, from problems of maintenance, and the impact of space junk and micro-meteorites. Most seriously, putting their components in orbit costs $10,000 or more per kilogramme – making them enormously expensive unless launch costs come down.

This suggests a third idea – mining asteroids for materials and rare elements, and perhaps building systems in space itself. In April 2012 – backed by the Google chief executive Larry Page and executive chairman Eric Schmidt; the Aliens director James Cameron; and the British entrepreneur Richard Branson – Planetary Resources launched, metaphorically if not literally. The venture planned to use low-cost robotic spacecraft to harvest asteroids for platinum, gold, nickel, iron and other metals, as well as water for future space expeditions and for fuelling satellites.

Space mining faces the challenges of costs. It is difficult enough to run a mine reliably in the Australian outback, let alone the interplanetary vacuum. The world is not short of base metals such as iron and cobalt, even if new deposits are remote, low-grade or deep.

A large new source of a precious metal such as platinum or palladium would unlock many uses, for example in fuel cells and catalysts. But then it would have to be cheap – undercutting the economics of the asteroid mining venture.

These dreams of space cornucopia may one day be attainable – but they appear far-off. By challenging our ingenuity, though, we can give science back the thrill and glamour it had during the Apollo missions in the 1960s. The students fixing their eyes on the stars today are the scientists who tomorrow will create breakthroughs in solar power, nuclear energy, minerals, ultralight materials and robotics.

The desolation of the Moon or Mars contrasts with the natural and human riches of the Earth. Maybe the space programme's true impact is not the resources it may find in outer space, but the innovation it can inspire on the ground.

Peak oil proponents play hide and seek with reality

The debate is certainly more sophisticated than in the early 2000s, when the focus was on physical declines in oil production and possible economic and the collapse of civilization. *By Robin Mills*

The debate over whether we are running out of oil sometimes resembles the medieval controversy over how many angels could dance on the head of a pin. By redefining the size of the pin and the agility of the angels, today's "peak oil" proponents have managed to continue the argument.

The characters have changed though. Matthew Simmons, author of Twilight in the Desert, casting doubt on Saudi oil production, died in August 2010, and the Oil Drum website closed down last September.

New disputants, including economist James Hamilton from the University of California, and Stephen Kopits, the managing director of the consultancy Douglas-Westwood, argue that oil production is limited by geology and is a severe drag on economic growth.

These factors will ultimately drive up the oil price if they are right. On the other side of the argument, voices such as the Reuters columnist John Kemp, who states that because of shale oil and other unconventional sources, "the supply of liquid transportation fuels is unlimited at prices of $100 per barrel".

The debate is certainly more sophisticated than in the early 2000s, when the focus was on physical declines in oil production and possible economic and the collapse of civilization.

The new "peak oilers" argue that crude oil production has barely grown globally since 2005, and extra output is increasingly in the form of "low-quality" hydrocarbons that are not real substitutes for oil. All new growth is coming from North America – the United States and Canada.

Actually non-Opec crude oil production has shown signs of revival over the past two years, up 2.3 per cent last year and 2.6 per cent to March this year. Meanwhile, Opec output is down – showing the organisation's role in balancing the market.

It is remarkable that Mr Kopits, in a 60-page presentation, makes only a single reference to Iraq, Iran and Libya. It is hardly surprising that virtually eliminating two-and-a-half major producers has caused global crude oil output to flatten.

Crises in these countries have removed more than 2.5 million barrels per day from the world market since 2011. Without that, OPEC production would be substantially higher or Saudi Arabia would have had to cut back and restore spare capacity – and either way oil prices would be lower.

A few years ago, "peak oil" advocates were claiming that new oil was poor quality because it was too heavy – now they say it is too light, because of condensates from shales. This lightness does require some rebalancing of refineries, but natural gas liquids are relatively easy substitutes for oil in vehicle engines, petrochemical feed stocks and home heating.

It is true that most recent non-Opec growth has come from US shales and Canadian oil sands. The mid-2000s argument that unconventional resources could not be brought on-stream quickly has been quietly forgotten in the face of history's largest production surge.

Elsewhere, mature areas such as the North Sea have indeed continued to slump, while major frontier projects such as Kazakhstan's giant Kashagan field have suffered technical delays. Security disruptions the in smaller non-Opec producers Syria, Yemen and South Sudan also contribute.

But it is not surprising that capital is flowing to North America. It offers political stability, moderate taxation, a huge resource opportunity and efficient services. North American shales are simply outcompeting oil reserves holders elsewhere, who have not moved fast enough to open up to investment, improve fiscal terms and unlock their own unconventional resources. Exploration and production companies operating elsewhere are short of capital, while successful North American players such as Occidental, Apache, Murphy and Hess are under shareholder pressure to sell their overseas assets.

By focusing on the head of the pin – the narrow details of what counts as "oil" – and ignoring the grander factors of geopolitics and Opec, it is indeed possible to make it seem that oil prices can only go up. But this latest peak oil debate is unlikely to be the last.

A safer world, even as global energy struggles abound

How do we resolve these contradictions? *By Robin Mills*

It may seem that the world is becoming a more dangerous place for energy. Geopolitical, military and revolutionary crises centre on oil and gas. The oil services giant Schlumberger now needs extra security in 20 countries, up from just two in 2001, as the Financial Times observed. Oil prices rose on the fighting in northern Iraq, then again on the news of the downing of the Malaysia Airlines flight in eastern Ukraine.

In Iraq and Syria, the "Islamic State" funds itself with looted oil. Libyan petroleum ports close and reopen in disputes over federalism and payments. Civil war in South Sudan threatens oilfields. Russia cuts gas to Ukraine as separatist fighting continues. Chinese and Vietnamese warships face off over a drilling rig in the South China Sea. Mexican drugs cartels siphon oil from pipelines and threaten to kidnap workers.

Yet despite these conflicts, the world has become a much safer place. From a peak during the 1980s, wars within and between states have dropped sharply since 1990. Even including the Syrian civil war, the death rate from political violence has fallen steadily since the 1970s. Oil price volatility has been exceptionally low over the past three years, and although prices remain high, there has not been a 1973 or 1979-style shock.

How do we resolve these contradictions?

Even in an overall more secure world, oil companies' exposure to insecurity may have increased. Since the 1990s, higher energy prices, the depletion of traditional safe areas such as the North Sea and Alaska, and the entry of Asian companies seeking to carve out their own positions have led the industry into more risky territory. Chinese companies, which have come under attack in South Sudan and Ethiopia, have realised this.

At the same time, countries once largely inaccessible to international energy investment, such as Iraq, Libya, Afghanistan and Mexico, have opened up. The Middle East, the world's most important oil-producing region, is passing through a period of political upheaval and conflict, even though lesser producers in Latin America and South East Asia have become more peaceful.

More recently, the North American shale oil and gas boom has opened up enormous resources in safe regions, changing US perceptions about energy security and helping to cap oil and gas price volatility.

Modern conflicts present new challenges to energy security. Ukraine and the South China Sea are hybrid conflicts – waged less by armies and warships than by online propagandists and fellow travellers, unofficial fighters and local proxies, saboteurs, fishing vessels, drilling rigs and economic weapons, including the cut-off of gas supplies and demands for debt payments.

Similarly, the West's response to Iran's nuclear programme, and to Russia over Ukraine, rests heavily on economic sanctions – halting Iranian oil exports and barring long-term financing to the Russian oil companies Rosneft and Novatek.

The activities of the Islamic State show how oil on a small scale is used to fund conflict and to deny revenues to government opponents. But in Iraq's Kurdish region, Libya, South Sudan, Somaliland and Yemen's Hadramaut, resource regionalism holds sway – petrodollars as the essential funding for new autonomous or independent entities.

The stand-off in the South China Sea shows that old-style, classic energy security – the military control of oilfields and shipping lanes – remains relevant, with echoes of 1914 as a rising power confronts the incumbent and its allies.

The direct physical effect of these conflicts may be limited to pipeline bombings and tanker hijackings. The major effect is longer-term – scaring off investors, distorting markets and so reducing global energy supplies and driving up their cost. Military methods are not enough – expanding and liberalising markets, conducting firm diplomacy, resolving conflicts and building strong, legitimate states must go together. Global energy security has become on the whole better and more robust – but also much more complicated.

Key MENA Energy Issues Scorecard

MENA energy price reform	🟠	↑	Yemen cuts fuel subsidy cuts to strengthen state finances, allowing government to ease fuel shortages; public anger emerges from interest groups and lower class.
MENA unconventional oil & gas	🟠	↑	UAE energy minister hopes shale gas will complement energy output and does not feel threatened by US shale boom; Oman to begin production from tight gas Abu Tabul field in September
MENA alternative energy	🟡	⇔	Iran's largest wind farm opens, 20 MW Takestan; Dubai's DEWA Dubai's ENOC announces all service stations now providing ultra-low sulphur Green Diesel to limit pollution; Kuwait unrealistically aims to generate 10% of electricity (2000 MW) from sustainable sources by 2020; First Solar to provide EPC for 52.5 MW Jordan solar PV plant with twenty year power purchase agreement starting 2016
MENA nuclear power	🟡	⇔	According to energy minister, UAE will start nuclear reactor in 2017 as planned
Energy infrastructure security	🔴	↓	ISIS attacks Kurdish forces; several companies halt/scale down operations; prospects for Kirkuk-Ceyhan pipeline remain dismal; Yemen's Maarib export pipeline blown up, halting crude flows; unknown assailants blew up Egypt-Jordan gas pipeline in Sinai; Apache employee shot dead in Egypt following carjacking between Qarun and Karama, southwest of Cairo
OPEC production	🟠	↑	OPEC July production rises to highest level in five months boosted by Libya as production rose by 200 kbpd; OPEC predicts demand for its crude at 29.6 Mbpd, a downward revision of 100 kbpd from July
East Mediterranean gas commercialisation	🟡	⇔	Australia's Woodside pulled out of Leviathan offshore gas field, reducing chance of LNG development; Israeli gas exports to Turkey hinge on Palestinian conflict; Israel exports via Egypt LNG plants progressing; Karish, Tanin fields to be sold to resolve cartel issue
Kuwait energy projects progress	🟠	⇔	Abdaliyah plans to build a combined-cycle gas power plant, with a capacity of 220MW, enhanced with solar generating another 60MW
Abu Dhabi concessions renewal	🟠	⇔	BP reports a 6% drop in production following end of Abu Dhabi concession in January; bids submitted for ADCO onshore operations, but ExxonMobil declines to bid
Baghdad-Erbil oil agreement	🟠	↓	*See pages below*
Iraq oil production build-up	🟡	⇔	Brent slips to $103 as Iraq oil output steady despite conflict; output in Kurdistan only slightly affected by ISIS incursion even as IOCs pull out staff; Kurdish production totalled 360 kbpd in June
Egypt subsidy reform	🟡	↑	Egypt raises electricity, diesel and petrol prices sharply; further fuel price rises expected and required; business activity shrinks in July after subsidy cuts
Iran oil sanctions and exports	🟠	↑	Iran multilateral agreement reached in July to run to November 2014; US will not cut Iranian exports below 1 Mbpd in exchange for Iran's curbing nuclear research activity; oil production increased by 11% since March 2014, official numbers not released; Iran aims to raise production by 70 kbpd within next three years; the state has exported 525 kbpd of condensates to Asia generating $1.5 billion in extra trade

🟢	Very positive	↑	Improvement in last month
🟡	Positive	⇔	No change
🟠	Negative	↓	Deterioration in last month
🔴	Very negative		

Energy Prices and Generation Costs in the Middle East

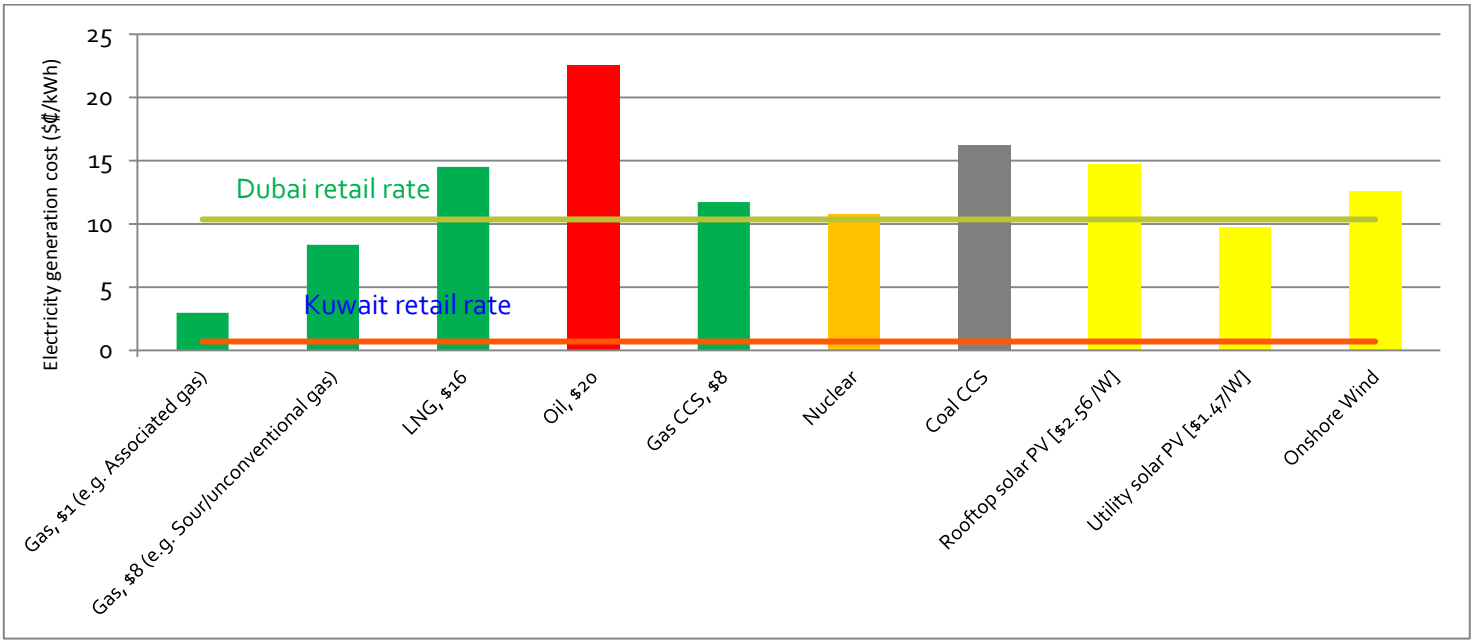
The following table represents February 2014 gasoline, diesel and electricity prices (top rate for residential consumers) in selected MENA countries, with the US for comparison, and the direction of change since last month.

	Gasoline ($/litre)	Diesel ($/litre)	Electricity ($¢/kWh)
Saudi	0.21	0.09	6.9
Qatar	0.25	0.25	2.7
Bahrain	0.27	0.26	4.2
Kuwait	0.32	0.27	0.7
Iraq	0.34	0.72	6.7
Yemen	0.93↑	0.91↑	7.9↑
Oman	0.40	0.48	7.8
UAE Dubai	0.48	1.01	10.35
Abu Dhabi	0.48	0.88	4.0
Sharjah	0.48	0.90	8.0

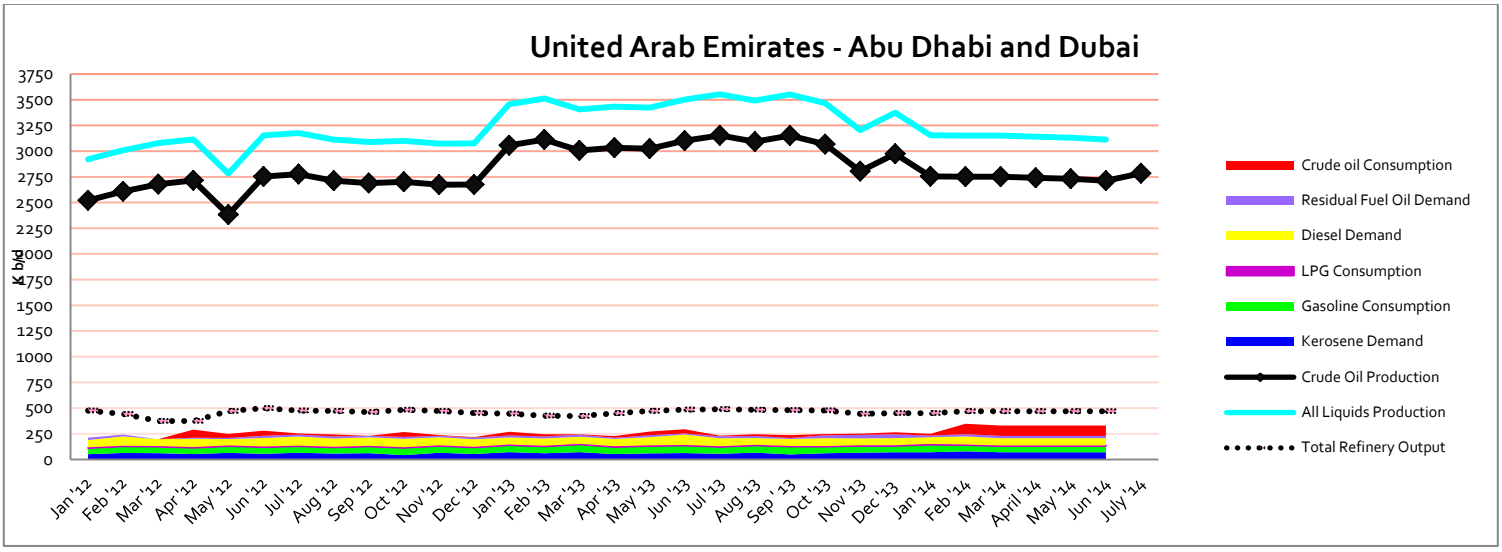
	Gasoline ($/litre)	Diesel ($/litre)	Electricity ($¢/kWh)
Egypt	0.27↑	0.46↑	6.8↑
Iran*	0.7** ↑	0.35** ↑	1.64**
US	*0.87*↓	*1.027*↑	*12.61*
Lebanon	0.878 ↓	0.87	13.3
Jordan	1.4 ↑	0.98 ↑	33.2

* Non-subsidized allocation, at current (volatile)
** Values changed mainly due to changes in the exchange rate
Open-market exchange rate (US$1:IR 24942)
Note: Gasoline & diesel are pump prices. Only the US, Lebanon and Jordan prices can be considered non-subsidized.

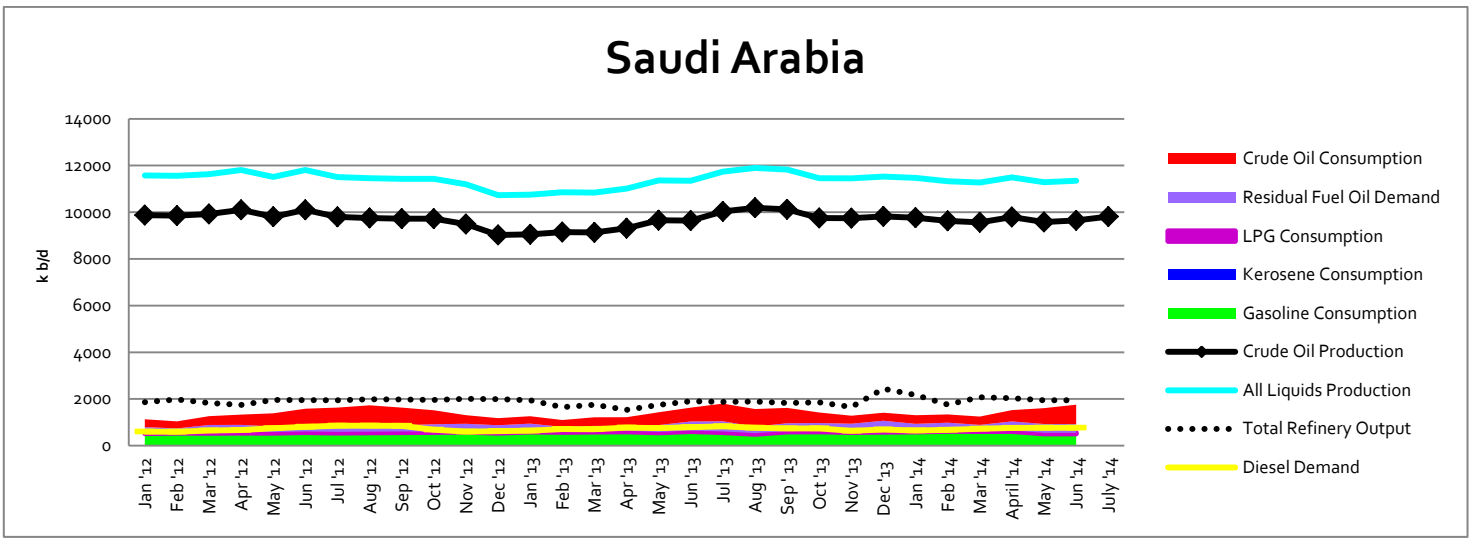
Source: Gulf Oil Review; Manaar research



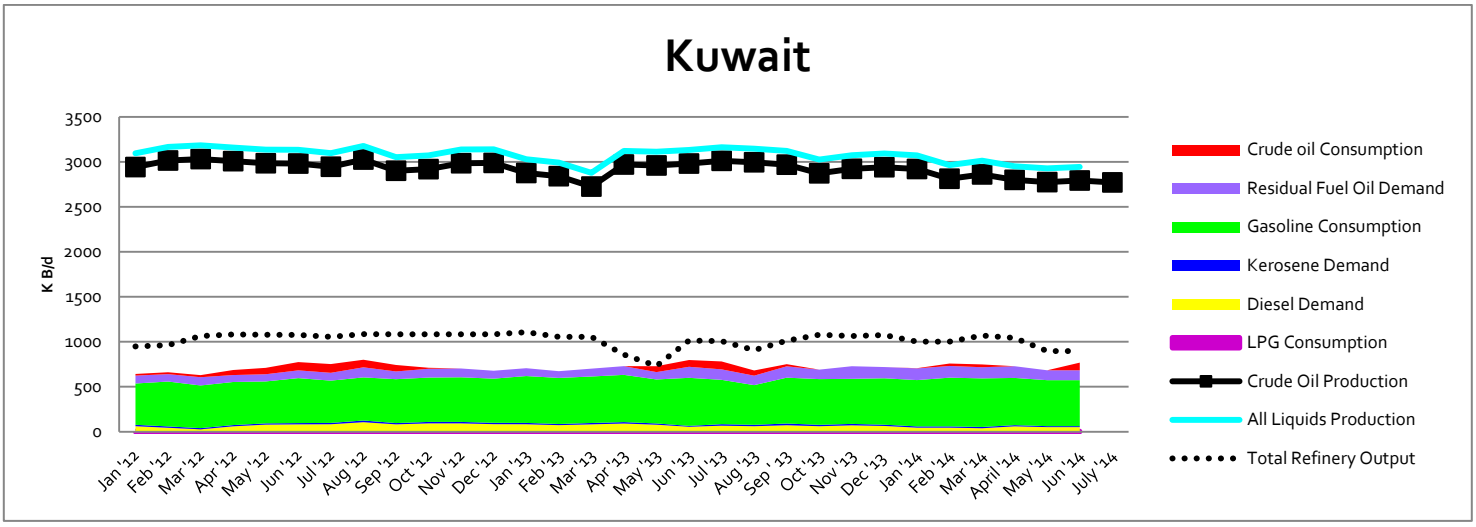
Regional Energy Statistics



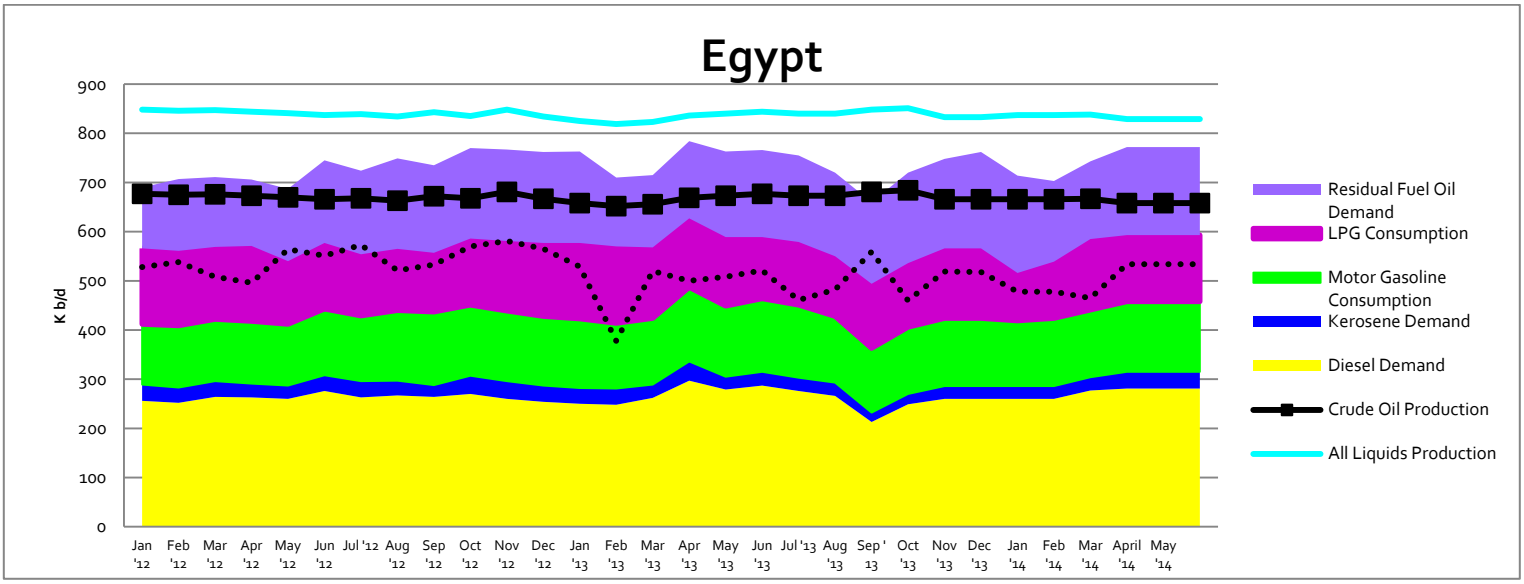
- UAE crude oil production remained steady, somewhat below 2013 record levels
- Hyundai Heavy Industries has been awarded a US$1.94 billion contract from Abu Dhabi Marine Operating Company (ADMA-OPCO) to build an offshore oil and gas platform 130 km off the coast of Abu Dhabi. The facility should increase the capacity of the offshore Nasr field from 22 000 bpd to 65 000 bpd when complete in 2019.



- Saudi Arabia has cut the price of its Arab Light Grade crude by 40 cents to its Asian customers, a premium of $1.65 per barrel over DME.
- Saudi oil exports fell to a low since May 2011, from 7.45 Mbpd last month to 6.99 Mbpd to this month despite conflicts in other OPEC countries. Increased US exports may also be considered as a factor.
- Local consumption of crude oil during 2014 stood at 475 million barrels or 23 percent of total domestic production.

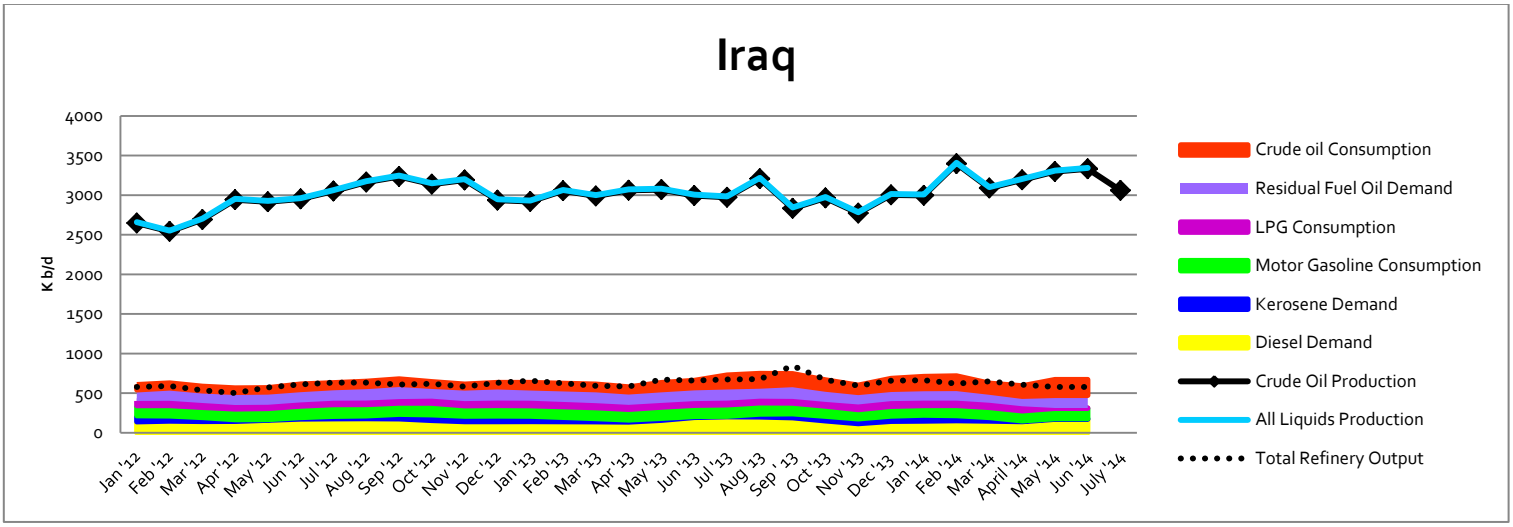


- Production was steady in July but down slightly this year from 2013's record levels
- Kuwait plans to invest $17 billion to develop oil refineries while adhering to strict environmental regulations. Refining capacity is expected to increase by 47% from 936 kbpd to 1.4 Mbpd

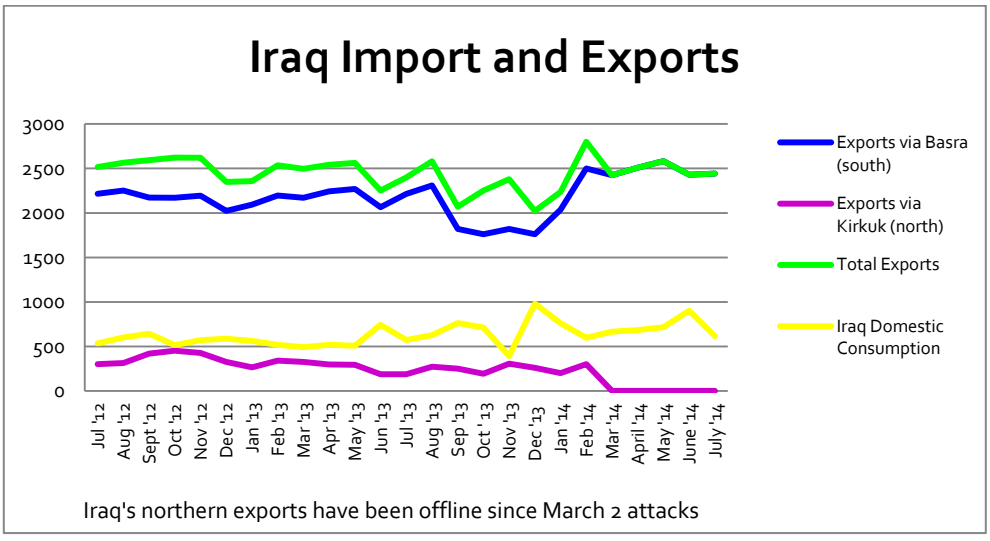


- Egypt is seeking $1.5 billion to assist with repaying its $6 billion debt to IOCs. Repaying debt will help open the door to investment, which Egypt needs to develop natural gas resources and build an LNG import terminal to combat natural gas shortages.

Energy Statistical Report for Iraq



- ISIS has captured two small North Oil Company fields in northern Iraq that produced a combined 20 000 bpd.
- As a result of recent developments and escalating instability around the Kurdistan Region of Iraq, TAQA of the UAE has suspended operations at the Atrush Block and significantly reduced staffing levels.



Iraq's northern exports have been offline since March 2 attacks

Iraq crude exports increased in July despite the civil unrest, but failed to meet the expectations of the Oil Ministry. Exports increased by 20 000 bpd to 2.442 Mbpd in July, an increase from the previous month but still below Ministry's expectation of 3.15 Mbpd.

180 000 kbpd exported by Kurdistan is not included in the figure.

Iraq News in Brief

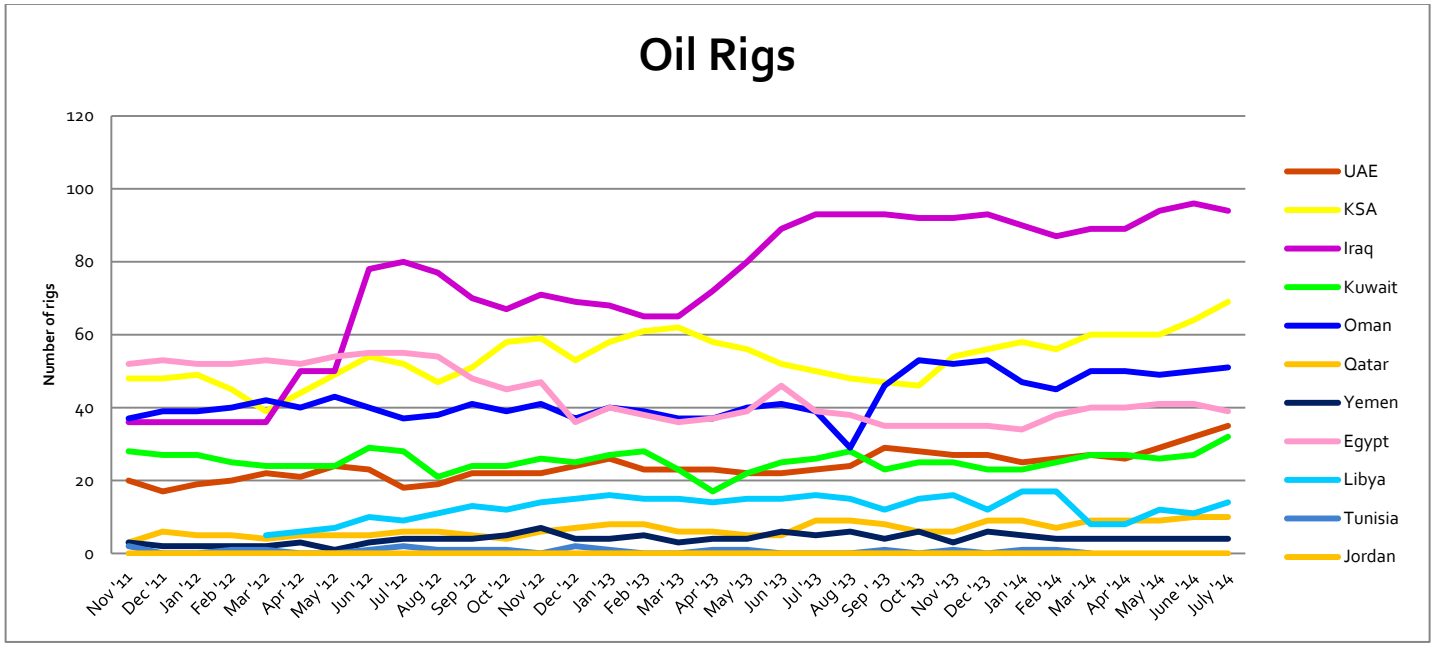
Iraq fails to Seize Kurdish Crude

The Iraqi government has called on U.S. marshals to seize 1 million barrels of Kurdish crude oil off the coast of Texas. A federal judge originally ruled in favour of Baghdad but reversed the ruling the next day, citing the lack of U.S. jurisdiction as the tanker holding the oil is in international waters.

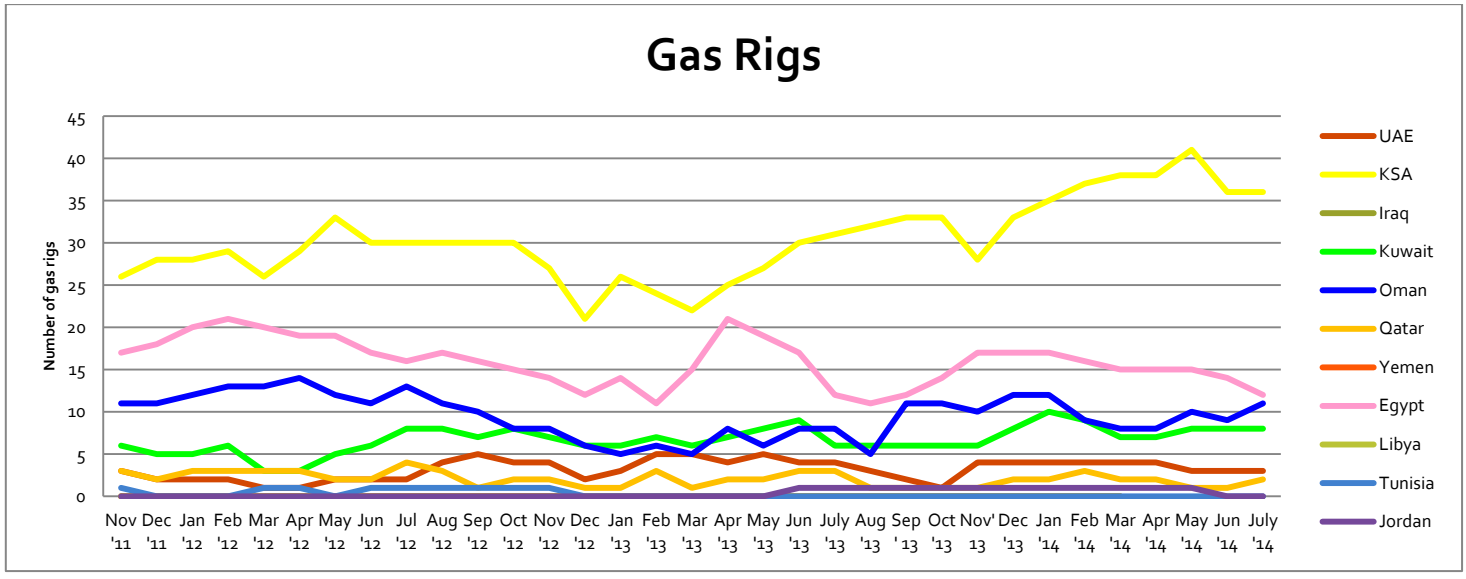
Axeon receives Kurdish crude despite disapprovals, changes mind afterwards

Axeon Specialty Products stated that it received a cargo of heavy crude oil from of Kurdistan's Shaikan oilfield in June, despite the Iraqi government's attempts to block independent exports of crude by the Kurdistan Regional Government (KRG). The oil was delivered to the company's refinery in Paulsboro, New Jersey. However, Axeon announced that it will not buy or accept delivery of any cargoes of disputed Kurdish crude until legal issues with Baghdad are resolved

Oil and Gas Rig Count



- Over the past two years the number of operating rigs in the Middle East has increased by 11%. This has resulted in the region overtaking Latin America and Canada to become the 2nd largest rig market in the world outside of the U.S.
- Middle East announced as the second biggest market for total operating oil rigs.



- Dana Gas, the United Arab Emirates energy firm, reported its second-quarter net profit jumped 70 percent as production across the group rose, with a net profit of $46 million.
- Saudi rigs remain at an all-time time high with an ambition to reach 200 by the end of 2014, driven by continuing high oil production levels and increased gas drilling

Recent and forthcoming MENA Licensing Rounds

Country	Round	Launch Date	Blocks on Offer	km^2 offered	Blocks Awarded	Closing Date
Egypt	Ganope	Dec – 12	20	125,577	1**	
Jordan	South Jordan Block	April - 12	1	10,416	-	June - 13
Egypt	EGAS	Dec – 13	22	NA	-	May - 14
Iraq	Nassiriyah	Dec - 13	1			
Iraq	5th Licensing Round	NA	10	NA		NA
Lebanon	1st Licensing Round	May – 13*	10	17,901	-	Jan – 14*
Oman	MOG	Jan – 12	4	26,837	2	Aug – 12
Oman	MOG	Nov – 12	7	103,422	-	Jan – 13
Oman	MOG	Aug-14	5	21,140	-	Oct-14
Yemen	6th Licensing Round	Sep – 12	5	20,132	-	NA
Yemen	March 2013 Licensing Round	March – 13	20	222,812	-	May - 13

* Delayed due to government formation; expected July 2014 * Participating in the Ganope International 2012 Bid Round #1, Dragon Oil awarded 100% interest in shallow-water block 19 in the Gulf of Suez.

In Video

"The US is gradually moving towards allowing exports case by case, with rising production effectively filling in for Iran, Libya and Iraq."

-Robin Mills, Head of Consulting at Manaar Energy on *CNBC Arabia*.

Source: Manaar stock

Watch the full video here: http://www.youtube.com/watch?v=i6UzVmq7fTY&feature=youtu.be

Current Studies

Hydraulic Fracturing

Manaar has recently updated its study of the market for hydraulic fracturing in the MENA region, with PacWest Consulting. The 2014 MENA hydraulic fracturing report addresses historical and forecasted frac demand, supply, utilization, constraints and trends for all MENA countries. Market coverage also includes current hydraulic fracturing projects, unconventional potential assessments, past and forecasted unconventional wells in Oman and Saudi Arabia, historical proppant volumes in all MENA countries as well as the dominant proppant type and detailed basin and play maps. The majority of the information gathered in the reports relies on primary intelligence: in-depth surveys and conversations with industry leading experts and technical specialists.

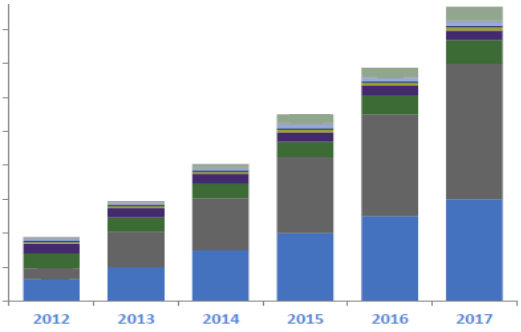


Figure 1. Oman frac capacity, by pumper (also available for Saudi Arabia, Algeria, Egypt, Libya, Tunisia, Bahrain, Kuwait, Iraq and Jordan)

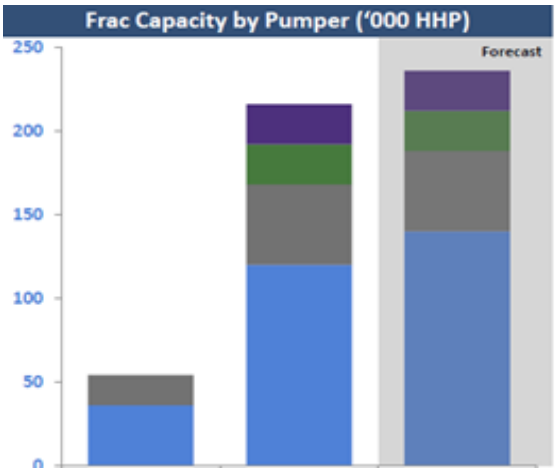


Figure 2. Forecast frac capacity, per MENA country

East Mediterranean Gas Markets Study- Israel, Jordan, Egypt, Lebanon and Cyprus

Manaar put together a study to obtain a deeper understanding of the natural gas markets and regulation in Israel, Egypt, Jordan, Lebanon and Cyprus. The study provides a natural gas pricing analysis – including insights on the relevant bearable gas price / market price / regulated price for natural gas.

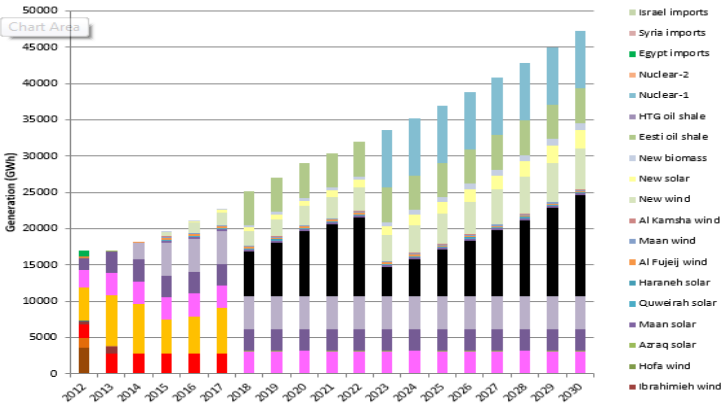
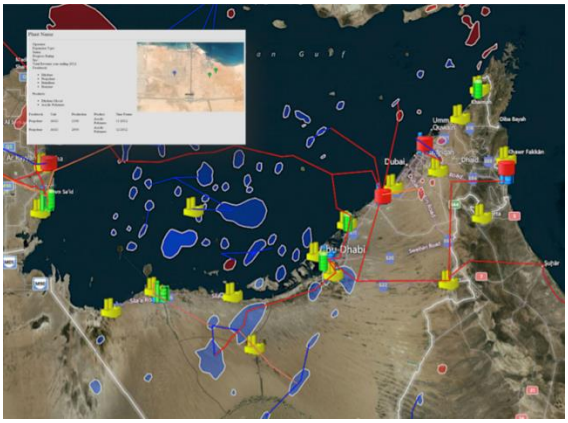


Figure1. Forecast Jordan power generation. Mid-case economic growth; one oil shale and one nuclear plant.

MENA Shale Study

Manaar has prepared a study on the impact of global shale resources on MENA. The study focusses on:

- The strengths, weaknesses, threats and opportunities of unconventional gas in the MENA region.
- Differences in the development of unconventional gas between North America and MENA.
- Identifying MENA's unconventional gas potential; understanding current and planned activity levels per country, company and basin.
- The impact of the shale boom on future demand for MENA oil & gas, oil and gas prices, possible new pricing hubs, and oil and gas exports.



Recent & Forthcoming Events

- Robin Mills spoke in the DMCC Iraq Conference on 3rd June in Dubai

Manaar Presentations

- EPC Market Study 2014
- Gas Development in Middle East: Impact on Product Demand
- Feedstock Challenges and Market Implications for Middle East Petrochemical Products

For more presentations and research, please visit www.manaarco.com

Manaar Energy and DIFC Capital Club event

Iraq in Crisis – What does it Mean for the Region's Energy Sector and Economy?

Monday 8th September 2014

The Venue:

Capital Club is Dubai's premier private City Club situated in the heart of the financial district – DIFC. The Club was opened in 2008 and has over 1500 Members, drawn from the leading businesses in the region. A members-only Club in a contemporary setting for Members to network professionally and socially; dine and party; host private meetings; and attend a wealth of social and business events, covering emerging trends in arts, culture, media, social development, cuisine, business and travel.

The Club is connected to over 250 premier private clubs around the world as part of its reciprocal club network.

Contact: admin@manaarco.com for full details of the event.

The Event:

The theme: Iraq Evening - Industry Analysis and Insight

The purpose: To discuss the current situation in Iraq and its impact on the GCC energy sector and economy.

The speakers:

Jaafar Al Taie

Managing Director

Manaar Energy Group

Robin Mills

Head of Consulting

Manaar Energy Group

Francis Matthews (Moderator)

Editor at Large

Gulf News

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Key Manaar people

JAAFAR ALTAIE
MANAGING DIRECTOR

• Jaafar founded Manaar in 2009. He is an energy economist and petroleum business advisor to IOCs and NOCs on regional upstream business and economics issues.

ROBIN MILLS
HEAD OF CONSULTING

• Head of Consulting at Manaar Energy, Robin is an expert on energy strategy and economics, described by Foreign Policy magazine as "one of the energy world's great minds".

MOHAMMED JAMBAZ
HEAD OF KURDISTAN OFFICE, ERBIL, IRAQ

• Mohammed represents Manaar in the Kurdistan Region of Iraq from our office in Erbil. He leads our support of companies in seismic, geoscience, exploration & production, logistics, laboratory services, energy market analysis, and other sectors of the oil industry.

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• Dr. Sadik is a Lead Consultant at Manaar with a focus on business operations consulting in Iraq and the UAE.

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• Roa is a specialist in assessing markets for energy industry technology in the Middle East, with a background in finance.

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