

TABLE OF CONTENTS

A. Introduction to Floating Production Systems (FPS)	17
➤ Brief History of the Offshore Industry	17
➤ FPS Life Cycle	22
➤ FPS Unit Types	26
◇ Floating Production, Storage and Offloading Units (FPSOs)	26
◇ Production Semisubmersibles (Semis)	30
◇ Tension Leg Platforms (TLPs)	33
◇ Spar	37
◇ Floating Liquefied Natural Gas Units (FLNGs)	40
◇ Floating Storage and Regasification Units (FSRUs)	45
◇ Floating Storage and Offloading Vessels (FSOs)	48
◇ Mobile Offshore Production Units (MOPUs)	51
B. Current Market Status	53
➤ What Happened in 2020?	53
◇ Project Awards	53
◇ Project Deliveries	62
◇ Decommissioned Units	64
➤ What Does the Market Look Like as of Sep 2020?	65
◇ On Order	69
◇ Trend in Order Backlog	73
◇ Composition of Order Backlog	73
◇ Available Floating Production Systems	75
◇ FPS Units Likely to Cease Operations in 2020-2022	78
◇ Projects in the Planning Pipeline	80
➤ List of Leading FPS Operators and Owners	84
◇ Top FPS Operators (Planning Pipeline)	84
◇ Top FPS Owners	86
◇ Top FPS Operators (Installed Units)	87

◇ Top FPSO Owners	87
◇ Top FSO Owners	90
◇ Top SPAR Owners	91
◇ Top Production Semi Owners	92
◇ Top FLNG Owners	93
◇ Top FSRU Owners	94
◇ Top TLP Owners	95

III. Underlying Market Drivers 96

◇ Market Synopsis	97
◇ Oil Prices	97
◇ Energy Demand	99
◇ Supply and Production	103
◇ US LTO	106
◇ General Oil Supply Outlook	107
◇ Upstream Investments	109
◇ Gas and LNG	110
◇ Upstream Projects Snapshot	111
◇ Resumed Projects	113
◇ Project Delays Due to COVID	114
◇ Mobile Drilling Rig Market	119

D. Market Forecasts 123

➤ Summary of 2021-2025 Forecast	123
➤ Forecast Scenarios	126
➤ FPSO Forecast	130
➤ FLNG Forecast	138
➤ FSRU forecast	142
➤ FSO forecast	146

➤ Production SEMI forecast	150
➤ Production SPAR forecast	154
➤ TLP forecast	157
➤ Forecast Appendix	160
F. Contractor Focus	161
➤ Leasing Contractors	161
◇ Bluewater	163
◇ Bumi Armada	165
◇ BW Offshore (BWO)	167
◇ MISC	170
◇ MODEC	172
◇ SBM	175
◇ Altera Infrastructure (formerly Teekay Offshore)	178
◇ Yinson	181
◇ FSRU/FLNG Companies (Excelerate, Golar, Hoegh)	183
◇ Excelerate	183
◇ Golar LNG	185
◇ Hoegh LNG	187
➤ EPC Contractors	189
◇ Chinese Yards	192
◇ Cosco Shipping Heavy Industry (CSHI)	192
◇ China Shipbuilding Industry Corporation (CSIC)	195
◇ China State Shipbuilding Corporation (CSSC)	196
◇ Korean Yards	198
◇ Daewoo Shipbuilding & Marine Engineering (DSME)	198
◇ Hyundai Heavy Industries (HHI)	200
◇ Samsung Heavy Industries (SHI)	202

◇ Southeast Asian Yards	204
◇ Keppel	204
◇ Malaysia Marine and Heavy Engineering (MMHE)	206
◇ Sembcorp Marine (Jurong and Sembawang)	208

LIST OF ILLUSTRATIONS

A. Introduction to Floating Production Systems (FPS)	17
➤ Fig 1. FPS Units > 1,500m by Year Installed	18
➤ Fig 2. Installed FPS Units by Maximum Water Depth Over Time	19
➤ Fig 3. Regional Distribution of Installed Units 1991-2000	19
➤ Fig 4. Regional Distribution of Installed Units 2001-2010	20
➤ Fig 5. Regional Distribution of Installed Units 2011-2020	20
➤ Fig 6. FPS Awards in Relation to Oil Price	21
➤ Fig 7. FPS Life Cycle Schematic	25
➤ Fig 8. FPSO Schematic	27
➤ Fig 9. Mooring Systems Comparison	28
➤ Fig 10. Production Semi Schematic	31
➤ Fig 11. TLP Schematic	35
➤ Fig 12. SPAR Schematic	39
➤ Fig 13. FLNG Schematic	43
➤ Fig 14. FSRU Schematic	46
➤ Fig 15 FSO Schematic	49
➤ Fig 16. MOPU Schematic	52
B. Current Market Status	53
➤ Fig 17. Awarded Units by Type	53
➤ Fig 18. Units Awarded in 2019 and 2020 by FPS Type	54
➤ Fig 19. Units Awarded in 2019 and 2020 by Capex	54
➤ Fig 20. Awarded Units 2016-2020 by Quarter	55
➤ Fig 21. Awarded Units 2016-2020 by Capex	55
➤ Fig 22. Distribution of Units Awarded in 2020 by Type	56
➤ Fig 23. Details for Units Awarded in 2020	57
➤ Fig 24. Units Awarded in 2020 by Capital Cost	58
➤ Fig 25. Units Awarded in 2020 by Yard	59

➤ Fig 26. Units Awarded in 2020 by Operator Category	59
➤ Fig 27. Units Awarded by Lease/Own	60
➤ Fig 28. FPSO Awards by Region	61
➤ Fig 29. FSRU Awards by Region	61
➤ Fig 30. FPS Awards by Capex	61
➤ Fig 31. Units Delivered in 2020 by Region and Unit Type	62
➤ Fig 32. Details of Non-LNG Units Delivered in 2020	63
➤ Fig 33. Details of LNG Units Delivered in 2020	63
➤ Fig 34. Units Decommissioned in 2019	64
➤ Fig 35. Total Installed Units by Type	65
➤ Fig 36. Global Distribution of Installed Units by Type	66
➤ Fig 37. Installed Units by FPS Type and Region	67
➤ Fig 38. Table of Production and Storage Floaters by Type and Region	68
➤ Fig 39. FPS Units On Order by Type and Region	69
➤ Fig 40. FPS Units On Order/Under Repair by Name and Type	70
➤ Fig 41. Distribution of Units On Order by Destination	71
➤ Fig 42. Distribution of Units On Order by Yard	72
➤ Fig 43. FPS Order Book	74
➤ Fig 44. FPS Order Book by Unit Type	74
➤ Fig 45. Available FPS Units by Year of Lay-Up and Type	75
➤ Fig 46A. Available FPS Units by Year of Lay-Up, Type and Status (FPSO)	76
➤ Fig 46B. Available FPS Units by Year of Lay-Up, Type and Status (Non-FPSO)	77
➤ Fig 47. Possible Available FPSOs 2020-2022	78
➤ Fig 48. Possible Available Non-FPSO Units 2020-2022	79
➤ Fig 49. Projects in Planning Process	80
➤ Fig 50. Projects in Planning Process by Region	81
➤ Fig 51. Projects in Planning Process by Region and Water Depth	82
➤ Fig 52. Projects in Bidding/Final Design Stage by Region and Water Depth	82

➤ Fig 53. Projects in Planning Stage by Region and Water Depth	83
➤ Fig 54. Projects in Appraisal Stage by Region and Water Depth	83
➤ Fig 55. Top Operators by Projects in Planning Process	85
➤ Fig 56. Top FPS Unit Owners	86
➤ Fig 57. Top Operators by Units Leased or Owned	87
➤ Fig 58. Top FPSO Owners	88
➤ Fig 59. Top FPSO Owners by Water Depth	89
➤ Fig 60. Top FSO Owners	90
➤ Fig 61. Top Spar Owners	91
➤ Fig 62. Top Semi Owners	92
➤ Fig 63. Top FLNG Owners	93
➤ Fig 64. Top FSRU Owners	94
➤ Fig 65. Top TLP Owners	95

III. Underlying Market Drivers 96

➤ Fig 66. Brent Spot Price	98
➤ Fig 67. Supply Demand Balance	98
➤ Fig 68. Brent Price Forecast	99
➤ Fig 69. IMF GDP Growth Rate Scenarios	100
➤ Fig 70. Global Confirmed Covid Cases	100
➤ Fig 71. IMF June GDP Forecast	100
➤ Fig 72. Annual Change in Energy Demand	101
➤ Fig 73. Changes in Demand vs GDP Growth	101
➤ Fig 74. Energy Demand Scenarios	101
➤ Fig 75. Global Flights	102
➤ Fig 76. Global Oil Demand in 2020	102
➤ Fig 77. OPEC Compliance	103
➤ Fig 78. Call on OPEC	104

➤ Fig 79. OPEC Crude Production Forecast	105
➤ Fig 80. OPEC Production Potential	106
➤ Fig 81. Total US LTO Production	107
➤ Fig 82. US Shale Activity	107
➤ Fig 83. Global Oil Supply Growth	108
➤ Fig 84. Global Oil Demand/Supply Balance	108
➤ Fig 85. Covid Impact on Global Energy Investment	109
➤ Fig 86. Fuel Supply	109
➤ Fig 87. Sanctioned LNG Capacity	110
➤ Fig 88. Investment in New LNG Capacity	110
➤ Fig 89. Henry Hub Price	111
➤ Fig 90. Future Development Wells	112
➤ Fig 91. Deepwater Tieback Projects	118
➤ Fig 92. Deepwater FPS Projects	118
➤ Fig 93. Offshore Mobile Drilling Rig Market	119
➤ Fig 94. Floater Overview	119
➤ Fig 95. Jackup Overview	119
➤ Fig 96. Contract Length & Lead Time	120
➤ Fig 97. Mobile Drilling Rig Average Fixture Rates	121
➤ Fig 98. Floater Fixture Rates by Region	121
➤ Fig 99. Floater Fixture Rates Forecast	122

D. Market Forecasts

123

➤ Fig 100. FPS Forecast by Unit Type	123
➤ Fig 101. Capex Forecast by Region and FPS Type	124
➤ Fig 102. Growth of FPS Inventory	125
➤ Fig 103. Forecast by FPS Type and Capex	129

➤ Fig 104. Historical Growth of FPSO Inventory	130
➤ Fig 105. Historical FPSO Orders	131
➤ Fig 106. FPSO Awards by Lease/Own	131
➤ Fig 107. FPSO Awards 2003-2025	131
➤ Fig 108. Forecast of FPSO Awards per Year (2021-2025)	132
➤ Fig 109. FPSO Awards 2021-2025 with Petrobras' Proportion	132
➤ Fig 110. FPSO Forecast by Hull Type	133
➤ Fig 111. FPSO Processing by Lease Own	134
➤ Fig 112. FPSO Forecast by Production Capacity	135
➤ Fig 113. Leased FPSO Forecast by Production Capacity	135
➤ Fig 114. FPSO Capex by Hull Type	136
➤ Fig 115. FPSO Awards by Region	136
➤ Fig 116. FPSO Orders by Production Ranges and Hull Type	137
➤ Fig 117. FPSO Capex by Production Ranges and Hull Type	137
➤ Fig 118. FLNG Orders and Deliveries	138
➤ Fig 119. FLNG Orders by Unit Size	141
➤ Fig 120. FLNG Forecast and Capex by Unit Size	141
➤ Fig 121. Historical Growth of FSRU Inventory	142
➤ Fig 122. Historical FSRU Orders	143
➤ Fig 123. FSRU Awards by Lease/Own	143
➤ Fig 124. FSRU Forecast by Unit Size	145
➤ Fig 125. FSRU Forecast and Total Capex by Unit Size	145
➤ Fig 126. Historical FSO Inventory	146
➤ Fig 127. Historical FSO Orders	146
➤ Fig 128. FSO Forecast by Unit Size	149
➤ Fig 129. FSO Forecast and Capex by Unit Size	149
➤ Fig 130. Historical Inventory of Semis	150
➤ Fig 131. Historical Semi Orders	150

➤ Fig 132. Semi Forecast by Unit Size	153
➤ Fig 133. Semi Forecast and Capex by Unit Size	153
➤ Fig 134. Historical Inventory of Spars	154
➤ Fig 135. Historical Spar Orders	154
➤ Fig 136. Spar Forecast by Unit Size	156
➤ Fig 137. Spar Forecast and Capex by Unit Size	156
➤ Fig 138. Historical TLP Inventory	157
➤ Fig 139. Historical TLP Orders	157
➤ Fig 140. TLP Forecast by Unit Size	159
➤ Fig 141. TLP Forecast and Capex by Unit Size	159
➤ Fig 142. Likely Awards in 2020	160

F. Contractor Focus **161**

➤ Fig 143. Top Leasing Contractors and Their Fleets	161
➤ Fig 144. Top Leasing Contractors and Their Fleets by Region	162
➤ Fig 145. Bluewater- Contracts by Field Operator	163
➤ Fig 146. Bluewater- Asset Distribution by Region	163
➤ Fig 147. Bluewater- Fleet Status	164
➤ Fig 148. Bumi Armada- Contracts by Field Operator	165
➤ Fig 149. Bumi Armada- Asset Distribution by Region	165
➤ Fig 150. Bumi Armada- Fleet Status	166
➤ Fig 151. BWO- Contracts by Field Operator	167
➤ Fig 152. BWO- Asset Distribution by Region	167
➤ Fig 153. BWO- Fleet Status	168
➤ Fig 154. MISC- Contracts by Field Operator	170
➤ Fig 155. MISC- Asset Distribution by Region	170
➤ Fig 156. MISC- Fleet Status	171
➤ Fig 157. Modec- Contracts by Operator	172

➤ Fig 158. Modec- Asset Distribution by Region	172
➤ Fig 159. Modec- Fleet Status	174
➤ Fig 160. SBM- Contracts by Field Operator	175
➤ Fig 161. SBM- Asset Distribution by Region	175
➤ Fig 162. SBM- Fleet Status	177
➤ Fig 163. Altera- Contracts by Field Operator	178
➤ Fig 164. Altera- Asset Distribution by Region	178
➤ Fig 165. Altera - Fleet Status	180
➤ Fig 166. Yinson- Contracts by Field Operator	181
➤ Fig 167. Yinson- Asset Distribution by Region	181
➤ Fig 168. Yinson- Fleet Status	182
➤ Fig 169. Excelerate- Contracts by Field Operator	183
➤ Fig 170. Excelerate- Asset Distribution by Region	183
➤ Fig 171. Excelerate- Fleet Status	184
➤ Fig 172. Golar- Contracts by Operator	185
➤ Fig 173. Golar- Asset Distribution by Region	185
➤ Fig 174. Golar- Fleet Status	186
➤ Fig 175. Hoegh- Contracts by Operator	187
➤ Fig 176. Hoegh- Asset Distribution by Region	187
➤ Fig 177. Hoegh- Fleet Status	188
➤ Fig 178. EPC Contractor Orderbook by Type	189
➤ Fig 179. SEA Yards - Client Distribution	191
➤ Fig 180. Korean Yards - Client Distribution	191
➤ Fig 181. Chinese Yards - Client Distribution	191
➤ Fig 182. SEA Yards - Order Destination	191
➤ Fig 183. Korean Yards - Order Destination	191
➤ Fig 184. Chinese Yards - Order Destination	191
➤ Fig 185. COSCO - Orders by Client	192

➤ Fig 186. COSCO - Order Destination	193
➤ Fig 187. COSCO - Order Backlog	194
➤ Fig 188. CSIC - Orders by Client	195
➤ Fig 189. CSIC- Order Destination	195
➤ Fig 190. CSIC - Order Backlog	196
➤ Fig 191. CSSC - Orders by Client	197
➤ Fig 192. CSSC - Order Destination	197
➤ Fig 193. CSSC - Order Backlog	197
➤ Fig 194. Daewoo - Orders by Client	199
➤ Fig 195. Daewoo - Order Destination	199
➤ Fig 196. Daewoo - Order Backlog	199
➤ Fig 197. Hyundai - Orders by Client	200
➤ Fig 198. Hyundai - Order Destination	200
➤ Fig 199. Hyundai - Order Backlog	201
➤ Fig 200. Samsung - Orders by Client	202
➤ Fig 201. Samsung - Order Destination	202
➤ Fig 202. Samsung - Order Backlog	203
➤ Fig 203. Keppel - Orders by Client	204
➤ Fig 204. Keppel - Order Destination	204
➤ Fig 205. Keppel - Order Backlog	205
➤ Fig 206. MMHE - Orders by Client	206
➤ Fig 207. MMHE - Order Destination	206
➤ Fig 208. MMHE - Order Backlog	207
➤ Fig 209. Sembcorp - Orders by Client	209
➤ Fig 210. Sembcorp - Order Destination	209
➤ Fig 211. Sembcorp - Order Backlog	210