

## Entering a new phase

We initiate on Gulf Keystone (GKP) at a time when the understanding of its massive Shaikan asset has increased markedly. The convergence of a tighter range of estimates around a higher (13.7bn bbls pMean) oil in place (OIP) demonstrates the better understanding of the Shaikan field gained over recent months and indicates that the next stage, development, is just around the corner. Our core NAV of 216p should grow as the current uncertainties (development details, recovery rates, pipelines and politics) become clearer while further value could be unlocked as exploration and appraisal takes place across its other blocks. In reality, big fields require big developers and we would ultimately expect to see GKP crystallise value for shareholders.

Year end	Revenue (\$m)	EBITDA* (\$m)	PBT* (\$m)	Net (debt) (\$m)	Capex (\$m)
12/10	1.0	(32.1)	(32.8)	(201.3)	(147.0)
12/11	6.9	(69.8)	(69.6)	(208.1)	(153.1)
12/12e	6.4	(46.0)	(45.0)	(86.8)	(71.3)
12/13e	81.7	11.7	(5.6)	96.3	(175.1)

Note: \*PBT is normalised, excluding intangible amortisation and exceptional items.

### Shaikan enters a new phase

GKP is a Kurdistan-focused E&P. Its key asset is the Shaikan oil field, with an independently-estimated 13.7bn bbls of OIP. Appraisal of Shaikan has now formally reached an end and the company anticipates that development will take gross production to a plateau of at least 400m bbl/d by 2016 (we model 475m bbls/d for nine years).

The development of Shaikan should bring significant value to GKP, but there are a number of unknowns to consider. Overall recovery rate for the complex reservoir is still uncertain, as is a route to monetise the production; an export pipeline to Turkey is planned, but tensions between Baghdad and Kurdistan means this is not 100% certain, although long term exports via Turkey are likely. Additionally, the company is being sued for 30% of its Kurdistan assets by Excalibur – the trial should start in October 2012.

### Valuation: More to come

GKP's value has increased considerably in the years since Shaikan was discovered and the shares have been a rollercoaster ride for many investors as hopes of a much-rumoured takeover increased and subsequently fell away. Our analysis shows that the core NAV of 216p underpins the value of the shares, while RENAV of 271p provides upside based on current E&A activity. However, GKP is an evolving story and further increases in resources would not be a surprise.

More potential upside is possible in the neighbouring Sheikh Adi block, which the company believes could be linked to Shaikan. A Shaikan superstructure, extending over neighbouring blocks, is a tantalising possibility. Ber Bahr could add further in time, while the company could realise value in the near term with a sale of Akri-Bijeel. An unrisks RENAV for the company (including a decrease in discount factor from 12% to 10%) stands at 575p.

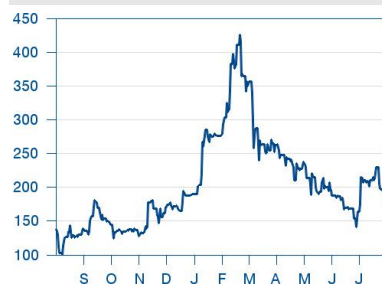
## Oil and gas

1 August 2012

Price 181.5p  
Market cap £1,590m

Shares in issue 876m  
Free float 92%  
Code GKP  
Primary exchange AIM  
Other exchanges N/A

### Share price performance



%	1m	3m	12m
Abs	11.0	(23.7)	30.6
Rel (local)	8.6	(22.9)	33.6
52-week high/low	425.25p	100.75p	

### Business description

Gulf Keystone is a Kurdistan-centred exploration and production company. It has interests in four blocks in Kurdistan including the Shaikan field, which has an independently estimated 13.7bn bbls of oil in place.

### Next events

Drilling results at Akri-Bijeel and H212  
Declaration of Commerciality at Shaikan

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## Investment summary: Shaikan not stirred

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### Company description: An emerging giant

GKP is an E&P company operating in Kurdistan. It has a share of the gross mean 19bnbbbls of OIP in Shaikan, Akri-Bijeel and Sheikh Adi blocks in Kurdistan, with further resources at Ber Bahr. The jewel in the crown is its share of Shaikan, a block with a new estimated 13.7bnbbbls OIP (pMean). The appraisal of Shaikan is coming to an end and the company plans to develop the field to produce to a plateau of at least 400mmbbl/d by 2016. However, we would expect the development plan to reflect a higher plateau with the recently announced increase in OIP.

### Valuation

In line with other E&Ps, we value GKP on a DCF-driven NAV basis. Our valuation of core NAV of 216p includes Shaikan pre-development, cash and a presumed back-in cost payment for Shaikan third-party back in. Further value can be released as Shaikan development progresses and as the understanding of the Ber Bahr and Sheikh Adi blocks increases. Our RENAV stands at 271p.

### Sensitivities: Shaikan is huge, but further work is required

Our in-depth analysis indicates these major sensitivities:

- With appraisal work now completed, the OIP figures are tightening around a current pMean of 13.7bnbbbls. However, the drilling has yet to find the oil water contact and so there is still uncertainty as to the absolute bottom of the structure. There is growing evidence that the field could overflow into neighbouring blocks, increasing the resources in its asset portfolio.
- Shaikan is an example of a fractured carbonate reservoir, which can be highly variable in their recovery factors (RFs). While the company estimates that the field could ultimately produce around a third of OIP, our analysis suggests this may be ambitious over the life of the PSC licence.
- Fractured carbonates work on a dual porosity model, with high initial production coming from the highly permeable fractures, which then falls as the oil flows from the less permeable matrix. Investors should be aware that a sharp drop-off from individual production wells is possible.
- To monetise the field the crude has to be exported by a pipeline to Turkey that has yet to be built. With tensions between Kurdistan and Baghdad still high, the timely construction pipeline cannot be guaranteed, even with the political backing of Turkey and the implied support of large companies such as Exxon, Chevron and Marathon moving into the region. Long term however, exports to Turkey (by one route or another) remain the most likely outcome in our view.
- Our DCF indicates the value of Shaikan is sensitive to oil production, oil price and the discount rate, but is insensitive to capex and opex. This means that increases in recoverable oil or changes in political environment will result in meaningful valuation effects, while changes to the mooted \$7-\$10bn development costs will leave the value relatively unchanged.
- The company is currently being sued by Excalibur for 30% of its Kurdistan assets. Management is confident of successfully defending the case. The trial is set for October 2012.

### Financials: Aiming for self sufficiency

The company has stated that it is funded up until the middle of next year – we agree. However, the development of Shaikan is an enormous financial undertaking – the company expects full field development capex to be \$7-10bn, with an initial train for 100mmbbl/d processing costing around \$250m and facilities over the life of the project at around \$4bn. We assume that the Kurdistan

Regional Government (KRG) will back-in and that a third-party will also become part of the consortium, leaving GKP with a diluted working interest of 54.3% (including TKI interest) from the end of 2012.

Shaikan development should be financed from existing cash and revenues if the company hits its current production targets (40mbbls/d by the end of H113 and 100mbbls/d by 1 January 2014). This leaves the company needing further capital to fund its other exploration and appraisal activities over time, though this should be forthcoming from a number of sources. The company is looking at convertible bonds, production-based loans as well as senior debt together with the potential proceeds from the sale of its stake in Akri-Bijeel (the company expects \$300-500m). At this stage, we do not assume a sale of Akri-Bijeel in modelling.

## Near-term catalysts

A number of events could serve as catalysts for the stock in the next few months.

**Shaikan:** In August we expect the long lead items to be delivered ready for a December/January start-up of EWT-1 facility (with a capacity of around 20mbbls/d), which should provide welcome revenues, and more importantly, better understanding of the reservoir and production. The second EWT facility should follow in March/April 2013. We would also expect the declaration of commerciality to be followed by the submission of the appraisal report and the submission of a field development plan before the end of 2012. Shaikan could see the back-in of a third party, although this is not within the company's control.

Away from Shaikan, the company has interest in a number of wells currently drilling. Well results from Bijell-3 (Aqra-1) and Bakrman-1 on the Akri-Bijeel block are due next, while we expect Genel to update the market on Ber Bahr-1 at their interim results. The Sheikh Adi-2 exploration well spudded in late May to confirm oil shows encountered with Sheikh Adi-1 last year and Gulak-1 (Akri-Bijeel block) spudded on July 23rd. The sale process of GKP's stake of Akri-Bijeel is ongoing.

## The longer-term future of Gulf Keystone

Kurdistan started as a high risk, frontier oil province. With exploration success in the region now at 70% and the resources now more evident, it is only a matter of time before larger players look to enter the area. As most of the acreage is now taken, entrants will have to acquire or farm-in with existing stakeholders and so we see a continuum of deals in the area as likely. We believe the entrance of Exxon and now Chevron bears testament to the start of this trend. GKP's assets will be in demand we think, as long as acquirers can get more comfortable with the extent and nature of the acreage.

Big fields tend to be developed by big players and we would expect the company to crystallise value for shareholders. We note that the recent creation of exit awards in March 2012 by management implies that the company is prepared for a potential change of control.

Under a more de-risked scenario, where funding is assured and the discount rate is reduced to 10% (either through relaxation of global economic worries, political easing in Iraq or other factors), a completely de-risked portfolio could be worth 575p to GKP. In this situation, every extra 250mboe of gross recoverable oil (equivalent to an increase of 1.8% RF) would be worth an incremental 34p unrisks.

## Company description: Giant potential<sup>1</sup> for Shaikan

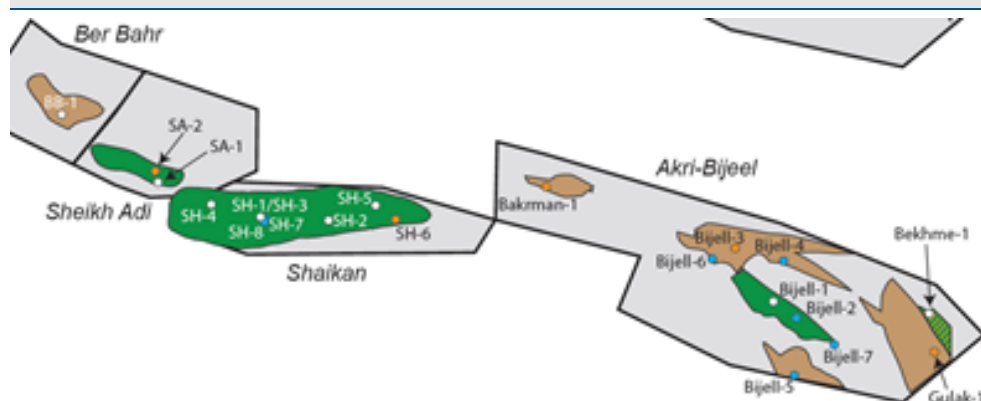
GKP's flagship asset is Shaikan, a world class field in the Kurdistan region of Northern Iraq. Since its discovery in 2009, the estimated size<sup>2</sup> of the field now stands at 13.7bnbbls (pMean) OIP with a P10 of 15.0bnbbls.

GKP is working towards submitting its field development plan by the end of 2012. Once this is obtained, the company aims to ramp up production to 100mmbbl/d by 2014 and then to a minimum plateau rate of 400mmbbl/d by 2016. We believe that a resource of this size can clearly support plateaus higher than 400bbl/d, dependent on well behaviour over time, and we would expect GKP to build this into development planning.

The field is an anticline sitting at the NW end of the Zagros Foldbelt approximately 85km NW of Erbil and extends 30km from east to west and 10km from north to south. To date, the discovery well and five further appraisal wells have identified six oil-bearing reservoirs in the Cretaceous, Jurassic and Triassic, of which the most significant is the Jurassic with 80% of the estimated resources. An exploration well, SH-7, is due to be drilled in Q213 and will target the previously undrilled Lower Triassic and Permian reservoirs.

The Jurassic consists of the Sargelu-Alan-Mus (SAM) and Butmah reservoirs with the zones successfully producing low gravity oil at rates up to 10,000bopd at SH-1 and SH-3. The company intends to concentrate initially on producing from the SAM. Two wells, SH-1 and SH-3, are connected up to extended well test (EWT) facilities and are currently producing from this interval, with appraisal well SH-4 due to be added imminently. The crude is characterised as medium to heavy oil with the API gravity ranging from 22° to 12° and becoming heavier with depth. The company is planning for the first wells to target the 18° to 22° range and be able to flow naturally initially, with electrical submersible pumps (ESPs) required after a few years.

**Exhibit 1: Blocks and drilling sites for Gulf Keystone**



Source: Gulf Keystone

<sup>1</sup> A giant field is a field with >500mmbbls of recoverable oil. A supergiant has >5000mmbbls of recoverable oil.

<sup>2</sup> Estimation by DGA (Dynamic Global Advisors) in July 2012

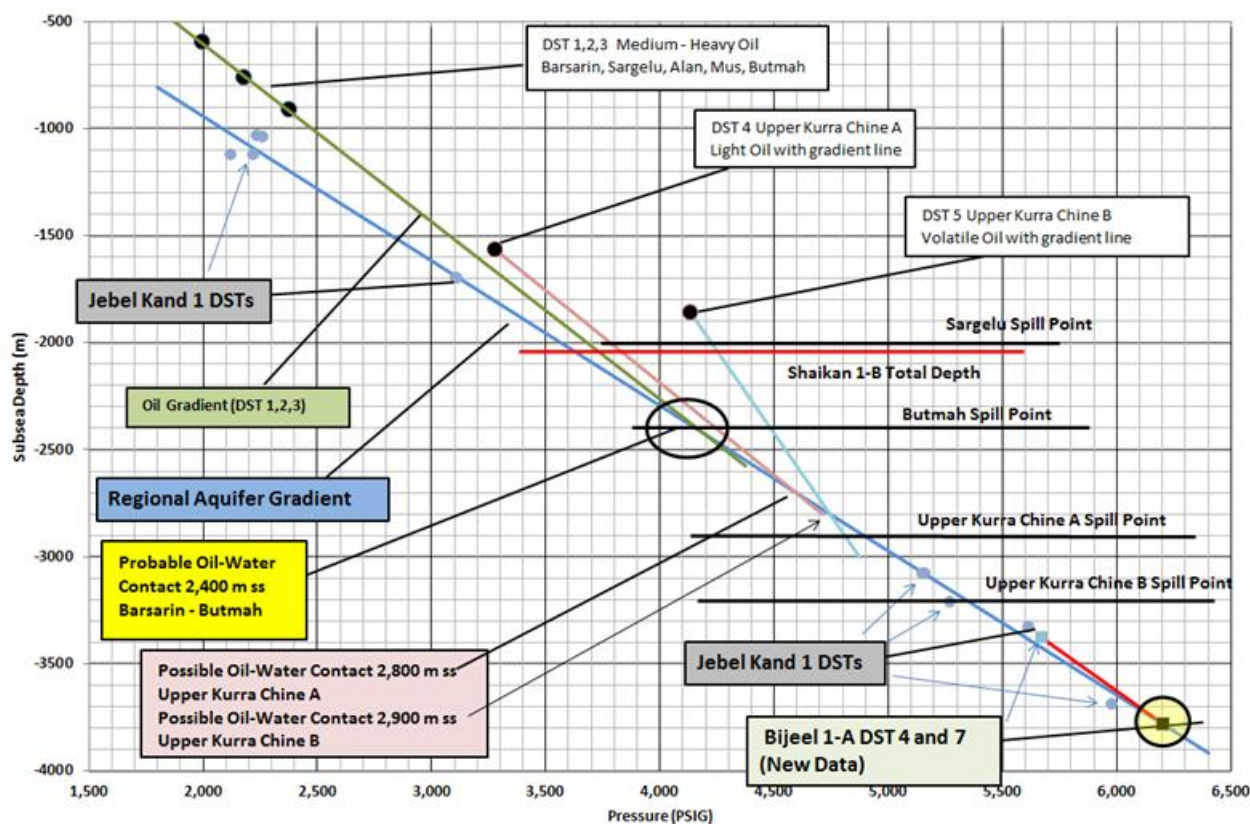
## Reservoir area: Big fields get bigger

Shaikan is vast, but the ultimate size is still uncertain. OIP has grown from a pMean of 4.2bnbbbls in January 2010 to 13.7bnbbbls in the latest independent auditor's (Dynamic Global Advisors, DGA) report, driven by a better understanding of the reservoir and the discovery of oil at greater depths in exploration drilling. A fundamental parameter that allows the reservoir size to be estimated is the depth at which the lowest known oil resides, governed by the oil water contact (OWC), where the oil (lower density) meets the underlying water (higher density). Until the OWC has been determined, the ultimate depth of oil (and therefore oil in place) is not known.

GKP will eventually find this through drilling, but in an effort to estimate the OWC, it obtained a water sample and pressure data from the Bijell 1-A well in the Akri-Bijeel block (66km east of the Shaikan discovery well) and plotted this against data from Jebel Kand 1 (20km SW of Shaikan). The data points correlated well and indicate that they share the same water pressure gradient – implying the presence of a regional aquifer extending under Shaikan and suggesting a depth for the OWC.

The existence of a regional aquifer of this size (extending 80km) is not unknown and examples can be found in other parts of the world (for example, an aquifer in the Anadarko Basin in the USA extends around 320km). Despite this evidence, we suggest that conclusive confirmation can only come from finding the OWC in a Shaikan well. The assumption of a regional aquifer allowed OWCs in each reservoir to be inferred based on the intersection of oil gradient data with the regional water gradient, as shown in Exhibit 2. These new OWCs were deeper than the lowest known oil depths obtained from log data available up to that point. This allowed the independent consultants DGA to increase the estimate the area, resulting in an initial increase in resources. We note if the field is water driven then an aquifer of this size could support recovery rates over time.

Exhibit 2: Water gradients suggest a regional aquifer – DST pressure vs depth with fluid contacts and spill points (April 2011 revision)



Source: DGA

The most recent well, Shaikan 6, was drilled to look for the OWC, but has instead found the deepest oil shows so far, around 150m below the last lowest known oil in the Jurassic and, importantly, below the previously mapped [spill point](#). GKP will now need to review its geological model to determine a new closure mapping. So, while the reservoir area is not yet fully defined, there looks to be more scope to the upside as evidence points to deeper OWCs. Indeed, when the data from SH-6 is incorporated, the company believes it is likely that the field will extend to the current block boundary (see Exhibit 6).

## P90 OIP is now 12.4bnbbls

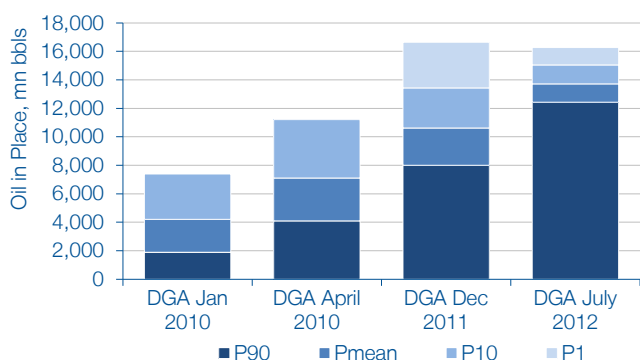
The company has consistently looked to auditors to provide independent opinion on the reservoir, as is common within the industry. The latest DGA report now estimates that the pMean OIP is 13.7bnbbls, representing a 3.1bnbbl increase from that given in November 2011, and more than the previous P10 estimate. The P90 figure of 12.4bnbbls is up over 4bnbbls (and nearly 2bnbbls more than the previous pMean). The report now includes data from the recent SH-4, SH-5 and SH-6 wells, which contain information on the deeper reservoirs that were targeted. The estimates are therefore in line with current information known. Two new intervals have been added to the resource estimates (Chia Gara and Baluti).

Importantly, the range of resource estimates is converging. In December, the P90-P10 range was more than 5.4bnbbls, now it is 2.6bn, while the P1 figure has fallen slightly. The tighter range reflects less uncertainty in the estimates and indicates a greater understanding of the known reservoirs. Future drilling should reduce the range further, although this will take time.

However, the new figures do not include the reservoirs in the late Triassic/Permian. In January 2010, DGA noted, "Seismic data shows even deeper closures below the Lower Kurra Chine Formation that are prospective. Potential resources for these deeper formations are ~ 1 to 5 BBO and 6 to 14 TCF". Further upside in Shaikan from these intervals is possible – we look to Shaikan-7 to explore them, which will require a larger rig to handle the higher pressures expected at these greater depths. This expectation is supported by the recovery of water from the Triassic in SH-6, which was found to be at a higher pressure than previously expected.

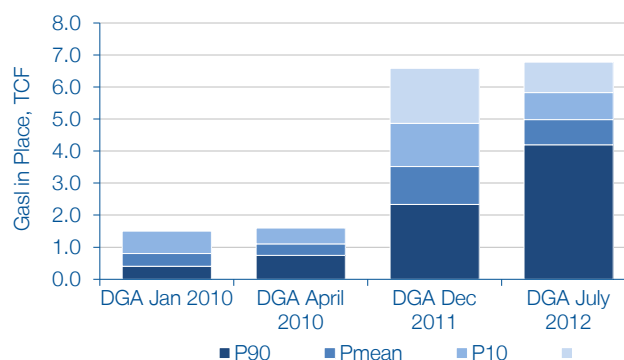
Additionally, the July report shows that the gas-in-place figures have increased significantly from 3.5tcf to nearly 5tcf (pMean). Although we expect much of the gas in place to be re-injected, there should still be enough for Shaikan to be a significant gas producer for Kurdistan, once an evacuation route has been identified and constructed. However, Shaikan remains essentially an oil reservoir (approximately 5% is gas by hydrocarbons in place).

Exhibit 3: Progression of OOIP for Shaikan



Source: DGA, Gulf Keystone

Exhibit 4: Progression of OGIP for Shaikan



Source: DGA, Gulf Keystone

## A Shaikan superstructure?

The implications of a larger Shaikan field are potentially significant, not just for production within the block but for neighbouring assets. Two seismic interpretations of the Shaikan area are given below. Exhibit 5 shows the seismic interpretation of the Shaikan, Sheikh Adi and Ber Bahr blocks assuming a water contact at 2230m. This indicates that the Shaikan structure could extend to neighbouring blocks.

The company's current interpretation of the area indicates that Shaikan and Sheikh Adi may be one structure, while Behr Bar and Akri-Bijeel are separate. We believe this leaves tantalising question marks over any connectivity between Shaikan and neighbouring (non-GKP) blocks such as AIQush (Exxon) and Ain Sifni (Afren/Hunt).<sup>3</sup> The latest estimated spill points from the July 2010 DGA report do suggest that the Shaikan field does extend beyond the block, although direct connectivity could be stopped by the heavy faulting in the region, we think.

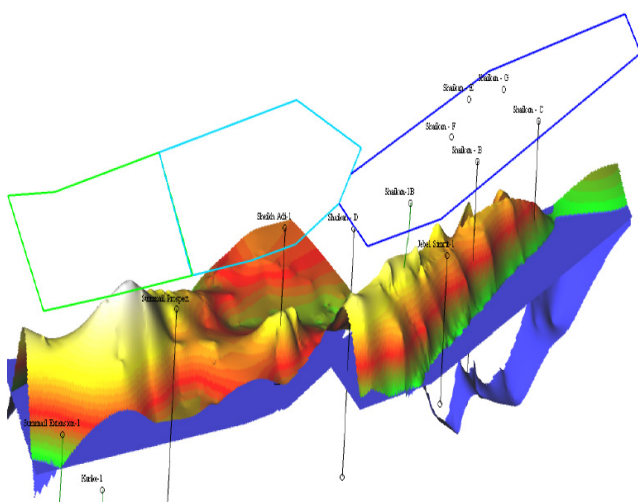
The faults evident in the Atrush Block (Exhibit 8) makes direct connectivity between Shaikan field, Atrush and Swara Tika (Sarsang block) less likely in our view, although a link between Atrush and

<sup>3</sup> The fault at the boundary of the Dohuk, Ber Bahr and Sheikh Adi (evident in Genel prospectus Dohuk CPR) makes connection further west to Dohuk unlikely in our view.

Sarsang is more possible.<sup>4</sup> Drilling is still required to explore the interval north of the Shaikan block boundary and the fault south of the Atrush discovery.

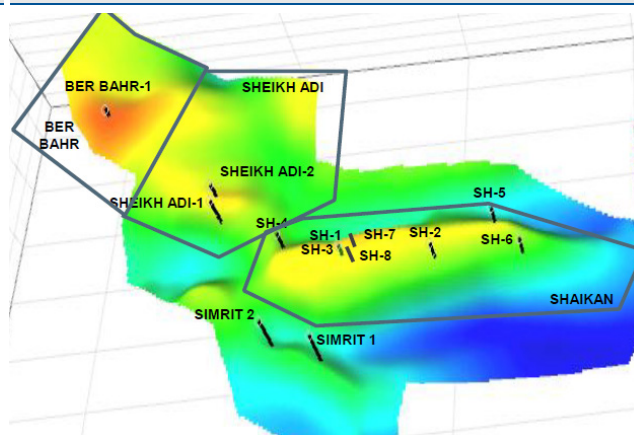
If connectivity is proven for a greater Shaikan field we would expect OIP estimates for this superstructure to be higher than the OIP estimates currently in the market for Shaikan. Exhibit 7 shows the close proximity of a number of significant discoveries over the last few years. Although connectivity would necessarily mean an increase in OIP numbers for Shaikan, it could also bring difficulties. Shared ownership of a large superstructure would involve unitisation and negotiation, and as many of the other blocks are not as well explored/appraised, we think discussion on unitisation and development strategy could bring delays. We also note that the other owners (including Exxon at AlQush) are much larger and not likely to be as quick in making decisions as the smaller players such as GKP. To balance this out, we would expect the (KRG) to encourage the players to be as efficient as possible, given the potential revenues from a quicker development. Additionally, a larger structure will not necessarily have the same productivity everywhere – we have seen that the fracture network has yet to be proved at Sheikh Adi and Ber Bahr, so an increase in OIP will not necessarily result in a concurrent percentage increase in recoverable resources.

Exhibit 5: SH, SA and BB Top Jurassic with TVDSS at 2230



Source: GKP

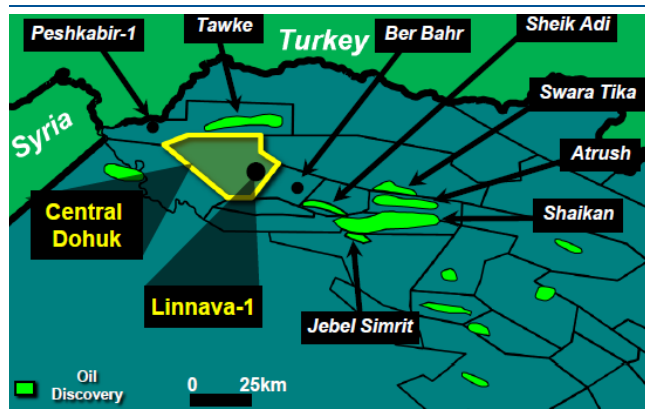
Exhibit 6: Regional top Jurassic structure map



Source: GKP

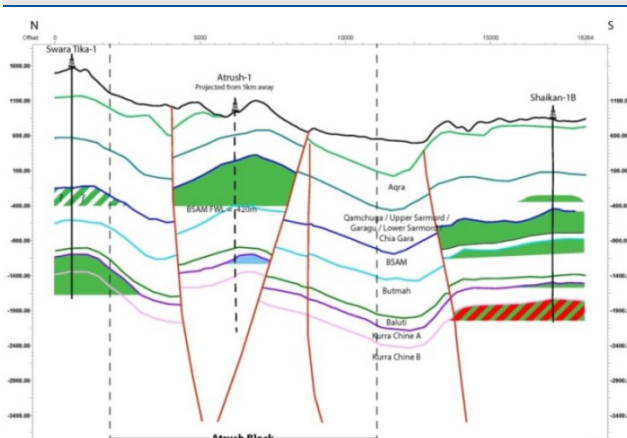
<sup>4</sup> The most recent presentation for ShaMaran Petroleum states a "Possible upside in the sub-thrust trap and extension of HKN Energy's Swara Tika discovery into the Atrush block". The seismic interpretation in Exhibit 8 would seem to suggest this as possible.

### Exhibit 7: Discoveries in neighbouring blocks



Source: Murphy Oil

### Exhibit 8: Faults between blocks may hinder direct connection



Source: ShaMaran Petroleum

## Recovery factor is hard to determine, but crucial

While OIP is important in estimating the size, the critical figure is to determine the amount of oil ultimately recoverable from the field and is determined by the recovery factor (OIP times recovery factor = recoverable resources). Given the early stage of the appraisal/development at Shaikan and the nature of the reservoir, there is uncertainty over what a reasonable recovery factor might be. In addition, the size of Shaikan means not all of the oil will be extracted within the current licence period (30 years) and hence the recovery factor gained by GKP will be lower than the recovery factor ultimately possible.

## Geology

The Shaikan field is a heavily fractured carbonate (limestone). Fractured carbonates are known to have highly variable and, on average, lower recovery factors (see Exhibit 9) than sandstone reservoirs and can be difficult to model.<sup>5</sup> However, under careful and proper reservoir management, ultimate recoveries can compare favourably with conventional reservoirs. Critical to this is a good understanding of how the reservoir will produce and the change in flow rates when the well moves from producing from the porous fractures to the less porous matrix (underlying rock).

## Well productivity

Initial well production is usually high as the oil comes from the open fractures, which have a high effective permeability. Once the fractures are drained, however, production can drop significantly as the flow switches to the lower porosity/permeability matrix (underlying rock formation). In some fields this drop in production is seen within weeks or months; however, this is not likely to be the case in Shaikan due to the large reservoir volume and the extensive fracture network. Instead, we believe it is possible to get high rates for one to two years before seeing any contribution to flow from the matrix. This leads us to our base case production profile for a typical Shaikan well (Exhibit 12).

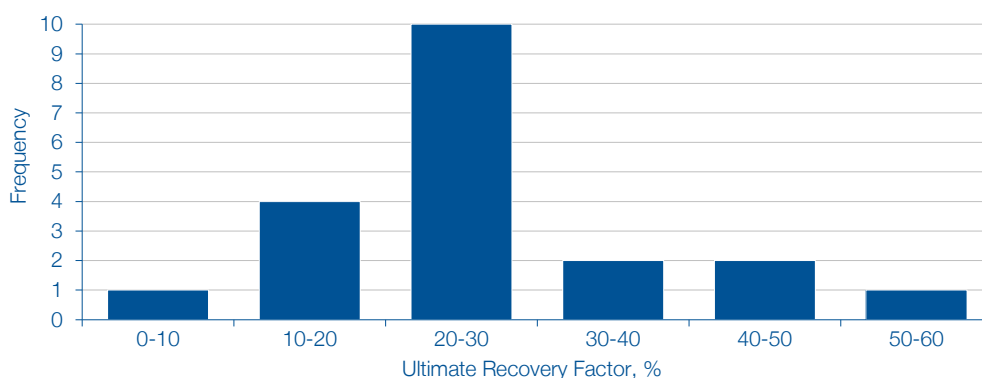
## Recovery factors

Unfortunately, the wells at Shaikan have not produced for long enough for production to move from fractures to the matrix. This makes understanding the field and therefore estimating the ultimate

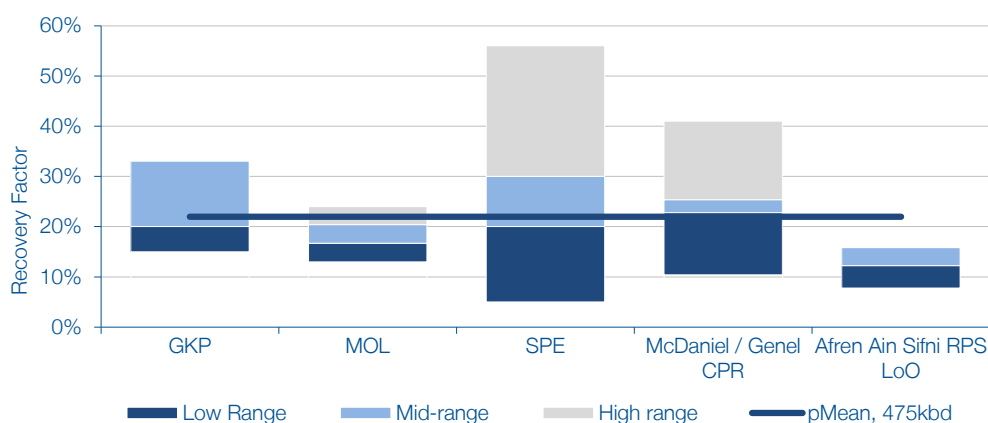
<sup>5</sup> “[Fracture porosity is highly heterogenous and very difficult to measure and estimate” Estimation of Fracture Porosity of Naturally Fractured Reservoirs With No Matrix Porosity Using Fractal Discrete Fracture Networks, 2009.

recovery rate difficult. However, we can look at a number of sources to gain a view of potential recovery factors:

1. The company has stated that it expects recovery to be in the order of one third of the OIP, although it has stressed that it does not expect to achieve this recovery in the initial 30-year production licence period due to the size of the field.
2. Independent estimates by other consultants on neighbouring blocks can also give us indications of potential recovery rates.
  - a. The Letter of Opinion by RPS to Afren in June 2011 for the Ain Sifni block indicates a recovery factor of around 12%.
  - b. In the CPR taken from Genel's prospectus performed by McDaniel (June 2011), recovery factors are estimated for Ber Bahr. McDaniel sees Shaikan as the closest geological analogy to the Ber Bahr field, although its study reviewed a number of fracture studies on fields around the world (including neighbouring Taq Taq and Tawke). If we reverse the logic and apply the Ber Bahr recovery factors to Shaikan, the implied recovery factor for the SAM interval (the reservoir GKP will target for initial production at Shaikan) at 23%. This is made up of fracture RF of 55% and matrix RF of 15%.
  - c. The Genel/McDaniel CPR gives us a measure for a possible lower recovery factor – if we were to assume that oil and condensates were recovered from the fractures only in the Jurassic SAM interval, the CPR indicates a potential recovery rate of around 10.4%.
  - d. In its corporate presentation in September 2010, the data from the CPR for ShaMaran's Atrush discovery indicates that the independent consultant RPS uses just the fracture volumes as recoverable and applies a RF for the fractures as 40% (vs 55% used by McDaniel). Under these circumstances, the overall recovery factor for Shaikan would be 8% (when applying the same logic to the McDaniel numbers for Ber Bahr in point b above). This calculation has been performed to get to a potential lower bound.
3. A paper from the Society of Petroleum Engineers (SPE), *Controls on Recovery Factor in Fractured Reservoirs: Lessons Learned from 100 Fractured Fields*, shows that for Type II reservoirs (those with low matrix porosity and permeability) the recovery factor can range between 9% and 56% with the most frequent recovery factor being between 20% and 30%.
4. In its investor presentations, MOL (the block operator) states it expects recoverable resource potential in its interests (13.6% Shaikan, 51.2% Akri-Bijeel) to be 725mboe (at \$100/bbl). Although it only assumes an OIP of 4.2bn at Shaikan, it includes the prospects in the Akri-Bijeel block (not just the Bijell discovery). We do not know the OIP MOL used over the whole of the block, but there are five structures identified within the Akri-Bijeel block by GKP. If we assume identical recovery factors from both blocks, this would imply a range of 13-24% based on the inclusion of one to three further discoveries similar in extent to Bijell. While this might imply a low RF range, we believe it could reflect conservatism by MOL in assigning the full OIP for all the structures given that exploration drilling has only just started and that no discoveries are guaranteed.

**Exhibit 9: Distribution of ultimate recovery factor for Type II fractured oil reservoirs**

Source: Controls on recovery factors in fracture reservoirs – lessons learned from 100 fractured fields (Allan, Qing Sun, SPE, 2003)

**Exhibit 10: Range of recovery factors**

Source: Gulf Keystone, MOL, SPE, Genel (McDaniel), Afren (RPS), Edison Investment Research estimates

Our current working assumption calls for a nine-year, 475mbbls/d plateau with a 12.5% decline rate, ending after 30 years of the production licence. This is higher than lower bound guided by the company and we must await GKP's development plan for more clarity in time. This production profile correlates with a recovery factor (for the pMean OIP) of around 22%. We caution that the fracture report, future drilling, early test production and early development results will be very informative over reservoir behaviour and potential recovery factors. As shown in the chart above, there is room for substantial movement (upwards or downwards) from our base case assumption, which could have a material effect on the barrels that can be extracted and the implied value of Shaikan.

The development scenarios and implications section on page 13 examines the effect of varying some of these assumptions.

## Reservoir management is critical

Crucially, if wells are flowed at excessively high rates, the reservoir cannot replenish the produced oil from the matrix quickly enough, potentially damaging the reservoir and reducing ultimate recovery rates. Moreover, an incorrect choice of secondary recovery technique will further reduce recovery, with the most common example of poor reservoir management being the waterflooding of a fractured

reservoir. This can result in early water [breakthrough](#), leaving a large amount of unrecovered oil behind in bypassed matrix blocks. Because of this, we see a cautious approach to the development as prudent.

It should also be noted that the period of high production rate is also affected by the number of wells and well spacing, so that the first well producing in a field will produce at a high initial rate for much longer than the hundredth well, as the larger number of wells will interfere with production from each other as they start to drain from the same areas of the fracture network. With the company planning over 300 wells over the licence period of the field, we think later wells will be unlikely to flow at the same high rates as those achieved in the early life of the field. As a result, we model that the initial production rate for later wells drop from 10mbbls/d to 4.5mbbls/d (see Exhibit 12) in 2023, although this is subject to significant uncertainty.

## Large-scale development in sight

There may be concerns that GKP is too small and inexperienced to develop an asset the size of Shaikan alone, and will be forced to look for a partner or sell the asset completely. While we view a trade sale as one possible route, we would point to the success of numerous other companies (eg, Cairn) that have developed large resources successfully. GKP has the advantage of on-shore fields with low drill/infrastructure costs, a growing oil services presence in the region and an enthusiastic government. The phased development plan should pay for itself if the company hits targets, thus reducing need for capital raises. The company has to strike a delicate balance between getting the production plateau as high as possible as quickly as possible (to maximise economic return) while ensuring that the field is developed responsibly with a view to getting the best long-term recovery from the reservoir.

Given the uncertainties of the reservoir behaviour, the company will carry out a flexible, phased development. This will allow for an evolving development strategy. At this stage the company plans to execute the following:

**Phase 0: In place.** EWT facilities – connected to SH-1 and SH-3 (with capacity around 6mbbls/d), with production limited by the ability of the existing facilities to handle the 11% to 13% H<sub>2</sub>S found in the Jurassic gas.

Two appraisal wells, SH-5 and SH-6, completed drilling in May 2012 and the tests of these wells will bring the appraisal phase in Shaikan to an end. GKP must then submit a field development plan to the KRG within six months of completing the appraisal programme with the 30-year production licence period starting as soon as the development plan is approved.

**Phase 1:** New EWTs (EWT-1&2) with a capacity of up to 20mbbls/d each by December 2012 and March/April 2013. Production capacity at this stage is more likely to be constrained by trucking capacity, which the company estimates at around 40mbbl/d. We see 40mbbl/d of trucking as possible, given nearby Taq Taq is trucking around 75mbbl/d, and the trucking network capacity is about 120mbbl/d according to Genel. Recent reports of trucking for exports could boost offtake capacity before the pipeline is completed. Any sour gas not required as fuel will be re-injected through a new gas injection well, SH-8, to be drilled in H212. We note that crude supplied to the domestic markets is not subject to the PSC – instead the contractor group splits any sales revenue with the government.

**Phase 2:** By January 2014, 3+ EWTs to get overall capacity to 100mbbls/d or more. This will be achieved by the drilling of five additional wells to complement the existing six already drilled – implying c 10mbbls/d production per well (we note that the McDaniel CPR for Genel in June 2011 assumes an

average well production rate of 5mmbbl/d [Taq Taq] and 6mmbbl/d [Tawke] vs our modelled IP [Initial Production] of 10mmbbl/d). We assume each EWT will have a capacity of 20mmbbl/d, although this could change – for instance ShaMaran is planning to use 30mmbbl/d facilities at Atrush. Production should reach 150mmbbl/d by January 2015 to meet reported KRG goals. Production of large volumes will be contingent on the completion of the pipeline(s).

**Phase 3:** Full field development, with “plateau production of 400mmbbl/d with a potential of achieving 500mmbbl/d” for “at least the first half of the Production Sharing Contract term”. This will involve building two central processing facilities for a cost of c \$4bn and the drilling of around 180 wells by 2026 and 330 over the life of the field.

Our base case modelling assumes delays to this timetable. While making no judgement about GKP specifically, many large-scale field developments have encountered delays to the intended timetable and we believe it prudent to assume a slippage. We model small step-changes as EWTs are put online until processing facilities are up and running, but with delays to the intended programme (the pipeline delayed and production of 150mmbbl/d being reached in January 2016, rather than January 2015).

The two central processing facilities (we assume 250mmbbl/d capacity each) will take time to construct and we model that this takes three years from January 2015, with the first online in the second half of 2016. We assume that the EWT network remains operational until the second train comes online so capacity from H216 will be close to 400mmbbl/d, and that the majority of production serves the export market from January 2014.

The two central processing facilities and all wells will have to be designed to deal with the high sulphur content of the oil and gas, with corrosion of the wells forcing some re-drills over time. However, while this is a development issue, it is not insurmountable and can be designed for. Additionally, the company could use some of the sulphur present in the reservoir to boost recoveries over time.<sup>6</sup> It does mean the overall capex cost of facilities will be c \$4bn, according to the company. We model that the majority is spent in the three years from 2015, with the first online in mid-2016. We note that overall, the insensitivity of the PSC to costs means that the large capex spend should not affect the overall economics for GKP, just cash requirements initially, which should be covered by production revenues.

The base case field development plan will concentrate on producing from the SAM in the Jurassic, where gravities range from 18° to 22° API. To achieve export blend, GKP is considering blending the crude with lighter oil from the Triassic, although this could be subject to change (see comments about pipelines below).

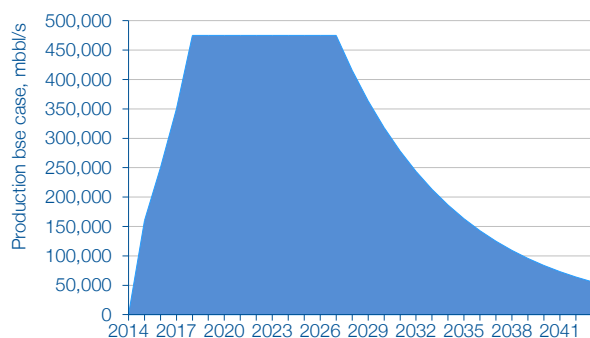
However, we caution that the company has still to decide on the development concept. This is made more difficult given the various unknowns including 1) whether the reservoir is gas or water driven; 2) the behaviour of fracture vs matrix production; 3) long-term production rates from the matrix; 4) the efficacy of recovery techniques such as artificial fracturing, acid washes, ESPs etc; and 5) the contribution of production from all the different zones (we are assuming production from SAM initially). We would expect the development to evolve as these factors become more fully known.

## Development scenarios and implications

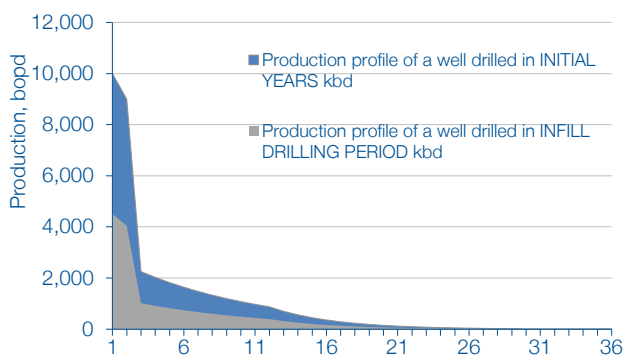
At this stage, we model the base-case development of Shaikan with a nine-year plateau of around 475mmbbl/d with a decline of 12.5% thereafter (Exhibit 11). This implies a c 22% recovery rate during the licence period and the need for (at peak) 14 rigs to drill 28 wells, though this is contingent on production rates seen as the field enters its infill drilling period and/or the company starts to target the

<sup>6</sup> “Acid gas is miscible with oil and when it is injected to maintain reservoir pressure.....it may increase the recovery of oil or gas liquids” Acid Gas / Sulphur Re-injection – A Layman’s Overview, Bill Kennedy, Shell Canada

less prolific zones within the field. This is subject to revision over time. Will the development plan call for a long, low plateau or a shorter, higher plateau and what impact do varying scenarios have?

**Exhibit 11: Gross Shaikan production, mmb/d**

Source: Edison Investment Research

**Exhibit 12: Production profile for Shaikan development estimate**

Source: Edison Investment Research

It is worth examining various potential development concepts and their implications, given the current uncertainties. In each of the scenarios, we assume a c 12.5% decline rate after plateau and a 180-day drilling time (though drilling time should decrease over time), with length of plateau governed by our assumption of a recovery factor during the licence period of c 22%. These scenarios are instructive in showing the sheer number of wells that will be required to sustain the plateaus, with a concurrent movement in the number of rigs required. It also indicates that, provided the oil can be recovered, Shaikan can sustain very large production volumes; with peak volumes of oil recovered in a single year being around 6-7% of total recoverable oil, even with very high plateau rates.

**Exhibit 13: Implications of different scenarios**

Scenarios	Total oil recovered	# of producing well drilled over lifetime	Peak # of wells drilled in year	Peak rigs req'd	Recovery factor assuming OIP, from 2015			
					P90	pMean	P10	Peak recovery year
					12400	13700	15000	
Scenario 1 - 400mmb/d plateau for 8 years, pipeline starts Aug 2013	2,475	264	26	13	20%	18%	16%	6.0%
Scenario 2 - 475mmb/d plateau for 8 years,	2,838	312	28	14	23%	21%	19%	5.8%
Scenario 3 - Pipeline delayed by 1 year, 475mmb/d plateau, SLOWER RAMP-UP	3,016	341	30	15	24%	22%	20%	5.7%
Scenario 4 - Pipeline delayed by 2 years, 475mmb/d plateau	2,977	347	34	17	24%	22%	20%	5.8%
Scenario 5 - 500 mmb/d for 8 years	2,994	321	32	16	25%	22%	20%	6.2%
Scenario 6 - 600 mmb/d for 6 years	3,296	344	40	20	26%	24%	22%	6.7%
Scenario 7 - 400mmb/d plateau for 15 years	2,571	425	26	13	27%	25%	23%	4.4%

Source: Edison Investment Research

To be consistent with earlier recovery factor analysis, we note that a 10-year, 200mmb/d plateau equates to a c 10% recovery factor of P50 OIP volumes. We would think that for this scenario to play out, our assumptions over production profiles would have to have proved incorrect, with individual wells producing at less than 10mmb/d. We see this as less likely at this time.

## Pipeline critical to Shaikan development, political concerns

**Without an export route, Gulf Keystone cannot develop Shaikan.** Trucking capacity restricts production to about 40mmbbl/d, and local markets cannot absorb the volumes that Kurdistan fields are mooted to produce in the coming years. It is therefore critical that an export pipeline is built. We see any delay in the construction of the pipeline as a major risk to the Shaikan development and to the value accruable to GKP.

The company has submitted a plan for a \$170m, 122km, 440mmbbl/d capacity pipeline to connect Shaikan to the Kirkuk-Ceyhan export pipeline. Once the necessary approvals from the KRG have been obtained, FEED will start and long lead items will be ordered. Under the current plan the pipeline would be completed by end 2013 ready for plateau rates in 2014. We note that on a per kilometre basis, the GKP pipeline is 10% cheaper than the cost estimate for Genel's proposed pipeline.

The recent announcement by Ashti Hawrami (Kurdish Oil Minister) of the agreement between the KRG and Turkey to build a 1mmbbl/d Kurdistan-wide pipeline network for export via Turkey by August 2013 is welcome news for the company. Although the planned network would require changes to the current GKP pipeline design, the immediate route from Shaikan is not affected so does not, in itself, present too many challenges in its re-design, we believe. Furthermore, the announcement indicates the KRG's drive to get an export pipeline constructed, which should mean approvals from the KRG should be quick.

Recent press reports that exports have started to Turkey via trucks are welcome and are further evidence of the KRG's determination to break the monopoly of control Baghdad has over crude export routes. Turkey has also approved the construction of a new pipeline in Turkey to take the crude on further.

### Politics

However, the plan also puts the political tensions within Iraq into stark relief. The pipeline would bypass Baghdad control of oil exports and give control directly to the KRG. As a result, the pipeline is against the wishes of the central government, which has warned Turkey against continuing with the plan and threatened to veto it. An adviser to Mr Maliki was quoted as saying "we have no problem with any deals, but they have to be according to the Iraqi constitution and laws that govern relations between Baghdad and the Kurdish region". We note that this is also the KRG view, although the parties differ on the interpretation of the Iraqi constitution. The pipeline would also bring other issues over oil sharing in Iraq into focus – current Iraqi law stipulates that oil is sold by the central government and revenues are then transferred to the various regions – in Kurdistan's case, the share is 17%. We note the constitution would require the KRG to share the revenues from the oil export with its regional neighbours as the pipeline would increase its oil share to well over 17%. According to the company, this would not be an issue for the KRG.

At this point, we view the KRG's position in Iraq as increasingly strong given the growing political backing from Turkey (trade between Turkey and Kurdistan is about \$8bn, according to Hawrami) and the entrance of large companies such as Exxon, Chevron, Hess and Marathon to the region. Their association gives further credence to the legality and strength of the KRG position in disputes against the central government, in our view.

Despite this, we do caution the continued opposition to the plans by the Iraqi government and that Iraq is not yet a stable country. Kurdistan production has fallen after exports were halted in March 2012, there are continued attacks on the Kirkuk-Ceyhan pipeline and the relationship between the central government and the KRG remains fractious. As a result, the final solution to the

Kurdistan/Baghdad dispute (including the building of the pipeline) is not assured, although long-term economics seem to demand the oil will make its way to market and Turkey is the most likely route.

## Further potential beyond Shaikan

Although Shaikan is GKP's largest asset, the company holds assets across three other blocks, which will all be targeted by exploration and appraisal wells in 2012 and 2013 and could provide further upside potential. Indeed, taking into account the Shaikan discovery, Akri-Bijeel, Ber Bahr and Sheikh Adi, GKP has a share of gross mean OIP resources of at least 19bnbbbls (excluding Ber Bahr). It is also worth noting that the company is drilling/planning to drill structures within these blocks that would add to this headline number if successful.

**Exhibit 14: Ownership structure of GKP blocks**

Block	WI	Fully diluted WI	Operator	Partners
Shaikan	75%	51%*	GKP	MOL (20%), TKI (5%)
Sheikh Adi	80%	80%	GKP	KRG (20%)
Ber Bahr	40%	40%	Genel	Genel (40%), KRG (20%)
Akri-Bijeel	20%	12.8%	MOL	MOL (80%)

Source: GKP. Note: \* Inclusive of TKI's holding, GKP ownership would move to 54.3%.

### Akri-Bijeel: GKP WI 12.8% (fully diluted), operator MOL, for sale

GKP has put its 20% share of Akri-Bijeel up for sale, engaging Strand Hanson and Perella Weinberg Partners as advisers in February 2012. The company has said it expects to raise between \$350m and \$500m for the sale of the block. We believe it is because of the small working interest and the greater potential in the other blocks. The sale will give the company more time (and money) to develop Shaikan.

A price of \$350-500m may seem a lot for a block with 2.4bnboe OIP, but GKP is clearly selling the future potential of this block, which could be substantial. MOL believes the blocks contain three to five structures in total. And, although we do not know the estimated sizes of the structures (only Bijell has been publicly assigned an OIP estimate), GKP CEO Todd Kozel was quoted as saying in 2010 that MOL "...drilled the smallest prospect on the Akri-Bijeel block... we believe that there are two prospects that could be as significant as Shaikan on that licence as well. We have not even started to scratch the surface of Akri-Bijeel's potential...".<sup>7</sup> At the time of these comments Shaikan had an estimated pMean of 4.2bnboe, implying an OIP at the time of at least 10.8bnboe over three structures.

Akri-Bijeel was discovered in March 2010 with Bijell-1, which flowed 3,700bpd of 18° API oil (and 100boe of gas) from the Upper Jurassic. The operator, MOL, estimates the structure contains 2.4bnbbbl OIP (P50), although further work is planned in 2012 that should help prove up the resource base. To this end, 3D seismic is being shot over Bijell. The Bijell-3 well was spudded in Q112 and is drilling to appraise the discovery (results are expected in early Q412 according to MOL). Four further wells will follow in late 2012 and 2013 to prove up the extension of the Bijeel structure and target Cretaceous and Jurassic zones. An EWT, similar to the Shaikan EWT is planned for 2012.

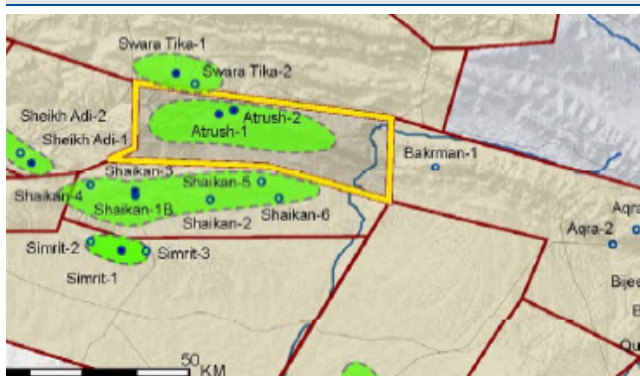
Exploration elsewhere on the block is ongoing; Bakman-1 was spudded in May 2012 and is being drilled on the same hill as the Atrush discovery (Exhibit 15) (Marathon, ShaMaran, Aspect Energy)<sup>8</sup>,

<sup>7</sup> [http://theoilandgasyear.com/uploads/interviews/pdfs/Todd\\_KOZEL\\_1.pdf](http://theoilandgasyear.com/uploads/interviews/pdfs/Todd_KOZEL_1.pdf)

<sup>8</sup> 13 April, Atrush-1 was drilled to 3400m and found a 726m gross oil column in Lower Cretaceous and Jurassic (120m net pay in Jurassic). Additional 140m net pay zones were indicated by drilling shows and log results in Upper

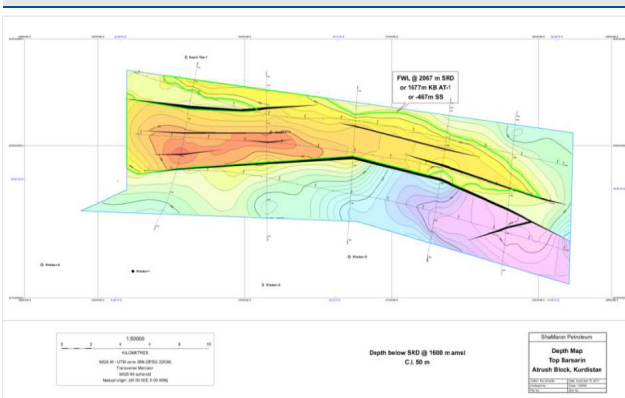
albeit over 20km away. The seismic over the two blocks is limited and the area is heavily faulted, so we will have to wait for drilling results to see if the wells share similar characteristics. Atrush-2 is currently being drilled and should TD at around the end of July 2012. Gulak-1 was spudded on 23 July, targeting a different anti-cline to Bekhme-1. We note that Bekhme-1 did not achieve commercial flow rates, and the company believes it was drilled in an area with fewer natural fractures as in Sheikh Adi-1. MOL stated that it does not expect this result to have significantly changed its share of earlier estimated ultimately recoverable resource in the AB and SH blocks.

Exhibit 15: Bakrman drilled close to Atrush block boundary



Source: ShaMaran

Exhibit 16: Atrush Block showing seismic interpretation and faults



Source: ShaMaran

#### Sheikh Adi: GKP 80% WI and operator

Sheikh Adi is a north-west/south-east trending anticline, which the company believes may be connected to Shaikan (to its west) and hence share many of its geological properties. The discovery well, Sheikh Adi-1, was drilled in 2011 and has been assigned 1.9bnbbbls of pMean OIP by DGA. However, the initial results from the first exploration well revealed a lack of the extensive fracture network that Shaikan exhibits and no hydrocarbons were produced at commercial rates. Five DSTs were attempted, with none being successful due to mechanical problems or bad interval selection. Only one recovered oil, which was heavy.

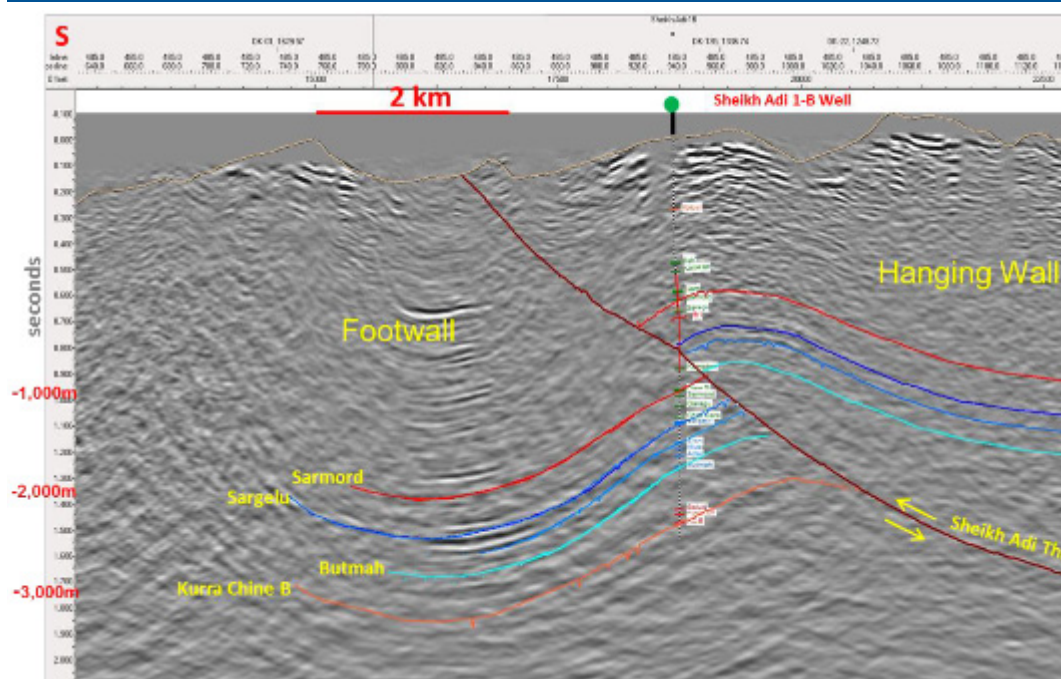
The company has spudded a second well, SA-2 (25 May 2012), which is targeting an area identified by the company to have a better developed fracture system (due to greater folding) and to target the Jurassic interval in the hanging wall missed in the first drill (as can be seen in Exhibit 17 below).

From Exhibit 1 on page 4, it is evident that GKP believes the Ber Bahr structure to encroach into the Sheikh Adi block. We do not believe that this is included in the current 1.9bnboe OIP figure.

Investors should note the larger working interest that GKP have in SA (vs Shaikan) means any commercial discovery could be very material. In addition, the proximity to Shaikan (and possible infrastructure) could mean a decreased time to develop. Sheikh Adi could therefore be a valuable asset to GKP in time. For now, on a risk basis, we value it at c 18p.

Butmah and Cretaceous. Flow rates over three intervals totalled over 6mbbls/d (equipment constrained). Three tests flowed 26.5 degree API. ShaMaran estimate that the potential for flow rates is >10mbbls/d.

Exhibit 17: Seismic interpretation of Sheikh-Adi 1 well



Source: Gulf Keystone

**Ber Bahr: GKP 40% WI, operator Genel**

Ber Bahr is an anticline on trend with Shaikan and Sheikh Adi. The first exploration well on the block, Ber Bahr 1, encountered a 300m oil column and completed testing in May 2012, but failed to flow and the well has been suspended pending the arrival of a work-over rig arriving to carry out an extended well test. The operator estimates that Ber Bahr contains resources of 1.5bnbbbls of OIP. As with Sheikh Adi, we would expect artificial fracturing to be attempted to generate commercial flow rates, although exploration will continue to identify areas of the block with higher natural fracture rates.

**Upside in OIP at Ber Bahr?**

The McDaniel CPR for Genel did equate the geology of Ber Bahr to Shaikan, and the report did include estimates for many of the same intervals (SAM, Butmah, Kurra Chine A&B, Lower Kurra Chine). Combining this with the areal extent of the Ber Bahr structure in Exhibit 1, we could infer that the 1.9bn OIP given could be increased over time, should exploration be successful.

## Management

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### **Todd Kozel (executive chairman and CEO)**

Mr Kozel co-founded GKP and serves as the executive chairman and chief executive officer. In 1988 he founded Texas Keystone and served as its president from 1995 to 2004. In 2001 Mr Kozel also co-founded Falcon Drilling, an American independent drilling and oilfield services company, and serves on its board of directors.

### **Ali A. Al-Qabandi (director of business development)**

Mr Al-Qabandi co-founded the company and has been a director 2007. Previously, he worked as executive assistant managing director of planning and finance at the Kuwait Oil Company and as a director of the Kuwait National Petroleum Company.

### **John B. Gerstenlauer (COO)**

Mr Gerstenlauer joined in October 2008 from BASF's Wintershall Nederland Group, where he was managing director. A petrophysical engineer, Mr Gerstenlauer's industry career started at Shell in 1979 and has served in a number of regions including the Gulf of Mexico, Cameroon, Brasil and Yemen.

### **Ewen Ainsworth (FD)**

Mr Ainsworth joined GKP in January 2008. He has worked for over 20 years in oil and gas and was previously FD of AIM-listed Europa Oil and Gas. Other roles include finance positions within Conoco (UK), Murco Petroleum and Texaco. Mr Ainsworth is a qualified accountant.

### **Tony Peart (Legal and Commercial Director)**

Mr Peart joined in 2008 and has over 29 years of legal, commercial and management experience in the oil and gas industry. He has held senior positions at African Arabian Petroleum, Petrokazakhstan, Bula Resources, MMS Petroleum, Lasmo, Ultramar Exploration and Veba Oil and Gas.

### **Chris Garrett (VP Operations)**

Mr Garrett joined in 2004 with a background in geology and geophysics. He has over 29 years of oilfield experience gained with Core Laboratories and Western Geophysical and latterly with Baker Hughes and Randall & Dewey.

### **Mehdi Varzi (non-executive director)**

Appointed in January 2008. Over the past 10 years, Mr Varzi has served as a member of the international advisory panel of Nippon Oil, non-executive director of Sonoran Energy and a number of other directorships.

### **General the Lord Guthrie of Craigiebank (non-executive director)**

General the Lord Guthrie of Craigiebank was appointed in October 2011. Lord Guthrie was chief of defence staff and the principal military adviser to two prime ministers and three secretaries of state for defence.

### **Mark Hanson (non-executive director)**

Mr Hanson was appointed in November 2011. He is a qualified barrister and solicitor and was CEO of Global Banking Corporation in Bahrain from 2006 to 2008. Mr Hanson has extensive regulatory and corporate governance experience during his 34-year career.

**Mr Adnan Samarrai (country manager)**

Mr Samarrai is GKP's country manager for Kurdistan and has over 45 years of experience in the oil and gas industry. He joined the Iraq Petroleum Company in the early 1960s before joining the Iraq National Oil Company in 1972 where he held the position of chief exploration geologist.

## Sensitivities and mitigation

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Below we list the risks we believe to be most prevalent at this time. Given the concentrated nature of the company's assets, the impact of a negative event to the risks outlined below could be significant.

### Political risk

Iraq is not yet politically stable, and there remain differences between the KRG and the central government in Baghdad over oil revenues and validity of the title of the oil. Although the company believes the contracts it holds are in good standing, they cannot be guaranteed. The entry into Kurdistan by companies such as Exxon Mobil, Repsol, Marathon, Hess, Genel, Talisman, Sinopec, OMV, Heritage, Reliance, Oil Search, Petroceltic and most recently Total should signal the effective risk of investing in Kurdistan has fallen. Turkey's recent agreement on the pipeline lends further credibility.

### Reservoir/geological risk

There are always uncertainties in reservoir characteristics, which could affect the ultimate recoverable resource and production profile of any development. In addition production could be affected by a number of other factors such as labour disputes, weather and civil unrest (among others). The nature of fractured carbonates means that incorrect reservoir management (high IP rates) or incorrect secondary recovery employment could reduce overall RF.

### Pipeline risk

Successful evacuation and marketing of crudes from GKP's assets is a key risk to the company's revenues. The planned completion dates for pipelines to Turkey could slip. Without a viable export route, both volumes of crude and the prices realised for that crude could be lower than our expectations. Construction of the pipeline is subject to political negotiation.

### Partner/third-party risk

GKP is not the only owner of its assets, nor is it the operator in every case. It depends on its partners to operate and fund their share(s) to enable exploration and development. Furthermore, the company contracts many of its functions to third parties for equipment and services. If partners are not able to fund or third parties do not fulfil obligations, delays or a halt of activities could result.

### Personnel risk

As an E&P, GKP has a small employee base. Loss of a key employee could materially affect the company. As GKP expands to fulfil its planned development of the Shaikan field, it will also need to recruit a large number of highly skilled personnel, which cannot be guaranteed.

### Tax risk

The company is domiciled in Bermuda, and is not subject to taxes on its income and capital gains and dividends are not subject to withholding tax. This cannot be guaranteed in future years.

### Macro risks

Macroeconomic factors and movement in the price of oil could have a material effect on profits and valuation and could affect access to bank/market funding. Other risks include foreign exchange movements.

## Litigation risk

The company is currently involved in a court case with Excalibur Ventures LLC, which is claiming entitlement to an interest of up to 30% in GKP's blocks in Kurdistan. GKP vigorously disputes the claims. The trial date has been set for October 2012. GKP has said it is "confident of being able to defeat all the claims asserted by Excalibur, even though it may take some time due to the lengthy preparation time required and the protracted nature of legal proceedings."

At this stage we do not include the risk of litigation in our valuation and leave it to the investor to make his/her own appraisal of the risks.

## Valuation

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### DCF-based NAV analysis

We model the company's assets using PSC terms in Kurdistan (published on the KRG website at [www.krg.org](http://www.krg.org)). Shaikan crude API ranges from 11-20° API. Heavy, high sulphur Kurdistan crude could face a discount of as much as \$20 vs Brent, we currently assume a \$10/bbl discount to Brent for export. In modelling the Shaikan field, we take the independent auditor OIP pMean estimate as our base case, while assuming a recovery factor of 22% following a nine-year, 475mbbls/d plateau. For the other fields, we assign an RF of 20%, given our uncertainty over the fracture network and lack of results from artificial fracking to date. We apply a discount rate of 12% to try to take account of the political risk.

We assume an international oil price of \$115 in 2012/2013, \$101 in 2014, \$95 in 2015, \$93 in 2016 and \$91 in 2017. Subsequent years are inflated by 2.5% per year. We assume that GKP production realises domestic pricing (around \$50) until a pipeline is complete. For comparison purposes, a similar NPV for the project can be arrived at by using a flat Brent price of \$101 from 2014 onwards – or a realised price of \$91 including the 10% discount.

It is important to take a rational view of the likelihood of the assets coming to production. Although the exploration success rate for GKP's assets has been good, there are still obstacles in getting them into development. When looking at the risking for the assets, we apply a chance of success for the Shaikan development (currently 70%) – this will increase as the development plan is submitted/approved and when an export route (pipeline) is approved. With the other assets still in exploration phase, we apply a lower chance of success to account for the uncertainty in bringing these assets to eventual production based on exploration results so far.

The resulting RENAV of 271p indicates that there is value in investing in GKP now, while longer-term value should be created as the development de-risks and exploration success is realised in the other blocks.

At this stage, we are not attributing any production or value to the gas in place. DGA estimates the field to have 5.0tcf (pMean GIIP), and therefore Shaikan will likely produce more than enough to seek commercial outlets. Possible routes include linking to a main gas pipeline (most likely in our view), selling to existing power stations in Kurdistan or to generating electricity on site (in addition to any gas re-injection performed). We would look include a valuation as and when a monetisation route is more discernible.

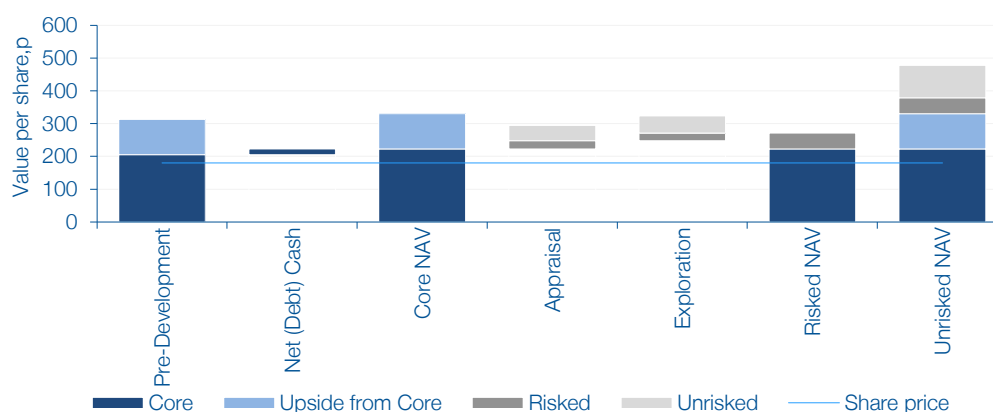
With this in mind, however, we note that Turkey imports almost all its natural gas requirements (Russia supplies 46%, Iran 20%, Azerbaijan 12%, Algeria 10%) and has reportedly looked to negotiate reductions in its supplies with both Russia and Iran in the last year. This is understandable if reports over the prices it is paying are true (Iran charging \$505/m<sup>3</sup> vs Russia's \$400 and Azerbaijan's \$330). Because of this, and the advantages of diversifying its supplies, we would expect that there is significant opportunity for both Kurdistan and Turkey to create an export gas pipeline alongside the oil export pipeline (even without considering the benefits to other European nations of an additional gas supply). Kurdistan gas could also therefore achieve good pricing in time. However, even with a gas development, the oil would still command the overwhelming majority of Shaikan value.

Exhibit 18: NAV table summary

	Diluted WI	CoS	Gross OIP	RF	Recoverable reserves		NPV/boe	Net risk value	Value
					Gross	Net			
	%	%	mmboe	%	mboe	mboe	\$/boe	\$m	p/share
Shaikan.	54%	70%	13,708	22%	2,988	1,623	2.3	2,622	193
Akri Bijeel. Bijell	13%	55%	2,400	20%	480	61	2.3	78	6
Shaikan third party back-costs								50	4
Net (debt) cash								183	13
<b>Core NAV</b>								<b>2,933</b>	<b>216</b>
<b>Exploration and development</b>									
Shaikan - extn (to P10).	54%	25%	1,337	22%	289	157	2.3	91	7
Akri Bijeel. Bakrman	13%	35%	4,200	20%	840	108	2.3	87	6
Akri Bijeel. Gulak	13%	35%	2,400	20%	480	61	2.3	50	4
Akri Bijeel. Bekhme	13%	35%	3,800	20%	760	97	2.3	79	6
Sheikh Adi.	80%	35%	1,900	20%	380	304	2.3	246	18
Ber Bahr.	40%	35%	1,500	20%	300	120	2.3	97	7
Sheikh Adi - extn (to P10).	80%	25%	1,100	20%	220	176	2.3	102	7
Exploration NAV								751	55
<b>Core NAV + risked exploration</b>								<b>3,684</b>	<b>271</b>
Unrisked (core + exploration)									478

Source: Edison Investment Research.

Exhibit 19: NAV waterfall of Gulf Keystone's assets



Source: Edison Investment Research

## Valuation sensitivities

We note that the terms of the PSC make the NPV highly insensitive to capex and opex, meaning that potential falls in drilling costs (as experienced by Genel, where drilling costs at Taq Taq have fallen from \$12m to \$7m) have very little effect on project NPV. However, variations in total oil production and oil price do have a more marked effect. A 10% move in either will result in an approximate 10% change in the NPV. As a result further upside to our NAV is possible if investors take a higher long-term oil price or a greater number of recoverable barrels (either through OIP or RF increases). Below, we give sensitivities to changes in barrels and oil price for the Shaikan development (unrisked).

Exhibit 20: Gross recoverable barrels for Shaikan, mmbbls

OIP / Recovery Factors		10%	15%	20%	25%	30%	35%	40%
P90	12,400	1,240	1,860	2,480	3,100	3,720	4,340	4,960
pMean	13,700	1,370	2,055	2,740	3,425	4,110	4,795	5,480
P10	15,000	1,500	2,250	3,000	3,750	4,500	5,250	6,000
P10	16,300	1,630	2,445	3,260	4,075	4,890	5,705	6,520

Source: Edison Investment Research

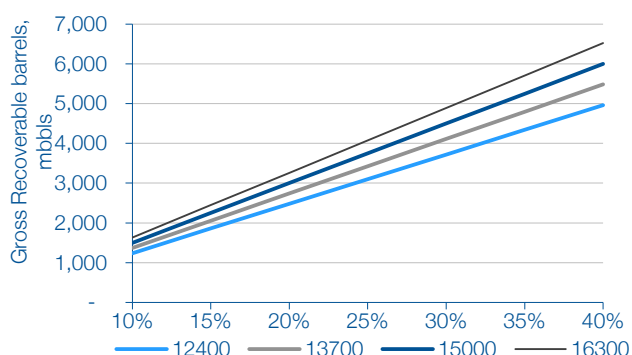
The table below shows the unrisks value of Shaikan for Gulf Keystone, assuming a 54% stake (fully diluted holding of GKP and TKI) on a per share basis.

Exhibit 21: Implied share value for Shaikan, based on Shaikan recoverable barrels and value per barrel (excludes all other assets) on a unrisks basis (p/share)

Gross recoverable oil, mmbbls	Value per barrel	1.5	2	2.5	3	3.5	4
1,000		60	80	100	120	140	160
1,500		90	120	150	180	210	240
2,000		120	160	200	240	280	320
2,500		150	200	250	300	350	400
3,000		180	240	300	360	420	480
3,500		210	280	350	420	490	560
4,000		240	320	400	480	560	640
4,500		270	360	450	540	630	720
5,000		300	400	500	600	700	800

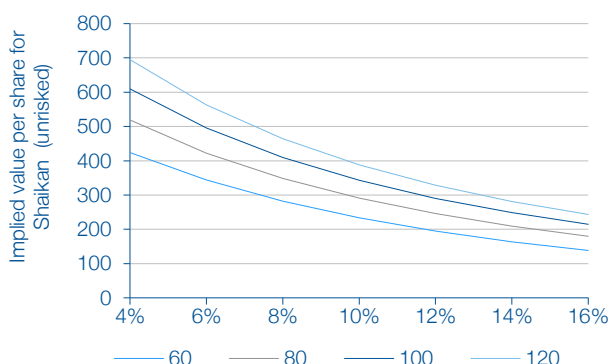
Source: Edison Investment Research

Exhibit 22: Gross recoverable oil given different OIP and recovery factors



Source: Edison Investment Research

Exhibit 23: Implied value for Shaikan (p/share) with different discount rates (Shaikan unrisks value) and export oil prices



Source: Edison Investment Research

The different production and plateau scenarios mapped earlier also have an impact on the valuation. There are only small differences between the overall value of the field under 475mmbbls/d, 500mmbbls/d and 600mmbbls/d plateaus (assuming a similar overall recovery factor), but as the plateaus become longer (and lower) the value decreases, mainly due to the time value of money effect. Delays to the project's production timetable (either due to technical or political reasons) will reduce the value.

## Transactional comparables

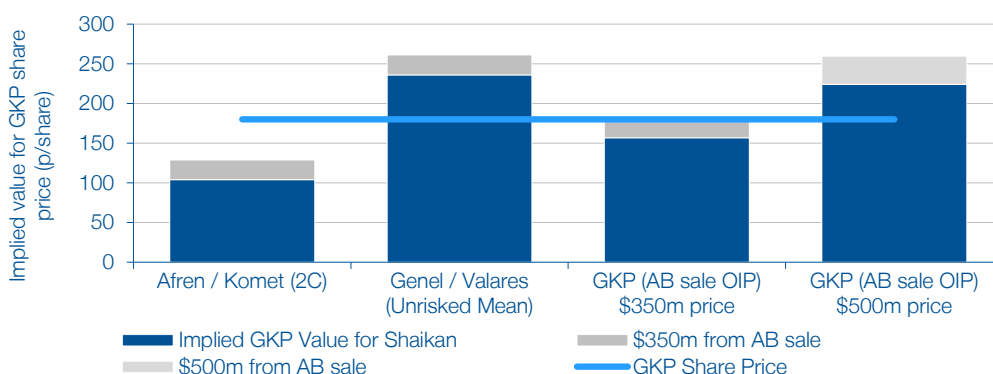
As an alternative to our fundamentally derived valuation, we have looked at values being attributed by the market to proximate assets, which have been established via M&A. Although blocks differ in prospectivity, fiscal terms and maturity of development phase, deals nevertheless give a view on what corporates are willing to pay for Kurdistan blocks. Details of recent transactions are given below. From this information, we try to derive an implied valuation for GKP using Shaikan's resources only (making assumptions where necessary).

To generate implied valuation for the Shaikan field (and other assets), we use the two completed deals involving Genel and Afren and apply them to the assumed comparable metrics for GKP's assets. We also include implied valuation from the AB sales using estimates of potential OIP over the entire AB block. While only one field has yet been discovered, MOL believes there are three to five independent structures within the block. We have assumed a success rate of 50% (vs 70% exploration success in Kurdistan in general) for the other structures, which we assume to be of similar size to Bijell. The resulting chart (Exhibit 25 below) suggests there is value in GKP asset portfolio.

**Exhibit 24: Summary of recent activity in Kurdistan**

Acquiror	Seller	Date	Detail	Metrics
Afren	Komet	27 Jul 2011	Afren buys 60% of Barda Rash from Komet and 20% of Ain Sifni from KRG. 890mboe net 2C. Unrisked 1074mmmbbl.	Total consideration \$588m, \$0.66 per 2C
Niko	Vast	15 Aug 2011	Vast sells 12% interest of Qara Dagħ to Niko for \$9m. Vast unable to finance expln expenses.	Total consideration \$9m
Maersk	HKN	27 Aug 2011	Maersk buys 20% holding in HKN, which holds 75% in Sarsung licence. MRO holds 25%.	Not disclosed
Genel	Vallares	07 Sep 2011	Vallares merges with Genel.	\$5.9/bbl, 2P \$1.5/bbl Unrisked
Genel	Longford	16 Jan 2012	Genel buys 40% of Chia Surkh block for \$68m. Longford unable to finance expln expenses.	Total consideration \$68m
Genel	Petoil	16 Jan 2012	Genel announces it will buy 20% of Chia Surkh from Petoil.	Total consideration \$26m, transaction terminated 1 May 2012
Maersk	HKN	30 Mar 2012	Maersk buys further 10% holding in HKN, which holds 75% in Sarsung licence. MRO holds 25%.	Not disclosed
Genel	A&T	14 May 2012	Genel buys 23% of Bina Bawi exploration licence from A&T (subsidiary of Petoil). OMV is operator.	Total consideration \$175m

Source: Maersk, Genel, Reuters, Bloomberg, Afren, Niko Resources

**Exhibit 25: Implied Value for GKP from recent transactions in Kurdistan**

Source: Afren, Genel, GKP, MOL, Edison Investment Research (assume pMean OIP for Shaikan)

## The longer-term future of Gulf Keystone

Kurdistan started as a high risk, frontier oil province. With exploration success and the resources now more evident, it is only a matter of time before larger players look to enter the area. As most of the acreage is now taken, entrants will have to acquire or farm-in with existing stakeholders and so we see a continuum of deals in the area as likely. We believe the entrance of Exxon bears testament to the start of this trend. GKP's assets will be in demand we think, as long as acquirers can get more comfortable with the extent and nature of the acreage.

Big fields tend to be developed by big players and we would expect the company to crystallise value for shareholders. We note that the recent creation of takeover options by management implies that the company is prepared for a potential change of control.

Under a more de-risked scenario, where funding is assured and the discount rate is reduced to 10% (either through relaxation of global economic worries, political easing in Iraq or other factors), a completely de-risked portfolio could be worth 584p to GKP. Every extra 250mboe of gross recoverable oil (equivalent to an increase of 1.8% RF) would be worth an incremental 34p unrisked.

## Third-party participation

Finally, the KRG has a right to sell up to 15% of Shaikan and 20% of Akri-Bijeel to a third party, for which the company anticipates significant interest. The prices obtained for the third party should provide a useful valuation read-across for the assets, although investors should be careful to note the conditions of the deal (whether any capacity building bonus is included for instance). Based on our DCF, GKP's 40% capacity building bonus reduces the NPV/bbl by over 40% (vs no bonus). So if the acquirer buys without a similar capacity bonus figure, the resulting valuation could imply a misleadingly high figure for GKP's interest. The third-party back-in should also provide about \$50m in back costs.

## Financials

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Given the size of the Shaikan development ahead (the company estimates full field development will take \$7-10bn gross), there could be concern that GKP may not have the financial muscle to develop the field. In our assessment, we have assumed the third-party rights are fully exercised before major capex calls are made and that the working interest for GKP is 51% (plus the c 3% that TKI would contribute). If a third party does not back-in, this will be beneficial for GKP's overall value, but will mean that upfront cash requirements increase by 50%.

The company believes that its financial resources will be enough to fund it through the middle of next year, as its \$183m cash (as of end April 2012) should be augmented by \$50m third-party back costs, and proceeds from the sale of Akri-Bijeel. In addition, the current production provides revenues of \$2.25m a month (average January-April 2012), which should expand as EWT facilities come online. However, the production facilities will likely cost \$250m for a first train (we are assuming the first 100mmbbl/d), with full facilities costing around \$4bn. This has to be paid for.

We believe the project development will be financed from existing cash in hand and revenues if the company hits its production targets (40mmbbls/d by mid-2013 and 100mmbbls/d by 1 January 2014, 150mmbbls/d by 2015) with a shortfall with the delay we are modelling. This would be fully covered by the proceeds from the sale of Akri-Bijeel or by funding sources the company is currently exploring, we believe. The company is in active discussions with debt providers and is considering convertible bonds, a production based loan and senior debt. Management has stated (2011 results meeting) that it is not considering equity funding.

## Exhibit 26: Summary financials

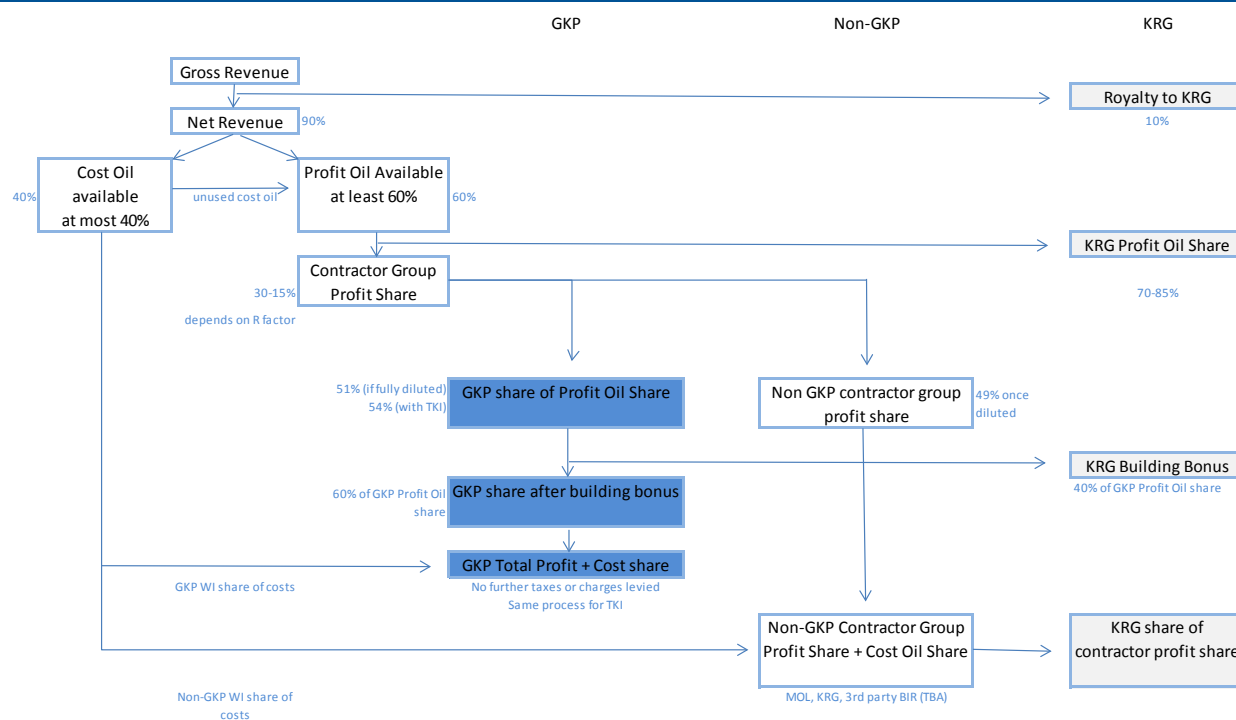
	\$'000s	2010	2011	2012e	2013e	2014e	2015e
Dec		IFRS	IFRS	IFRS	IFRS	IFRS	IFRS
<b>PROFIT &amp; LOSS</b>							
<b>Revenue</b>		<b>808</b>	<b>6,919</b>	<b>6,372</b>	<b>81,694</b>	<b>203,407</b>	<b>679,133</b>
Cost of Sales		(808)	(6,919)	(8,392)	(25,986)	(42,608)	(77,021)
Gross Profit		0	0	(2,020)	55,709	160,799	602,111
<b>EBITDA</b>		<b>(32,101)</b>	<b>(69,821)</b>	<b>(46,020)</b>	<b>11,709</b>	<b>116,799</b>	<b>558,111</b>
<b>Operating Profit (before amort. and except.)</b>		<b>(32,595)</b>	<b>(70,350)</b>	<b>(46,020)</b>	<b>(4,768)</b>	<b>80,552</b>	<b>480,106</b>
Intangible Amortisation		0	0	0	0	0	0
Exceptionals		0	0	0	0	0	0
Other		5,940	5,791	0	0	0	0
<b>Operating Profit</b>		<b>(26,655)</b>	<b>(64,559)</b>	<b>(46,020)</b>	<b>(4,768)</b>	<b>80,552</b>	<b>480,106</b>
Net Interest		(156)	766	1,065	(833)	(11,267)	(20,407)
<b>Profit Before Tax (norm)</b>		<b>(32,751)</b>	<b>(69,584)</b>	<b>(44,955)</b>	<b>(5,600)</b>	<b>69,285</b>	<b>459,699</b>
<b>Profit Before Tax (FRS 3)</b>		<b>(26,811)</b>	<b>(63,793)</b>	<b>(44,955)</b>	<b>(5,600)</b>	<b>69,285</b>	<b>459,699</b>
Tax		819	1,437	0	0	0	0
<b>Profit After Tax (norm)</b>		<b>(25,992)</b>	<b>(62,356)</b>	<b>(44,955)</b>	<b>(5,600)</b>	<b>69,285</b>	<b>459,699</b>
<b>Profit After Tax (FRS 3)</b>		<b>(25,992)</b>	<b>(62,356)</b>	<b>(44,955)</b>	<b>(5,600)</b>	<b>69,285</b>	<b>459,699</b>
Average Number of Shares Outstanding (m)		622.6	778.9	876.2	876.2	876.2	876.2
EPS - normalised (c)		(4.2)	(8.0)	(5.1)	(0.6)	7.9	52.5
EPS - normalised and fully diluted (c)		(4.2)	(8.0)	(5.1)	(0.6)	7.9	52.5
EPS - (IFRS) (c)		(4.2)	(8.0)	(5.1)	(0.6)	7.9	52.5
Dividend per share (p)		0.0	0.0	0.0	0.0	0.0	0.0
Gross Margin (%)		0.0	0.0	-31.7	68.2	79.1	88.7
EBITDA Margin (%)		-3972.9	-1009.1	-722.3	14.3	57.4	82.2
Operating Margin (before GW and except.) (%)		-4034.0	-1016.8	-722.3	-5.8	39.6	70.7
<b>BALANCE SHEET</b>							
<b>Fixed Assets</b>		<b>232,032</b>	<b>372,277</b>	<b>443,620</b>	<b>602,268</b>	<b>747,759</b>	<b>1,294,797</b>
Intangible Assets		223,824	360,005	360,005	360,005	360,005	360,005
Tangible Assets		4,102	4,295	75,638	234,286	379,777	926,815
Investments		4,106	7,977	7,977	7,977	7,977	7,977
<b>Current Assets</b>		<b>240,631</b>	<b>301,136</b>	<b>179,838</b>	<b>80,526</b>	<b>100,370</b>	<b>177,934</b>
Stocks		14,423	17,233	17,233	6,660	16,582	55,364
Debtors		3,663	8,594	8,594	6,660	16,582	55,364
Cash		201,268	208,103	86,805	0	0	0
Other		21,277	67,206	67,206	67,206	67,206	67,206
<b>Current Liabilities</b>		<b>(39,423)</b>	<b>(59,269)</b>	<b>(59,269)</b>	<b>(7,730)</b>	<b>(17,652)</b>	<b>(56,434)</b>
Creditors		(39,423)	(59,269)	(59,269)	(7,730)	(17,652)	(56,434)
Short term borrowings		0	0	0	0	0	0
<b>Long Term Liabilities</b>		<b>(6,399)</b>	<b>(8,070)</b>	<b>(8,070)</b>	<b>(104,339)</b>	<b>(169,731)</b>	<b>(275,668)</b>
Long term borrowings		0	0	0	(96,269)	(161,661)	(267,598)
Other long term liabilities		(6,399)	(8,070)	(8,070)	(8,070)	(8,070)	(8,070)
<b>Net Assets</b>		<b>426,841</b>	<b>606,074</b>	<b>556,119</b>	<b>570,725</b>	<b>660,746</b>	<b>1,140,629</b>
<b>CASH FLOW</b>							
<b>Operating Cash Flow</b>		<b>(26,225)</b>	<b>(24,236)</b>	<b>(26,020)</b>	<b>(7,117)</b>	<b>127,612</b>	<b>539,513</b>
Net Interest		192	1,239	1,065	(833)	(11,267)	(20,407)
Tax		(503)	(665)	0	0	0	0
Capex		(147,009)	(153,120)	(71,343)	(175,125)	(181,737)	(625,043)
Acquisitions/disposals		(10,177)	(19,351)	0	0	0	0
Financing		359,895	197,905	(25,000)	0	0	0
Dividends		0	0	0	0	0	0
Net Cash Flow		176,173	1,772	(121,298)	(183,074)	(65,392)	(105,937)
<b>Opening net debt/(cash)</b>		<b>(19,156)</b>	<b>(201,268)</b>	<b>(208,103)</b>	<b>(86,805)</b>	<b>96,269</b>	<b>161,661</b>
HP finance leases initiated		0	0	0	0	0	0
Other		5,939	5,063	0	0	0	0
<b>Closing net debt/(cash)</b>		<b>(201,268)</b>	<b>(208,103)</b>	<b>(86,805)</b>	<b>96,269</b>	<b>161,661</b>	<b>267,598</b>

Source: Edison Investment Research, company accounts

## Appendices

A summary of the PSC for Shaikan is below. Domestic sales are not subject to the PSC and instead is based on a revenue split between the contractor and government.

**Exhibit 27: Summary of Shaikan PSC**



Source: Gulf Keystone, Edison Investment Research

## Management shareholdings

The company management (including family and trusts) own 2.4% of the outstanding share capital, with a further 4.8% available through options. Another 1% is available if an exit event occurs (more than 50% of the company's assets being sold).

**Exhibit 28: Management shareholdings as of May 2012**

	Shares	% of shares out
TF Kozel	5.31	0.61%
AA Al Qabandi	10.45	1.19%
JB Gerstenlauer	1.15	0.13%
KE Ainsworth	2.16	0.25%
M Varzi	0.58	0.07%
P Truscott	1.12	0.13%
MAC Hanson	0.00	0.00%
CRL Gurthrie	0.00	0.00%
Share options outstanding as of 31 Dec 2011	41.8	4.77%
Exit Event shares	10.00	1.14%
<b>Total</b>	<b>30.77</b>	<b>3.51%</b>

Source: Gulf Keystone

## Catalysts for Gulf Keystone and other Kurdistan companies

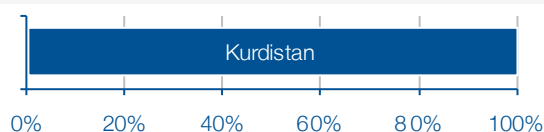
Exhibit 29: Kurdistan catalysts

Qtr	Company	Block	Event
Q212	Genel	Peshkabir	Peshkabir-1 results - DNO confirms presence of moveable oil in Jurassic
Q212	GKP	Shaikan	SH-5 results
Q212	MOL	Akri - Bijeel	Bijell-2 results
Q212	GKP	Sheikh Adi	Sheikh Adi-2 spud
Q212	GKP	Ber Bahr	Ber Bahr results
Q212	Genel		KICE pipeline construction expected to begin
Q212	Genel	Miran	Miran West results 3
Q212	Shamaran	Atrush	Atrush appraisal well spud
Q212	Shamaran	Taza	Taza - 1 well spud
Q212	OMV	Mala Omar	Currently drilling >4000m, target 5300m
H212	GKP	Shaikan	Updated OIP announcement. pMean increased from 10.5bnboe to 13.7bn boe
H212	GKP	Shaikan	Submit Development plan
Q312	MOL	Akri - Bijeel	Gulak-1 spud
Q312	GKP	Shaikan	SH-6 results
Q312	GKP	Shaikan	SH-8 spud
Q312	GKP	Shaikan	EWT processing upgraded, 20mmbbl/d capacity Aug 2012 (SH-4 added to SH-1 and SH-3)
Q312	Genel	Chia Surkh	First Chia Surkh well spuds
Q312	Genel	Kewa Chirmila	Kewa Chirmila well spuds
Q312	Murphy	Central Dohuk	Results from Linnava expected. 900m depth as of May 2012. To North West of Ber Bahr
Q312 / Q412	MOL	Akri - Bijeel	Bijell-3 Results
Q312 / Q412	MOL	Akri - Bijeel	Bakrman-1 results
Q312 / Q412	MOL	Akri - Bijeel	Bijell-4 spud
Q412	GKP	Shaikan	EWT processing upgraded, 20mmbbl/d capacity Dec 2012 (SH-5 and SH-6)
Q412	MOL	Akri - Bijeel	Bekhme-1 results expected
Q412	MOL	Akri - Bijeel	Bijell-2 spud
Q412	MOL	Akri - Bijeel	Bijell-5 spud
Q412	MOL	Akri - Bijeel	3D seismic shoot complete
Q412	MOL	Akri - Bijeel	Prod. Dev
Q412	Genel	Taq Taq	Taq Taq deep spuds
Q412	Genel	Tawke	Tawke deep spuds
Q412	Genel	Tawke	Tawke facilities at 100kbopd
Q412	Genel	Dohuk	Dohuk 3D seismic completes
Q412	Shamaran	Atrush	Atrush appraisal well results (AT-2/3)
Q412	Shamaran	Atrush	EWT startup 15mmbbl/d capacity, AT-1, AT-2 connected
Q412	Shamaran	Taza	Taza - 1 well results
2012	GKP		Legal case vs Excalibur
2012	GKP		List on FTSE
2012	GKP		Sale of Akri-Bijeel block
Q113	GKP	Shaikan	SH-7 spud
Q113	MOL	Akri - Bijeel	Bijell-4 results
Q113	MOL	Akri - Bijeel	Bijell-5 results
Q113	GKP	Sheikh Adi	Sheikh Adi-2 results
Q113	GKP	Company	SG&A
Q213	GKP	Company	SG&A
Q313	GKP	Shaikan	1mmbbl/d pipeline to Turkey complete Aug 2013
Q313	GKP	Shaikan	440mmbbl/d pipeline from Shaikan due for completion August 2013
Q114	GKP	Shaikan	1mmbbl/d pipeline to Turkey complete Jan 2014

Source: Companies

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www.gulfkeystone.com

**Revenue by geography****CAGR metrics**

EPS 11-13e

N/A

ROCE 2014e

N/A

EPS 13-15e

N/A

Avg ROCE 2011-15e

N/A

EBITDA 11-13e

N/A

ROE 2014e

N/A

EBITDA 13-15e

N/A

Gross margin 2014e

N/A

Sales 11-13e

N/A

Operating margin 2014e

N/A

Sales 13-15e

N/A

Gr mgn / Op mgn

N/A

**Balance sheet metrics**

Gearing 2014e

13%

Interest cover 2014e

N/A

CA/CL 2014e

N/A

Stock turn

N/A

Debtor days

N/A

Creditor days

N/A

**Sensitivities evaluation**

Litigation/regulatory

●

Pensions

○

Currency

●

Stock overhang

●

Interest rates

●

Oil/commodity prices

●

**Management team****CEO, exec chairman: Todd Kozel**

Co-founder. Started Texas Keystone in 1988, served as President from 1995-2004.

**Business development director: Ali A. Al-Qabandi**

Co-founder. Other positions include numerous committee chairmanships for Kuwait Oil Company.

**COO: John B Gerstenlauer**

Previous roles include Wintershall Nederland Group (MD), Shell, Occidental.

**CFO: Ewen Ainsworth**

Joined 2008. Previous roles include Europa, Conoco, Murco, Texaco and CIECO.

**Principal shareholders**

	(%)
TD Direct Investing	6.9
Baillie Gifford	6.0
M&G Investments	5.8
Barclays Personal Investment Management	5.6
Capital Research & Management Co	4.6
Hargreaves Lansdown Asset Management	3.7
Halifax Share Dealing	3.2

**Companies named in this report**

Afren, Chevron, DNO, Exxon Mobil, Genel, Heritage, Hess, Longford, Maersk, Marathon, MOL, Murphy Oil, Niko Resources, Oil Search, OMC, Petroceltic, Reliance Industries, Repsol, ShaMaran, Sinopec, Sonaran, Talisman, Total, Vast Exploration

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