

We're enhancing our subsea engineering coverage.

The final issue of *Subsea Engineering News* will be on Jan. 31, 2019. All our subsea engineering content will be made exclusively available at *HartEnergy.com* beginning Feb. 4, 2019.

The transition to *HartEnergy.com* means you'll get the same information you've come to rely on, plus much more.

Instead of waiting two weeks for your PDF publication, you will have 24/7 access to continuous coverage. As a *HartEnergy.com* subscriber, you also will have access to seven interest-based emails, including our new *Tech Direct* and *E&P Buzz*. No loss in coverage, just a faster way to get it.

Shell Develops Real-time Evaluation Technology For FPSO In Brazil



An FPSO is shown offshore Brazil in the Campos Basin. (Source: Leo Francini/Shutterstock.com)

Royal Dutch Shell subsidiary Shell Brasil has teamed up with ABS, SBM Offshore and Federal University of Rio de Janeiro (UFRJ) to develop tools for real-time evaluation of the impact of operating activities and environmental conditions on the degradation of FPSOs.

In addition, the project will develop new techniques for estimating the remaining time for safe platform operation.

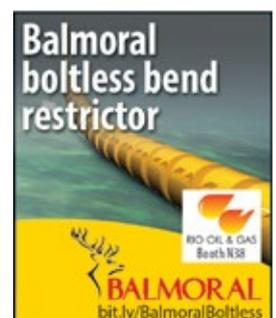
According to Shell Brasil, this new methodology represents a different approach to the current practice, in which the shelf life of the platform is estimated at the

The move comes as the Anglo-Dutch major aims to develop new technologies to increase operational safety, reduce costs and increase productivity and efficiency of its assets.

The project, which has an estimated investment of US\$1.5 million, was developed in Brazil over the last two years. It involves determining which parameters and information are vital for FPSO integrity assessment to define a standard for data acquisition and treatment at fields.

WHAT'S INSIDE

BP Green Lights \$1.3 Billion GoM Project	3
Equinor Closes UK Rosebank Acquisition From Chevron	5
Exxon Mobil Begins Drilling Offshore Guyana	7
Subsea Innovation Achieves World First DNV GL Type Approval ...	8





Guilherme Pinto

Guilherme Pinto, technology manager at SBM Offshore in Brazil, added, “We are very pleased to be part of this project. SBM believes it can deliver significant added value through its technical expertise, built with extensive experience in decommissioning, life extension and reallocation of FPSOs and its robust asset integrity program.”

design stage and its degradation by aging only at the end of the project. The new techniques will allow the company to estimate maintenance costs required to extend the operational life of FPSOs.

“Understanding the current condition and knowing how to predict changes in the structural integrity of FPSO units over their useful life is critical to support the decision on the appropriate timing for decommissioning or replacement,” said Shell Brazil Technology Manager José Ferrari. “This partnership with ABS, SBM Offshore and UFRJ is crucial to ensuring the delivery of something of value to the offshore industry.”

In addition to contributing to the optimized management of unit integrity, this new methodology will also enhance the safety of workers by minimizing exposure to repair and inspection interventions, and reducing the risk of structural incidents and deviations from normal operating conditions.

“This project is an opportunity for the university to join forces with the industry in developing advanced techniques and methodologies that will reliably guarantee the extension of the operational life of offshore platforms,” said Luis Sagrilo, a professor at the Laboratory of Analysis and Reliability of Offshore Structures (LACEO) for UFRJ’s civil engineering program.

Guilherme Pinto, technology manager at SBM Offshore in Brazil, added, “We are very pleased to be part of this project. SBM believes it can deliver significant added value through its technical expertise, built with extensive experience in decommissioning, life extension and reallocation of FPSOs and its robust asset integrity program.”

Sidney Bereicoa, ABS’s chief engineer, called the project “an important development opportunity to incorporate technological innovations” into ABS and international regulations applicable to the design and operational management of floating oil and gas production facilities. “It also highlights Brazil as a FPSO technology development center,” Bereicoa said.

The program will be funded by resources from the Research, Development & Innovation program developed by ANP, Brazil’s oil and gas regulator.

Shell’s output in Brazil is roughly 350,000 barrels of oil equivalent per day. Currently, Shell is the second largest oil company in Brazil. The company is present in the Abalone, Argonauta, Ostra, Bijupirá and Salema fields—all located in the Campos Basin.

The purchase of BG Group in 2016 further expanded Shell’s E&P assets in Brazil. With this transaction, the company gained interest in the main presalt fields: Lula, Sapinhoá and Lapa in the Santos Basin. Shell operates several blocks in the Barreirinhas Basin in addition to the S-M-518 (contract BM-S-54) in Santos, site of the Gato do Mato prospect.



Shell’s FPSO *Espirito Santo* has a storage capacity of more than 2 MMbbl. (Source: Shell Brasil)

In September, Shell Brazil—along with its partners Petrobras and Chevron—won an oil and gas contract at an auction organized by ANP. The contract gives the consortium 35 years to explore the Três Marias Block in the presalt Santos Basin, which is considered as one of the most prolific oil regions in the world.

—Brunno Braga

DEVELOPMENT

BP Green Lights \$1.3 Billion GoM Project

BP Plc is betting big on the U.S. Gulf of Mexico (GoM), where the company has unveiled a \$1.3 billion expansion of the Atlantis Field, exploration efforts have led to two oil discoveries and seismic imaging has uncovered 1 billion more barrels of oil in place near an existing field.

The British company, which aims to grow its net GoM production to about 400,000 boe/d in the next decade, shared the news Jan. 8. The move serves as further proof that the GoM continues to rebound and maintain the interest of the world's biggest energy players.

"We can see many opportunities for further development, offering the potential to continue to create significant value through the middle of the next decade and beyond," Bernard Looney, BP's upstream chief executive, said in a company release.

BP credited the development to recent breakthroughs in advanced seismic imaging and reservoir characterization. The technology, called full waveform inversion, combined with supercomputing power and a proprietary algorithm led to the discovery of an additional 400 MMbbl of oil in place at Atlantis.

The expansion project, called Atlantis Phase 3, will include constructing a new subsea production system from eight new wells that will be tied to the existing platform, which stands in more than 2,134 m (7,000 ft) of water.

A final investment decision on the project is expected in early 2019 from partner BHP, which holds a 44% interest.

If all goes as planned, the project will increase production by about 38,000 boe/d.

Production is scheduled to start in 2020, but two more phases of the development could be in store.

BP puts net hydrocarbons initially in place at the Atlantis Field at an estimated 1.7 Bboe. As of year-end 2017, about 11% of that had been recovered. That is expected to grow—thanks to technologies such as 4-D ocean-bottom nodes (OBN) seismic and distributed acoustic sensors—with plans for the new field underway plus the potential for additional phases and a water injection expansion.

Discovered in 1998, production began at Atlantis in 2007.

"Atlantis Phase 3 shows how our latest technologies and digital techniques create real value—identifying opportunities, driving efficiencies and enabling the delivery of major projects," Starlee Sykes, BP's regional president for the Gulf of Mexico and Canada, said in the statement.

The same seismic technology was used at the Thunder Horse Field, where BP said on Jan. 8 it has identified



The Atlantis Phase 3 project will include constructing a new subsea production system from eight new wells that will be tied to the existing platform. (Source: BP)

another 1 Bbbl of oil in place. The company said it plans to acquire additional seismic at both fields using OBN and its proprietary Wolfspaar seismic technology, which uses ultralow frequencies to see under deep layers of salt.

BP spokesman Jason Ryan told Hart Energy that BP is using full waveform inversion technology in other parts of the world, including the Caspian Sea and North Sea. The technology also could be used offshore Angola.

More than 10% of the Thunder Horse Field's 2.9 Bboe net estimated hydrocarbons initially in place have been recovered. Potential growth opportunities come with a new south shallow field in addition to a second south expansion and water injection expansion, according to BP. BP further added to its success in the GoM with news of two oil discoveries. The Manuel discovery hit oil in Miocene sandstone reservoirs. The discovery will be tied back to the Na Kika platform. BP did not say how much oil was found.

The other discovery, Nearly Headless Nick, also hit oil in the Miocene sandstone reservoirs. Plans are for it to be tied back to the Delta House facility. Operator LLOG Exploration said Jan. 14 that Nearly Headless Nick will be brought online in 2019. Partner Kosmos Energy reported in October 2018 that the prospect was drilled to a total depth of 5,807 m (19,052 ft) and hit 26 m (85 ft) of net pay.

Both discoveries are located in the Mississippi Canyon area of the GoM. BP has a 50% interest in Manuel

HARTENERGY **MERITORIOUS Engineering Awards**
 Now Accepting Your 2019 Engineering Technology Award Entries
 Submit to: Meaentry.com

with partner Royal Dutch Shell Plc. The company has a 20.25% interest in Nearly Headless Nick with partners LLOG Exploration Co. LLC, Kosmos Energy Ltd. and Ridgewood Energy.

Other major GoM projects underway by BP include Mad Dog Phase 2, which is on budget and on track to start up in late 2021. Costs for the project, which includes a new floating production platform called Argos, already have been cut to about \$9 billion from the initial \$20 billion. Currently, construction of the platform's hull is

underway at Samsung Heavy Industries in South Korea and development wells are being drilled at the field.

The new platform will have the capacity to produce from 14 wells up to 140,000 bbl/d of gross crude oil, compared with the existing platform's production capacity of up to 80,000 bbl/d of gross oil.

BP, the biggest oil producer in the GoM, said it has grown its production in the region since 2013 by more than 60% to over 300,000 boe/d.

—Velda Addison

DEVELOPMENT BRIEFS

LLOG Gears Up To Bring More GoM Wells Online

After bringing eight wells online in 2018 in the U.S. Gulf of Mexico (GoM), Louisiana-based LLOG Exploration has its sight set on bringing nine more wells online in 2019.

Of the nine new fields brought online last year in the GoM, five were operated by LLOG, said LLOG President and CEO Philip LeJeune.

“All of these accomplishments are evidence of our ability to continue to execute on our strategy of generating deepwater prospects in areas of proven success near existing infrastructure that can be drilled, developed and placed on production efficiently and economically,” LeJeune said in a Jan. 14 company statement.

LLOG said it plans to bring online four development wells from the Who Dat, Mandy and Red Zinger fields plus five wells from three new fields—Stonefly, Buckskin and Nearly Headless Nick.

“LLOG continues to progress 10 other developments and has an extensive pipeline of follow up development drilling to prior exploratory successes,” the company said in the release.

TechnipFMC Wins Work For BP's Atlantis Project In GoM

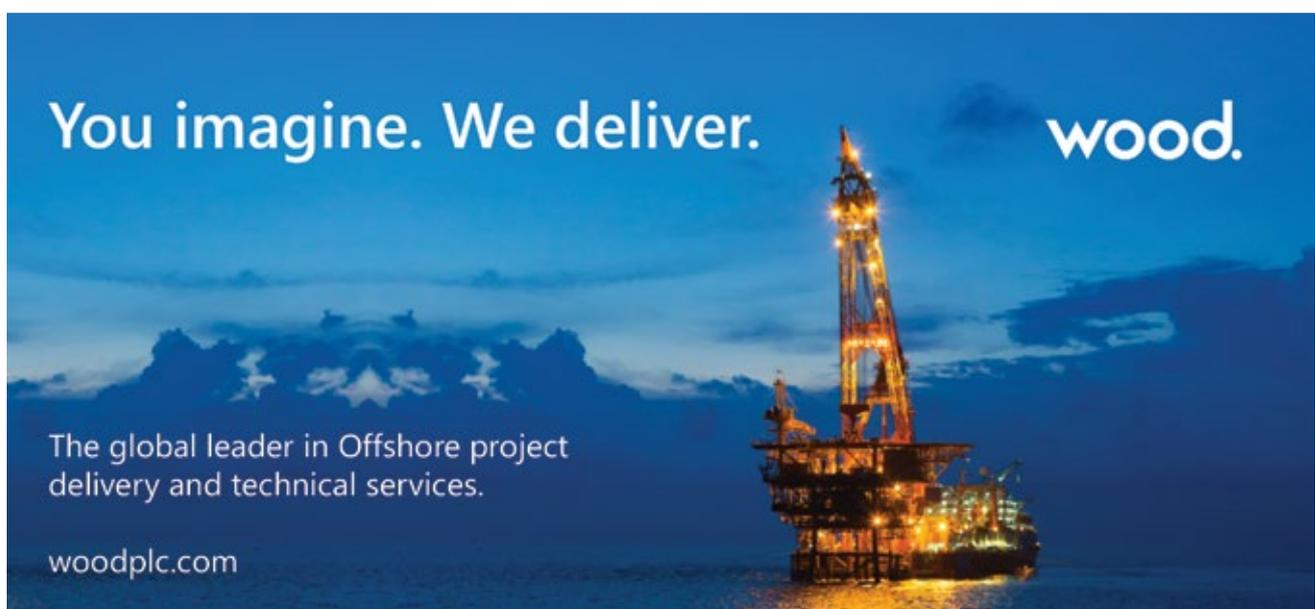
BP has awarded TechnipFMC an integrated engineering, procurement, construction and installation contract for the Atlantis Phase 3 project in the Gulf of Mexico (GoM), the company said Jan. 9.

The contract has a value between \$75 million and \$250 million.

After all partners make final investment decisions for the project, TechnipFMC will manufacture, deliver and install subsea equipment, including subsea tree systems, manifolds, flowline, umbilicals and subsea tree jumpers, pipeline end terminations, subsea distribution and topside control equipment, according to a news release.

The contract also includes provisional services for tooling and personnel required to install the hardware, the release said.

The Atlantis Phase 3 field is located about 241 km (150 miles) south of New Orleans at a water depth of roughly 2,100 m (6,800 ft) and will be tied back to the existing platform.



You imagine. We deliver.

wood.

The global leader in Offshore project delivery and technical services.

woodplc.com

Norway Clears North Sea's Oda Field For Startup

Norwegian authorities have approved the application for startup of the Spirit Energy-operated Oda Field in the North Sea.

Plans are for the subsea development to start production in February or March, the Norwegian Petroleum Directorate said in a Jan. 7 news release.

Total investments for the development are estimated at NOK 5.5 billion (US\$645 million).

Oda Field reserves are estimated at 5.2 million standard cubic meters of oil equivalents. This includes about 31.5 MMbbl of oil.

Produced gas from the subsea development will be sold to the Ula licensees for use as injection gas for alternating water and gas injection on the Ula Field. Oil will be exported via the Ekofisk Field to the Teesside terminal in the U.K.

Equinor Taps Danos For Deepwater GoM Job

Equinor has selected Danos to provide production operation support on the energy company's Titan SPAR platform in the deepwater U.S. Gulf of Mexico (GoM), according to a news release.

The Equinor project began late 2018 and employs production personnel on the floating drilling and production structure located at Mississippi Canyon Block 941 at a depth of nearly 1,219 m (4,000 ft), the release said.

Danos said it also has been awarded a multiyear contract for production operations with another major oil and gas producer in the GoM. The recent contract awards have enabled Danos to increase its production workforce by about 150 new employees, the company said.

Trendsetter Set To Deliver Equipment For West African Project

Houston-headquartered Trendsetter Engineering Inc. said it will deliver three template slot adapters (TSA) and associated Trendsetter Connection System connectors for a major operator in West Africa.

The equipment will be delivered in the first quarter of 2019.

"By utilizing the TSA, the operator will be able to reconfigure the template and associated manifold slots to allow for the tie-in of satellite trees without removing the existing wellhead systems or production guide bases," the company said in a news release. "This technology provides flexibility to add new wells, ultimately eliminating the need for specialized tooling and significantly reducing the vessel time necessary to complete the tie-ins that are traditionally required to connect the template to a satellite well."

IOG Expands UK Plans With Goddard Find

Independent Oil and Gas Plc (IOG) provided an upgrade on its core development project in the U.K. Southern North Sea, the company said on Jan. 8.

The company's two-phase Core Project has been expanded to include the 3 Bcm (108 Bcf) of 2C contingent resources assigned to the Goddard discovery by ERC Equipoise and now comprises a total of 12 Bcm (410 Bcf) of 2P+2C reserves and resources across six discovered gas fields.

IOG said this significantly enhances Core Project economics, delivering a 40% internal rate of return and peak annual production rate of about 4 MMcm/d (146 MMcf/d), up from about 3 MMcm/d (114 MMcf/d), with no increase in funding requirement.

Goddard's 108 Bcf of 2C contingent resource is discovered gas, which is development ready. The company believes these resources can be reclassified to reserves upon submission of the field development plan to the Oil & Gas Authority, which is planned for the first half of the year.

As previously announced, the project is technically ready to enter the execution phase, and Phase 1 prefinal investment decision (FID) engineering is complete. The company aims to reach FID within the first quarter of 2019 with first gas delivered within 20 months of FID.

Total Starts Production At Nigeria's Deepwater Egina Oil Field

Total SA said on Jan. 3 it started production from the Egina oil field off Nigeria's coast, part of a shift by the French energy firm toward deepwater oil and gas projects to drive cash flow.

Output from Egina, which is located in waters about 1,600 m (5,250 ft) deep, is expected to plateau at 200,000 bbl/d of oil, Total said. That rate is equivalent to about 10% of Nigeria's current production.

"Egina will significantly boost the group's production and cash flow from 2019 onward, and benefit from our strong cost reduction efforts in Nigeria where we have reduced our operating costs by 40% over the last four years," said Arnaud Breuillac, Total's head of E&P.

Total is betting on profitable deepwater oil and gas fields in Sub-Saharan Africa, Brazil and the U.S. Gulf area. In Africa the company is ramping up deepwater projects in the Republic of the Congo and Angola.

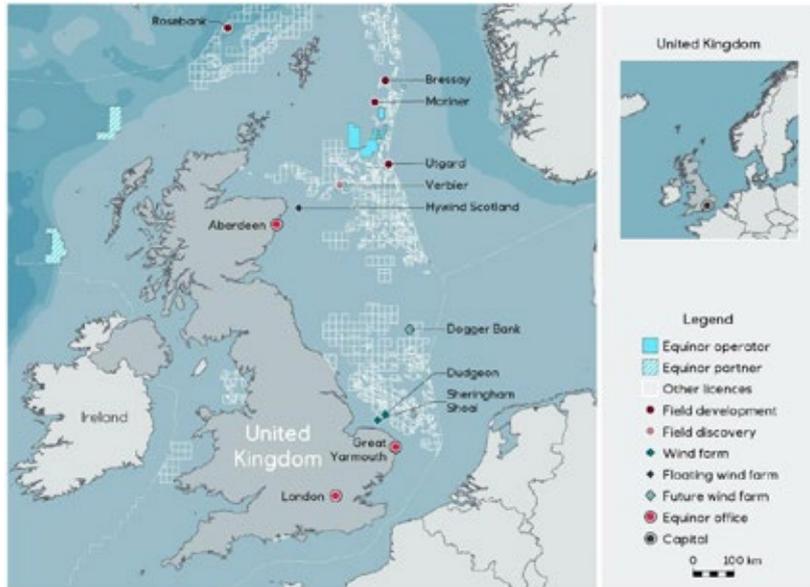
Total forecasts output from deepwater projects will reach 500,000 boe/d by 2020 and account for more than 35% of cash flow in coming years, compared with about 15% now.

Total also said it would make a decision this year on whether to invest in developing the Preowei Field, located in the same block as the Egina Field.

Equinor Closes UK Rosebank Acquisition From Chevron

Equinor said Jan. 11 it had completed the acquisition of Chevron Corp.'s stake in the U.K. Continental Shelf project, Rosebank, for an undisclosed sum.

The acquisition of Chevron's 40% operated interest was initially announced in early October 2018 and came as Chevron was looking to shrink its presence in the North Sea.



Equinor has added to its portfolio with the acquisition of Chevron's interest in the Rosebank Field. (Source: Equinor)

Rosebank is one of the largest undeveloped oil and gas fields off Britain. Chevron has estimated that the field, situated some 130 km (80 miles) northwest of the Shetland Islands, could hold more than 300 MMbbl.

The Rosebank project is estimated to cost more than \$6 billion, according to consultancy firm Wood Mackenzie.

Other partners in the field are Suncor Energy Inc. with 40% and Siccar Point Energy with 20%. Siccar Point is seeking to sell at least half of its stake.

Aibel Secures Johan Sverdrup Bridge Option From Equinor

Equinor has awarded Aibel the engineering, procurement and construction contract for the final bridge on the Johan Sverdrup Field, the company said on Jan. 3.

The 100-m (328-ft) bridge (YB005) will connect the P2 process platform with the riser platform (RP) at the field and weighs about 1,350 metric tons. The contract was included as an option in Aibel's initial contract for the Johan Sverdrup P2 topside awarded by Equinor in April 2018 and has an estimated value of about \$22.9 million.

The bridge is part of Phase 2 of the Johan Sverdrup project. This includes the jacket-based processing platform P2, modifications to RP and to the field center and Phase 2 of the onshore power plant at Haugsneset. These developments will expand production capacity from 440,000 bbl/d of oil to 660,000 bbl/d of oil. Production start for Phase 2 of the field is expected in the fourth quarter of 2022.

DeltaTek Secures Contract For Karish Project Offshore Israel

Energean Oil and Gas has awarded well construction specialist DeltaTek Global a contract to provide its SeaCure cementing technology for the Karish deepwater project offshore Israel.

SeaCure technology will be used for all 20-in. surface casings, which will be drilled from the *Stena Drill-MAX* in about 1,750 m (5,741 ft) of water, DeltaTek said in a news release.

The company described its technology as "a unique system, which delivers stabbed-in, inner string cementing for subsea wells." DeltaTek added that the technology brings down costs and saves time, including by eliminating shoetracks and cleanout runs, improving cement placement and reducing displacement among other benefits.

Aker BP Awards Optime Subsea Well Access Contract

Aker BP has tapped Optime Subsea to provide a well access system and services on the Norwegian Continental Shelf for the next two years, with extension options, according to a news release.



The Subsea Controls and Intervention Light System will be used on the Jette Field offshore Norway. (Source: Optime Subsea)

Optime Subsea said its Subsea Controls and Intervention Light System will be used as part of the long-term contract. The system will be deployed this spring on Aker BP's Jette Field as part of plug and abandonment operations and at Skogul for its installation campaign, Optime Subsea said in the release.

The value of the contract was not disclosed.

—Staff & Reuters Reports

EXPLORATION

Exxon Mobil Begins Drilling Haimara-1 Exploration Well Offshore Guyana



The *Stena Carron* drillship is drilling the Haimara-1 exploration well offshore Guyana. (Source: Hess Corp.)

Exxon Mobil Corp. said on Jan. 7 that it has begun drilling the Haimara-1 exploration well offshore Guyana, the first of two planned wells in January. The *Stena Carron* drillship is drilling the well, which is located 31 km (19 miles) east of the Pluma-1 discovery in the southeast Stabroek Block.

The *Noble Tom Madden* drillship is expected to drill the second well, Tilapia-1, about 5 km (3 miles) west of the Longtail-1 discovery. The Tilapia-1 well is located in the growing Turbot area.

“We continue to prioritize high-potential prospects in close proximity to previous discoveries in order to establish opportunities for material and efficient development,” said Steve Greenlee, president of Exxon Mobil Exploration Co. “Like the Liza and Payara areas, the Turbot area is on its way to offering significant development options that will maximize value for Guyana and our partners.”

Exxon Mobil is progressing the Liza Phase 1 development, which has moved into its peak execution phase ahead of expected startup in early 2020. Drilling of development wells in the Liza Field is continuing using the *Noble Bob Douglas* drillship, subsea equipment is being prepared for installation, and the topside facilities modules are being installed on the *Liza Destiny* FPSO vessel in Singapore.

Preparations are underway for the commencement of pipelaying activities in the Liza Field in the spring. The *Liza Destiny* FPSO is expected to sail from Singapore to arrive offshore Guyana in the third quarter of 2019.

The potential exists for at least five FPSOs on the Stabroek Block producing more than 750,000 bbl/d of oil

by 2025. Liza Phase 2 is expected to start up by mid-2022. Pending government and regulatory approvals, project sanction is expected in the first quarter of 2019 and will use a second FPSO designed to produce up to 220,000 bbl/d. Sanctioning of a third development, Payara, is also expected in 2019 with startup as early as 2023.

Exxon Mobil also plans to deploy a seismic vessel operated by Petroleum Geo-Services (PGS) to the Turbot area to acquire 4-D seismic data similar to a 4-D campaign conducted in the Liza area in 2017. A second PGS vessel has been released after seismic acquisition activities were suspended on Dec. 22 when vessels were approached by the Venezuelan navy in the northwest portion of the Stabroek Block.

Drilling and development operations offshore Guyana are unaffected by the incident, which occurred more than 110 km (68 miles) from the Ranger discovery, the closest of 10 discoveries made by Exxon Mobil in the southeast section of the Stabroek Block.

Exxon Mobil operates the Stabroek Block offshore Guyana under license from the government of Guyana. The acquisition of seismic data was being conducted under license from the government of Guyana in the country’s exclusive economic zone. Exxon Mobil is evaluating next steps for the seismic program.

Throughout its activities, Exxon Mobil continues to emphasize and promote direct benefit to local business. More than 50% of the Guyana affiliate’s employees, contractors and subcontractors are Guyanese, a number that will continue to grow as operations progress. Exxon Mobil, its partners and its contractors spent about \$65 million with more than 300 local suppliers during the first three quarters of 2018. The Centre for Local Business Development, established by Exxon Mobil in 2017 to promote the establishment and growth of small- and medium-sized local businesses, continues to enable access to training and capacity-building. More than 1,300 local businesses have registered with the center.

Exxon Mobil affiliate Esso Exploration and Production Guyana Ltd. is operator and holds 45% interest in the Stabroek Block. Hess Guyana Exploration Ltd. holds 30% interest and CNOOC Nexen Petroleum Guyana Ltd. holds 25% interest.

—Business Wire

EXPLORATION BRIEFS

Faroe Plans To Revise Brasse Volumes After Appraisal Work

Following results of an appraisal well sidetrack in the North Sea's Brasse Field, Faroe Petroleum plans to revise the field's volumes, the company said in a news release.

"The sidetrack well encountered a lower than expected net to gross ratio and a significantly deeper oil water contact," Faroe said on Jan. 11. "These new datapoints will now be incorporated in the Brasse geological models and an updated reserves range will be reported in due course."

Drilled to appraise the northern part of the Brasse Field, the appraisal well was drilled to a total depth of 2,254 m (7,395 ft). Faroe said wireline logging, pressure data and fluid sampling confirmed the well hit 62 m (203 ft) of gross hydrocarbon-bearing Jurassic reservoir and about a 20-m (66-ft) deeper oil water contact than the central and southern parts.

"Based on the extensive data collected from the four previous wellbores and the excellent quality sands encountered in the Brasse East exploration well 31/7-3 S, immediately to the east of Brasse and the northern appraisal sidetrack, the uncertainty range for the total gross volumes of recoverable hydrocarbons in the Brasse field will be revised," Faroe said.

The company said it would plug and abandon the well as planned.

Faroe's partner in the Brasse license areas is Vår Energi AS (50%).

Aker Confirms Successful Pecan-4A Appraisal Well Offshore Ghana

Aker Energy, operator of the Deepwater Tano Cape Three Points (DWT/CTP) Block, said Jan. 10 that it was near-

ing completion of a successful drilling operation of the Pecan-4A appraisal well offshore Ghana.

The well was drilled at the Pecan Field in the DWT/CTP Block, about 166 km (166 miles) southwest of Takoradi in Ghana, to a vertical depth of 4,870 m (15,977 ft) in 2,667 m (8,750 ft) of water. Pecan is the main discovery of seven discoveries date in the block.

The main purpose of the Pecan-4A appraisal well was to confirm Aker Energy's understanding of the geology in the area and to identify deep oil water contact in the Pecan reservoir. This was successfully proven.

"Based on these results, we will optimize the plan of development for the Pecan Field," said Aker Energy CEO Jan Arve Haugan. "There is still a lot of work to be done, including to conclude the phasing of the development, the size of first phase and detailing of the concept. Our most important priority going forward is to deliver a robust field development plan to the Ghanaian authorities."

Based on existing subsurface data from seismic, wells drilled and an analysis of the Pecan-4A well result, the existing discoveries are estimated to contain gross contingent resources (2C) of 450 MMboe to 550 MMboe. The next two appraisal wells to be drilled could boost total volumes in the plan of development (POD) to between 600 MMboe and 1,000 MMboe. In addition, multiple well targets have been identified to be drilled as part of a greater area development after the POD is submitted.

Aker Energy is the operator of the DWT/CTP Block with a 50% participating interest. Aker Energy's partners are LUKOIL (38%), the Ghana National Petroleum Corp. (10%) and Fueltrade (2%).

—Staff Reports

TECHNOLOGY BRIEFS

Subsea Innovation Achieves World First DNV GL Type Approval

Subsea Innovation Ltd., part of Tekmar Group Plc, has been awarded DNV GL type approval for its SIClamp structural pipeline repair clamp technology. In doing so, Subsea Innovation is the first manufacturer in the world to achieve this certification.

The new technology can act as a temporary or permanent structural repair clamp for carbon steel pipelines designed for water, oil or gas transport, according to the company. Emergency pipeline repair systems such as these are designed for immediate deployment should a subsea oil or gas pipeline become damaged or its integrity is found to be deficient due to corrosion or defect.

The clamps are designed for sizes between 8-in. and 44-in. and temperature ranges from -4 C to +80 C (24.8 F to 176+ F).



The SIClamp can act as a temporary or permanent structural repair clamp for carbon steel pipeline. (Source: Subsea Innovation Ltd.)

The technology was developed for operational offshore oil and gas platforms that have had working life extended and pipelines are required to last longer. With the increase in working life, emergency pipeline repair systems support this by maximizing operational life and production efficiency and can be deployed at short notice.

Subsea Innovation has delivered nine such systems in the last two years, which enabled the company to apply for the DNV GL type approval. Of these nine systems, five are ROV-automated, utilizing Subsea Innovations in-house designed hydraulic reversible bolt tensioners, which allows for installation and operational in deep water down to 1,350 m (4,429 ft). The company is developing systems for even deeper water, supporting global demand, with a previous client list that includes Subsea7, RasGas, Chevron and Impex.

Eni Deploys OPT PowerBuoy In Adriatic

Ocean Power Technologies Inc. (OPT) said its PowerBuoy has successfully been deployed in the Adriatic Sea to advance Eni's R&D MaREnergy project, which aims to develop, deploy and demonstrate suitability of wave energy renewable technologies in oil and gas operations.

The PB3 PowerBuoy will allow for remotely controlled field developments powered by wave energy, environ-



The PB3 PowerBuoy is being used to demonstrate wave energy renewable technology in oil and gas operations. (Source: Ocean Power Technologies Inc.)

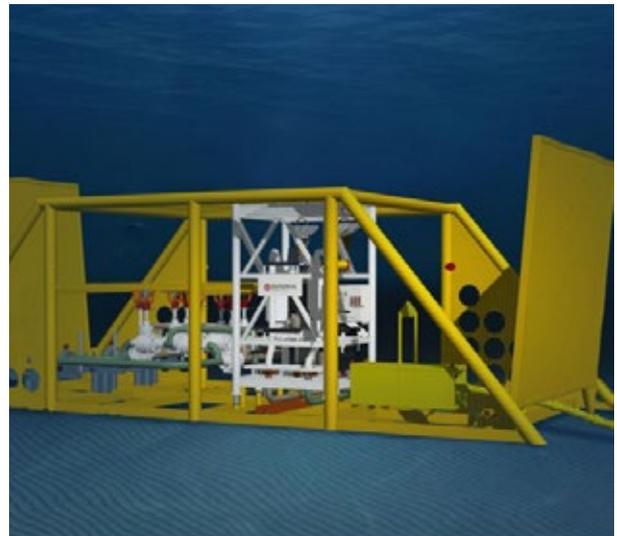
mental monitoring and offshore asset inspection using AUVs, according to the company. The unit demonstrates subsea battery charging, which eventually may be used to provide a standalone charging station and communications platform that would enable the long-term remote operation of AUVs.

OPT's PB3 PowerBuoy supports a suite of end user selectable mission critical payloads while extending their range of operation, lowering their operational costs and enabling real-time data transfer and decision-making.

The agreement between OPT and Eni provides for a minimum 24-month contract that includes an 18-month PB3 PowerBuoy lease and associated project management. OPT also will provide deployment support, remote data collection and monitoring. At the conclusion of the initial 18-month lease, and upon meeting technical metrics, Eni will have the option to either extend the lease for an additional 18 months or purchase the PB3 PowerBuoy.

Schlumberger To Deliver Subsea Boosting System For Vigdis Field

OneSubsea, a Schlumberger company, has been awarded an engineering, procurement and construction contract by Equinor for the supply of the industry's first all-electric actuated subsea boosting system for the Vigdis Field in the Norwegian North Sea.



OneSubsea's all-electric actuated subsea boosting system will be used in the Vigdis Field. (Source: OneSubsea, a Schlumberger Company)

The scope of the contract includes a pump station, with a manifold foundation and protective structure; and a pump module, topside equipment, umbilical, and all-electric controls with electric actuation.

Work was scheduled to begin in Bergen, Norway, in December 2018, and the first delivery is scheduled for February 2020.

—Staff Reports

VESSEL BRIEFS

Energean Signs New Gas Sales Deal for Karish and Tanin FPSO

UK-based Energean Oil & Gas has agreed to supply 5.5 Bcm of natural gas over 19 years, depending on the results of four wells drilled offshore Israel. The gas sales and purchase agreement is with IPM Beer Tuvia Ltd. and involves its *Karish and Tanin* FPSO.

Assuming necessary approvals are granted, the program will begin with the spud of Karish North in March, targeting 36.8 Bcm of gas with an estimated success possibility of 69%. Gas sales would begin in 2024 and Energean estimates revenues of \$900 million over the life of the contract.

The Karish and Tanin development expects first gas in the first quarter of 2021.

IPM, an independent power producer, is building a power plant with an expected in-service date in the second half of 2020. The plant will depend, in part, on gas from the Energean deal as a feedstock and will supply Israel's national power grid.

"This additional gas sales agreement aligns with Energean's strategy to secure offtake for the remaining spare capacity in our 8 Bcm/year FPSO and to commercialize the resource being targeted by our upcoming drilling program, providing competition and energy security to the Israeli domestic market," said Energean CEO Mathios Rigas.

"The signing of this contract ahead of results from our 2019 drilling program demonstrates not only the attractiveness of the Karish and Tanin fields but the strong incremental demand that we have identified for our gas, and we will continue to target additional sales," he added. "Our future sales contracts will target both the growing

domestic and regional export markets, delivering attractive incremental economics for all of our stakeholders."

Forum's New eROV Designed With Savings In Mind

Forum Subsea Technologies focused on cost when developing its newest ROV, the XLe Spirit.

"As the subsea market continues to recover from a sustained downturn, cost efficiency is high on the agenda for the industry," said Kevin Taylor, Forum's vice president of subsea, in a statement.

XLe Spirit is the first observation class ROV equipped with Forum's Integrated Control Engine, which provides it with a level of functionality typically only found in larger work class vehicles. Its ethernet interfacing integrates with other industry sensors using common IP architecture and ease of remote data transfer.

"By utilizing the same system across all vehicles, pilots only have one interface to learn as the skills are transferrable between the smallest observation vehicle and the largest trenchers," Taylor said. "This means training can concentrate on operational tasks opposed to control systems, providing further efficiencies."

Among the XLe Spirit's features are regulated propulsion power, optimized thruster orientation and location, accurate thruster speed control, and a wide range of auto-functions for positioning and flying.

Following 12 weeks of testing at Forum's facility in Kirkbymoorside, Yorkshire, the vehicle is now set for sea trials in the first quarter of 2019.

—Staff Reports

UPCOMING

The next issue of *Subsea Engineering News* will be distributed Jan. 31, 2019. Until then, visit EPMag.com.

JOBS

Looking for a new job in the industry? Find opportunities in the jobs section at EPMag.com/jobs.

CONTACT INFORMATION

LEN VERMILLION Group Managing Editor
Digital News Group
lvermillion@hartenergy.com

CONTRIBUTORS:

Velda Addison (Houston)
Brunno Braga (Brazil)
Mary Holcomb (Houston)

Ariana Hurtado (Houston)
Joseph Markman (Houston)
Emily Patsy (Houston)

Subsea Engineering News (ISSN 0266-2205) is published twice monthly by Hart Energy Publishing LLP, Houston TX, USA. Telephone: +1 713 260 6400; Email: sen@hartenergy.com or custserv@hartenergy.com; Website: www.epmag.com/subsea-engineering. Email for subscriptions: mpigozzi@hartenergy.com.

Copyright 2019. All rights reserved. Reproduction of this newsletter, in whole or in part, without prior written consent of Hart Energy is prohibited. Federal copyright law prohibits unauthorized reproduction by any means and imposes fines up to \$100,000 for violations. Permission to photocopy for internal or personal use is granted by Hart Energy provided that the appropriate fee is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. Phone: 978-750-8400; Fax 978-646-8600; Email: info@copyright.com.

2019 ANNUAL SUBSCRIPTION: £425 + VAT (WHERE APPLICABLE), \$675 USA. FOR MULTI-USER SUBSCRIPTIONS, CONTACT US OR CHECK THE WEBSITE. CREDIT CARDS ACCEPTED SUBJECT TO CHARGES.

HART ENERGY
1616 S. Voss, Suite 1000 • Houston TX 77057-2627 • USA
www.hartenergy.com | www.epmag.com



Follow us on Twitter [@Hart_EPMag](https://twitter.com/Hart_EPMag)