Norwegian Session at OTC
Look to Norway – The cradle of Subsea Technology
The iEPCI™ contract model – sustainable cost reductions on the Norwegian Continental Shelf

iEPCI™ is our model to deliver integrated engineering, procurement, construction and installation of subsea production systems (SPS) and subsea umbilicals, risers and flowlines (SURF). This integrated approach was chosen to deliver value for Equinor's field Trestakk in the Norwegian Sea. This is the first example of an iEPCI™ contract. It shows how taking an integrated approach, starting at project inception, can simplify development solutions, significantly reduce costs, and enhance overall value. The iEPCI™ contract model is perfect for marginal fields on NCS. To unlock the potential in undeveloped resources, TechnipFMC has designed a integrated subsea solution which addresses the short-term market of satellite tie-backs and stranded assets. This concept opens up for a high degree of flexibility in field development through early engagement and continuous iteration with operator. A “design to installation” approach is used to identify target cost of systems. The complete subsea
system from wellhead to riser hang-off is delivered installed on the seabed ready for start-up.

DeepOcean

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Technology Revolution is Changing Life of Field for Subsea Production

Digitalization and artificial intelligence is completely changing the way we inspect, modify and repair subsea fields. In the future, such work will be performed by autonomous vehicles and sensor technology. This leads to a fact based maintenance regime and less use of expensive ships. The costs will be a fraction of what we see today, and this again will make subsea production much more competitive.

Deepocean is a leading company investing into this technology. The presentation will highlight some of the exciting technologies that are under development.
Subsea Cold Flow System for Long Distance Tie-backs

Objective: Managing temperature and pressure in oil dominated tie-back systems gradually becomes technically and economically inefficient as transport distances increase. An alternative is to condition the well stream for long distance transport at seawater ambient temperature conditions without any further fluid initiatives. This condition is termed Cold Flow. By combining existing and technologies currently under research and development, we can now offer complete subsea solutions to the market in the near future. CFS’s can make long-distance tie-backs possible for oil dominated flows for significantly lower cost compared to FPSO or other platform based solutions, and at much lower power budgets. This lead to improved field development economy, safer operations and a large reduction in the carbon footprint of the development.

Novel information: By conditioning oil dominated well streams for cold flow it is realistic to connect remote fields to central host facilities by means of un-insulated small diameter transport pipelines. This is particularly interesting in areas with lack of existing infrastructure or outside of helicopter reach, or when platform solutions shall be replaced by unmanned subsea operations.

Key words: Cold Flow, Submerged Production Unit, Towed Production Systems, Subsea Processing, Subsea Separation Systems, Subsea Water Treatment System, Multiphase Pump, Wet Gas Compressor, Subsea power distribution, Subsea water injection pump, Multiphase flow meter, and Wax Control Unit
Subsea Water Injection – Mobilizing Stranded Tie-backs

To optimize oil recovery, water injection is normally used as the preferred drainage mechanism. While water injection can more than double recovery, it is also intensive for capital expenditures, often making the project non-economic. Moving water treatment and injection close to the subsea well head, as close to the reservoir as possible, enables a flexible, cost efficient, and robust field development. The short distance the water travels and the unique approach to water treatment makes the subsea solution superior to topside solutions, both in terms of water quality and energy efficiency.

Treating seawater at the seabed allows for an effective disinfection and removal of particles, unlike the traditional maintenance intensive topside solutions. Moving water treatment from topside to the seabed reduces weight and space requirements topside and simplifies the process since they are no longer an issue. At the seabed,
Seabox™ is a system without any moving parts and filters and is significantly simpler than the traditional topside systems.

Seabox represents a unique system that ensures proper disinfection of water and removal of particles for different applications. Water quality for water injection into the reservoir may require further treatment of the water, like removing all suspended solids, removing sulphate or producing low salinity water. Part of the quality specifications are for protecting the reservoir and facilities, other parts are for changing conditions in the reservoir to increase production and oil recovery.

No chemicals are added in the water treatment at seabed since the required chemicals for disinfection are produced in the Seabox.

Two systems were installed in 2018.

Seabox represents a simplification of the water treatment process, resulting in a cost effective and reliable solution. The stand alone and modular approach provides flexibility to phase in capacity where and when needed, enabling a more active reservoir management and increased recovery. No chemicals are added for the water treatment and a more energy efficient solution reduces the carbon footprint.
New Subsea Technology

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Integrated drilling and production well construction

The Integrated Drilling and Production System (IDPS) from New Subsea Technology combines the conventional conductor, wellhead, production flowbase, x-mas tree, protective structure and tie in systems in one unit which is fully built, assembled and tested onshore. The IDPS can be pre-installed as one assembly by low cost vessels prior to drilling activities commence, reducing rig well construction scope and cost.
Session 2: Improved Oil Recovery Through Subsea Solutions

Equinor

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Åsgard Subsea Compression – World Class Recovery through Technology Innovation

16 September 2015 the world’s first subsea gas compression plant started successfully at the Åsgard field, located approximately 200 km west of the coast of mid Norway, approximately ten years after project initiation. The subsea compression station installed at 300 meters water depth has a footprint of 74x44 meters, is 24 meters in height and the total weight is approximately 5000 tons. Two parallel compression trains each at 11,5 MW gives a design flow rate of 743 mmscf/d. The compressor station is controlled by an all-electric control system from the Åsgard B semisubmersible gas platform and is powered from the Åsgard A FPSO via 40 km long high voltage power and control cables. Commissioning of the compression plant was primarily done from the Åsgard operations centre at shore.
For optimization of IMR activities a dedicated installation system has been developed for handling of modules with weight up to 420 tons in 4,5 meter Hs. The subsea brown field scope including module installation did involve 14 different vessels and 1600 vessel days. The project has been executed without any serious incidents. The project represented highly challenging technology implementations and the new plant have shown a successfully high regularity since start-up.

Equinor ASA is the operator, with Petoro AS, Vår Energi AS, Total E&P Norge AS and ExxonMobil Exploration and Production Norway AS as partners.
Subsea oil and gas production is undergoing a revolution

In the quest for maximum recovery, there is new demand for flexible, efficient and digitally enabled subsea production equipment that reduces cost and utilizes data to drive effective investment, operations and maintenance decisions.

In this presentation, Aker Solutions’ Chief Technology Officer will outline how the company is creating sustainable subsea solutions by utilizing standardized and simplified building blocks, automated execution and applying data-driven insight across the full field lifecycle. This intelligent approach enables increased recovery, increases cost efficiency and improved operational performance.
Subsea Boosting Technology – Enabling Increased Recovery and Competitive Field Developments

Future oil and gas production rely on exploiting reserves at greater depths, and harsher and more remote locations subsea. The associated challenges of increased recovery in subsea fields has driven the advancement of subsea processing technologies, in particular within the subsea boosting domain. The successful operation of subsea multiphase boosting systems on a global scale, coupled with the significant added value these systems generate, has driven technological advances in terms of higher differential pressures and longer step-outs.

Subsea boosting today represents a viable alternative, or complementary, system to other artificial lift technologies, and may introduce a wide range of advantages in production and field development. The effect of the subsea boosting system on oil recovery has been proven to be significant, and examples are available of how field developments have been enabled through use of fit-for-purpose technology.

This presentation will provide an overview of how increased recovery of oil and gas may be enabled by implementation of subsea boosting, as well as subsea compression, and how these systems can enable development of marginal and deepwater assets in remote locations. Emphasis will be put on associated developments cost, in particular in subsea tieback scenarios.

A number of case studies will be presented where field developments have been enabled, and significant increase in production has been seen, as a result of implementing subsea boosting at the seabed, even in challenging conditions in the global industry.
Monitoring of changes in wall thickness at subsea installations

Corrosion and erosion on subsea installations is a big challenge for oil and gas industry, involving significant cost and risk.

The ClampOn subsea ultrasonic corrosion-erosion monitoring system (CEM) presentation will focus on working principle and how the system can provide the operator with valuable information on the condition of a subsea pipe, whether (or not) corrosion and/or erosion is causing damage to the subsea installation.

The ClampOn CEM system is measuring an entire section of the pipe providing the operator with information on changes in wall thickness over a defined area.

Field cases with different solutions of installed subsea CEMs will be presented.
PROMOTING NORWEGIAN ENERGY CAPABILITIES IN INTERNATIONAL MARKETS

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