

Siemens Takes Step Toward Making Subsea Power Grid Reality

With the depletion of existing onshore reserves, the industry is witnessing an upward trend in the quest for deepwater oil and gas exploration. It is also seeing an upward trend in production activities, which requires cost-efficient subsea processing developments, especially for long step-outs, marginal and dispersed fields. The result is that the demand for subsea power grids is expected to increase significantly over the coming years, and the race is on to deliver a reliable certified solution.

With the move to smaller and marginal fields managed by tieback requirements, subsea separation and boosting will grow and become more aligned with the move to greater digitization while the power requirements for subsea electric control is increasing. Without a subsea grid, these components will be fed individually from a topside power distribution network.

“The typical configuration today is what we call a point-to-point connection,” said Bjørn Rasch, product life-cycle manager for subsea systems at Siemens. “You have a single consumer of power that has been an individual power system, which is typically located topside. With what we call the subsea power grid, the umbilical feeds power to a subsea transformer, and because you have a high-voltage transmission, and it’s stepped down to a medium voltage, which can be distributed locally with medium voltage subsea switchgear. Then you have the variable speed drives that connect to each power consumer.”

The subsea power grid offers several advantages, including a simpler and cheaper umbilical as well as a more straightforward subsea electrical system design that offers flexibility and can be easily expanded if the situation demands.

Testing times

Siemens has taken another significant step forward this month with a field trial of its subsea power grid technology at the Dora drydock in Trondheim, Norway. The system, which includes the transformer, switchgear, variable speed drives and power management, will be tested for six months.

“It’s not only the power module, it’s a complete control system as well, with all the control functionality as it would be in a real installation, and all the condition and monitoring and functionality

in place,” said Endre Brekke, head of product development and management for subsea systems at Siemens.

Siemens has a wealth of onshore power transmission and distribution experience that it can call on for its subsea efforts. But as Brekke was quick to explain, the harsh pressure and temperature environment of subsea presents unique challenges.

“We have qualified technology that has been proven topside such as transformers, switchgear, variable speed drives and control,” he said. “You will see us adopting the kind of topology and technology that has been proven



Siemens is testing its subsea power grid technology at the Dora drydock in Trondheim, Norway. (Source: Siemens)

WHAT'S INSIDE

KrisEnergy Readies Development Plan for Apsara.....	2
Schlumberger Finds Buyer for WesternGeco Assets.....	8
Analysts: Subsea to be Main Solution for North Sea.....	9

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topside over many years, but it has to be redesigned explicitly for the environment.

“It all needs to be qualified to support the challenging subsea application and to meet the strict subsea standards,” he said. “That is the biggest challenge.”

Gaining control

The majority of the subsea control solutions used is based on using hydraulic systems. “If you look into the future and an all-electric future on the seabed, it requires a new electrical control system because the time requirements and behavior for electric actuation are very different from hydraulic valves,” Rasch said. “You have a much better response from electrical valves, and you need to have higher bandwidth on the communication channel, and you need to have deterministic behavior from the system.

“For communications, the current fiber optics are suitable for the physical assets, but for the electrical control, you require a high-performance communication protocol such as PROFINET or EtherNet/IP. That’s what we have done with the controls that we have developed for the power grid application, and we have further developed it for a lot more generic control system.”



A subsea power grid offers several advantages. (Source: Siemens)

According to Brekke, Siemens already sees this gradual transition to a subsea environment driven by the sharp drop in oil prices that heralded a new era of operational efficiency.

“There is a definite trend of going from electrohydraulics to electrical activators, which makes these concepts much easier to deploy because hydraulics is very specific to every process equipment, whereas if you opt for electrical activators, then the only thing we need to distribute is power and communication,” he said. “It’s easier to interface to third-party equipment that way because we don’t have complicated specific hydraulic interface.”

—Mark Venables

DEVELOPMENT

KrisEnergy Readies Development Plan for Apsara

KrisEnergy Ltd. is moving ahead with the Phase 1 development plan for the Apsara oil field offshore Cambodia in the Gulf of Thailand. It is the first hydrocarbon development project in the kingdom.

The company is close to finalizing the contractors for integrated drilling services and engineering, procurement, construction, installation and commissioning of a minimum facilities platform and a mooring production barge for the field, which is in the Block A concession.

“KrisEnergy is reviewing the submitted bids and is seeking clarifications with the participants,” Singapore-based KrisEnergy said in an operational update last week.

Tenders floated received bids from several engineering companies, including Keppel Shipyard Ltd. (Singapore), Offshore Oil Engineering Co. Ltd., Shanghai Zhenhua Heavy Industries Co. Ltd. and BOMESC Offshore Engineering Co. Ltd. (all three from China).

Contracts for Phase 1A are expected to be awarded by the end of the September quarter.

The Apsara Field, located in the eastern part of Block A in a water depth of 71 m (232.9 ft), is estimated to have contingent oil resources of 10.27 MMbbl of 2C and 18.08 MMbbl of 3C.

Phase 1A plan

The Phase 1 development plan will focus on development of hydrocarbon prospects in the northern part of the



The Apsara Field is located in the eastern part of Block A in a water depth of 71 m. (Source: KrisEnergy)

Apsara Core Development Area in Block A. It envisages drilling of 20 development wells; construction of single unmanned minimum facility 24-slot wellhead platform (Platform-A) and moored production barge capable to process up to 30,000 bbl/d of fluid with gas, oil and water separation facilities; and laying 1.5 km (0.93 mile) subsea pipeline to transport the produced oil to a permanently

moored floating, storage and offloading (FSO) vessel for Apsara oil field.

The FSO, however, will be procured on a lease basis.

Platform-A will be located to provide access to all potential well locations, maximizing access to the current known oil resources and the potential resources.

The unmanned platform and mooring system are to be installed before July 2019 to launch the drilling campaign. Development wells will be drilled in the northern part of the field.

Appraisal wells have confirmed the presence of individual and multiple oil accumulations throughout the Oligo-Miocene section in a large geographical area of the field. All six wells drilled on the Apsara Trend encountered total vertical net hydrocarbon play ranging from 22.2 m to 42 m (73 ft to 138 ft). Four of the six wells flowed oil at rates ranging between 410 bbl/d and 860 bbl/d during the tests.

First oil is scheduled in late October 2019. Production from Phase 1 is expected to peak at 10,000 bbl/d.

Future plans

After Phase 1 KrisEnergy plans to develop hydrocarbon prospects in the central and southern part of the field in the second (1B) and the third (1C) phases.

The next two phases of development, however, will be launched subject to the favorable and consistent production results from the previous phases.

“The individual oil accumulations in Cambodia Block A are small in size and spread over a large geographic area, requiring significant funds and time to fully develop. Additionally, reservoir production performance in the Khmer Basin has yet to be proven,” KrisEnergy said in a report. “For these reasons, among others, there is some uncertainty regarding long-term production rates, reserves and commercial viability, and therefore a phased development approach has been prudently adopted.”

Phase 1B, according to the company, involves construction and installation of up to three additional minimum facility platforms (B, C and D), similar to Platform-A, with associated 5 km (3.1 miles) pipelines tied back to Platform-A, in the central part of the field. The production barge and FSO vessel used in Phase 1A will process and store the produced oil.

Phase 1C will focus on the development of the prospects in the southern part of the Apsara, which include construction of five additional wellhead platforms similar to those employed in Phase 1A and Phase 1B, and central processing hub platform.

Besides Apsara, the operator discovered six more hydrocarbons prospects in Block A, including Poulo Wai, Basit, Angkea Sel, Rotanak, Bokor and Dai. They are to be taken up for development at the later stage.

KrisEnergy holds a 95% participating interest in Block A, with the Cambodia government holding the remaining 5%.

—Ravi Prasad

DEVELOPMENT BRIEFS

Exxon Mobil Selects Saipem for Liza Phase 2 SURF Job

Saipem has received more work for the Exxon Mobil affiliate Esso Exploration and Production Guyana Ltd. (EEPG)-operated Liza development offshore Guyana.

The latest awarded will entail Saipem performing detailed engineering, procurement, construction and installation of the risers, flowlines, and associated structures and jumpers for Phase 2 of the Liza development, Saipem said Aug. 21. The work, which comes in addition to contracts awarded to Saipem in 2017 for Liza Phase 1, would follow engineering, required government approvals and project sanction from the joint venture partners.

Plans for Liza Phase 2, which will produce an estimated 220,000 bbl/d, include more wells and related subsea equipment than Phase 1.

Saipem also will transport and install umbilicals, manifolds and associated foundations for the production and water and gas injection systems, according to the release.

EEPG is the operator of the Stabroek Block, where the Liza development is located with a 45% interest. Partners are Hess Guyana Exploration Ltd. (30%) and CNOOC Nexen Petroleum Guyana Ltd. (25%).

Premier Oil Approves Tolmount Gas Project in UK North Sea

Premier Oil will press ahead with the development of the Tolmount gas field in Britain's North Sea, which is expected to produce about 14 Bcm (500 Bcf) of gas from late 2020.

The approval of Tolmount is the latest in a series of moves by oil and gas companies showing their commitment to the North Sea, traditionally a high-cost environment, which is experiencing a revival as costs have fallen.

Premier expects to pay \$120 million for the development, which includes a minimal facilities platform and a pipeline, commissioned from Saipem, leading to Centrica's Easington terminal.



Construction for the project, in which Dana Petroleum holds 50%, is to start this year.

“The sanction of our...Tolmount project marks a major milestone for Premier and underpins our medium term U.K. production profile,” Premier Oil CEO Tony Durrant said. “Tolmount is one of the largest undeveloped gas discoveries in the Southern North Sea and is, in barrel of oil equivalent terms, similar in size to our Catcher project.”

Centrica Storage Ltd., a subsidiary of Centrica Plc, said it had been awarded a \$153 million contract to process gas from the field, which will extend the life of its Easington gas terminal in Yorkshire until at least 2030.

Centrica said it will modify the terminal so it can receive and process the gas from the Tolmount Field starting in the winter of 2020 when it is scheduled to come onstream. The field is expected to produce gas for 10 to 15 years.

Premier sees Tolmount’s peak production at about 8.5 MMcm/d (300 MMcf/d). This is enough to supply about 2.5 million homes.

First output at Premier’s Catcher Field marked a milestone for the company in December 2017, boosting a 10% output hike for 2018.

Tullow Oil Expects to Hit Output Capacity at Ghana TEN Field by 2020

Oil production from Tullow Oil’s offshore TEN Field in Ghana is expected to hit full output capacity of 80,000 bbl/d by 2020, a local manager said Aug. 15.

TEN, with reserve estimates of 240 MMbbl of oil and 60 MMbbl of associated gas, produces about 56,000 bbl, external affairs director Cynthia Lumor told reporters in Accra.

Tullow held back work at TEN, its second operation in the West African country, for nearly two years due to a maritime border dispute between Ghana and Ivory Coast. An international tribunal ruling last year on the dispute favored Ghana.

“Since the ruling, we’ve added one more well adding up to 11, and we will be drilling more to boost production toward plateau in 2020,” Lumor said.



The Tullow Oil-operated TEN Field development, located offshore Ghana, utilizes an FPSO. (Source: Tullow Oil)

Tullow had said it needed to drill 24 wells to complete the project.

Kosmos Energy, Anadarko Petroleum Corp., Ghana National Petroleum Corp. and PetroSA also have stakes in the TEN project, which flowed its first oil two years ago. The consortium also operates Ghana’s flagship 120,000 bbl/d offshore Jubilee oil field, which went onstream in late 2010 with reserves estimated at 800 MMbbl.

Infinity Lands Work on North Sea Seagull Development

Engineering firm Infinity said it has been awarded a contract to provide production assurance, pipeline integrity engineering and subsea technical assurance for the Seagull development in the North Sea.

The work will be in support of pre-FEED and FEED, Infinity said in a news release.

“To support this success, Infinity’s engineering division has moved to larger premises in Westhill, Aberdeenshire, and it is expected that an additional 10 employees will be recruited over the next 12 months,” the company said.

Seagull is being developed as a subsea tieback to an existing nearby platform. Neptune Energy Group recently

Tubular Bells
First Oil
November
2014

Jack/St. Malo
First Oil
December
2014

Lucius First Oil
January 2015

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announced it agreed to acquire U.K. Central North Sea exploration and development assets from Apache North Sea Ltd. The acquisition included Apache's 35% working interest in the Seagull development. First production is expected by first-quarter 2022.

DNV Scoops Penguins Deal

DNV GL has won a cross-service contract to support Shell's Penguins Field redevelopment offshore the U.K. The contract involves delivering an integrated verification and class project for the Penguins Field FPSO vessel.

The work will be led by a team from UK Oil & Gas, collaborating with the DNV GL Offshore Class unit in Norway and the DNV GL yard team in China and the Philippines.

The Penguins Field has a water depth of 165 m (541 ft) and lies 241 km (150 miles) northeast of the Shetland Islands. The project is a joint venture between Shell (50% and operator) and Exxon Mobil (50%).

Wood Wins Contract for Malampaya Deepwater Project in Philippines

Wood has landed a six-year contract with Shell to provide asset management services for the Malampaya deepwater gas-to-power project in the Philippines, Wood said in a news release Aug. 20.

The company said it will provide maintenance services, modifications and shutdown support as part of the contract that covers Shell's onshore facilities in Batangas and offshore assets in the Malampaya Field near Palawan Island.

The contract will be supported by Wood's presence in Manila and regional upstream hub in Kuala Lumpur, creating 60 new positions, the company said in the release.

Aker Solutions Wins Orders for Liuhua Umbilical Systems in China

Aker Solutions won orders valued at more than \$41.5 million to deliver power umbilical systems to China National Offshore Oil Corp.'s Liuhua oil fields in the South China Sea off Hong Kong.

The work scope includes more than 35 km (21 miles) of dynamic and static power umbilicals for the Liuhua 16-2, 20-2 and 21-2 fields, linking the subsea development to a new FPSO.

The static section of the Liuhua 16-2 umbilical will be engineered using Aker Solutions' advanced manufacturing process called OsciLay.

"OsciLay is a unique manufacturing method that addresses challenges of more extreme tension loads during installation, eliminating splicing of cables due to manufacturing weight limitations," said Greg Ross, Aker Solutions' vice president of subsea sales in Asia-Pacific. "OsciLay allows us to manufacture extremely long or heavy power umbilicals, which would otherwise be limited using conventional manufacturing approaches."

Aker Solutions' team in Malaysia will lead the engineering work, while production and manufacturing will take place at Aker Solutions' umbilical production facility in Mobile, Ala., in the U.S. Project delivery for Liuhua 16-2 and 20-2 is set for year-end 2019 and for Liuhua 21-2 in 2020. The order will be booked in the third-quarter 2018.

Neptune to Acquire UK Central North Sea Assets from Apache

Neptune Energy Group said Aug. 13 it has agreed to acquire U.K. Central North Sea development and exploration assets from a subsidiary of Apache Corp.

The acquisition included Apache's 35% working interest in the Seagull development and a 50% working interest in the Isabella prospect, both operated by Apache North Sea Ltd. The terms of the transaction weren't disclosed.

The Seagull development will consist of a multiwell subsea tieback project to existing nearby facilities that will commence during 2019 with first production expected prior to first-quarter 2022. Meanwhile, the Isabella prospect is considered one of the largest undrilled exploration opportunities in the Central North Sea, with planned drilling operations also commencing during 2019.

The acquisition provides Neptune with a low-cost, near-term development in close proximity to existing infrastructure and a material undrilled prospect. In addition, the deal demonstrates the company's commitment to the U.K. Central North Sea, which includes a series of recent acquisitions.

In June Neptune announced an agreement to acquire VNG Norge AS' portfolio of production, development and exploration assets on the Norwegian Continental Shelf. The agreement followed the closing of a \$3.9 billion acquisition of a majority stake in Engie SA's E&P business in February that included several fields in the U.K. and Norwegian North Sea.

Malaysia's Petronas Acquires 30% Equity in Senegal Oil, Gas Block

Malaysian oil and gas company Petroliaam Nasional Bhd (Petronas) said on Aug. 13 it has acquired a 30% stake in Senegal's Rufisque Offshore Profond Block, its first project in the West African nation.

Total will maintain operatorship of the block with a 60% ownership, Petronas said in a statement.

The block is located in the vicinity of significant recent oil and gas discoveries, the company said, and exploration drilling activities will begin in the block in 2019.

Petronas said taking the stake is part of an upstream strategy "to grow its exploration portfolio in West Africa, where it is operator of an ultradeepwater block in Gabon and currently looking to explore further in the region."

—Staff & Reuters Reports

EXPLORATION BRIEFS

Faroe Petroleum Farms into North Sea's Agar-Plantain Well

Faroe Petroleum has farmed into the U.K. Continental Shelf Agar Plantain exploration and appraisal well, near the U.K./Norwegian median line, operated by Azinor Catalyst Ltd., the company said Aug. 14.

The Plantain exploration prospect will be drilled first followed by a contingent sidetrack to appraise the Agar oil field. Operator volumes in Agar and Plantain have been estimated by Catalyst at a combined mid-case resource of 60 MMboe with an upside case of 98 MMboe. Plantain is an Eocene oil prospect that follows on from the original Agar oil discovery in 2014 (9/14a-15A) and the analogous Frosk oil discovery (24/9-12 S) made in Norway by Aker BP earlier this year.

Drilling on Agar Plantain is scheduled to begin in August using the Transocean Leader at a total estimated gross cost of \$15 million. Faroe joins Catalyst (25% and operator) and Cairn Energy Plc (50%) in this sole-risk well, the results of which will be announced on completion of drilling operations. Faroe's equity interest in this well is 25%, to be funded through existing cash resources, and through the same transaction will become a 12.5% equity interest holder in the wider P1763 license (Apache 50% and operator, Cairn 25% and Catalyst 12.5%).

This farm-in remains subject to the customary regulatory and third-party consents.

Eni Wins Exploration License, Lease Extension for Egypt Assets

Eni said Aug. 14 that a new concession agreement, aimed at governing an offshore exploration license in the prolific East Nile Delta Basin of the Mediterranean Sea, has received approval by Egyptian authorities.

The exploration license, named Nour, is located about 50 km (31 miles) offshore in the Eastern Mediterranean in water depth ranging from 50 m to 400 m (164 ft to 1,312 ft) and covers a total area of 739 sq km (285 sq miles). Eni plans to drill an exploration well in second-half 2018.

Nour is operated by Eni through its subsidiary IEOC. In the concession, which is in participation with Egyptian Natural Gas Holding Co., Eni holds an 85% stake in partnership with Tharwa Petroleum Co., which holds a 15% stake.

Also, Eni said that Egyptian authorities have authorized a new Nile Delta concession agreement allowing a 10-year extension of the Abu Madi West development lease, where the Nooros Field is located, and the execution of further exploration activities within El Qar'a exploration lease. These assets are located in the Great Nooros area.

In addition, Egyptian authorities have authorized a five-year extension of the Ras Qattara concession agreement and relevant development lease. Following this extension, a new drilling campaign in the Zarif and Faras fields will unlock remaining hydrocarbon reserves and allow further exploration activities within the Western Desert Basin.

Eni, through its subsidiary IEOC, holds a 75% stake in the Great Nooros area concession in partnership with BP, which has a 25% stake. The operator of Nile Delta is Petrobel, a joint venture between IEOC and Egyptian General Petroleum Corp. (EGPC).

In the Ras Qattara concession, Eni holds a 75% stake with partner INA (25%). The operator is Agiba, a joint venture between Eni's subsidiary IEOC and EGPC.

Exxon Mobil Acquires Stake in Block Offshore Namibia

Exxon Mobil Namibia, an affiliate of Exxon Mobil Corp., has entered an agreement with Namibian explorer Azinam Ltd. to acquire a 30% interest in petroleum exploration license (PEL) 44 offshore Namibia, according to a news release from Aug. 14.

Azinam, which is backed by the Seacrest Capital Group, will retain a 12.5% interest with Maurel & Prom, the license operator, retaining its current 42.5% equity interest, Azinam said in the release. NAMCOR, Livingstone Mining and Frontier Minerals would also retain their carried interests of 8%, 4% and 3%, respectively.

The acquisition is subject to government approval and other conditions.

PEL 44 is located in the Walvis Basin and covers 5,722 sq km (2,209 sq miles) in water depths ranging from less than 300 m (984 ft) to more than 2,500 m (8,202 ft). Azinam said in 2016 that it acquired a 2,000-sq-km (772-sq-mile) 3-D seismic survey, and following interpretation the company acquired an additional 1,160 sq km (448 sq miles) of new data. Data processing is ongoing.

"Since we announced our intention to drill multiple wells offshore Namibia, we have contracted the Ocean Rig Poseidon to drill Prospect S in PEL 71 and now welcome Exxon Mobil onto PEL 44," Azinam Chairman Erik Tiller said in the release. "We continue to be extremely active in our technical evaluation and in engaging the industry as we seek appropriate strategic partners to join us in the next phases of our license developments."

3-D Survey Clearly Identifies Colibri Target Offshore Jamaica

The high-grade Colibri target offshore Jamaica has been clearly identified on the fast-track version of the 3-D seismic dataset, United Oil & Gas Plc said in a news release.

The company said the fast-track version of the recently acquired 3-D seismic dataset over the Walton-Morant license offshore Jamaica was delivered by Tullow Jamaica Ltd., the operator. The target had previously been mapped on 2-D seismic.

The 3-D seismic survey, which spanned 2,250 sq km (869 sq miles), is part of a program focused on de-risking highly prospective Cretaceous- and Tertiary-aged clastic and carbonate reservoir targets mapped by Tullow on 2-D seismic data, according to United.

“The technical case for Colibri has been further strengthened by the recent identification of an active thermogenically derived offshore oil seep to the south of the structure,” United said in the release. “Processing and interpretation work is now underway, and the company

will provide a further update to the market once this has been completed and final volumes are available.”

United holds a 20% equity interest in the license. Tullow holds the rest.

—*Staff & Reuters Reports*

TECHNOLOGY BRIEFS

JFO Executes North Sea Projects

James Fisher Offshore (JFO) has delivered its hydraulic shear (the 1950Te), which is nicknamed Tiny, for subsea cutting projects for Subsea 7 on behalf of BP and Premier Oil in the North Sea.

Anything but small, Tiny is 4.5 m long by 1.2 m wide and 2.2 m high, with a jaw that can cut pipes or other subsea infrastructure over 1 m in diameter.

These versatile tool can be deployed by both ROVs or divers and can be hung either horizontally or vertically from the certified lifting points, thereby allowing access in the most challenging of situations.



Little Nipper is a subsea cutting tool with a jaw capacity of 1.2 m in diameter (Source: JFO)

The BP project, which was completed at the beginning of May, involved the recovery of flexible pipelines to the west of the Shetland Islands in Scotland. Tiny is designed to be deployed from a vessel and lowered by a crane to depths of 3,000 m (9,843 ft) and used to cut sections of pipe, which are then removed from the seabed by a 20Te Universal Grab and brought up to the surface on special recovery subsea baskets.

For the Premier Oil job, JFO was called into work on the decommissioning of subsea wellhead structures at the Balmoral field 200 km (124 miles) northeast of Aberdeen in 140 m (459 ft) of water. JFO developed a bespoke solution that would enable its topside equipment to work with Premier Oil’s own subsea kit, using Tiny to get the job done. Tiny managed 32 cuts and cleared the seabed of all scrap material.

JFO has also just created a new hydraulic shear that is said to be bigger, stronger and more powerful than Tiny. Dubbed Little Nipper, the cutting tool is 6 m long, 1.5 m wide and 1.8 m high and has a jaw capacity of 1.2 m. This new product means JFO now has the largest fleet of hydraulic ROV/diver-operated shears in the world.

Rotech Subsea’s Cable Grab Tool Executes First Campaign

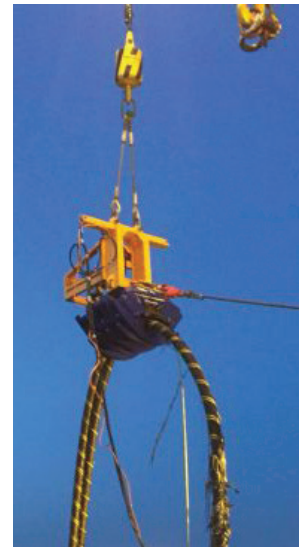
Rotech Subsea has released the RSG1, a cable grab system that has been deployed on a major North Sea renewables project, according to a press release.

The debut of the tool, designed and manufactured by Rotech’s in-house R&D division, heralds the launch of a new service from the subsea operator, which is now able to offer a cable deburial, cutting, grabbing, recovery and backfilling service.

In addition, Rotech said the RSG1 can be applied to umbilical recovery, pipeline recovery and rock removal/relocation applications.

Rotech’s RSG1 can operate in depths up to 200 m (656 ft) with a grab diameter of 50 mm to 1,100 mm and grip force of 50 kN.

Rotech Subsea said it had been awarded a follow-on project on the back of the successful campaign with the RSG1. The new contract will see TRS2 complete a backfilling scope of work for an undisclosed client.



The RSG1 cable grab system has been deployed on a major North Sea renewables project. (Source: Rotech Subsea)

Oceaneering Bags Equinor Contract for E-ROV Services

Oceaneering International Inc. said Aug. 13 its wholly owned subsidiaries have entered into a contract with Equinor ASA for a three-year term with two one-year optional extension periods to provide a resident, battery-powered electric ROV system to support subsea inspection, maintenance and repair activities.

The E-ROV system is expected to be deployed in water depths up to 1,000 m (3,280 ft) on the Norwegian Continental Shelf. Work under the contract is scheduled to commence in early December.

The E-ROV system is piloted from one of Oceaneering’s onshore Mission Support Centers, using the company’s proprietary Remote Piloting and Automated Control Technology, or RPACT. The RPACT transfers ROV control data and live, high-definition video with low latency, using a 4G mobile broadband signal transmitted

from a buoy on the water's surface. This technology also deploys machine vision learning and augmented reality

techniques, and allows efficiencies and versatility that lead to real-time control of the ROV and its tooling.

VESSEL BRIEFS

Report: FPSO Market to Eclipse \$115 Billion by 2024

The world's FPSO market can expect growth of 19%, surpassing \$115 billion in revenues by 2024, contends a report released by Global Market Insights in mid-August.

The report supports the forecast by citing rising demand for hydrocarbons and increased drilling activity by E&P companies. That growth will spur an 18% uptick in vessel conversions to FPSO.

Global Market Insights expects the expansion of redeployed FPSOs to exceed 22% by 2024, with demand for new-built vessels increasing along with ultradeep and sub-sea activities.

The report cites investment by Japanese companies into the offshore Brazil FPSO market.

Saab Seaeye: Cost of Anode Repair Cut with Cougar-XT

Saab Seaeye's Cougar-XT, an electric e-robotic underwater vehicle, is being used as a development platform for SubC's advanced, high-speed anode exchange procedure that enables repair, even in extreme weather conditions, and does not require a diver.

The Cougar-XT can cut costs by up to 75% compared to hydraulically delivered anode repair systems. The system, which comes as a skid, can be adapted for any size and shape of sacrificial anode.

The company is marketing the product as a resource for offshore wind installations, oil and gas fields and a range of



Two large FPSOs, *P-67* and *P-75*, arrived in Brazil several weeks after leaving the Qingdao facility in China. (Source: Petrobras)

maritime facilities, including anode repair at monopiles, jackets, ships and semisubmersibles.

Petrobras Receives Twin FPSOs from China

Petrobras said Aug. 20 that it has received twin FPSOs, *P-67* and *P-75*, after a voyage of several weeks from the Qingdao shipyard in China, where the hulls were converted.

P-75 will be the second FPSO to operate in the pre-salt Búzios Field after it is installed in August. The vessel, which was towed to Guanabara Bay in July, has a production capacity of up to 150,000 bbl/d of crude oil and 6 MMcm/d of gas.

The *P-67* arrived more recently and will operate in the Lula Norte section of the Lula-Cernambi Field in the Santos Basin.

—Staff Reports

BUSINESS

Schlumberger Finds Buyer for WesternGeco Assets in \$600 Million Deal

Shearwater GeoServices Holding AS is set to more than triple its fleet with the purchase of Schlumberger Ltd.'s marine seismic acquisition business for \$600 million cash, the companies said Aug. 22 in a joint statement.

The transaction includes the marine seismic acquisition assets and operations of WesternGeco, the geophysical services product line of Schlumberger, and is a fulfillment of Schlumberger's previously stated goal announced earlier this year.

In January Schlumberger said it intended to exit the land and marine seismic acquisition business due to the product line's failure to meet future return expectations. At the time, Schlumberger CEO Paal Kibsgaard called the decision difficult but inevitable.

"This has not been an easy decision to make. But following a careful evaluation of the current market trend,

our customers' buying habits and our current and projected financial return, it is an unfortunate and inevitable outcome," Kibsgaard said during the company's earnings call on Jan. 19.

Analysts with Tudor, Pickering, Holt & Co. (TPH) said they view the transaction as a slight positive for Schlumberger as it's an execution of the company's strategy and relieves the Houston-based oilfield services company of an "asset-heavy, highly cyclical group."

"We may be in the initial innings of an offshore upcycle, but we're content to see Schlumberger sell these assets," TPH analysts said in an Aug. 22 research note.

For Shearwater, a marine geophysical services company jointly owned by GC Rieber Shipping ASA and RAS-MUSSENGRUPPEN AS, the transaction will boost the Norwegian company's fleet to 14 vessels from four.

Shearwater CEO Irene Waage Basili said growing during the downturn has been part of the company's strategy, and it plans to continue down that path.

"We intend to grow, and we are committed to investing in technology and people to drive the efficiency of our services," Basili said in a statement. "We will have a strong balance sheet with the sector's lowest loan-to-value ratio and a leading cost position, which together with our technology and highly skilled people provide significant competitive advantages."

As part of the WesternGeco purchase, Shearwater will gain 10 high-end seismic acquisition vessels, including seven 3-D vessels and three multipurpose vessels configured to serve the ocean-bottom seismic market, 12 complete streamer sets with spares and two source vessels. The deal also includes WesternGeco proprietary marine seismic technology as well as development and manufacturing facilities in Norway and Malaysia.

Shearwater also said it plans to inject an additional \$50 million cash into the company as part of the transaction for working capital purposes "to ensure a more robust financial platform."

The company will cover the transaction's total \$650 million price tag with two separate \$325 million financings of new cash equity and debt.

RASMUSSENGRUPPEN has fully underwritten the equity issue, and GC Rieber Shipping intends to subscribe for roughly \$28 million of the total \$325 million before closing. The debt financing will be provided by DNB Bank ASA and Sparebank 1 SR-Bank.

After completion of the transaction, Shearwater will have nearly 600 employees and operate in all major offshore basins around the world. Schlumberger will also retain 15% equity interest in Shearwater.

In addition, Schlumberger will have an option to utilize two vessels from Shearwater on potential multiclient work for the first two years after closing the transaction, which the companies expect in fourth-quarter 2018.

Carnegie and DNB Markets were financial advisers to Shearwater in connection with the transaction, and Arntzen de Besche was its legal adviser. Pareto Securities was Schlumberger's financial adviser, and Advokat firmaet Schjødt AS was its legal adviser.

—Emily Patsy

Analysts: Subsea to Be Main Solution for North Sea

The North Sea region, including the maritime areas between the U.K., Norway, Denmark and the Netherlands, will see 63 oil and gas fields brought onstream between 2018 and 2023, of which 34 will be subsea tiebacks, according to analysts at GlobalData.

The Gulf of Mexico (GoM) region shows a higher ratio of subsea tiebacks to total projects than the North Sea. In the GoM, 30 projects are expected to go onstream by 2023, of which 23 are subsea tiebacks.

The North Sea, however, provides a higher average internal rate of return (IRR) at 45% for subsea developments, compared to an average of 32% in the GoM for the same type of development. From the total estimated capital spending of \$69 billion for planned and announced projects in the North Sea, \$14 billion will be spent on subsea tieback developments, according to GlobalData.

"Tieback developments become ideal solutions for operators looking to maintain the short- to medium-term production outlook, providing a quicker return to investment when compared to larger standalone developments," said Luis Pereira, an oil and gas analyst for GlobalData. "Average payback time is less than six years, the shortest time for all development type solutions."

By 2023, planned and announced fields in the North Sea are expected to contribute 1.6 MMboe/d, of which 500,000 boe/d are expected to come from subsea tieback projects.

Subsea tieback development options show an average development net present value per barrel of oil equivalent (NPV/boe) of nearly \$6 and an average IRR of 45%, noted the analysts.

"The rise of the number of subsea tiebacks projects in the North Sea is perhaps also due to the few large discoveries been made in the region, as is also the trend in the U.S. GoM. These types of developments become an

attractive solution for operators looking to fill the mid-term production outlook gaps with lower capital risks," Pereira added.

Projects offer proof

Evidence of the importance of subsea projects to the rebounding oil and gas industry can be seen by looking at activity so far in August alone in the North Sea—with subsea development awards and project sanctions backing up the forecast that subsea will dominate the region for the near future at least.

For instance, recently Premier Oil and its partner Dana Petroleum sanctioned the development of its U.K. North Sea Tolmount Main gas field. The Premier-operated Tolmount Main gas field, located in the southern North Sea, is expected to produce about 14.16 Bcm (500 Bcf) of gas (equivalent to 96 Mboe), with peak production of up to 8.50 MMcm/d (300 MMcfd), equivalent to 58 Mboe/d.

The project includes a minimal facilities platform exporting gas to shore via a new subsea gas pipeline. The capex required to develop this gas field is estimated at \$240 million, including project management and development drilling costs.

Meanwhile, Norway's Equinor has plans to tieback the Sigrun oil and gas discovery to its Gudrun Field facilities in the Norwegian North Sea, after firming up the field's reserves. Appraisal well 15/3-11 drilled on the 15/3-4 (Sigrun) oil and gas discovery shows the field contains reserves of between 7 MMboe and 12 MMboe.

The Norwegian Petroleum Directorate said the licensees in production license 025 "would assess the profitability of the discovery with regard to a potential development over the Gudrun field."

—Steve Hamlen

BUSINESS BRIEF



Stephen Auld

Stephen Auld to Head Sonardyne's Subsea Asset Monitoring Business

Stephen Auld has been named global business manager for Subsea Asset Monitoring at Sonardyne, an underwater engineering and technology company. Auld, who joined Sonardyne in June 2017, takes over for Stephen Fasham, who has been promoted to a newly created role within

the business focusing on growth and investment opportunities.

Asset monitoring is increasingly critical to oil and gas companies' ongoing safe and profitable operation of offshore infrastructure. Sonardyne's portfolio of acoustic positioning, sonar imaging, datalogging and wireless communications technologies has been used in a range of applications, including leak detection, riser monitoring, reservoir surveillance and pipeline creep.

Before joining Sonardyne, Auld was business development manager at Liquid Robotics Oil and Gas, which was a joint venture between Schlumberger and Liquid Robotics Inc. Before joining Liquid Robotics, he was managing director at CodaOctopus Products Ltd.

Woodside Petroleum Half-year Profit Rises

Australia's Woodside Petroleum Ltd. said on Aug. 15 that its first-half 2018 net profit rose 6%, and it raised its 2018

production outlook after strong performances from its Wheatstone and Pluto LNG projects.

For the 2018 fiscal year, Woodside said it now expects fiscal 2018 production between to 87 MMboe to 91 MMboe from an earlier outlook of 85 MMboe to 90 MMboe.

Production costs per barrel of oil equivalent across all operating assets for 2018 are expected to be between \$5.50 and \$5.80, Woodside said.

Australia's biggest listed oil and gas explorer reported net profit of \$541 million in the half-year ended June 2018 compared with \$507 million a year ago, aided by larger production volumes.

Production was spurred by a ramp-up at the Wheatstone LNG project in Western Australia. The plant's second production unit started up in mid-June and is ramping up as planned.

Wheatstone, run by Chevron Corp., is expected to contribute more than 13 MMboe to the company's annual output once it is fully operational.

Woodside said it expects to reach a preliminary tolling agreement between the North West Shelf Project participants and Browse joint venture in the third quarter of 2018.

Browse is seen as an important source of growth for Woodside but it has been on the drawing board for years as plans for onshore and floating LNG development estimated at \$30 billion to \$45 billion were scrapped.

The oil and gas explorer announced an interim dividend of 53 cents per share, up from 49 cents a year ago. Revenue for the first half came in at \$2.39 billion, a 27% rise from a year ago.

—Staff & Reuters Reports

UPCOMING

The next issue of *Subsea Engineering News* will be distributed Sept. 13. Until then, visit epmag.com.

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