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2018 DEEPWATER SOLUTIONS & RECORDS FOR CONCEPT SELECTION

Enabling Technologies for Deepwater Production — May 2018

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Industry Acronyms

CT	Compliant Tower
DDCV	Deep Draft Caisson Vessel
DDS	Deep Draft Semi
DPDS	Floating Drilling, Production, Storage and Offloading System
FLNG	Floating Liquefied Natural Gas Vessel
FPS	Floating Production System
FPSO	Floating Production, Storage and Offloading System
FPU	Floating Production Unit
MinDOC	Cross between a semisubmersible and a truss spar
MODU	Mobil Offshore Drilling Unit
Semi-FPU	Semi-Submersible Floating Production Unit
SSTB	Subsea Tieback
TLP	Tension Leg Platform

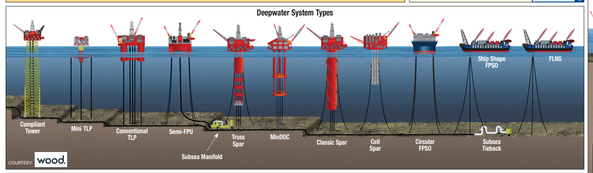
Notes

1. Though referenced throughout the poster, Hutton TLP and Typhoon TLP, and Red Hawk spar have been decommissioned and abandoned. At press time, Independence Hub Semi-FPS has been decommissioned but not abandoned. It is currently moored on location.
2. World Records are noted in red throughout the poster or with the ★ symbol adjacent to the record.
3. Throughput Capacity Chart – gas processing capacity is converted to barrels of oil equivalent as follows: 6 MMscfd = 1 MMBOE/d.
4. The Mesa Maritime Octabuoy is qualified for at least 2 locations: the UK North Sea and the Gulf of Mexico. Well capability for the Cheviot designed facility is noted for both locations.
5. Canyon Express subsea tieback well capability is based on the same flow line loop.
6. Data for these comparison charts have been derived and updated by Wood using internal research, Wood Mackenzie's data, and Energy Maritime Associates' and World Energy Reports.

Information Accuracy: Every attempt has been made to identify, locate, and establish the most current and correct information for all the various types of deepwater production solutions either sanctioned, installed, operating or decommissioned worldwide. No facility was intentionally excluded from this poster. In some cases the most current information was not included because information was not supplied in time or the project was not sanctioned at press time. We make no guarantee that this list is all inclusive. We have summarized the capability and operating experience by acting as a neutral party and integrator of information. We have collected the information from company brochures, interviews, press releases, industry publications, contractor supplied information, and websites. Neither Wood. nor Offshore Magazine guarantees or assumes any responsibility or liability for any information on the information presented. If any information is found to be incorrect, not current, or needs to be added, please send your comments to posters@Wood.com.

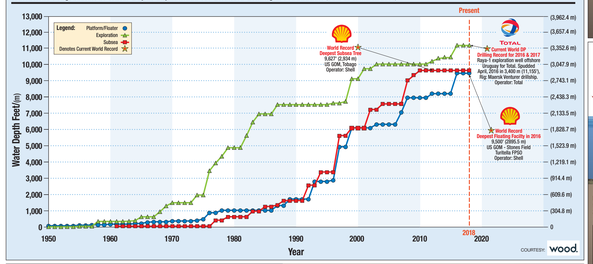
POSTER 132 2018 Edition

Deepwater System Types



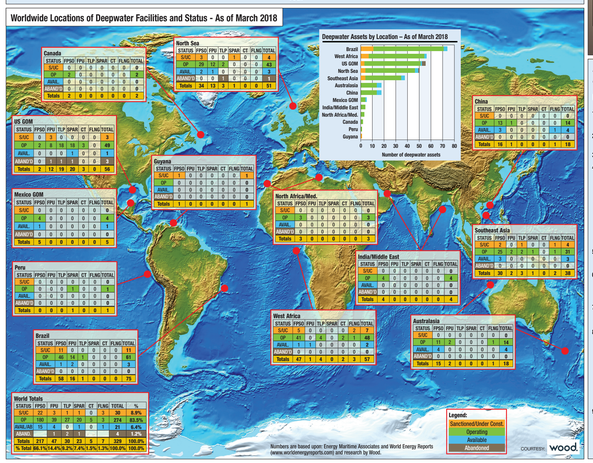
COURTESY: wood.

Worldwide Progression of Water Depth Capabilities for Offshore Drilling & Production (Data as of March 2018)



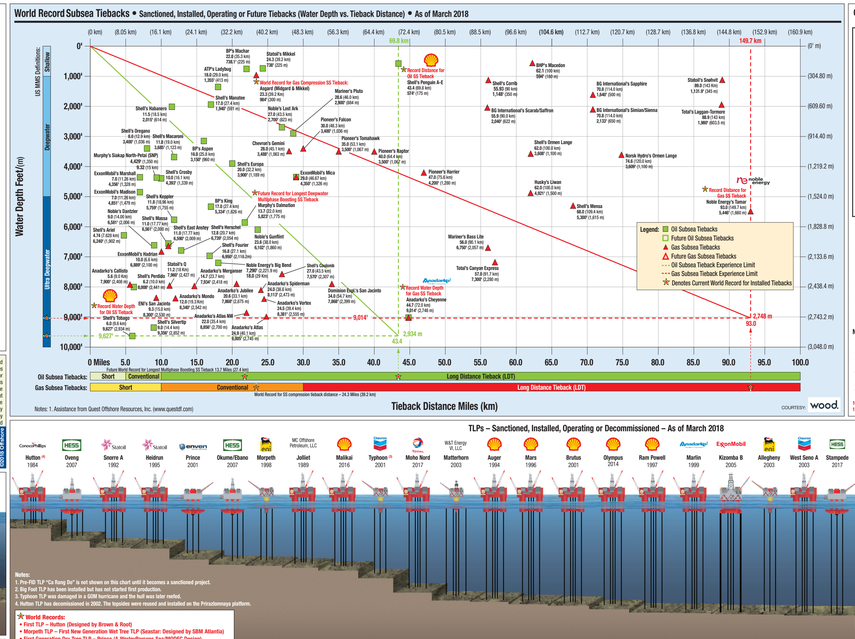
COURTESY: wood.

Worldwide Locations of Deepwater Facilities and Status - As of March 2018



COURTESY: wood.

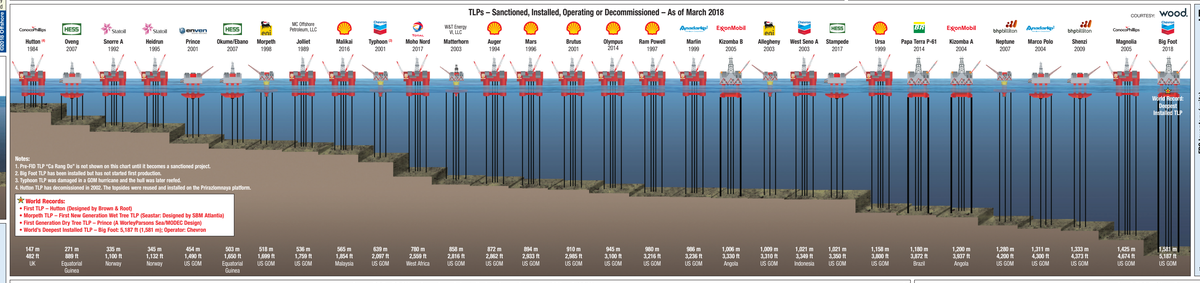
World Record Subsea Tiebacks • Sanctioned, Installed, Operating or Future Tiebacks (Water Depth vs. Tieback Distance) • As of March 2018



Notes: 1. Assistance from Quest Offshore Resources, Inc. (www.questoff.com)

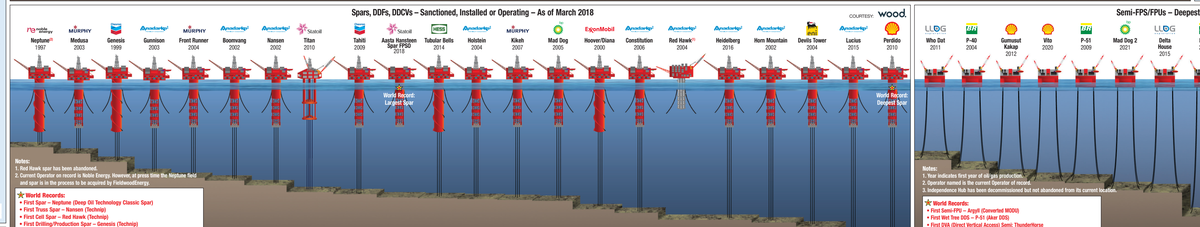
COURTESY: wood.

TLPs – Sanctioned, Installed, Operating or Decommissioned – As of March 2018



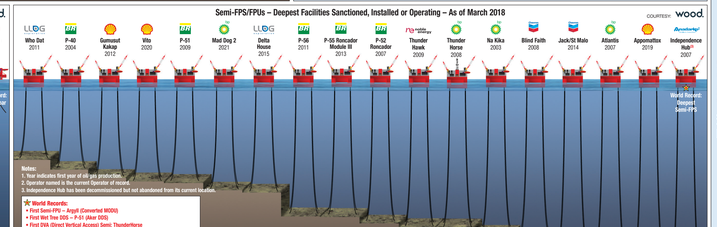
COURTESY: wood.

Spars, DDFPs, DDCVs – Sanctioned, Installed or Operating – As of March 2018



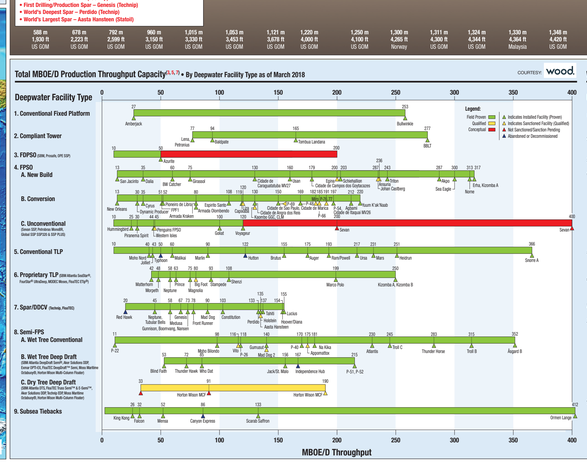
COURTESY: wood.

Semi-FPS/FPUs – Deepest Facilities Sanctioned, Installed or Operating – As of March 2018



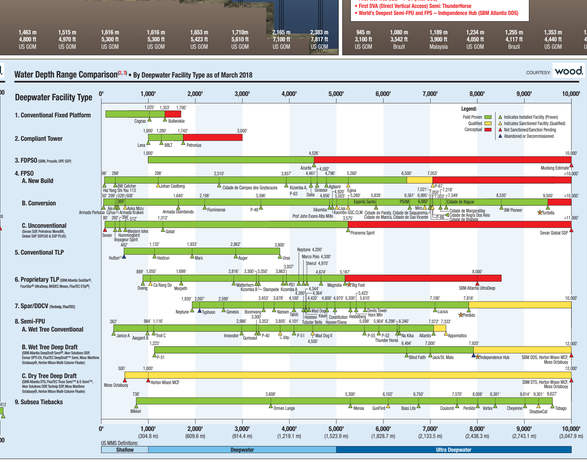
COURTESY: wood.

Total MBOE/D Production Throughput Capacity[5,6,7] • By Deepwater Facility Type as of March 2018



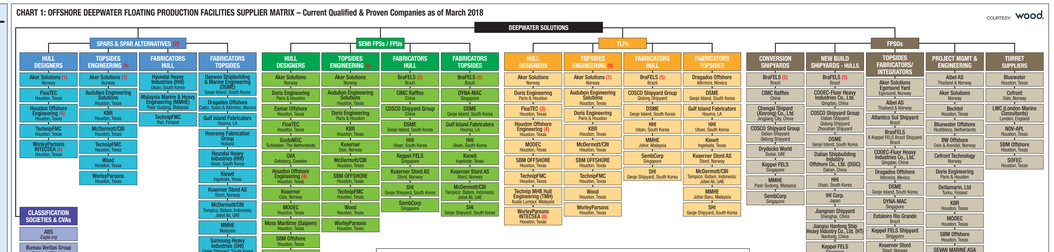
COURTESY: wood.

Water Depth Range Comparison[6,7] • By Deepwater Facility Type as of March 2018



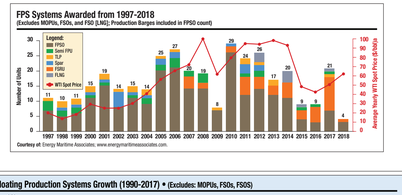
COURTESY: wood.

CHART 1: OFFSHORE DEEPWATER FLOATING PRODUCTION FACILITIES SUPPLIER MATRIX – Current Qualified & Proven Companies as of March 2018



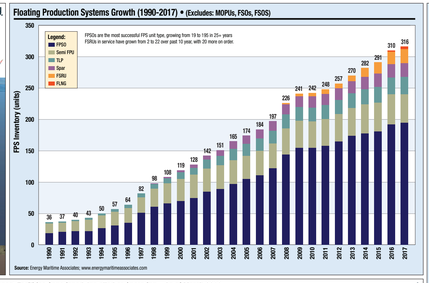
COURTESY: wood.

FPS Systems Awarded from 1997-2018

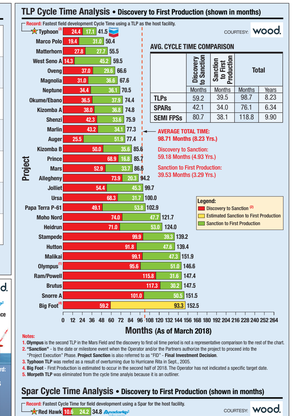


Courtesy of: Energy Maritime Associates; www.energymaritimeassociates.com

Floating Production Systems Growth (1990-2017) • (Excludes: MOPUs, FSOs, FSOs)



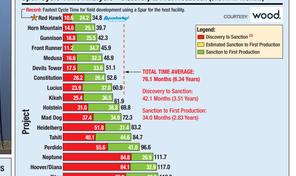
TLP Cycle Time Analysis • Discovery to First Production (shown in months)



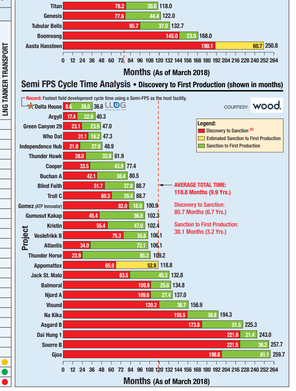
AVG. CYCLE TIME COMPARISON

	Discovery to Sanction	Sanction to First Production	Total
	Months	Months	Months	Years
TLPs	42.1	34.0	76.1	6.34
SPARs	42.1	34.0	76.1	6.34
SEMI FPSs	60.7	38.1	118.8	9.90

Spar Cycle Time Analysis • Discovery to First Production (shown in months)



Semi FPS Cycle Time Analysis • Discovery to First Production (shown in months)



Deepwater Field Development Concept Selection Matrix

Legend: Installed, Qualified, Conceptual

	MAJOR CAPABILITY					INSTALLATION					RESERVOIR AREAL EXTENT	COMPLETION & FLOWS TO PLATFORM	LOCATION APPLICATION	ENVIR. CONDITIONS	RISERS				EXPORT OPTIONS	
	FIELD APPLICATION EXPERIENCE	PRODUCTION	DRILLING	STORAGE	WATER DEPTH RATING	PAYLOAD SENSITIVITY (HIGH/MED./LOW)	DECK/HULL MATING OFFSHORE	DECK/HULL MATING @ FAB. YARD	DECK/HULL MATING LARGE AREA	WET TREE	DRY TREE	NEARBY INFRASTRUCTURE	REMOTE	SMALL FOOTPRINT	BENIGN	AREA WITH HURRICANES/TYPHOONS	MUDSH	SCR CAPABLE	FLEXIBLE PIPE CAPABLE	OIL EXPORT PIPELINE	SHUTTLE TANKER	GAS PIPELINE	GAS REINJECTION	LNG TANKER TRANSPORT
FPSOs																								
Spread Moored	●	●	●		L	●	●		●										●	●				
Turret Moored	●	●	●		L	●	●		●										●	●				
Unconventional	●	●	●		L	●	●		●										●	●				
TLPs																								
Conventional	●	●	●	●	H	●	●	●	●	●		●												
Proprietary	●	●	●	●	H	●	●	●	●	●		●												
Spars																								
Dry Tree	●	●	●	●	M	●	●			●	●	●												
Wet Tree	●	●	●	●	M	●	●			●		●												
Semi-FPS/FPU																								
Conventional	●	●	●			●	●																	
Deep Draft Wet Tree	●	●	●			●	●																	
Deep Draft Dry Tree	●	●	●			●	●																	
Subsea Tieback																								
Gas Tiebacks	●	●																						
Oil Tiebacks	●	●																						
Buoys																								
Wellhead Production Buoy	●				H																			
Well Control Buoy	●				H																			
FLNG																								
Spread Moored	●	●	●		L	●	●		●										●	●				
Turret Moored	●	●	●		L	●	●		●										●	●				
Unconventional	●	●	●		L	●	●		●										●	●				

See Water Depth Range Graph

Notes:
1. Asset Solutions' contract party is Aker Engineering & Technology AS.
2. The MinDOC concept is considered as a SPAR alternative.
3. ABB Lummus Global sold their eTLP design to FloatSTC in 2005.
4. Technip's Deep Draft Semi is based on the Marco Polo design. Technip is a Member of the SNC-Lavalin Group.
5. BluePetro is a wholly owned subsidiary of Keppel FELS Brasil & Marine in Singapore.
6. Jurong Shipyard is a wholly owned subsidiary of Sembcorp Marine Ltd.
7. Shanghai Waigaoqiao Shipbuilding Co., Ltd is a wholly owned subsidiary of China CSSC Holding Ltd.
8. INTECGEA is a subsidiary of WorleyParsons.
9. Companies listed under "Topsides Engineering" include companies that do Front End Engineering and Detail Engineering. Many can do Front End Engineering, but not all can do Detail Engineering.
10. Companies are listed in alphabetical order. They are not shown in any ranking order.
11. SM-963 is a joint venture with Samsung and a local Nigerian company

COURTESY: wood.