OBJECTIVES OF THE TOPIC

At the end of the lecture, students should be able to:

(1) Explain the rationale behind the invention and use of FPSO
(2) Name at least two active FPSOs in Nigeria
(3) Explain the meaning and purposes of the following terms:
   a) Turret mooring system
   b) Weathervaning
(4) Advise O & G clients on the vital contractual structure issues
(5) List eight of the vital contractual issues involving the analysis of the entire certification concerning FPSO projects.

MEANING OF FPSO

The abbreviation FPSO stands for Floating Production Storage and Offloading (FPSO) facility.

It is a floating facility, generally made from converted ship hull which was designed as an oil tanker. It is specially prepared and equipped with crude oil processing equipment for the separation and treatment of water, crude oil, and gases, directly extracted on board the hull from sub-sea oil wells through the aid of flexible pipelines.

On board the cargo tank within the hull are fitted cargo tanks where the treated crude oil is stored in the FPSO. Also, the treated natural gases are used to power the FPSO power generation systems. The surplus gases are often re-injected into the sub-sea reservoirs whilst some of the surpluses are transported through pipelines to other waiting tankers and to the shore.
The water and contaminated crude oil produced during production processes are discharged into the sea from the FPSO. However, where the regulatory regime is strict, there are maximum limits for the discharge of the waste into the sea. Also, some form of regulatory frameworks does require that the waste should be injected back into the seabed.

It is crucial to note that, the FPSO is a floating vessel hence, must be anchored and allowed to rotate up to 360 degrees. The rotary and anchoring system generally, use the Bluewater core technology known as the turret mooring system (metal anchors), usually fixed inside the FPSO’s hull. The turret is fastened to the seabed with strong chains, wires and anchors flexible enough to tolerate free and unobstructed 360° rotation of the FPSO around the turret. This rotary allowance is called “weather vaning”. There are spaces in the FPSO for the oil workers to Crude oil stored on board is commonly transported to shuttle tankers and ocean barges going to the shore, through extended loading hoses. This loading process is known as tandem loading. Also, gases are usually transported to shore through pipelines use as living quarters, including the machine, medical rooms, fire control and mechanical control rooms. In some larger FPSOs there are spaces for bars, restaurants, swimming pool and gymnasium.

The processing paraphernalia aboard the FPSO are the same as those used on stationary rigs. However, the FPSO ship does have in-built components, including: FPSO water separation, gas treatment, oil processing, water injection and gas compression.

**THE RATIONALE FOR FPSO**

The cost of constructing and decommissioning stationary offshore Oil rigs and platforms are huge. As of the early 1950s, when offshore production of crude oil became popular, all the offshore oil rigs were fitting to the seabed. In about 1972 offshore crude oil exploration were being shifted far into deep sea waters. The shifting was necessary because of the discovery of crude oil reservoirs too far into the deep sea horizons. The idea of the floating production systems came to prominence as a means of eliminating the huge cost and improving efficient production.
As of April 2018, there are an estimated 276 FPSOs in the World. All these came in the backdrop of the first FPSO (the ship) manufactured in Spain in 1977. The technology of the FPSO enables the oil companies to capture crude oil from the most remote offshore and deeper water, which otherwise would have been very complicated to achieve with other available technology. Moreover, FPSOs have relatively reliable storage capacity for the preservation of crude oil. They also make it easier to offload and transfer the crude oil to sea tankers for shipment to various refineries, instead of depending solely on pipeline transportation. One of the advantages of the FPSO is that it can be detached from the anchors and moved to another deep sea location such as a marginal field.

**TYPES OF FPSOs**

a) FSO - Floating Storage and Offloading
b) FPSO - Floating, Drilling and Production, Storage and Offloading
c) FSRU - Floating Storage Regasification Unit.
d) FDPSO - Floating, Drilling and Production, Storage and Offloading
e) FSRU - Floating Storage Regasification Unit.

**LIST OF FSO AND FPSOs IN NIGERIA**

a) Yoho FPSO, Operator: Mobil Producing Lagos, Nigeria COMMENCED: 2006
b) Usan, FPSO. Operators: Esso Exploration & Production Lagos, Nigeria Total
c) Courbevoie, France, Started: 2011
d) Unity FSO, Elf Petroleum Lagos, Nigeria. Total Courbevoie, France 2002
e) Sea Eagle FPSO, OPERATOR: SHELL. EA, Gulf of Guinea, 2003
g) Armada Perkasa, FPSO, Okoro Setu, OPERATORS: Afren / AMNI, 2009
h) Armada Perdana FPSO, 2010, OYO, OPERATORS: Allied Energy / Agip
i) Akpo FPSO, Akpo, Gulf of Guinea, Total, 2009
k) Abo FPSO, Abo, Gulf of Guinea, AGiP 2002
l) Bonga FPSO, Bonga, Gulf of Guinea, 2005, Shell
m) EGINA FPSO, Off The Coast Of Bonny/Andoni, Total, 2018
FPSO - BONGA FIELDS

Bonga is the first large deepwater project of the Shell Nigeria Exploration and Production Company (SNEPCO) in Nigeria. The reservoir is located 120km southwest of the Niger Delta, in a water depth of more than 4,160 metres and situated within the 60 square kilometres field. The drilling started in 1993 and continued to 1996 with oil prospecting license (OPL) 212 and new deep water development in OML118. The first Bonga discovery well was drilled between September 1995 and January 1996. The reservoir is estimated to hold about 600 million barrels of oil. The FPSO produces 200,000 barrels of crude oil and 150 million standard cubic feet of natural gas per day.

The FPSO was constructed in Asia in 2002, the compartments have a hull of 300,000 tonnes capacity. Bonga is operated by SNEPCO under a production sharing contract for the partners, namely: The Nigerian National Petroleum Corporation (NNPC) (55%), Esso (20%), Agip (12.5%), Elf Petroleum Nigeria Limited (12.5%).

Gas from the Bonga is conveyed to the Nigeria Liquefied Natural Gas (NLNG) plant at Bonny via pipelines. LNG is exported to Atlantic and European markets via tankers. Prior to direct offloading, the oil is stored on-board the production facilities. The cost of the full field development of the FPSO is $3.6bn.

EGINA FPSO

Sailed into Nigeria on 23 January 2018; located some 130 km off the coast of the Niger Delta at water depths of more than 1,500 metres Project type: Ultra-deep offshore.

Operator: Total (24%)
Partners: NNPC, Total, CNOOC, Petrobras Sapetro
Start date: January 2018
Estimated Production Capacity: 200,000 barrels/day
Number of Well: 44 subsea oil wells
Hull Capacity: 2.3 million barrels of oil.
The legal issues that usually arise from FPSOs are:

a) CONTRACTUAL STRUCTURE ISSUES

FPSO contracts must never forget to define the following elements:
1) the technical requirements and performance criteria;
2) the hire structure; and
3) the scope of the owner’s rights and obligations towards the FPSO client.

In addition to the vital elements of the contracts, the prevalent contractual issues involve the analysis of the entire certification concerning the projects including:

1) The concession licences,
2) Manufacturing of the FPSO,
3) Funding agreements,
4) Marketing of the crude oil sales, and
5) Allocation of profits and liabilities.
6) Ownership, including financing and mortgages
7) Registration and flag
8) Maritime liens and rights of civil arrest
9) Civil jurisdiction
10) Penal jurisdiction
11) Salvage
12) Limitation of liability
13) Liability for pollution
14) Removal of decommissioned structures and wrecks
15) Conversion contracts with shipyards;
16) Procurement contracts concerning main components or equipment;
17) Design and engineering contracts;
18) Consultancy and pre-delivery management agreements.
b) ALLOCATION OF FPSO CLAIMS ISSUES

One of the very complex legal concerns regarding offshore oil and gas projects is how courts and regulatory institutions classify the various types of floating exploration, production, storage, and offloading ships.

From a legal and regulatory standpoint, there seems to be some confusion as to whether FPSOs should be regarded as transportation ships or as oil tankers. Also, whether the FPSOs should be regulated as permanent offshore E&P installations such as well-head rigs.

In reality, however, two significant issues often arise. First, not all aspects of FPSO operations can be divided precisely into either “ship-related” or “E&P-related” and regulated independently.

Second, conflicts can arise between certain “shipping” and “offshore” laws and regulations, meaning that it may not be possible for an FPSO to comply fully with both regimes at the same time. This means that, in the event of a cause of action arising, only one route should be pursued.

These practical considerations lead to the common sense conclusion that, in any given place, there should be a single and consistent body of laws and regulations for FPSOs. Furthermore, given the diversity of location of many FPSO projects, the fact that some FPSOs can be deployed in more than one place, and the increasingly transnational nature of the offshore oil and gas industry, there should be consistency - if not close harmonization - between the applicable laws and regulations of producing states.

There is, of course, an enormous range of relevant laws and regulations, which differ from country to country. They may extend to matters of health and safety, structural integrity, licensing and permits, pollution and environment, and civil liability, to name just a few.
LIMITATION OF LIABILITY

Many countries permit ship owners, and sometimes other parties, to limit their liability for third-party claims for loss or damage relating to the operation of a ship. The widespread adoption of international conventions on civil liability in the marine industry means that a ship owner’s entitlement to limit liability is today recognized with reasonable consistency across many trading states.

Two main international conventions permit ship owners to limit their liability, namely:

a) *The International Convention on Limitation of Liability for Maritime Claims, 1976 (The LLMC Convention)*

The International Convention on Limitation of Liability for Maritime Claims (LLMC) deals with a range of claim types, including claims relating to death, personal injury, and property damage “occurring on board or in direct connection with the operation of a ship.” The LLMC entitles a “ship owner” (which also includes a charterer, manager, or operator) to limit its liability with respect to such claims, and the level of limitation is calculated by reference to the ship’s gross tonnage.

*(b) International Convention on Civil Liability for Oil Pollution Damage (commonly called the Civil Liability Convention or CLC), 1969, renewed in 1992 (The CLC Convention)*

The International Convention on Civil Liability for Oil Pollution Damage (commonly called the Civil Liability Convention or CLC) deals specifically with *claims arising from loss or damage caused by the escape or discharge of oil from a ship*. The owner of a ship is deemed to be strictly liable for such loss or damage, but is entitled to limit its liability at a level calculated again by reference to the ship’s gross tonnage.
FIG 1: Old Style FPSO

Source: google images