The Newfield team – Azmi Yahya, Daryll Howard, Rob Deane & Ahmad Fuad – poring over some data

On the SIDELINES NO MORE

Thanks to buoyant oil prices, more and more oil and gas players are giving smaller fields a second look. For the independents and new players, however, these fields have been anything but insignificant. By **SREEREMA BANOO**

Ask any of the independents and new upstream oil and gas players for their thoughts on small fields and you'll be assured of an enthusiastic response. While these players acknowledge that high oil prices are one reason for the growing interest in these fields, for many players marginal fields have been the basis for their growth and remain an important component for future expansion.

Essentially, a small field is defined as one that may not produce enough net income to make it worth developing at a given time, yet holds the potential to become economical, should technical or economic conditions change. Factors affecting the economics of the field include reserve size, oil price, location (onshore or offshore), water depth, available infrastructure, technology and fiscal terms.

One player that is no stranger to extracting value from small fields is Houston-based Newfield Exploration Company. Founded in 1989, the company was built around monetising marginal fields in the Gulf of Mexico. While the company has since diversified its asset base, small fields remain important to its overall growth and this is exemplified in its two production sharing contracts (PSCs) in Malaysia – PM323 and PM318, offshore Peninsular Malaysia.

Newfield's first foray into Malaysia, PM318, is operated by PETRONAS Carigali Sdn Bhd (PCSB) with Newfield having a 50 per cent interest. Besides the two existing fields, Penara and North Lukut, Newfield and PCSB are developing two additional fields, Abu and Puteri. Development work, meanwhile, is ongoing in Newfield's operated block PM323.

The offshore construction team installing a piggyback dual 4" and 10" pipeline for Newfield's PM 323 block

While players like Newfield are finding success in Malaysian waters, local companies like M3nergy Bhd are cutting their teeth abroad. M3nergy has secured two contracts – a service contract as part of a consortium to develop offshore marginal fields in India; and a PSC in Indonesia (see side story, **Big Business From Small Fields**). For the company, which began as an FPSO (Floating Production Storage and Offloading) and FSO (Floating Storage and Offloading) operator, marginal fields open the door to exploration and production ventures.

CEO and Group Managing Director Datuk Shahrazi Sha'ari says, for a new upstream oil and gas player like M3nergy, small fields are the way forward. And while high oil prices are a major boost to exploration and production activities, he says price is not the only driver. "We've been looking at options to grow the company and decided on marginal fields three years ago, even though at the time oil prices were at US$30 a barrel," he adds.

Nonetheless, he admits that the current high prices have allowed upstream oil and gas players to take a second look at small fields. "In the past, a marginal field was considered viable if it had 20-30 million barrels of recoverable resources. Today, some players reckon that these fields are viable even with 4-5 million barrels of recoverable resources," he says.

Even so, developing marginal fields is not a straightforward matter, says Newfield Peninsula Malaysia Inc Manager for Operations and Development Daryll Howard. "There is no magic formula for defining marginal fields. They all need technical scrutiny to solve the equation," he adds.

He also believes that buoyant oil prices are not – and should not be – the sole driver behind the development of small fields, especially in a PSC environment. What's more, he points out, while high oil prices are allowing the monetisation of small fields, costs are also on the rise.

THE TECHNOLOGY & TOOLS

Prolonging the life of small fields is a major component of the US Department of Energy's Oil Program. The department believes that the application of new and existing recovery technologies to marginal fields would have a positive effect on future oil production. It is an opinion shared by Energy Quest's Head of Engineering Department, Allida Muhammad Said. (Energy Quest, a leading oil and gas E&P consultant in Malaysia, is a member of the Orogenic Group of Companies, an integrated E&P geosolutions specialist based in Kuala Lumpur.) Still, Allida stresses that in advising its clients, the firm does not look for fancy technology, rather one that is fit-for-purpose (see side story, **Finding Value in Small Fields**).

M3nergy, on the other hand, sees FPSO and FSO vessels as a cost-effective solution in the development of small fields, thanks to their adaptability and flexibility, explains General Manager of Project Development Madzri Abdul Rahman. Given that drilling costs constitute 30-40 per cent of the capital expenditure, the group also looks at innovative drilling technology.

Exploration Manager Dr Ismail Che Mat Zin says, by using horizontal and multilateral wells instead of conventional vertical wells, costs can be significantly reduced.

"We have to consider geopolitical, commercial and technical aspects against rig availability when proposing economically viable plans for our clients."

— Allida Muhammad Said —

Members of Energy Quest's integrated geoscience & engineering team Stanley Jaul Kampit, Khairul Adzlee and Morina Timah scrutinising an interpretation locating oil pockets

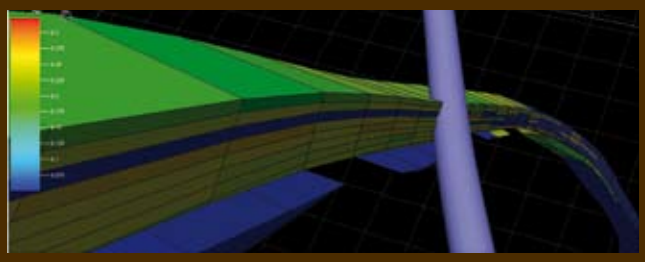
FINDING VALUE IN SMALL FIELDS

The services of geosolutions specialists like the Orogenic Group are increasingly in demand as the race for small field developments heats up.

It's an exciting time for not only the oil and gas exploration and production (E&P) players, but also their service providers. The excitement – and challenge – is taken up a notch when marginal fields come into the picture and as more E&P players train their sights on these resources thanks to the current high oil price environment. While buoyant prices are paving the way for the development of marginal fields, the key determinant is still the economics of the field.

This is where players like Energy Quest Sdn Bhd come in. An oil and gas E&P consultant, Energy Quest is involved in all the phases of the E&P lifecycle, from data review and asset acquisition to exploration, prospect evaluation, resource assessment, field development plans formulation and implementation. A member of the integrated E&P geosolutions specialist Orogenic Group, Energy Quest conducts studies in Malaysia and the Southeast Asian region as well as delineating international basins in Yemen, India, Bangladesh and Niger. Its clients include major oil companies and service providers.

Elaborating on its approach to assessing the economic viability of an asset (field, prospect or block), Energy Quest's Head of Engineering Department, Allida Muhammad Said, stresses that work processes are similar regardless of the asset size. "The exercise is kick-started with geoscience evaluation using local and regional data in locating hydrocarbon cumulation and assessing its volumes," she says. Integrating the interpretation with petrophysical evaluation and engineering assessment, the team then utilises fit-for-purpose technology and techniques to enhance the asset definition and to optimise its development plan. "The bottom line of these studies is maximum profit to the asset owner, where reserves are maximised and production optimised," she adds.



3D Modeling

Although similar work flows exist, in small field evaluations every single step in technical and commercial assessment has to be conducted in a rigorous manner with incremental economics. In this instance, the team at Energy Quest conducts risk analysis, taking into account geological, reservoir and drilling factors. Application of the right technology and adopting an integrated team approach guided by proven work processes are essential in marginal field development, she emphasises.

"The current high crude price environment means that it's definitely an exciting time for marginal field development given the many challenges where we have to consider geopolitical, commercial and technical aspects against rig availability when proposing economically viable plans for our clients," Allida concludes.

M3nergy's FPSO *Perintis* in the MASA Field, offshore Terengganu

Beyond technology, Newfield believes that value added exploration and redevelopment can significantly boost small field developments by providing reserve growth not identified in the original development plan. In this instance, Newfield employs a Life Cycle Project Management Team that is PSC-oriented as opposed to project-oriented.

"The team creates value through exploration, exploitation and development activities. The team is with the project throughout the life of the project, from field assessment, drilling, the preparation of the field development plans, the execution of the development, all the way to first oil," elaborates Howard. He adds that such an approach builds ownership and accountability. "The team is focused on creating value from small exploration prospects and redevelopment ideas by using existing infrastructure."

The Life Cycle Project Management Team approach also creates schedule efficiency which, together with capital efficiency and maximising sub-surface resources, is vital to monetising small fields successfully. The company adds that efficient capital deployment can be achieved by designing fit-for-purpose facilities. Each small field is different; with a fit-for-purpose design, every component can be optimised, reducing the overall topside facilities and jacket size thus significantly reducing project costs.

Beyond controlling costs, both Newfield and M3nergy say the shortage of skilled manpower is another challenge. For M3nergy, strategic alliances are a way to mitigate this problem. "We approach this challenge by working with technical partners such as design and sub-surface consultants. And we actively look out for service providers that can offer innovative solutions that are cost competitive," says Madzri.

ARE SMALL FIELDS WORTH IT?

In an environment where timing is everything, both Newfield and M3nergy say a flat organisational structure that allows for quick decision-making is key to successfully monetising small fields. Challenges aside, these independents add that developing marginal fields is definitely worth the sweat and tears.

"One does make money, and it's not dependent on high oil prices," says Datuk Shahrazi.

The group has its eye trained on opportunities in Southeast Asia, South Asia (in particular India) and the Middle East. Beyond the two projects it already has in hand, the group is currently bidding for a concession in Thailand. To grow, the group is making significant investments and does not discount the possibility of expanding its production, storage and offloading facilities. Ideally, he says, the group would like to have at least three such vessels to meet its own requirements as well as secure operations contracts.

For Newfield, despite higher costs and limited upside to the high oil prices within a PSC environment, the company is committed to marginal field development in Malaysia. "This is where our strengths lie…We built a company on marginal assets and redevelopment opportunities, and we'll continue to do so," says Howard.

> "In the past, a marginal field was considered viable if it had 20-30 million barrels of recoverable resources. Today, some players reckon that these fields are viable even with 4-5 million barrels of recoverable resources."
>
> — Datuk Shahrazi Sha'ari —

BIG BUSINESS FROM SMALL FIELDS

Since 1997, M3nergy Berhad has grown from an FPSO and FSO operator to a player in the upstream oil and gas sector, proving that there might just be a pot of gold at the end of the rainbow.

CEO and Group Managing Director Datuk Shahrazi Sha'ari and his team at M3nergy Berhad have every reason to be pleased with the company's achievements to date. The newcomer to the upstream oil and gas sector has not only secured the service contract to develop offshore marginal fields in India, but also scored a major coup when it outbid other players for a production sharing contract (PSC) at the Ujung Kulon oil and gas block in Indonesia.

The group's successful foray into the upstream oil and gas sector is noteworthy given that the company started out in the FPSO (Floating Production Storage and Offloading) and FSO (Floating Storage and Offloading) business. M3nergy is the owner and operator of a fully integrated FPSO vessel called *Perintis*; the vessel is chartered to PETRONAS Carigali Sdn Bhd for a period of nine years ending in 2008 and is currently deployed at the MASA oilfield, offshore Terengganu. The group also has the operations and maintenance contract for an FSO called *Puteri Cakerawala* belonging to Carigali Hess Operating Company Sdn Bhd. The vessel, operating since 2004, is deployed in the Malaysia-Thailand Joint Development Area.

While M3nergy plans to bid for new FPSO and FSO projects and extend its existing FPSO and FSO contracts, Datuk Shahrazi – who came on board in 2004 – says it was evident early on that the path to growth lay in upstream exploration and production activities. And, for a new player like M3nergy, this means developing marginal fields.

Explaining the rationale behind the group's foray into marginal fields, General Manager of Project Development Madzri Abdul Rahman says it was only natural to leverage on its experience and expertise in providing FPSO and FSO solutions. "These are cost-effective solutions for the development of marginal fields because these facilities can be re-used and relocated," he says.

Given that production facilities are a major cost component in the development of marginal fields, M3nergy recognises that its experience in this area will stand it in good stead. "We're confident of getting the right production facilities at the right cost thanks to our experience in this field…others may need to source from a third party. In our case, even if we have to build a new one, we can do it competitively and in a timely manner. We know how much to build and operate each of these facilities," he adds.

And in an environment where economic viability is the name of the game, it's unsurprising that M3nergy has chosen to leverage on these strengths in its foray into the upstream oil and gas sector.

Still, as Datuk Shahrazi maintains, the path has not been easy. "It's been tough because we had minimal track record in this area at the beginning. It took us a lot of time to convince people that we're the right ones to develop marginal fields," he says.

The group caught its big break in March 2006 when the consortium comprising M3nergy, Hindustan Petroleum Corp Ltd and Prize Petroleum Company Ltd (in which M3nergy has a 30 per cent interest) was awarded a service contract for the development of offshore marginal fields known as Cluster 7, off Mumbai, India. The 13-year contract was awarded by the Oil and Natural Gas Corp Ltd of India (ONGC). ONGC had done extensive well drilling, confirming the presence of oil and gas. The estimated recoverable reserve is 30-40 million barrels of oil. According to Madzri, front-end engineering work is being done to identify the most optimal development solutions. Drilling is expected to commence in the second half of 2009, with first oil anticipated in 2010.

On the heels of its maiden venture into exploration and production, in March 2007 M3nergy won a bid for a 30-year PSC for the Ujung Kulon oil and gas block on and offshore Southwest Java, Indonesia. The area, covering 3,700 sq km,

is estimated to have a reserve of 300-400 million barrels of oil, with expected recoverability of 20-30 per cent. According to M3nergy, exploration drilling carried out in the past showed there was oil; further seismic surveys and drilling work will be undertaken to assess the potential recoverable resources. M3nergy expects first oil here in 2012.

Conceding that the upstream oil and gas sector is fraught with risks, Datuk Shahrazi says the group mitigates such risks by identifying oil fields that have previously been discovered and explored but not developed because they were not economically viable at the time. “We don’t go in blind. We identify assets with sizeable reserves based on existing data. We look for a minimum return on investment of 15 per cent. If we don’t get that, we don’t touch it,” he adds.

The group has its eye trained on opportunities in Southeast Asia, South Asia (in particular India) and the Middle East. Beyond the two projects it already has in hand, the group is currently bidding for a concession in Thailand. To grow, the group is mulling the expansion of its FPSO business. Datuk Shahrazi says if the Cluster 7 marginal field in India were commercially viable, it would need one FPSO facility by the middle of 2009. Ideally, he says, the group would like to have at least three such units to meet its own requirements as well as secure operations contracts.

Investments are also vital. To date, the group has already poured in RM25 million in the development of marginal fields. These include seismic studies as well as geological and geophysical works. The group also does not discount the possibility of entering into strategic partnerships and alliances in order to secure new jobs. Madzri adds that such a route is also a means to mitigate the shortage of skilled manpower plaguing the oil and gas industry.

Going forward, Datuk Shahrazi anticipates that by 2012, 70 per cent of the group’s revenue will come from its overseas operations. Of this, 80 per cent will be derived from its exploration and production activities. “It’s an exciting time for us, and an exciting time for marginal field development,” he adds.

Datuk Shahrazi Sha’ari, CEO & Group Managing Director, M3nergy

MOPUs: The Fast-Track Solution for Marginal Fields

In the hunt for new methods to reduce costs and obtain faster returns on investment, the Mobile Offshore Production Unit has emerged as an increasingly popular option for oil and gas operators. The Global Process Systems Group (GPS), which has two MOPUs in operation and a third undergoing conversion, explains how it is possible to turn exploration opportunities into production revenue in less than a year using this type of solution.

Cendor Producer

One of the many benefits of a Mobile Offshore Production Unit (MOPU) is its economic potential, stemming partially from provision on a lease basis, which enhances the cash flow of a project by enabling costs to be repaid from production revenues. The MOPU can also be installed as an early production facility, allowing reservoir data to be gathered, and evaluation of the viability of the field to be completed before commitment to full field operation.

This concept is proving an advantageous way for oil and gas operators to get a quick return on marginal fields in less than 70m water depth and also offers excellent flexibility for the future exploitation of the field. Already a well-accepted method for exploration and production in Brazil, the UK, Norway, Australia and the Middle East, operators of MOPUs in these areas have repeatedly shown the ability to turn a profit even during periods of low oil prices.

In spite of this positive experience, the MOPU concept arrived in Southeast Asia only relatively recently. A work programme embarked on by Global Process Systems (GPS) and operator Petrofac saw the first Malaysian-installed MOPU provided by GPS as the solution for the marginal fast-track Cendor development in Block PM304 offshore Peninsular Malaysia.

FAST-TRACK IMPLEMENTATION

Compared to the three years needed to complete and install a conventional platform, the MOPU can be in place in less than 12 months. A MOPU has the added benefit of having facilities that can be configured quickly to match specific oil or gas requirements. In the case of the Cendor Development, the availability of a MOPU was the deciding factor that turned a marginal non-economic development into a highly successful producing asset.

Rapid innovation and development of the field within a two-year timeframe was required to avoid relinquishment of the field, and the timely availability of a MOPU is acknowledged

The upgrade and topsides installation of Maleo MOPU Producer took place at a conversion yard in Sharjah, UAE

The imminent deployment of the third MOPU asset would indicate that the industry is acknowledging the MOPU as a cost-effective tool for providing solutions for marginal fields.

by Petrofac as a key ingredient in realising that goal. During the Front End Engineering & Design work, it was determined that because the seabed around Cendor is very flat, a converted MAT-type jack-up rig as a production platform was the preferred solution.

FLEXIBILITY & ADAPTABILITY

Owned by Cendor MOPU Producer (a company owned 80 per cent by GPS and 20 per cent by Tanjong Offshore Services Berhad), The Cendor Producer was constructed for the Cendor Field and leased by GPS on a two-year basis to Petrofac.

Based on Petrofac's previous experience with riser/conductor arrays, by selecting the MOPU, it was possible to utilise unusually long spanned conductors without the need for underwater support bracings. This was the first time anyone had tried this concept in Malaysia.

The former drilling slot was converted into a wellhead platform together with four guide slots to sustain the four 80-metre unsupported conductors at the surface. The wellhead platform was designed as an integral part of the MOPU and, importantly, allows for simultaneous drilling and production.
Through the use of triple splitter wellheads, there are effectively 12 well slots within four 36 inch conductors. This provides Petrofac with an option to produce from wells in the first conductor, while drilling the wells in the second, third and fourth conductors.

A processing deck area provides sufficient space for two first stage separators as well as a production test unit and a second stage separator. Facilities include an electrostatic coalescer unit,a seawater injection system and a vacuum deaeration unit, as well as utility systems. Deck space also incorporates a lay down area and a hydraulic work over unit. The MOPU has accommodation facilities for up to 50 men and a helipad.

The Cendor Project was brought from farm-in to full production in less than two years – in a tight market, within budget and ahead of the prescribed timetable. Start up was announced on September 23, 2006, ramping up to a rate of 14,000 BOPD from five wells. Produced oil is pumped from the MOPU via submarine hose to a permanently moored converted tanker, the FSO Cendor. The FSO Cendor has a capacity of 380,000 barrels of oil and was leased together with the MOPU.

SECOND ASSET

A second MOPU, The Maleo Producer, also owned by GPS, is contracted to Madura Offshore Production Sharing Contract in association with GPS' Indonesian partner PT Radiant Utama Interinsco. The contract is for a minimum four-year asset/operate lease with options for an additional eight years on a year to year basis. The participants in the Madura Offshore Production Sharing Contract are Santos as operator (67.5 per cent), PETRONAS Carigali Madura (22.5 per cent) and PT Pantai Madura (10 per cent).

For Santos – the largest producer of domestic gas in Australia – development of the Maleo Field marked its first offshore gas project outside its home market. The Maleo Field is estimated to contain 240 bcf of proven and probable reserves that will be produced over a field life of eight to 12 years.

OBTAINING CLASS

The Maleo Field is located at a depth of some 57 metres of water in the Madura Sea, offshore Indonesia. Due to the high levels of seismic activity in the area and soft clay soils, it was necessary to obtain independent verification of the MOPU structural integrity and foundations and then class certification before The Maleo Producer could begin operation.

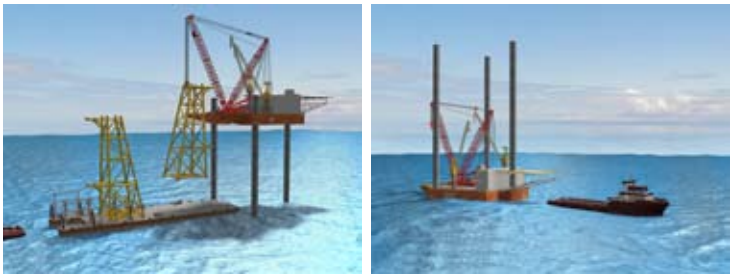
Extensive studies, field work, laboratory testing and non-linear finite element analysis were undertaken. A 1,000-year return period was selected with additional analyses demonstrating that overturning would not occur using twice the acceleration magnitudes in the 1,000-year event.

The combination of the MOPU's flexural stiffness, foundation area and geometry, and the soft soil were found to result in acceptable platform deflections and stresses, leading to full class approval by international certification authority ABS.

RAPID START-UP

The selection of a MOPU facility for the Maleo Field development is widely regarded as the most appropriate choice as it enabled production to be expedited much sooner than with a conventional production platform. The MOPU's deck-mounted gas processing facilities provide for dehydration, filtering, compression and metering of up to 110 MMSCFD of wet gas. The gas is then delivered through a 7.4 km spur line connected to the Trans-Java Pipeline, eventually supplying Indonesian National Utility Company PT Perusahaan Gas Negara (PGN).

GPS Producer 1, a 250 ft MAT type jack-up Baker Marine rig, the third GPS asset currently undergoing conversion in Labuan



The SERF concept

First production from the Maleo Field was achieved on schedule within the original budget estimate just four years after its discovery. This is considered by Santos to be an outstanding achievement, with the use of the MOPU solution enabling first gas to be achieved only 16 months after final investment approval.

THIRD ASSET DUE FOR DEPLOYMENT

A third GPS MOPU asset, GPS Producer 1, is currently undergoing upgrade work in Labuan, Malaysia, in preparation for deployment on a similar lease contract in Southeast Asian waters. This third unit has been developed as a SERF or Self Elevating Relocatable Facility, a concept jointly formulated between the client and the GPS/Tanjong team.

The first phase of the SERF project is utilising an upgraded MODU (Mobile Offshore Drilling Unit) with a heavy lift crane temporarily installed to assist in offshore construction and installation activities. Due to the flexible nature of the asset, it can be readily converted into a MOPU application, giving the client the option to deploy the vessel in different applications as the field development requirements dictate.

UNQUALIFIED SUCCESS

It cannot be denied that the first two GPS MOPU assets achieved unqualified success in enabling operators to commence production from marginal fields in record time. This success and the imminent deployment of the third MOPU asset would indicate that the industry is acknowledging the MOPU is a cost-effective tool for providing solutions for marginal fields and early production developments and an economic means to monetise stranded oil and gas production.