

Adapting to an Uncertain Future

Even though the sense of hopelessness that prevailed when the oil and gas sector last assembled in Stavanger two years ago had largely dissipated, uncertainty marked ONS 2018.

Oil and gas majors are facing a quandary. What does the future energy landscape look like and how should they prepare for it? The industry accepts that the future will be carbon-constrained, but the timescale for the transition is unclear, forcing companies to tread warily regarding future investments.

Adapt and innovate

The opening ceremony at ONS 2018, under the theme of “innovation,” brought together some disparate views and did more to highlight ambiguity than to plot a path forward. The event was opened by His Royal Highness Crown Prince Haakon of Norway, who called on the sector to face the future by adapting.

“To enjoy more golden moments in the future we have to reinvent ourselves, and no one knows this better than the oil and gas industry,” he said. “Over the past years, the oil and gas industry has gone through significant adjustments.

“In difficult times the industry has been able to reduce costs and increase efficiency and demonstrate a willingness to make long-term investments in new business models and technologies and adapt to a new market reality. The fact [is] global warming affects all industries, but particularly the energy sector.”



The opening of ONS 2018 brought together some disparate views and did more to highlight ambiguity than to plot a path forward. (Source: Hart Energy/Mark Venables)

He added the world population is growing and so too is the demand for energy. “Access to affordable, secure and clean energy is important to the development of our society,” he continued.

He threw the gauntlet down to the sector saying that it was up to the oil and gas industry to make a difference in delivering a sustainable future. “A green energy future is the long-term goal, and the oil and gas sector must play an important role with its knowledge, expertise and experience that is key to delivering new solutions,” he said.

Force of disruption

To set the context for the discussion, Ramez Naam, co-chair for energy and environment at Singularity University, took on the role of purveyor of doom with predictions that the age of oil will not end because the oil runs out. “My fondness is seeing technology move very rapidly and disrupt industry after industry,” he said. “Technology has a way of disrupting previous generations of technology.”

As an example, he pointed to Peabody, which in 2011 was the largest traded coal company in the world. Between 2011 and 2015 its stock price dropped from \$1,000 to \$2, and in 2016 it declared bankruptcy. It was not just one company that fell afoul of the market; there were seven large coal company bankruptcies in a five-year period. The total market capitalization of all listed coal companies fell by 90%.

“This did not happen because we stopped using coal power; in fact, coal is still the number one source of energy,”

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Naam said. “The coal market grew continuously from the 1850s until 2013 when it peaked. Those coal companies expected demand to keep rising, and they took on debt to build new facilities and infrastructure. When demand slowed the commodity price collapsed, and they found it very hard to service that debt and that led them into a death spiral.”

Initially, the coal demand was replaced by gas, but now renewables have become the fastest displacer of coal in the U.S. This demise of a prevalent energy source is not a new idea. Back in 2000 the Saudi oil minister Sheik Ahmed Zaki Yamani warned fellow oil Sheiks that the stone age didn’t end for lack of stone; the world will invent a disruptive technology that will disrupt the use of oil.

“I believe in the case of oil it will be at the hands of three technologies—the move from buying cars to buying rides, autonomy and electrification,” he said.

Making the right choices

Total CEO Patrick Pouyanné, while acknowledging that renewables play a significant role going forward, cautioned against too great a focus on investment in green energy that would leave a gap in the supply of energy.

“The world needs energy and more energy,” he said. “First, the world needs access to reliable, affordable and clean energy, and the three words are equally as important because you have 1.5 billion people in the world today that have no access to energy. Clean energy is important, but we should not forget the first two points. It is a combination of ambition and pragmatism. What we do not want is to have no fuel in 15 or 20 years because we have not done our job in developing new oil and gas resources. That is a real danger, so we have to be pragmatic.”

He explained that as an oil and gas company it looked at the most aggressive state, International Energy Agency’s 2oC Scenario. “I’m not saying it’s right, but by 2040 we will still need oil to deliver 25% of our energy needs, so we need more oil, and we need to focus on the low-cost resources to deliver that. We should not accept the simplistic speeches that oil will disappear.”

Changing times

Eldar Sætre, CEO of state-controlled Equinor, decried the fear of change and said the industry must embrace the transformation.



ONS 2018 was held in Stavanger, Norway, under the theme “innovation.” (Source: Hart Energy/Mark Venables)

“Change is often seen as a threat because we have to do things differently, but that is why we should view change and innovation as an opportunity to demonstrate responsibility and add great value in a long-term perspective,” he said. “In the future, energy will become even more in demand and essential to growth. I have no interest in innovation itself, after all, I am an economist, so I am interested in the solutions that come out of it to meet these new trends. Hence, we need to change and to be innovative to deliver a sustainable energy transition that will come from both outside and inside oil and gas.”

Aside from its well-reported commitment to offshore wind, Sætre spoke about lowering the carbon footprint of production. He reported that the average amount of CO₂ emitted to produce a barrel of oil is 17 kg.

“That number is simply unsustainable,” he said. “That is why Equinor is working hard to reduce that to 3 kg of CO₂ emitted from our next generation portfolio of oil and gas projects. There, the capacity is to produce 8 billion barrels of energy with only one-fifth of the current CO₂ emissions.

“We want to be part of the transition to a much more diversified energy mix, but the single most important thing we can do for the climate in the short term is to produce the oil and gas that the world needs with the lowest possible CO₂ and methane footprint.”

—Mark Venables

DEVELOPMENT

Eni Plans Merakes Drilling in March

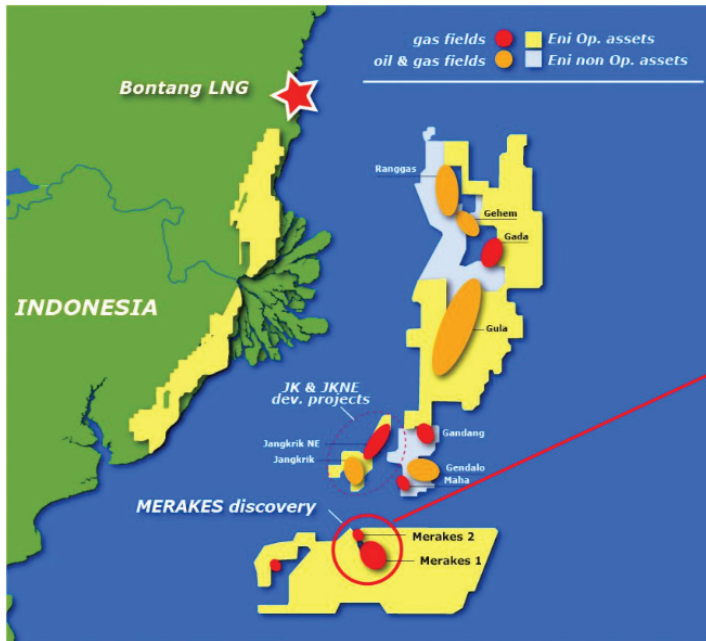
Italian major Eni is gearing up to develop the Merakes gas field offshore Indonesia in the East Sepinggan Block with a six-well drilling campaign in March 2019.

“East Sepinggan drilling is scheduled for March 2019,” said Wisnu Prabawa Taher, a spokesman for SKK Migas, Indonesia’s upstream regulator.

The operator has identified the sites to drill six wells as

part of a plan to develop the Merakes Field as a tie-in to the existing floating production unit (FPU) in the neighboring Jangkrik Field in the Muara Bakau concession.

The Merakes development plan, approved by the energy and mineral resources ministry at an estimated cost of about \$1.1 billion, includes construction of umbilical system, control system, infield flexibles and manifolds,



Eni identified sites to drill six wells as part of a plan to develop Merakes Field. (Source: Eni)

and laying subsea pipelines of about 50 km (31 miles) tied in to the existing Jangkrík FPU.

Produced gas will be shipped from the Jangkrík FPU to the Bontang LNG processing facility in East Kalimantan through an existing 72-km (44.7-mile) subsea pipeline.

The six development wells are scheduled to begin production in second-half 2020 and are expected to pump about 150 MMscf/d.

The new wells will target hydrocarbon reserves located in the Pliocene and other sediments in the field, which are estimated to contain in place reserves of 57 Bcm (2 Tcf) with potential for more. Merakes-1, the first exploration well, was drilled to a total depth of 2,640 m (8,661 ft) in a water depth of 1,372 m (4,502 ft) and encountered a hydrocarbon column of 60 m (196.8 ft) in high-quality sandstones in the lower Pliocene clastic sequence.

The appraisal well Merakes-2, drilled to a depth of 2,732 m (8,963 ft) in 1,269 m (4,163 ft) of water depth and encountered 17 m (55.7 ft) of clean sands with very good petrophysical characteristics of Pliocene age.

The Merakes Field is located in the northern part of central East Sepinggan PSC in water depth of 500 m (1,640 ft) in the Kutei Basin, 170 km (105 miles) south of the Bontang LNG Plant and 35 km (21.7 mi) from the offshore Jangkrík Field, also operated by Eni.

Sharing benefits

The operator is looking to utilize existing offshore production facilities developed for the nearby Jangkrík Field to reduce costs and time needed to develop the field. The Jangkrík FPU is a barge-type spread moored unit with a capacity that could be expanded to 800 MMscf/d.

“It [Merakes] provides the opportunity for the Jangkrík floating production unit to become a hub for the development of our nearby gas discovery Merakes. ... We will consolidate our near-field exploration strategy and operating model and maximize the integrated development of our projects also in Indonesia,” Eni CEO Claudio Descalzi said earlier.

The Italian company in 2017 developed the Jangkrík and Jangkrík North East fields in Muara Bakau PSC, located in water depths between 200 m and 500 m (656 ft and 1,640 ft), with 10 wells, an FPU and a 72-km (44.7-mile) subsea pipeline to an onshore terminal at East Kalimantan. It currently produces about 600 MMscf/d of gas, which supplies the local market and the Bontang LNG plant, which exports liquid gas to the countries such as Japan, South Korea and Taiwan.

The Jangkrík gas fields, located in a water depth about 500 m (1,640 ft), are estimated to contain total proven reserves of more than 37 Bcm (1.3 Tcf).

Future plan

Eni also has hinted at developing oil and gas prospects in the future in another nearby concession called East Galan PSC as tie-ins to the Jangkrík FPU. Initial geophysical studies have indicated the presence of a viable hydrocarbon system.

The development plan for East Galan, however, will be known after the assessment of hydrocarbon systems in prospective areas.

“This [East Galan] award expands Eni’s position and upstream activities in the East Kalimantan’s Kutei Basin, which is one of the most promising hydrocarbon provinces in Indonesia,” Eni said after being awarded the concession in May.

The operator secured the rights to explore East Galan during competitive bidding with a commitment to pay a \$1.5 million signature bonus and invest at least \$35.5 million during the exploration stage.

Eni is the operator of the East Sepinggan, Muara Bakau and East Galan production-sharing contracts, holding participating interests of 85%, 55% and 100%, respectively.

—Ravi Prasad

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LLOG, Partners Green Light Stonefly Project in GoM

LLOG Exploration and partners have sanctioned the Stonefly development in the U.S. Gulf of Mexico (GoM) as the Louisiana-headquartered company pushes forward with a bevy of other projects.

The two-well Stonefly, located in the Viosca Knoll area of the central GoM, will be developed as a subsea tieback to the Talos Energy-owned Ram Powell platform, LLOG said Sept. 4 in an operational update. The decision to sanction the deepwater discovery comes about two years after a well drilled by LLOG struck oil-bearing sands in the Middle Miocene. A second well drilled in 2017 also hit pay.

If all goes as planned, production is set to begin around December 2019, LLOG said. Stonefly partners are Beacon Offshore Energy Operating, Houston Energy, Red Willow Offshore and Ridgewood Energy.

The project is one of several underway by deepwater-focused LLOG. The company said it has already brought two wells online this year and plans are to bring online six more wells by year-end 2018. These include the LaFemme, Blue Wing Olive and Red Zinger prospects—all located in the Mississippi Canyon area and planned as tiebacks to LLOG's Delta House facility. The Claiborne prospect, being developed as a tieback to the Walter Oil & Gas-operated Coelacanth platform, is also on the list.

LLOG and partners Beacon Offshore and Ridgewood already have brought the Crown & Anchor development online in the GoM's Viosca Knoll area, LLOG said. The two-well development, which is tied back to Anadarko Petroleum's Marlin facility, produced at a combined rate of more than 10,000 boe/d when they went online in early June, the company said.

"We expect 2018 to be a milestone year as we bring online a number of wells and move forward with addi-

tional development projects," LLOG CEO Philip LeJeune said in the update. "Our strategy of generating deepwater prospects in areas of proven success and near existing infrastructure that can be drilled, developed and placed on production continues to serve us well and our standardized approach to development allows us to maintain a lower cost structure and generate faster cycle times."

Production also is scheduled to begin in 2019 for the Buckskin development, located in the Keathley Canyon area of the GoM. Installation of subsea facilities for the project, which will initially include two development wells and a 9.64-km (6-mile) subsea tieback to the Anadarko Petroleum-operated Lucius platform, will begin shortly, LLOG said in the update.

"In order to fully develop the field, which is estimated to contain nearly five billion barrels of oil in place, additional wells and subsea facilities will be required after the initial phase," LLOG said. The field is located in about 2,072.6 m (6,800 ft) of water.

Buckskin partners include Repsol E&P USA Inc., Beacon Offshore Energy Buckskin LLC, Navitas Petroleum LP and Ridgewood Energy.


Meanwhile, LLOG and partners Ridgewood Energy, Red Willow Offshore, CL&F Offshore and Houston Energy are evaluating whether a new floating production system will be needed to jointly develop the Khaleesi and Mormont discoveries "given the potential upside," LLOG said.


"Each of the two discoveries has been delineated by two wells and a sidetrack that discovered multiple oil-bearing Miocene horizons," the company said.

Both discoveries are located in the Green Canyon area.


—Staff Reports

Tubular Bells
First Oil
November
2014






Lucius First Oil
January 2015



Jack/St. Malo
First Oil
December
2014



Three Successful Startups, One Common Denominator

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DEVELOPMENT BRIEFS

McDermott Finishes Greater Western Flank Pipeline Work

McDermott International Inc. said it has finished the pipeline installation job it was selected by Woodside Energy Ltd. to carry out as part of Phase 2 of the Greater Western Flank project offshore western Australia.

The project, which is expected to start producing natural gas by year-end 2018, will develop resources from the Keast, Dockrell, Lady Nora, Pemberton, Sculptor and Rankin fields.

McDermott was responsible for procuring, fabricating, installing and testing pipeline buckle initiators, pipeline end terminations and foundation mudmats, in-line tee structures and about 35 km (21 miles) of a 16-in. corrosion-resistant alloy pipeline extending from the existing Goodwyn A platform to the Lady Nora and Pemberton field manifold locations, McDermott said Sept. 4.

To carry out the job, McDermott said it deployed its *DLV 2000* and *Lay Vessel 108* vessels and set up an onshore portable and temporary double jointing facility at its Batam fabrication yard in Indonesia to simulate the offshore installation campaign.

Located in water depths between 80 m and 130 m (262 ft and 426 ft), the Greater Western Flank Phase 2 fields are about 40 km to 60 km (29 miles to 37 miles) southwest of the Goodwyn A platform.

Aker Energy Plans to Submit Plans for Ghana Field in 2019

Aker Energy will delay submitting a plan for development of its block offshore Ghana until early next year to allow time to complete appraisal drilling, expected to start in October, the company's CEO said.

The unlisted firm, controlled by Norwegian billionaire Kjell Inge Røkke, bought a 50% stake in Ghana's Deepwater Tano Cape Three Points (DWT/CTP) Block from Hess for \$100 million in February.

Aker had initially intended to submit a development plan in second-half 2018 but has since changed its mind.

"The forecast now is to start drilling in October. ... Our goal is to identify the oil/water contact to update the reservoir model," CEO Jan Arve Haugan told Reuters on the sidelines of an energy conference.

Aker Energy plans to make a final investment decision and to submit a field development plan to Ghanaian authorities early next year, with production seen starting in late 2021 or early 2022, Haugan said.

The plan involves developing about 400 MMbbl of oil by using an FPSO.

"We believe that we should be able to increase the volumes further, but that depends on the recovery rate and on the possibility to tie in nearby discoveries," Haugan said.

The volumes in place are estimated to be more than 1 Bbbl, he added.

The company has signed a letter of intent to use Maersk Drilling's *Maersk Viking* drillship, which was previously

employed by Exxon Mobil and is currently located in the U.S. Gulf of Mexico, Haugan said.

Aker Energy holds 50% in the DWT/CTP Block with Lukoil (38%), Ghana National Petroleum Corp. (10%) and Fuel Trade (2%).

Equinor Explores Floating Wind Turbines to Power North Sea Oil Fields

Norway's Equinor said on Aug. 28 it is considering whether to build a pioneering offshore wind farm with floating turbines to supply electricity to two North Sea oil fields as part of a strategy to curb greenhouse gas emissions.

The project at the Gullfaks and Snorre oil fields would cost about \$592 million and could reduce Norway's emissions of CO₂ by more than 200,000 tonnes per year, Equinor said.

"This could be the first time an offshore wind farm is directly connected to oil and gas platforms," state-controlled Equinor said in a statement. The two fields are powered by generators running on natural gas at the platforms.

A final investment decision on the plan for Snorre and Gullfaks, known as the Hywind Tampen floating wind farm, will be made in 2019, according to Equinor. The company will seek to reduce the cost from the preliminary estimate.

Equinor said it hoped Norwegian government subsidies would cover half the capex for the project, where 11 turbines, each with a capacity of 8 MW, would meet about 35% of the power demand from the two fields.

Electricity generation costs could be 40% to 50% less than the \$229/MWh at the Scottish project.

The Gullfaks Field is owned by Equinor, OMV and Norway's state-owned Petoro, while Snorre is held by Equinor, Petoro, Exxon Mobil, Idemitsu, DEA and Point Resources.

M2 Subsea Finishes Survey, Inspection Project for Stella Field in North Sea

ROV services provider M2 Subsea has completed a contract with Ithaca Energy UK Ltd. that involved conduct-



The *Go Electra* multiservice vessel was used to help deploy the Triton XLX ROV to carry out work in the Stella Field. (Source: M2 Subsea)

ing a subsea system survey of the Stella Field in the North Sea, according to a news release.

The company said it deployed the *Go Electra* multiservice vessel, equipped with a Triton XLX work class ROV, to the field located 280 km (174 miles) off Aberdeen with a water depth of 85 m (279 ft).

The scope of work included the survey and inspection of subsea systems, including pipelines and subsea structures.

M2 Subsea said it mobilized a team from its Aberdeen headquarters to carry out the work.

ABB Aims to Deliver Fastest Upstream Startup for Aasta Hansteen's First Gas

ABB is set to deliver what it believes to be the world's fastest startup when Equinor's Aasta Hansteen gas field begins operating and produces its first gas later this year.

ABB is in the final phase of providing a suite of innovative ABB Ability digital technologies for Aasta Hansteen, which is located in 1,300 m (4,265 ft) of water in the Voring area of the Norwegian Sea.

To accomplish the task ABB needed to reduce more than 1,000 manual interventions to as few as possible. The outcome is a series of buttons that are as simple as starting a car.

"Our teams went through the startup steps, identified and defined obstacles that needed to be improved, then used our ABB Ability System 800xA simulator to do a virtual startup of the plant," said Per Erik Holsten, managing director for ABB Oil, Gas and Chemicals. "At this stage we made a lot of improvements for starting up and operating the plant. Through automating much of the process, we managed to reduce a complex set of manual interventions to just 20, which means we are all set to deliver what we believe to be the world's fastest startup at first gas."

The company estimates it saved about 40 days in the commissioning phase of the project, or nearly 2,700 man-hours by using ABB's simulator to identify and improve 57 areas in the startup. The simulator, part of a larger suite of digital technologies being implemented by ABB at Aasta Hansteen, minimizes risk and reduces the occurrence of unplanned shutdowns, while improving safety, productivity and energy savings.

Wood Lands Maintenance Data Build Contract from Total

Wood has secured a new four-year contract with Total Denmark E&P to provide the development and delivery

of a significant operations readiness assurance scope for the Tyra redevelopment project in the Danish North Sea, the company said Aug. 27.

The oilfield service company will deploy its integrated maintenance database to build Total's SAP maintenance management system. The IMD enables the creation and manipulation of hierarchical equipment lists, job plans and tasks, task lists, object lists, bills of material, routes and planned maintenance, according to a news release.

Tyra is Denmark's largest gas field and its redevelopment constitutes the largest oil and gas investment ever made in the Danish North Sea. The project is expected to extend the life of field for the next 25 years.

Equinor Increases Estimate for Giant Sverdrup Oil Field

Equinor has increased its resource estimate for the Johan Sverdrup oil field, the North Sea's largest discovery in more than three decades, while cutting the cost of development.

The field is believed to hold 2.2 Bboe to 3.2 Bboe, up from a previous forecast of 2.1 Bboe to 3.1 Bboe.

The overall cost of developing the field has been cut to \$15 billion, down some \$714 million since February, Equinor said, as it presented its investment plans for the field's Phase 2.

"Johan Sverdrup is on track to deliver vast volumes of energy with high profitability and low emissions for many decades to come," CEO Eldar Sætre said.

The field will produce up to 660,000 bbl/d at its peak, with a breakeven price of less than \$20/bbl. While Phase 1 of the development is on track to start production in November 2019, Phase 2 is planned to begin pumping in the fourth quarter of 2022.

"Full field development of Johan Sverdrup is projected to contribute more than 900 billion [crowns] in income to the Norwegian state over the lifetime of the field," Equinor said.

Equinor operates the field and holds a 40% stake. Partners are Lundin Petroleum (22.6%), Petoro (17.36%), Aker BP (11.57%) and Total (8.44%).

The operator and its partners will invest about \$5 billion into Phase 2, about \$477 million less than an estimate made in February. It will put about \$10 billion into Phase 1, a reduction of about \$238 million. Since announcing its initial plans for the field in 2015, Equinor has cut the investment cost by more than \$9 billion, the company said.

—Staff & Reuters Reports

EXPLORATION

Exxon Mobil, Hess Say Hammerhead Hits Oil Offshore Guyana

The winning streak continues offshore Guyana for Exxon Mobil Corp. and partners. A ninth discovery in the Exxon-led exploration effort has ushered in a new play concept for potential development.

Hammerhead-1, which is located about 21 km (13 miles) southwest of the Liza-1 well, hit about 60 m (197 ft) of "high-quality, oil-bearing sandstone reservoir" after being drilled to a depth of 4,225 m (13,862 ft) in a water

depth of 1,150 m (3,373 ft), Exxon Mobil said in a news release Aug. 30.

“The Hammerhead-1 discovery reinforces the potential of the Guyana Basin, where Exxon Mobil is already maximizing value for all stakeholders through rapid phased developments and accelerated exploration plans,” said Steve Greenlee, president of Exxon Mobil Exploration Co., in the release. “Development options for Hammerhead will take into account ongoing evaluation of reservoir data, including a well test.”

The well was drilled by the *Stena Carron* drillship on the Stabroek Block, where Exxon Mobil affiliate Esso Exploration and Production Guyana Ltd. has made four other discoveries in the past year.

The Hammerhead discovery brings the total count up to nine. These include Liza, Liza Deep, Payara, Snoek, Turbot, Ranger, Pacora and Longtail, amounting to what could be more than 4 Bbbl of estimated recoverable resources.

The discoveries, including the latest, received praise from analysts.

“Guyana is set to create the greatest value of any offshore basin since the downturn,” said Maria Cortez, Latin America upstream senior research manager for Wood Mackenzie, in a statement. “Exxon Mobil’s latest discovery, Hammerhead, is another play-opener and adds to more than 4 billion barrels of oil equivalent of reserves through an exploration program with a success rate that now stands at 82%.”

Exxon Mobil said up to five FPSOs could be needed to produce more than 750,000 bbl/d of oil from the discoveries by 2025.

“Hammerhead is another significant oil discovery that further demonstrates the tremendous prospectivity of the Stabroek Block, where we continue to see multibillion barrels of additional exploration potential,” Hess CEO John Hess said in a separate news release. “This ninth discovery further enhances our potential to maximize value through rapid phased development.”

Work is already progressing on Liza Phase 1 in hopes of hitting first oil by early 2020. Plans are to use the *Liza Destiny* FPSO to produce up to 120,000 bbl/d, Exxon Mobil said, adding construction of the FPSO and subsea equipment is “well advanced.” Phase 2 of the development calls for another FPSO to produce up to 220,000 bbl/d. If sanctioned, a decision for which is expected by year-end 2018, production from Liza Phase 2 could begin in 2022.

“A third development, Payara, will target sanctioning in 2019 and use an FPSO designed to produce approximately 180,000 barrels of oil per day as early as 2023,” Exxon Mobil said in the release.

The Payara Field is located about 19 km (12 miles) northwest of Liza. The company increased its estimates



The Hammerhead-1 well was drilled by the *Stena Carron* drillship on the Stabroek Block. (Source: Hess Corp.)

of gross recoverable resources for the block in 2017 after encountering additional oil in the Payara reservoir, solidifying its status at the time as the second largest field discovered by the company offshore Guyana.

In addition, Exxon Mobil said in July that the Longtail well—the eighth discovery on the block—set up the Turbot-Longtail area as a possible development hub for more than 500 MMboe. But that estimate could grow.

The Stabroek Block, which has already proven prolific, could have more to give. Exxon Mobil and partners Hess Corp. (30%) and CNOOC Nexen Petroleum (25%) have more undrilled targets in their crosshairs, and more appraisal drilling is in their plans.

The *Noble Tom Madden* exploration vessel is scheduled to arrive offshore Guyana in October. The exploration vessel will drill at the Pluma prospect, which is about 27 km (17 miles) away from the Turbot discovery.

“With an impressive success rate and almost 18 prospects left to chase in the Stabroek Block, the project will only get bigger,” Cortez added.

But the exploration effort does not come without risks.

“There are development challenges that range from building the required infrastructure to ensuring good natural resource governance,” Cortez said. “Moreover, although Guyana’s portion of the Guyana Basin is set to create the greatest value of any offshore basin in the Americas, the country must overcome several challenges and risks to reap the full benefit of this oil windfall. Priorities include developing the institutional and regulatory framework to effectively manage the emerging sector, plus possibly setting up a sovereign wealth fund.”

But the small country, which has a population of about 750,000, has “hit the jackpot” with “billions of dollars of revenue about to come its way.”

Covering about 26,800 sq km (10,348 sq miles), the Stabroek Block is located about 209 km (130 miles) offshore Guyana.

—Velda Addison

EXPLORATION BRIEFS

Panoro Energy Makes Oil Discovery at Dussafu Offshore Gabon

Panoro Energy has made an oil discovery with the Ruche North East Marin-1 (DRNEM-1) well drilled in the Dussafu Marin PSC, offshore Gabon, the company said Aug. 31.

The DRNEM-1 well was drilled to identify additional oil resources in the presalt Gamba and Dentale formations in the greater Ruche area and completed within budget. These resources may be developed together in the future with Ruche Field discoveries made by Panoro in 2011 and located 3 km (1.8 miles) to the south west.

Drilled with the Borr Norve jackup unit in a 115 m (377 ft) water depth, the DRNEM-1 well reached a vertical depth of 3,400 m (11,154 ft) within the Dentale Formation. Log evaluation, pressure data and fluid samples indicate that about 15 m (49 ft) of good quality oil pay was encountered in the Gamba Formation and 25 m (82 ft) of oil pay in stacked reservoirs within the Dentale Formation.

The forward plan includes a sidetrack, which will appraise the Dentale sands in an updip location and the lateral extent of the Gamba reservoir. Panoro expects to provide an update in September.

“This is another exciting oil discovery at Dussafu, where since 2011 we have had an outstanding drilling success rate with nine consecutive well penetrations finding oil,” Panoro CEO John Hamilton said.

As previously announced, the FPSO *Adolo* has arrived in Gabon and is connected to the mooring system. First oil is estimated for approximately late September or early October 2018.

GulfSlope Energy Hits Oil at GoM Canoe Prospect

GulfSlope Energy Inc. said it encountered oil sands while drilling the northwest center of Vermilion Block 378, also known as the Canoe Shallow Prospect, in the Gulf of Mexico.

The results were based on LWD and isotube analysis of hydrocarbon samples, the company said in a news release. The well was drilled to 5,765 ft measured depth (5,700 ft true vertical depth) and encountered no problems while drilling.

The company said it will further evaluate the shallow potential of the wellbore and the block using seismic data and fully integrating well information. This also will help define commerciality of the oil pays.

“The well is being temporarily abandoned with multiple openhole plugs to be set across several intervals. The well is equipped with a mud line suspension system for possible future re-entry,” GulfSlope said in the release. “A deeper subsalt prospect on VR 378, for which the block was originally leased, is not yet drill-ready and is pending further seismic enhancement.”

The Rowan Ralph Coffman jackup rig will be used to drill the Tau Subsalt prospect, marking the start of GulfSlope’s subsalt drilling plan for high-potential prospects, according to the release. The well will test Miocene reservoirs beneath thick salt sheets.

“At a planned depth of 29,860 feet [9,101 m] measured depth (26,132 feet [7,965 m] true vertical depth), the Tau Prospect exploratory well is projected to drill one of the thickest sub-seafloor geologic sections in Gulf of Mexico history almost 5 miles below the seafloor,” the company said.

Holding a 20% working interest, GulfSlope is the operator of the Tau well. Partners are Delek Group subsidiary Delek GOM Investments (75%) and Texas South Energy Inc. (5%).

Lundin Petroleum Raises Size of Norway’s Rolvsnes Oil Discovery

The Rolvsnes oil and gas discovery in Norway’s North Sea is almost five times as large as initially thought, Swedish operator Lundin Petroleum said on Aug. 27 after completing an appraisal well.

Lundin has increased its resource estimates to between 14 MMboe and 78 MMboe from a previous interval of 3 MMboe to 16 MMboe, the company added.

The company said it now plans to perform a longer production test, likely in 2020 or 2021, before deciding whether to develop the discovery.

“If the long-term test is successful, we will develop the discovery, because it’s so close to the Edvard Grieg Field,” said Kristin Faeroevik, head of Lundin’s Norwegian unit, during a news conference.

The timing of any tie-ins will depend on availability of spare capacity at the Edvard Grieg production platform, which also processes oil from Aker BP’s Ivar Aasen Field.

Faeroevik said Edvard Grieg’s production is expected to begin to fall in 2020, providing spare capacity for future tie-ins.

The area around Rolvsnes, including the nearby Goddo prospect, could contain up to 250 MMboe, Lundin said, adding that it plans to drill an exploration well at Goddo in 2019.

—Staff & Reuters Reports

TECHNOLOGY

Petrobras, Eca Hytec Design Compact ROV for Subsea Activities

In its ongoing effort to increase investments in technology for subsea activities, Petrobras debuted a compact prototype ROV that was designed in partnership with the French company Eca Hytec.

According to the Brazilian operator, the compact ROV, which is also known as the Roving Bat, provides greater flexibility, reaching more complex places. It is also able to work in rough sea conditions. The ROV was presented to the market during the Mec Show in August in the state of Espírito Santo.

According to Eca Hytec, the Roving Bat is the result of an evolution that started in 2006 to meet Petrobras' request for an ROV that could crawl along its FPSO hulls to run close inspections and UltraSonic measurements.

Due to the increasing demand for local cleaning of Petrobras' vessel hulls in 2010, the Eca Hytec started a study of several cleaning techniques, going from mechanical brushing to water jetting. It finally adopted the cavitation in close cooperation with the Cavidyne company. In 2017 Eca upgraded the compact ROV by incorporating two additional horizontal thrusters, which can provide cleaning operations in harsh subsea environment, pushing from crawler plus thrusters secure an impressive thrust.

"The Roving Bat solution is by far more efficient than other traditional underwater inspection(s) in lieu of dry-docking methods such as divers, conventional ROVs or magnetic crawlers," Eca said in a press release.

For the French company, the traditional method has several drawbacks. For example, it points out that divers can't approach the hull in case of rough or ocean turbidity. The traditional methods also present safety hazards and have poor efficiency, which can create high costs for companies.

"The traditional inspection or working class ROVs can't remain at close contact with the hull and are inoperable in case of rough seas. The magnetic crawlers need manual handling for docking on hull and face possible loss of magnetic adherence in case of significant marine growths and/or hull irregular shape," an Eca press release said.

Jorge Luiz Brito, Petrobras Research Center's senior inspector of equipment and facilities, also confirmed the high potential of the robot. "It has a compact size and can make movements that other ROVs cannot do. It can be combined with other equipment, such as a crawler, to perform specific actions," he said.

In addition, he said the compact ROV also can be used by other companies besides those in the oil industry.

Due to its greater efficiency, the equipment also allows a greater availability over time and, consequently, an increase in the number of inspections. It also limits the use of divers in risky operations.

Over the past few years, Petrobras has been increasing its demand for ROVs in intervention operations, inspection and subsea maintenance in equipment, rigid and flexible pipelines, support to anchorage operations and in geodetic activities.

According to Petrobras, the company has a fleet of 75 ROVs and expects to increase it over the next five years.

Earlier this year, DOF Subsea was awarded two new ROV contracts by Petrobras. The contracts were scheduled to start in April and end in November 2020. Petrobras has extended two ROV contracts for the ROVs onboard Skandi Iguacu and Skandi Urca until year-end 2018.

In June Fugro secured two contracts to provide ROV services to support the Brazilian major in its E&P activities. The contract was established to support drilling-related activities such as towing, mooring, commissioning and decommissioning, positioning of production and drilling units, and installation of subsea equipment in Petrobras oil fields.

The ROVs will be deployed in water depths of 3,000 m (9,842.5 ft) on the Brazilian continental shelf.

The first of the two contracts started in the second quarter of 2018. The second contract is scheduled to begin at year-end 2018. Fugro and SolstadFarstad will jointly manage operations, which will involve Fugro's ROV being deployed from SolstadFarstad's Far Scout AHTS offshore vessel.

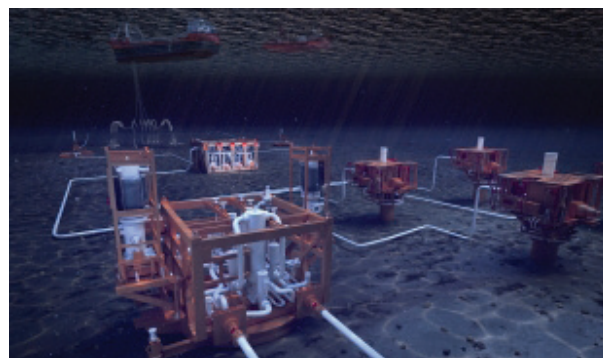
— *Brunno Braga*

TECHNOLOGY BRIEFS

Castrol Unveils Control Fluid Technology to Enhance Protection for Subsea Systems

Castrol has launched its next-generation subsea control fluid. Castrol Transaqua SP (System Protection) is designed to simplify subsea operations and offer enhanced system protection compared to products currently on the market. Improvements in system protection will lead to increased component reliability, the company said in a press release.

Control fluids are one of the most complex moving parts in a subsea system, so reliability is essential. The control fluid has to transfer power, lubricate, deal with contamination and protect control modules, christmas



Castrol Transaqua SP is designed to simplify subsea operations and offer enhanced system protection compared to products currently on the market. (Source: Castrol)

trees and wellheads from degradation in a wide range of temperatures and pressures on the ocean floor.

Fields are producing for longer than ever, meaning that subsea production systems need to perform for longer than intended. As a consequence operators often are using a mix of different generations of subsea equipment, and control fluids have to accommodate a wide variety of equipment, increasingly in suboptimal conditions.

Castrol Transaqua SP is designed to be compatible with a wide range of elastomers, plastics, metals and completion fluids. This compatibility with completion fluids is especially important during well installation activities, when fluid mixing may occur potentially leading to line blockages.

Another key challenge faced by operators is the potential for seawater to become trapped in the system, leading to a reduction in corrosion resistance or the formation of deposits. Castrol has designed Transaqua SP to have class-leading stability with seawater, up to 50% at seabed conditions of 5 C (41 F) with critical additives remaining in the solution. Additionally, Transaqua is thermally stable, tested in conditions up to 160 C (320 F), allowing for safe operation at temperatures between -50 C and 150 C (-58 F and 302 F).

Trendsetter Engineering TC7 Connection System Makes a Splash

Talos Energy has successfully deployed and installed a flexible well jumper using Trendsetter Engineering's TC7 clamp connectors and TEX gaskets to connect the Mt.



Trendsetter TC7 is used to connect the Mt. Providence subsea well to the Pompano template system. (Source: Trendsetter Engineering)

Providence subsea well to the Pompano template system, the company said on Aug. 27.

The TC7 clamp connectors were supplied as part of a larger scope of work where Trendsetter Engineering developed new hardware, including a template adapter module and subsea tree connector porch, to assist Talos Energy facilitate long-term growth from its existing assets.

The product is part of the Trendsetter Connection System (TCS), a family of subsea connector solutions.

The Mt. Providence well, located in 563 m (1,850 ft) water depth, has since been successfully commissioned and is in production. Trendsetter Engineering has been awarded an additional template adapter module to facilitate future tiebacks to the Pompano template.

VESSEL BRIEFS

Egina FPSO Sails to Offshore Field

The *Egina FPSO* left the Lagos Deep Offshore Logistics Base (LADOL) on Aug. 23 on a three-day voyage to the Egina oil field, about 130 km (81 miles) offshore Nigeria.

The \$3.3 billion vessel had undergone fabrication and integration work at LADOL's Samsung Yard since January after arriving from Samsung's facility in Geoje, South Korea.

The oil field, representing a \$16 billion investment by Total, is expected to produce 200,000 bbl/d of crude, or



Egina FPSO's journey took it from Samsung's shipyards in South Korea and Nigeria to the Egina oil field offshore Nigeria. (Source: Total)

about 10% of Nigeria's output. It is located in depths of 1,500 m (4,921 ft).

The oil field is controlled by Total Upstream Nigeria (24%) with CNOOC (45%), Sapetro (15%) and Petrobras (16%).

POSH Xanadu Wins Accommodation Contract from Petrobras

POSH Xanadu has landed its second charter from Petrobras and will head to the Campos Basin on completion of its current project for Chevron in the Gulf of Mexico (GoM).



POSH Xanadu achieved zero lost time injury and close to 100% gangway connectivity in its previous charter with Petrobras. (Source: POSH)

The Petrobras deal is for eight months, with an option to extend for another eight months.

The vessel's stellar performance during its work for Petrobras in the Campos in 2015-2016 included achieving zero lost time injuries and almost 100% gangway connectivity, despite harsh sea conditions. That record has been duplicated during *POSH Xanadu's* time supporting Chevron in the GoM.

POSH Xanadu and sister vessel *POSH Arcadia* are the world's largest vessels of their class.

J2 Subsea 4-Port Tool Changers Get First Use on Brazilian MOBO Campaign

J2 Subsea has landed a large order for its 4-Port Tool Changers to be used in an offshore Brazil campaign. They will replace eight subsea pumps weighing 150 tons from the manifold in water depths up to 2,000 m (6,561.6 ft).

Palm Tecnologia will use the devices in a MOBO (modulo de bomba or pump module) subsea boosting intervention this year. The tool changers enable ROVs to connect with subsea tools and avoid leaks. The cost- and time-saving benefits come into play because the ROVs no longer have to make multiple trips between the vessel and seabed to replace each tool.

The compact dimensions of the tool changers save money because they can be moved by helicopter, allowing them to be mobilized and demobilized quickly. That was important for this MOBO campaign so that the devices would not have to sit on a support vessel during a long transport.

The tool changer consists of an ROV end plus a tool end. The device is self-sealing, which avoids leaks, and saves time because it does not need to resurface for tool changes.

Report: Floating Production Use Will Rise Sharply

The "Floating Production Systems" market report by MRRSE forecasts that more than 80 offshore drilling projects will be carried out in the near future in Brazil and western Africa.

The European region also is projected to rise to meet output from upcoming offshore drilling projects in the U.K. The majority of the Europe's oil reserves are located in the offshore regions of Norway such as the North Sea, Barents Sea and Norwegian Sea.

MRRSE also expects North America and the Asia-Pacific region to show a remarkable growth in the near future, owing to growing population.

BUSINESS

Analysts: Transocean's Acquisition of Ocean Rig Necessary Consolidation

With the state of doing business in the oil rig industry in flux, industry analysts were not at all surprised by the decision of Transocean Ltd. to acquire Ocean Rig UDW Inc. for \$2.7 billion on Sept. 4.

Transocean is now in line to have the top fleet of premium ultradeepwater and harsh environment rigs.

"The announcement is not a surprise. Industry consolidation is necessary to get these premium assets back to work over the next two to three years," said Leslie Cook, a principal analyst for Wood Mackenzie, in a statement. "The Ocean Rig fleet aligns very well with Transocean's best-in-class portfolio."

What made this deal necessary was the combination of constructive and stable oil prices during the last several quarters, streamlined offshore project costs and reserve replacement challenges driving material increases in offshore contracting activity, according to Transocean CEO Jeremy Thigpen.

"It is Wood Mackenzie's view that the premium ultradeepwater drillship market has reached the bottom and rates for some of the highest-spec assets have the potential to double in the next couple years as active utilization begins to tighten," Cook said. "Operators are already demonstrating a preference for newer rigs that offer greater efficiency in their drilling programs."

With the acquisition, Transocean has become the market leader for consolidation in the offshore drilling industry,



Analysts said Transocean's acquisition of Oil Rig UDW is part of doing business in today's oil rig industry. (Source: Shutterstock.com)

said Liz Tysall, a senior analyst for oilfield service research with Rystad Energy. The acquisition adds nine high-specification ultradeepwater drillships plus two more under construction and two harsh environment semisubmersibles.

Transocean now has a combined fleet of 57 floaters, 17 of the top 50 and 31 of the top 100 deepwater drillships in the industry. The deal also enhances Transocean's exposure and ability to capitalize on the ultradeepwater market recovery.

“In contrast to Transocean’s recent acquisition of Songa Offshore, which included 24 years of backlog, this acquisition positions Transocean for a market upturn in the ultra-deepwater drillship segment, particularly in two key areas of the Golden Triangle,” Tysall said in a statement. “Ocean Rig operates in three of Transocean’s key markets: Brazil, West Africa and the North Sea. The newly combined fleet will have just under one year of contracted backlog in Brazil, just over four years of contracted backlog in West Africa and just over 27 years of contracted backlog in the North Sea going forward.”

Transocean said it also has decided to retire the *C.R. Luigs* ultra-deepwater drillship and the *Songa Delta* mid-

water semisubmersible. Going forward, the company plans to continue to retire rigs that are no longer a strategic fit for its fleet. Since 2014 Transocean has scrapped 45 rigs, including the two rigs just announced. The company has indicated that it will continue to explore opportunities in the market for further enhancement of its rig fleet.

“As rates begin to float back up, the need to keep drilling costs down will drive demand for these newer rigs that can offer efficiency gains,” Cook said. “By buying Ocean Rig, Transocean is positioning itself to offer the industry premium rigs at competitive day rates.”

—Terrance Harris

BUSINESS BRIEF

Norway Prime Minister Appoints New Oil Minister in Cabinet Reshuffle

Norway’s Prime Minister Erna Solberg replaced her ministers for oil and transportation in a cabinet reshuffle on Aug. 31, her office said in a statement.

Oil Minister Terje Søviknes of the right-wing Progress Party was replaced by fellow party member Kjell-Børge Freiberg, a former mayor of a town in the Arctic Lofoten archipelago, in which the oil industry has long sought permission to explore.

Agriculture Minister Jon Georg Dale will move to the ministry for transport and communications, replacing Ketil Solvik-Olsen, while parliamentarian Bård Hoksrud will take on Dale’s old portfolio.

August opinion polls showed the center-left opposition taking a narrow lead over the government for the first time in more than a year, a compilation by Norway’s poll of polls website showed.

—Reuters Reports

UPCOMING

The next issue of *Subsea Engineering News* will be distributed Sept. 20. Until then, visit epmag.com.

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