



SEN

SUBSEA ENGINEERING NEWS

Subsea Renewables Crossover Potential Attracts



Offshore wind turbines generate energy at the Robin Rigg wind farm off the coast of Dumfries, Scotland. (Source: Scottish Enterprise)

Transferring subsea skills to the offshore renewables sector could offer a new string to the bows of subsea players that have traditionally only worked in the oil and gas sector. The most obvious benefit is generating extra revenue streams in the tough times the petroleum industry is experiencing.

Diversification of subsea companies into offshore renewables, especially the growing wind sector, is not a new phenomena by any means but could be a more popular choice as oil and gas subsea engineering work has declined significantly in the recent downturn.

“The growth of the offshore renewables presents a range of opportunities for subsea engineering companies, something we’ve been working to highlight for a number of years,” Ian McDonald, foresighting senior executive for energy and low carbon technologies at Scottish Enterprise (SE), told SEN.

“Oil and gas supply chain companies can operate very successfully in the offshore wind market, regardless of the oil price environment, if they have a compelling proposi-

tion and are able to commit the necessary time, effort and resources into serving the sector.”

Room For New Entrants

“Subsea companies are already thriving in the offshore renewables, particularly the offshore wind sector, and there remains room for new market entrants. The rate at which new products and services come to the market is astounding at times, driven by the industry’s very strong drive to realize cost reductions,” McDonald said.

“The major offshore wind developers and their tier one suppliers are also very focused on improving U.K. local content levels in their U.K. projects, having agreed to a target to source at least 50% of their offshore wind farm contracts (in value terms) from U.K. companies back in 2012.

“Therefore, the industry is very open to U.K. companies offering products and services that do something better or cheaper.”

SE suggested nine key areas of opportunity for new market entrants: project management; array cables; substation structures; turbine foundations; secondary steelwork; cable installation; installation equipment; installation support services; and maintenance and inspection services.

Subsea Synergies

“There are strong synergies between oil and gas and offshore renewables—the fabrication of topsides and jackets serve as two really good examples of areas of crossover. The topsides of oil and gas rigs and offshore wind substations are superficially similar, and we’ve seen companies like Bladt in Denmark and Iemants in Belgium building both in recent years” McDonald said.

“Oil and gas jackets also bear a striking similarity to their offshore wind counterparts, and we’ve seen companies like BiFab alternate between building both here in the U.K. Other strong areas of synergy include site investigation, array cables, installation equipment and support services.”

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BUOYANCY, INSULATION and ELASTOMER PRODUCTS

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The most obvious advantage for subsea companies entering the offshore renewables market is access to new revenue streams. However, there are a range of other benefits too, as exemplified by companies like FoundOcean, which entered the sector in 2003.

“While offshore wind work was relatively few and far between in the early 2000s, FoundOcean has experienced a steady growth in offshore wind grouting contracts since 2010, which now represent approximately half of the company’s revenues,” McDonald explained.

“This offshore wind driven growth also has had knock-on benefits for the oil and gas arm of the business, enabling the company to secure contracts and operate in markets they did not previously have the scale to do so.”

Disadvantages, Challenges

While there are clear synergies between oil and gas and the offshore renewables, McDonald said it was important to note the differences between the sectors in terms of business practices and contracting models.

“The fabrication of offshore wind jackets serves as a good example of these differences. While they may look superficially similar to oil and gas jackets, the sheer volume required for an offshore wind project—Scottish-Power’s 714-MW East Anglia One project will use 102 turbine jackets—is very different to that of a typical oil or gas project,” he said.

“The high volume, low margin nature of some offshore wind contracts has proved too challenging for a number of tradition oil and gas supply chain firms, who entered the offshore wind market only to leave it again a few years later.

“Furthermore, the industry’s ubiquitous drive for cost reductions has put a downward pressure on margins across the highly competitive offshore wind supply chain, which operates at a European rather than a U.K. or local level.”

Wind Opportunities

Offshore wind is one of the biggest and most immediate opportunities for subsea oil and gas players. The main advantages of the offshore wind market are its sheer scale and the relatively certainty regarding the pipeline of projects being built into the 2020s.

“A recent study by BVG Associates for SE forecasts global offshore wind capacity to grow to 40 GW by 2020 and 60 GW by 2025, up from 12 GW today. Subsea companies already are securing major contracts with these projects, such as the £100 million [US\$127.6 million] contract recently secured by BiFab to fabricate foundations for Beatrice offshore wind farm in Scotland,” McDonald said.

“There are also a number of smaller demonstration projects being built in the near future, particularly in Scotland, which may offer a route to market for companies with suitable capabilities but a limited track record in offshore wind.”

Dong’s Grimsby Investment

Denmark’s Dong Energy has recently unveiled plans to set up an offshore renewables hub in Grimsby, eastern England, to service the growing sector.

“Dong’s announcement follows a very welcome pattern of major investments in the U.K. offshore wind industry in recent years, which includes the Siemens’s investment in blade manufacturing and turbine assembly at Hull, the MHI-Vestas investment in blade manufacturing on the Isle of Wight, and the Bladt/EEW investment in mono-pile manufacturing at Teesside,” McDonald said.

“Earlier this year we also saw CS Wind take ownership of the Wind Towers Scotland facility in Machrihanish, and shortly afterward announce plans for a £27 million [US\$34.5 million] upgrade in the facility to allow the fabrication of offshore wind towers.”

—Steve Hamlen

DEVELOPMENT

DEA Unveils Subsea Plans For \$1.2 Billion Dvalin Development

Germany-based DEA Deutsche Erdoel AG and partners have agreed to shell out \$1.2 billion to develop the Dvalin natural gas field in the Norwegian Sea.

Developers plan to tieback four subsea wells to the Heidrun platform to produce about 18.2 Bcm (642 Bcf) of natural gas from two reservoirs. The gas will be taken via an export pipeline to Polarled and onto the Nyhamna onshore gas terminal for processing, eventually delivered to the European market. Hopes are for production to begin in 2020.

DEA shed light on its plans of the field, formerly called Zidane, on Oct. 3 after submitting the plan for development and operation to Norwegian authorities. The development will be the first operated by DEA in Norway.

“Together with our partners, we have come up with a development solution with sustainable long-term economics in an environment of low market prices,” Hans-Hermann Andreae, managing director of DEA

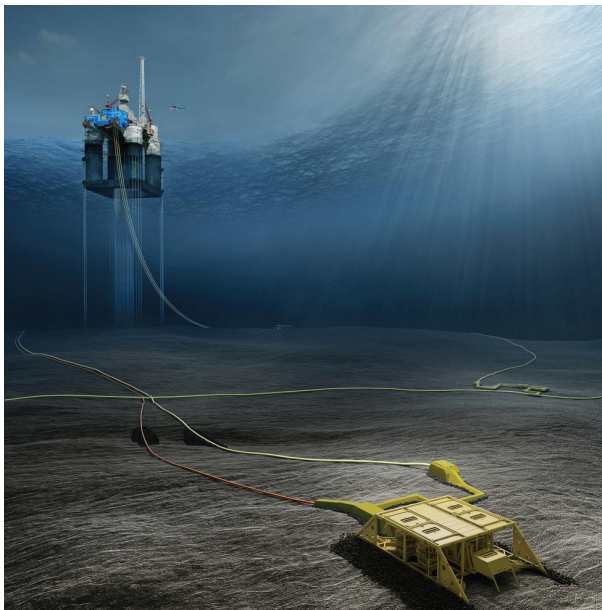
Norge, said in a news release. “Over the last few years we have managed to reduce cost by more than 20%. As a consequence, DEA has got the opportunity to open a new area in the Norwegian Sea for gas production and export.”

Credit was given to a creative project team and market developments in the supplier industry to make the project economical.

The news was delivered as the oil and gas industry continued to rebound from a downturn marked by low commodity prices and curtailed spending. Although oil prices have recouped some of their losses, spending for investments offshore remains depressed.

By moving projects forward, after finding cost savings, developers hope to turn profits while opening a new area of the Norwegian Sea for gas development.

Dvalin already has brought work for engineering, services and equipment companies.



Aker Solutions won the contract to provide the subsea production system for the Dvalin development. (Source: DEA)

Aker Solutions and Aibel were among the first to land contracts.

Winning two contracts, Aker was tapped to deliver the subsea production system, maintenance and services at the Dvalin natural gas development offshore Norway, Aker said in a news release.

The first order is for a production system, including a manifold, four subsea trees and a 15-km-long (9.3-mile-long) umbilical that will connect to the Heidrun platform. It also covers wellheads, controls, tie-in and workover systems and options for further subsea production tieback connections to Heidrun, Aker said. Initial deliveries are expected in first-half 2018.

The companies also agreed on a five-year framework contract, which might be extended, for maintenance and servicing of all subsea production systems ordered under the first agreement. This includes installation and commissioning services, Aker said.

Stavanger-based Aibel secured a contract to prepare the Heidrun platform for production from Dvalin.

As part of the modification assignment, Aibel said it will build two new modules—a 4,000-ton one for gas treatment and a 400-ton injection system—to be installed on the platform. The latter is expected to be installed in 2018, with the former slated for installation a year later.

“In addition to building the modules, Aibel will clear the area on Heidrun and manage integration on the platform,” the company said in a news release.

These topside modifications for tie-in of Dvalin to Heidrun will be planned, executed and operated by Statoil, according to DEA.

The Dvalin license will award 530 million euros (US\$592 million) worth of contracts over the coming weeks, DEA said.

License partners included DEA Norge, the operator, Edison, Maersk Oil Norway and OMV Norge. However, OMV has entered a sale and purchase agreement to sell its interest to Petoro, and Maersk Oil said this week that it will no longer be a partner.

“Maersk Oil’s technical view of the project means our participation in Dvalin does not provide the economic value we would need to justify further investment. Consequently, we are withdrawing from the development,” a Maersk Oil spokesperson told SEN in an emailed statement. “We have planned a smooth and quick exit from the license and ensured that our partners in the development, and the authorities are aligned with this to ensure this does not affect the momentum of the remaining partners in delivering the project.”

—Velda Addison

Maersk Starts Drilling At Culzean In North Sea

Maersk Oil has started the first production well on its operated Culzean Field in the U.K. North Sea—with the operator preparing drilling on a “digital virtual rig.”

The well is the first of six production wells to be drilled on the HP/HT Culzean Field, with continuous drilling activity planned over the next five years. First gas is expected to be produced from Culzean in 2019.

“This is an important milestone in ensuring that we can deliver Culzean on schedule and with it 5% of U.K. gas demand in 2020–2021,” Maersk Oil CEO Gretchen Watkins said in a statement. “It is great to have Maersk Drilling as a partner and together we are working to ensure a safe drilling program on this critical project for Maersk and the U.K.”

The *Maersk Highlander* rig is drilling the first production well through a wellhead platform (WHP) jacket and well access deck (WAD), which were installed on the field in the spring of 2016.

When the three topsides are installed in 2018 and hooked up in 2019, three of the six production wells will

be ready for first gas. The WHP jacket and WAD were constructed in the Netherlands and Hartlepool, U.K., with construction of the wellhead topsides ongoing in Singapore, Maersk Oil said.

The drilling campaign will be supported by more than 30 U.K.-based well services companies.

“Maersk Drilling and Maersk Oil have jointly prepared the drilling on a digital ‘virtual well’, using a specialized drilling simulator at Aberdeen’s Robert Gordon University,” Maersk Oil added.

“Working on a virtual rig, designed to look and feel like the *Maersk Highlander* has been invaluable,” said Andrew Lough, Culzean’s wells delivery manager. “It has enabled us to prepare in a very lifelike environment for the drilling campaign, which will contribute to a safe and efficient drilling operation that will be an important milestone in developing the largest new field discovered in the U.K. North Sea for more than a decade.”

—Steve Hamlen

Aasta Hansteen Work Progresses Offshore Norway

Statoil, Subsea 7 and others are making strides at the Aasta Hansteen Field in the Norwegian Sea as those involved in the deepwater project continue checking off tasks from the to-do list.

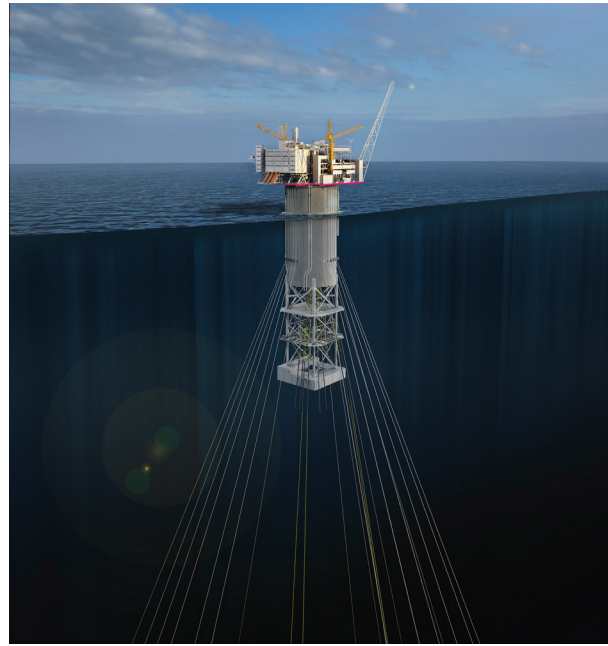
The pipelines, risers and spoolers have been installed and hooked up to subsea templates and umbilicals. Having been pressure-tested, the pipelines also have been prepared for production. In addition, the mooring lines have been installed on the seabed, Statoil said in a news release updating progress at the deepwater, harsh environment development, which has a water depth of 1,300 m (4,265 ft).

Per Rusås, project director for Aasta Hansteen, commended Subsea 7 for doing a “great job” in this year’s campaign. Subsea 7 is responsible for engineering, procurement, installation and construction (EPIC) of the 18-km (11-km) flowlines and four steel catenary risers, EPIC of rigid spools from flowlines to manifolds as well as for the SPAR mooring anchors. The company’s work scope also included installing the umbilical system, manifolds and mooring lines among other responsibilities such as flowline and umbilical tie-in and mooring line hookup.

The project also will mark the first time Statoil will use BuBi mechanically lined pipes, which will be supplied by Subsea 7, for corrosion protection. The pipes include liner pipes and steel catenary risers.

The platform is scheduled to arrive in 2018.

“When the platform arrives, the risers that are currently in wet storage on the seabed will be pulled up by the vessel and connected to the platform,” Helge Hagen,



Aasta Hansteen development is scheduled to arrive in 2018. (Source: Statoil)

project manager for the Aasta Hansteen subsea, umbilical, risers and flowlines project, said in the release.

The project, which develops the Luva, Snefrid and Haklang reservoirs, includes subsea wells tied back to a spar platform. Plans are for natural gas to be exported via Polarled flowline to Nyhamna.

—Velda Addison

Eni Asks For Billions To Finance Mozambique Gas Project

Italian oil firm Eni has approached banks for billions of dollars to finance a huge offshore gas development in Mozambique, a significant step in getting a long-delayed project off the ground, the company and sources said.

Eni confirmed it met bankers in London in September about project financing to develop the Coral Field, part of the huge reserves discovered six years ago in the Area 4 concession off the Mozambican coast.

“It’s running into billions of dollars,” one source familiar with the financing told Reuters, adding banks also were looking for credit guarantees from foreign governments, including Britain and China.

Banks are likely to respond within three to four weeks with terms of loans they are willing to provide, one of the

last stages before Eni can make a final investment decision (FID) on the project, two sources close to the deal said.

Eni said it hoped to announce a FID by year-end 2016.

Some lenders might be concerned about involvement in a project in Mozambique, given recent clashes between opposition guerrillas and government forces and financial scandals.

The International Monetary Fund (IMF) is in Mozambique this week to try to restore trust between President Filipe Nyusi’s government and international lenders after more than \$2 billion in secret loans came to light this year.

The IMF has suspended its own lending to the south-east African country, insisting on external scrutiny as a precursor to resuming financial aid.

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“The biggest challenge is Mozambique country risk,” one of the sources said.

Reserves discovered in Mozambique’s Rovuma Basin in recent years amounted to some 85 trillion cubic feet [2.4 Tcm], one of the largest finds in a decade and enough to supply Germany, Britain, France and Italy for nearly two decades.

The gas offers Mozambique an opportunity to transform itself from one of the world’s poorest countries into a middle-income state and a major global LNG exporter.

Negotiations with operators Eni and U.S. firm Anadarko have dragged on for years due to disputes over terms and concerns about falling energy prices.

However, there have been several signs of significant progress in recent months.

Eni has struck a deal with Samsung Heavy to provide a floating LNG platform to process the gas from the Coral Field, which will be sold to BP.

Mozambique and Eni have signed a 20-year deal to sell BP LNG.

Eni also has wrapped up long-running talks to sell a multibillion-dollar stake in other fields in Area 4 to Exxon Mobil, sources told Reuters last month.

In 2013 Eni sold 20% of its Area 4 license to China’s CNPC for \$4.2 billion but since then oil and gas prices have come down by more than half.

Anadarko’s \$24 billion onshore LNG project is expected to lag Eni’s, and its FID is unlikely this year.

—Reuters

DEVELOPMENT BRIEFS



The *Skandi Skansen* anchor-handling vessel is part of DOF Subsea’s fleet. (Source: DOF Subsea)

DOF Subsea Lines Up Athena Decommissioning Work

Ithaca Energy has tapped DOF Subsea to remove the subsea water column infrastructure used on the Athena Field in the U.K. North Sea as part of the first phase of decommissioning work at the field.

As part of the contract, DOF will be responsible for removing mid-water arch and risers as well as securing utilization of several DOF Subsea vessels capable of taking on moorings and construction work.

“This is a very important project for us. Conditions in the industry are challenging, but the North Sea decommissioning sector is active, and we are well positioned

to deliver in this market,” DOF Subsea’s U.K. Managing Director Robert Gillespie said in a news release. “We have completed several decommissioning projects in recent years, and we are looking forward to working with Ithaca Energy on this scope.”

Athena is located in the Outer Moray Firth area in the central North Sea at a water depth of 130 m (426.5 ft). Production ended at the field in January with the FPSO unit leaving the following month.

Eni Ramping Up Output At Goliat Oil Field

Eni has restarted production at its Goliat oil field off the coast of northern Norway and expects to reach full capacity soon, a spokesman for the operator said Sept. 27.


The Goliat Field, situated in the Barents Sea, has a capacity of 100,000 bbl/d of oil.

The outage began on Aug. 26 following a power outage and partial evacuation of Eni’s platform, the latest in a series of safety incidents. Since then, the company has said its staff needed to improve its grasp of the field’s potential risks.

Eni owns 65% of Goliat while Norway’s Statoil holds the remaining 35%.

Leviathan Field Developers Sign \$10 Billion Jordan Export Deal

Backers of Israel’s massive Leviathan natural gas field on Sept. 26 signed a \$10 billion deal to supply 45.3 Bcm (1.6 Tcf) of gas to Jordan’s National Electric Power Co.



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“Subject to regulatory approvals from Israel and Jordan, sales ...are anticipated to commence at field startup,” said Texas-based Noble Energy, the project’s operator.

Talks on the contract began more than two years ago.

The 15-year deal for Leviathan, which holds an estimated 622 Bcm (22 Tcf) of gas, should help the U.S.-Israeli group secure funds to bring it online. Production is expected to begin around 2019 or 2020.

The Leviathan group also has been in talks to export much larger quantities of gas to companies in Egypt.

Leviathan, discovered in the eastern Mediterranean in 2010, is one of the world’s largest offshore gas discoveries of the past decade. Last year Israel approved plans for a 15.5-km (9.6-mile) pipeline near the Dead Sea to export gas to Jordan.

Petrofac Wraps Up Decommissioning Work For Tullow Oil

Petrofac said it saved Tullow Oil about \$2.5 million, compared to traditional approaches, on its well plugging and abandonment campaign for the Horne & Wren platform in the North Sea.

The service provider deployed well engineering and well project management services within the six-month contract and delivered the conceptual design, detailed planning, procurement, subcontractor management and the full execution of the plug and abandonment operations.

The company’s technical solutions for the normally unmanned asset included using a jackup lift barge instead of a jackup rig and using a pipe recovery technique instead of a heavy-lift vessel. The company also used its WellAtlas well project management software.

INPEX Selects Amec Foster Wheeler For Ichthys Consultancy Job

Amec Foster Wheeler has landed a consultancy contract from INPEX for its Ichthys LNG project in Australia. As part of the contract, Amec Foster Wheeler said it will conduct competency assessments for Ichthys operations and maintenance teams covering the central processing facility, floating production storage and offtake vessel, and the Bladin Point LNG onshore processing plant. The assessments, which will take place at construction yards in Korea, offshore Western Australia and at the onshore LNG facility in Darwin, will be aligned to Australian national competency standards for the Process industry, the company said. The contract ends in April.

ACE Winches Wraps Up Subsea Infrastructure Project

ACE Winches said it has finished work for Technip that entailed overcoming the challenge of limited deck space involving the Quad 204 redevelopment project.


The company developed a package that houses the hydraulic drum, an overboard system and spooling gear into the winch base frame. The winch package includes closed-loop hydraulic power units located nearby, the company said.

“A custom-made compact winch was designed to accommodate the limited space and meet the required performance characteristics for riser installation, while the overboard system provides access to the tower, with ladders and walkways included,” ACE Winches said.


The subsea infrastructure project was for Loyal Field, one of two fields that are part of the Quad 204 redevelopment project west of the Shetland Islands.

—Staff & Reuters Reports

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FLOATERS

CFD Optimizes Platform Orientation

Platform orientation is one design aspect that can play a significant role in the inherently safe design process. Traditionally, the platform orientation has been determined by engineering judgment, heavily weighted by past experiences. While this approach initially appears to be time- and cost-effective, it has the potential to lead to a non-ideal design solution that could cause safety and operational issues to go unaddressed and increase costs in later design stages. A recent study examined potential factors that could add to these costs.

Optimization Parameters

The parameters considered for the optimization study were as follows:

- The natural ventilation (wind), which can reduce the potential accumulation of toxic and flammable gases as well as provide indications of potential vapor cloud explosion consequences;
- The helideck impairment, which can impact helicopter operations due to hot turbine exhaust gases, affecting both general operations and potential emergency operations;
- The wind chill, which can affect the ability for personnel to work on the platform. This is particularly important in cold climates and extreme weather areas where working conditions can influence the number of personnel required for operation;
- The lifeboat drift-off direction, which can impact the safety of the crew in an emergency situation; and
- The hydrodynamic drag, which can affect tendon fatigue life, hull integrity and structural design requirements.

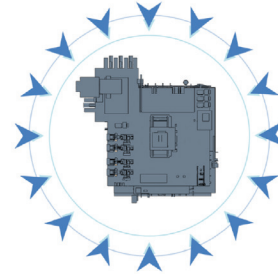
Natural Ventilation (Wind)

In the event of an unintended hydrocarbon release, higher ventilation rates typically translate into the formation of smaller flammable gas clouds. This parameter is therefore intended to be maximized.

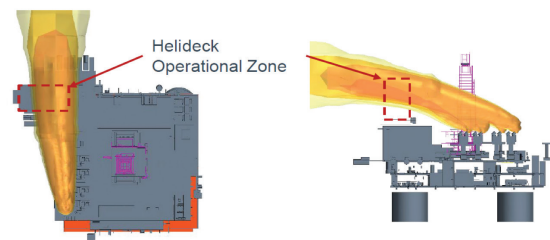
Exhaust

Civil aviation regulations dictate that restrictions be put in place to the helicopter operations if there is a temperature increase of 2 C (3.6 F) above ambient within the operational zone above the helideck. Temperature rise is used to define potential impairment to operations; in some cases this might limit operations altogether or require adjustments to payload weight, approach paths, etc. For many offshore facilities, particularly in extreme weather areas, helicopters are used as the primary means of transportation and evacuation during an emergency. Thus it is imperative that the helideck remains available through as many expected weather conditions as possible.

METHODOLOGY



Step 1: Simulate wind from 16 directions and 2 wind speeds



Step 2: Calculate helideck impairment from exhaust for each scenario



Step 3: Calculate mean air speed through the platform

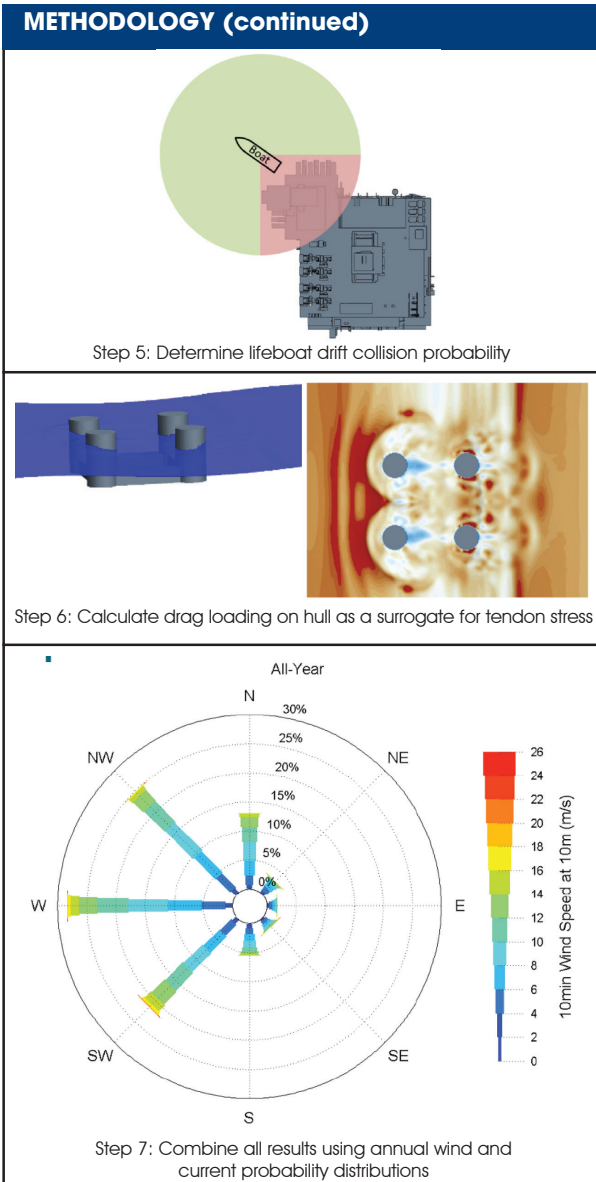


Step 4: Calculate wind chill on the platform

The methodology can be summarized in seven steps. (Source: Atkins)

Wind Chill

Wind chill is quantified by the perceived decrease in temperature felt by the body on exposed skin. Wind chill can impact the number of personnel required to operate a facility. In some cases, environmental effects such as wind chill have been known to increase the potential for operator error. To provide personnel with acceptable working conditions and maximize safety, wind chill effects are intended to be minimized. It is important to note that this can be



The methodology can be summarized in seven steps. (Source: Akins)

counter to increasing ventilation for the reduction of flammable clouds during an unintended release of hydrocarbons. One intent of the optimization approach is to find a balance between these two potentially competing goals.

Lifeboat Drift-off

If a lifeboat is deployed during an emergency, it is imperative to maximize the potential survival of the craft by limiting exposure to potential hazards. A lifeboat deployment might also suffer from loss of power, thus left to environmental effects to reach safety. To maximize the potential for survival, the lifeboat should drift safely away from the platform, assisted by the current. Adverse drift-off, the length of time to reach a safe area and potential drift back into the facility should be minimized.

Tendon Stress

Tension-leg platforms are typically used in water depths

reaching up to 2,134 m (7,000 ft). The stress in the tendons resulting from maintaining the platform in place despite wave impact and drag loading from the current needs to be minimized. Tendon requirements can lead to weight and structural design limitations as well as requiring unnecessary buoyancy complications during operations.

Why Use CFD?

Good judgment is fundamental in solving any engineering problem. However, numerical simulations can help in making a good design even better. Today, with powerful multidesign exploration and multidesign optimization tools such as HEEDS, it has never been easier to make a design reach its best potential.

In the oil and gas industry, however, decisions relating to the platform orientation are still typically made solely based on previous experience and qualitative judgment, which can lead to unintentional biases. This study is aimed at improving the accuracy of experts' predictions through the use of numerical tools to meet the following design objectives:

- Maximize ventilation;
- Minimize helideck impairment from exhaust;
- Minimize wind chill effects;
- Minimize tendon stress; and
- Minimize adverse lifeboat drift-off.

Of course, using formal models doesn't come without limitations. There are a few challenges associated with using computational fluid dynamics (CFD) to resolve issues related to offshore platforms.

Firstly, from a technical point of view, offshore platforms are very large and have extremely complex geometries. This makes it difficult, if not impossible, to explicitly resolve all objects within the available time frame.

Secondly, from a project management point of view, projects are strongly schedule-driven. Stakeholders want their platform to start running as early as possible since each day of delay will cost upward of \$10 million in deferred revenue.

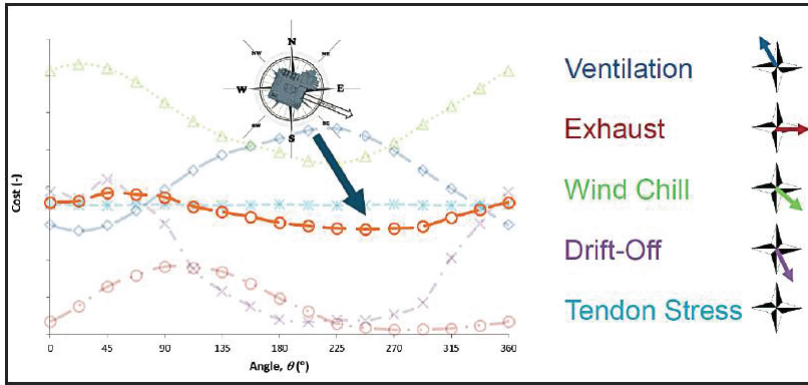
In addition, the platform orientation is one of the first design aspects to be decided. However, in very early design stages, information is scarce. Many uncertainties need to be dealt with regarding the location of the equipment, etc.

Finally, the budget allocation for HSE is usually about 1% of the total project cost, which greatly limits the amount of influence technical safety bears on the final design.

The combined cost function shows that the optimum orientation of this particular platform, once all objectives were taken into account, is for its north to face true east-southeast. This result does not coincide with any of the ideal orientations found for the individual design objectives, but it is the best compromise between all these objectives.

Future Considerations

The optimum orientation of the platform was obtained using simulation tools based on five design objectives: ventilation, exhaust, wind chill, lifeboat drift-off and tendon stress. The approach taken in this case study considers



A cost function for all combined objectives was obtained by linear weighting of the individual cost functions. It shows that the optimum platform orientation is facing true east-southeast. (Source: Atkins)

the number of parameters considered is expected to change, as will their weighted contribution. The idea is that the orientation can be further optimized as the design process progresses or in some cases completely alters the selection based on safety and operational prioritizations. If a proper balance of previous experience, qualitative judgment and the use of formal models such as CFD are deployed, this function method can be used to achieve an inherently safe design. Further work could involve optimizing the facility layout based on turbine stack design and positioning, helideck positioning, module placement, flare tower design, etc.

—Gerard Reynolds & Andrew Staszak, Atkins

an early stage of design, with parameters covering both safety and operational issues. As the design progresses,

FPSO Vessel Regains Insurance Following Turret Failure

The FPSO *Kwame Nkrumah*, which suffered a turret bearing failure earlier this year, now has confirmed hull and machinery insurance coverage, Tullow Oil announced.

The policy covers relevant operating and capital costs associated with both current and long-term operating procedures at the FPSO. Tullow, operator of the Jubilee field, said it will work closely with the loss adjusters and

reinsurers to establish a payment schedule as remedial work continues.

Tullow said it also continues to work with its business interruption reinsurers on confirming coverage for loss of production and revenue caused by the failure.

—Staff Reports

VESSELS

Big Tasks Await World's First Single-lift Vessel

The successful lifting of the topsides of the decommissioned Yme platform offshore Norway by the world's first single-lift vessel in August was a watershed moment for the offshore history books.

With the North Sea set to be a ripe hunting ground for decommissioning projects large and small over the course of the next several decades, the proof that innovative and bold Swiss-based contractor Allseas' unique flagship vessel is up and running was a rare and welcome bright spot in what has been a downbeat time for the marine construction and heavy lift sector.

Yme was the first commercial job for the twin-hulled *Pioneering Spirit*, with the Repsol-operated jackup production facility's 13,500-tonne topsides well within the lift vessel's capabilities, but it still represented the largest single lift ever undertaken offshore.

Bigger Tasks

Bigger tasks await the offshore behemoth. Next year in the U.K. North Sea it is set to tackle what will be a world-record single lift of Shell's Brent Delta platform topsides, weighing 23,000 tonnes.

The oil company's three other Brent platforms, Alpha, Bravo and Charlie, also are lined up for similar topsides



The *Pioneering Spirit* straddles its twin bows around the Yme platform before securing the structure, cutting the jackup facility's steel legs and lifting the 13,500-tonne topsides. (Source: Allseas)

removal work over the next few years under a contract and options awarded to Allseas in 2013. Those four Brent field topsides decks have a combined weight of more than 100,000 tonnes, with the heaviest weighing in at about 30,000 tonnes.

The contract also includes the removal of Alpha's steel jacket (the other three Brent platforms are concrete gravity-based structures). All sit in water depths of about 140 m (459 ft) about 186 km (115.5 miles) offshore.

Trial Run

A few weeks before the work on Yme was carried out, there was a crucial first offshore test for the topsides lift system beams on the *Pioneering Spirit*. It successfully installed a test platform topsides weighing 5,500 tonnes on a substructure in the K-13 Field in the Dutch sector of the North Sea Aug. 7.

The motion-compensated lift system accurately positioned the topsides, after which installation went exactly as planned, according to Allseas at the time. It also then carried out dynamic-positioning (DP) trials as well as a series of installation and removal trials with the test platform topsides under varying conditions.

The Class 3 fully redundant DP and maneuvering system was supplied by Kongsberg Maritime and relies on a distributed and open system design, employing a fully backed-up systemwide standardized communication network. This was a complete solution custom-made for the vessel's uniquely demanding duties.

The *Pioneering Spirit* has two fully equipped and redundant Kongsberg Navigation bridges, one fore, one aft and occupying separate fire zones. The "K-Bridge" system also utilizes radar transceiver interface technology and has the ability, for example, to combine radar images from multiple radar transceivers and display them as a single composite picture. This provides a 360-degree view around the vessel and eliminates blind spots, according to Kongsberg.

Yme Lift

It was after the successful test on K-13 that the maiden job on Yme about 100 km (62 miles) offshore was undertaken. The jackup facility stands on a trio of 3.5 m-diameter (11.4-ft) steel legs, which are inserted inside the field's subsea storage tank columns in a water depth of 93 m (305 ft).

Pre-lift preparation work by Allseas included the installation of temporary strain fenders around caisson and leg cutting and the design and development of leg-cutting equipment.

The sheer size of the *Pioneering Spirit*—measuring 382 m (1,253 ft) in length and 124 m (407 ft) in width—enables it to have a slot between its bows that is 122 m (400 ft) long and 59 m (194 ft) wide. This enables it to straddle platforms such as Yme and other larger facilities to remove topsides in a single lift. In this first case it used eight sets of horizontal lifting beams.

The fact that it can do this without the need for jacking down the platform also results not only in a simpler and safer operation but also further cost savings for the field operator.

Once in place, the Yme topsides were lifted and off-loaded in a matter of seconds, sea-fastened onboard and then transported to an onshore decommissioning yard at Lutelandet in Norway.

The vessel then returned to Rotterdam in the Netherlands for its remaining four topsides lifting beams of 65 m (213 ft) in length to be installed ahead of its work on the

Brent Field, which is due to start with the Delta topsides in the summer of 2017.

Motion Compensation System

The active motion compensation system is a crucial aspect that enables the vessel to undertake large lifts in harsh environments, in waves of up to 3.5 m in height, while eliminating impact forces on the topsides.

According to Allsea's Founder and President Edward Heerema, on Yme it worked absolutely to plan. "She was very steady on the waves, and the motion compensation system worked very accurately, so we were delighted with the performance," he said during an interview at the Offshore Northern Seas event in Norway, just days after the Yme work was completed.

Heerema, whose father Pieter Schelte Heerema famously was the first to think big and draw up the vessel's original design several decades ago, has made that vision a reality—albeit at a cost of more than \$2 billion. He pointed out that the vessel's next job for Shell will be another world record lift. "Nobody before has lifted 13,500 tonnes in the history of the offshore, but the Delta lift will be even more of a record because it will be 23,000 tonnes," Heerema said.

Doubters

While there were plenty of doubters out there who felt that the concept would never work, Heerema praised those—especially oil companies—who he said recognized the technical possibilities and potential. "They asked dozens of questions, critical questions, but we were able to convince them that it would work and they went with us, and that is also very remarkable," he said.

His faith in the giant single lift concept is now increasingly set to pay off. Aside from the Yme and Brent Field decommissioning work, Statoil also stepped forward, awarding Allseas a contract not for removal but for transportation and installation of topsides for three of the platforms for its Johan Sverdrup field offshore Norway, which is currently under development. It also has an option to install the interconnecting bridges between the drilling, processing and living quarter installations.

The topsides weights will range from about 19,500 tonnes up to 26,000 tonnes, with the installation work expected to get underway for the drilling platform's top-side in 2018, followed by the processing and living quarter topsides in 2019. The field is due onstream in 2020.

Big is beautiful

The *Pioneering Spirit* was built at Daewoo Shipbuilding and Marine Engineering's yard in Okpo, South Korea, after being ordered in 2010. With a topsides lift capacity of 48,000 tonnes and a jacket lift capacity of 25,000 tonnes, it is undoubtedly big.

But apparently not big enough. Allseas made it known in 2013, while the first vessel was being built, that it had a larger one on the drawing board.

Named *Amazing Grace*, Heerema said its concept emerged after Allseas carried out lifting studies for a number of clients that showed that for some older, very large platforms, even the *Pioneering Spirit* was not big enough. The second vessel, if it does come to reality, will

be able to lift wider, longer and heavier topsides than its predecessor. It could lift up to 77,000 tonnes, the company has said previously, with a vessel width put at 160 m (525 ft).

—Mark Thomas

EXPLORATION

UK Skipper Oil Heavier Than Expected

In a year when exploration and appraisal drilling offshore the U.K. has hit record lows, this week has provided some interesting results from ongoing operations.

Independent Oil and Gas (IOG) has produced initial results from its first operated appraisal well on the Skipper oil discovery in Block 9/21a (license P1609) in the U.K. Northern North Sea.

“Although the oil is moving in the reservoir, the first sample results indicate that the oil is approximately 11°API and has a significantly higher viscosity than expected,” IOG said.

“These measurements do not align with our observations and therefore the remaining samples need to be reviewed and tested. Next steps will then be reservoir modeling to consider potential development options. Determining commerciality may therefore take several months.”

The Skipper appraisal well was successfully drilled to a total vertical depth of 1,700 m (5,578 ft) in August 2016, with no safety incidents and achieved its primary objective of retrieving oil samples from the Skipper reservoir to optimize the Skipper field development plan.

The crest of the Skipper reservoir in the appraisal well was found to be 13 m (44 ft) shallower than prognosed. As a result, management’s estimate of the most likely oil in place has increased from 136.5 MMbbl in the 2013 Competent Persons Report to 142.6 MMbbl.

An increased distance between the crest of the reservoir and the oil water contact in any development will improve the likely oil recovery by delaying the onset of water breakthrough.

The quality of the sands, although not cored, suggested permeabilities in excess of 10 darcys, which is significantly better than previously assumed.

The initial license commitment on P1609, to drill a well into the Maureen Formation to a minimum depth of 1,700 m (5,578 ft), has been fulfilled and the license will proceed into the second term.

“The analysis of the oil retrieved from the appraisal well indicates that Skipper is a heavy oil discovery with similar gravity to other nearby heavy oil fields,” IOG CEO Mark Routh said. “We have observed that the oil

moves in the reservoir and is mobile at surface at ambient conditions.

“The initial oil analysis results are incompatible with our observations; therefore, we are now reviewing our strategy to establish the commerciality of Skipper,” Routh continued. “In addition, we have an increased oil in place, higher observed reservoir permeabilities and an increased reservoir height from the crest to the oil water contact.

“Drilling our first well as operator was a very important step for IOG and we now have an excellent portfolio of assets, comprising one-third oil and two-thirds gas. This is subject to completion of the Vulcan Satellite fields acquisition, which is expected in short order.”

IOG operates Block 9/21a with a 100% stake.

North Sea Exploration Results

Also on the U.K. exploration drilling front, a couple of wells recently have been completed and some others are still pushing forward.

Apache Corp. has plugged and abandoned exploration well 9/19b-19z on the Storr prospect using the *WilPhoenix* semisubmersible rig. The probe was spudded on June 30. The U.S. operator promptly kicked off 9/19b-19y using the same rig as it looked to evaluate Storr further.

Shell is drilling ahead with appraisal well 21/30-27 on the Belinda prospect. The probe is being drilled using the Ocean Patriot rig, which spudded the well on Sept. 8.

Nexen is drilling ahead with the 38/2-1 exploration well on the Komodo prospect. The well was spudded on Sept. 1 with the *Paragon MSS1* semisubmersible rig.

Hurricane Energy completed the testing and logging phase of the 205/21a-7 well on the Lancaster Field offshore the U.K. in September after the probe encountered a significant hydrocarbon column.

“Operations are now progressing as planned to permanently abandon the pilot well reservoir section prior to side-tracking the top-hole to form the 7Z horizontal sidetrack,” Hurricane said.

—Steve Hamlen

EXPLORATION

CGG Acquires Survey Basin Offshore Brazil

CGG has begun a large broadband 3-D multiclient survey in the presalt area of the deepwater Santos Basin, the company said in a news release.

Santos VII (Saturno), the third phase in CGG's presalt project called the Santos Basin Trilogy, will cover 13,900 sq km (5,367 sq miles). The acreage includes the Saturno prospect, which CGG said has no 3-D seismic coverage to date.

Plans are for the BroadSeis dataset to be acquired in two phases, running from September 2016 to June 2017 with processing set to take place CGG's Rio de Janeiro Subsurface Imaging Center. Fast-track products will be available in spring 2017, the company said.

"The project is designed to make ultramodern seismic datasets available as quickly as possible to support each phase in the presalt evaluation process in anticipation of Brazil's next presalt licensing round," CGG said.

The other two phases of the project are the Galaxy 3-D migrated grid and the Constellation reprocessing project.

Schlumberger, Petronas Sign Contract For Deepwater GoM Seismic Survey

Petronas, through its wholly owned subsidiary, Petronas (E&P) Overseas Ventures Sdn Bhd, has signed an agreement to license a significant part of the WesternGeco Campeche wide-azimuth deepwater multiclient seismic survey in the southern part of the Gulf of Mexico, according to a Schlumberger news release.

More than 80,000 sq km (30,888 sq miles) of newly imaged subsurface data, which have been acquired in the last 12 months, are available for oil and gas companies participating in exploration in Mexico. The project follows the Mexican government's opening of licensing rounds to nongovernment companies for the first time.

TGS Completes Acquisition Of 'Gigante' Survey

More than a year after kicking off its single largest 2-D seismic survey acquired, TGS has completed acquisition of its 186,000-km (115,575-mile) Gigante seismic survey offshore Mexico.

The task used five seismic vessels to gather a dense, modern, long offset regional 2-D seismic grid, according to TGS.

"Processing of the Gigante survey is ongoing with fast-track PSTM [prestack time migration] and preliminary PSDM [prestack depth migration] products available in advance of the scheduled licensing rounds," the company said. "Early interpretations of the seismic continue to shed new light on the geology in this region. Combined with TGS' multibeam, coring and geochemical analysis, these data are allowing geoscientists to evaluate the whole basin at a detailed level for the first time."

The company said it expects to finish the Gigante multibeam bathymetry coverage in early October and the seafloor coring in December.

—Staff Reports

TECHNOLOGY

Subsea Services Alliance Makes Plans For Riserless Abandonment System

The Subsea Services Alliance, a collaboration between Helix Energy Solutions Group Inc. and Schlumberger, have launched development of the first riserless open-water abandonment module (ROAM).

In a news release, Schlumberger said the 18¾-in. large bore system will enhance well abandonment capacity from a well intervention vessel by allowing tubing to be pulled in open water in a safe and environmentally contained manner.

The ROAM system, which will be engineered and built at the OneSubsea's Aberdeen manufacturing facility, is expected to be available in third-quarter 2017.

"We are taking this step in response to a market requirement to lower the cost of subsea abandonment that is impacting our customers globally," Mike Garding, president at OneSubsea, a Schlumberger company, said in a news release. "The ROAM system will extend our capability into true lower completion abandonment and also reduce the uncertainty of well integrity that our customers face when they proceed to upper completion abandonment operations."

—Staff Reports

POLICY

Brazil Should Pass Law Easing Petrobras' Subsalt Rights In 2016

A bill ending the requirement that Brazil's state-controlled Petrobras must lead all new projects in the country's Subsalt Polygon region should become law by year-end 2016, the president of oil industry association IBP said on Sept. 28.

Petrobras has repeatedly said its debt and financial problems have made it impossible for it to take part in large new investments in the Polygon, an offshore region near Rio de Janeiro where several of the world's largest recent oil discoveries have been made.

If such changes are not passed there is a chance that oil rights auctions planned for next year could fail like other recent auctions, IBP President Jorge Camargo said at a conference in Sao Paulo.

"We can only know the degree of attractiveness, the participation of investors in the next auction," he said. "If there is no change, we will repeat the last auction, which was a disaster."

Brazil's Senate has passed a bill easing Petrobras' subsalt rights. It is expected to pass the country's lower legislative chamber sometime after two rounds of municipal elections slated to end on Oct. 30.

After a decade of regular auctions that opened up the country's oil sector to international investment and led to the discovery of Brazil's subsalt region in 2007 and 2008, the governments of former President Luiz Inacio Lula da Silva and his successor, former President Dilma Rousseff, moved to increase state control of the sector.

Auctions stopped for five years and Petrobras' was given increasing control of the best new areas.

But when auctions began again, interest dropped off. At the last major sale in October 2015, Brazil was able to sell only 37 of the 226 blocks for sale.

Petrobras, the country's dominant player, did not bid for any blocks.

The company was made the sole operator of all new developments in the Subsalt Polygon, which covers most of the giant discoveries in undersea reservoirs trapped deep beneath the seabed by a layer of salt. Petrobras was forced to take at least a 30% financial stake in all such developments.

The company, overburdened with government-mandated fuel subsidies, saddled with nearly \$125 billion of debt and discredited by a corruption scandal, soon found itself unable to participate in any new subsalt development.

Ending those requirements is considered essential for the government to find the investment needed to reap the expected tax windfall from the subsalt oil and gas bonanza.

Mexico Gives Bidders More Time For First-ever Deepwater Venture

Mexico's oil regulator on Oct. 3 gave oil companies an extra week to submit comments and questions about the country's first-ever deepwater joint venture covering state oil company Pemex's Trion Field.

Potential bidders will now be able to submit comments through Oct. 10, the regulator, known as the CNH, said.

The CNH also approved a weeklong extension on the final publication of clarifications to the joint operating agreement between Pemex and its future partner to Oct. 14.

The regulator left unchanged the Dec. 5 date on which bids from prequalified companies or consortia will be unveiled and a winner announced.

"This is an additional space for participants to study, analyze and comment on this new version of the joint operating agreement," said CNH President Juan Carlos Zepeda.

The Trion light oil field is located in the Perdido Fold Belt, which lies just south of Mexico's maritime border with the U.S.

—Reuters

BUSINESS

UAE's Adnoc Will Consolidate Two Key Offshore Oil Firms

Abu Dhabi National Oil Co. (Adnoc) said on Oct. 4 it planned to consolidate the operations of two of its offshore oil companies into a new entity as part of a bigger restructuring of the United Arab Emirates' (UAE) main energy firm in the era of cheap oil.

The consolidation of Abu Dhabi Marine Operating Co. (Adma-Opc) and Zakum Development Co. (Zadco) "aimed at capitalizing on synergies to drive operational efficiency and maximize value," Adnoc said in a statement.

"The new company resulting from this integration will be more agile, better able to respond to changing market demands, and be well positioned to take advantage of strategic opportunities for future growth."

Current production for the Adma-Opc and Zadco offshore oil fields is about 1.2 MMbbl/d and Adnoc's plan is to boost output potential to about 1.6 MMbbl/d in 2017-2018.

The UAE, which is a member of OPEC, produces about 3.2 MMbbl/d.

The consolidation comes after Adnoc reshuffled its leadership in May, the first major shakeup since the appointment of Sultan al Jaber as CEO earlier in 2016.

The sharp drop in crude prices since mid-2014 has forced the oil industry to become more efficient amid tough competition.

“With Adnoc’s recent focus on driving efficiency, performance and profitability ... the consolidation of Adma-Opco and Zadco is a logical step,” said al Jaber, who is also UAE Minister of State, in the statement.

A steering committee will be formed by Adnoc and its joint venture partners—BP Plc, Exxon Mobil Corp., Japan Oil Development Co. and Total—to oversee the integration.

Yaser al-Mazrouei, CEO of Adma-Opco, will be co-CEO of Adma-Opco and Zadco. The consolidation is expected to conclude by early 2018, Adnoc said.

“The existing concession rights of our partners in the concessions currently operated by Adma-Opco and Zadco will not be affected by the consolidation,” al Jaber said.

“Adnoc will continue to review and consider all options, and pursue partners for concessions expiring in 2018,” he added.

Adnoc has a 60% share in Adma-Opco, with the remainder owned by BP, Jodco, and Total. Adnoc has a

60% stake in Zadco, while Exxon Mobil and Jodco hold the rest.

“This timely integration will serve to streamline operations, lending to greater efficiency and benefits for all stakeholders involved,” said Hiroshi Fujii, President and CEO of Jodco, which is owned by Japan’s Inpex.

Adnoc said it plans to invest more than \$25 billion in the next five years on boosting oil output from offshore fields as part of the UAE’s plan to boost its oil output capacity to 3.5 MMbbl/d by 2017-18.

Adma-Opco’s oil and gas production comes from two major fields, Umm Shaif and Lower Zakum. The company’s concession with its partners expires in 2018.

Zadco was established in 1977 to develop and operate the Upper Zakum Field, one of the world’s largest, with plans to boost its production capacity to 750 Mbbl/d by 2017-2018. It also operates Umm al Dalkh and Satrah fields.

—Reuters

BUSINESS BRIEFS

ROVOP Takes Delivery Of First US GoM ROV

ROVOP expanded its fleet of ROVs for the U.S. region, taking delivery of a new vehicle, which will be the first of its kind for the U.S. Gulf of Mexico (GoM), the company said Sept. 29.

The commercially proven Seaeye Leopard electric work-class ROV will help operators reduce costs by 40%. The ROV is compact and generates a significantly smaller footprint than other vehicles used in the GoM, the company said, adding that it can handle work tasks including drill support, pipeline surveys, exploration and salvage in strong currents, ideal for the GoM, where loop currents often stop operations.

RPSEA Releases Plan For Researching Industry Challenges Beyond 2016

On Sept. 26, RPSEA released its strategic plan for management of research into the oil and gas industry’s biggest technical challenges through 2016 and beyond.

Numerous new opportunities for research exist, highlighted by pressures on the industry through low commodity prices and increasingly stringent regulations, RPSEA said in a press release.

RPSEA said it has begun seeking broader sources of funding for projects and will continue pursuing government funding through various state and federal agencies.

It also is pursuing new project opportunities with individual energy companies, joint industry projects, foundations and nonprofits.

Under the strategic plan, RPSEA will continue using its technical advisory committees to identify research needs and create and manage strong teams to perform critical research, expand the scope of its environmental and safety committee and establish regulatory and investor committees.

RigNet Will Provide Managed Communications To Offshore Services Company

Technology solutions provider RigNet Inc. received a multivessel contract to provide its managed communication network to an international offshore energy services company that provides subsea contracting and well intervention.

RigNet also said Sept. 20 that, through the customer, it will provide communication services to a national oil company and the vessel owner for operations in Brazil.

Houston-based RigNet’s contract includes installation, commission, monitoring and maintenance.

BHP: GoM Mad Dog Economical At Current Oil Price

Phase 2 of BHP Billiton Ltd.’s Mad Dog offshore joint venture with BP Plc in the Gulf of Mexico was economical at oil prices below \$50/bbl, BHP said on Oct. 5.

Originally slated for development in 2013, the project has been deferred due to low oil prices and moves to reduce construction costs.

After losing three-quarters of its value from mid-2014 to early 2016, West Texas Intermediate prices have rallied more than 80% since February to nearly \$50/bbl.

Aker Solutions Add To Semisub Platform Offerings

The semisubmersible platform selection has grown as Aker Solutions has unveiled a new lighter-weight platform.

With topsides weighing about 6,000 metric tons, Aker Solutions claims the Lean Semi platform will help “producers unlock more marginal oil and gas fields in harsh environments across the globe.” The platform is capable



Aker Solutions targets marginal oil and gas fields with its new Lean Semi platform. (Source: Aker Solutions)

of bringing fields holding as much as 300 MMboe online in water depths ranging from 100 m to 400 m (328 ft to 1,312 ft), the company said in a news release.

Other features include an unmanned hull with a single flat top deck and a topside designed for standardized equipment, which makes way for easier placement of equipment skids and small modules on the deck.

“We envisage these platforms will be ideal in developing marginal resources that are located next to bigger

fields with excess processing capacity,” Valborg Lundegaard, head of Aker Solutions’ engineering business, said in a news release. “The concept combines lean design philosophy with the highest levels of safety.”

The new offering comes after Aker brought together elements from two designs—one for the North Sea and one for the Gulf of Mexico—following a review of platform items, Aker said. The goal was to enable a 60,000-bbl/d production capacity at a lower cost.

Equipment For Johan Sverdrup Arrives At Kvaerner Yard

A shipment of pile clusters and flotation tanks that will be installed on the largest steel jacket for the Statoil-operated Johan Sverdrup development in the North Sea have arrived at Kvaerner’s Verdal yard at Verdal.

Kvaerner shared news of the arrival Oct. 4, noting that the steel jacket is under construction.

The company said the Johan Sverdrup riser platform will be its biggest and most complex jacket from Kvaerner to date. “The four pile clusters and two sets of flotation tanks weighing 7,000 tonnes will be unloaded from transportation vessels to Kvaerner’s quay at Verdal,” a news release said.

—Staff & Reuters Reports

UPCOMING

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