3.　海洋構造物・オフショア作業船で主に使用されている設備・機器の概要

3.1　海洋構造物で使用されている主な設備・機器

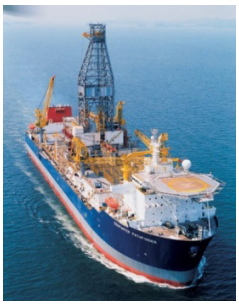
3.1.1 掘削機器

オフショア掘削リグには、主にジャッキアップ型、セミサブ、掘削船の 3 種類がある。ジャッキアップ型は最大水深 300 - 400 フィートまで稼働可能であり、セミサブと掘削船はさらに深い水深でも作業できる。最新型（第 6 世代）は最大 10,000-12,000 フィートまで操業可能である。

以下で説明する機器は、セミサブと掘削船という浮体式リグにのみ該当する係留設備/推進器を除き、上記 3 種類すべてに共通するものである。

ジャッキアップ型リグ

セミサブリグ



掘削船

（1） 掘削パッケージ[85]

掘削パッケージには、掘削に必要な主要構成要素がすべて含まれる。具体的には以下を含む。

<u>デリック（油井やぐら）</u>

約 50 フィートの高さのデリックは、掘削リグのなかでも最も見分けのつく機能で、掘削パイプなど重量物を吊り下げるために使われる。最近の掘削船やセミサブリグには、作業効率を上げるために 2 組のデリックを備えるものもある。

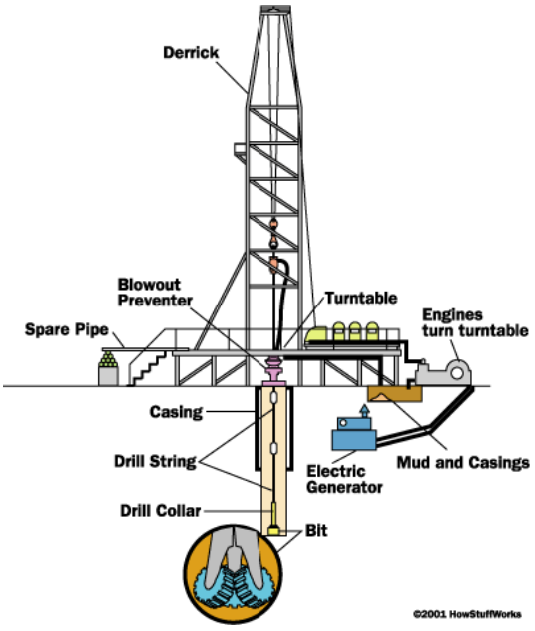


図 3-1　掘削パッケージの図解

[85] Howstuffworks.com

巻上げシステム[86]

坑井の中に様々な物を降ろしたり、それらを制御された方法で引き上げるには、ドローワーク（くみ上げ機械）と呼ばれる大型のウィンチを使って行う。ドローワークは大径の鋼製スプール、ブレーキその他種々雑多な補助装置から構成される。また、新設計のもののなかには、ウィンチとワイヤ･ロープの代わりに油圧ラム（つち打ち機）が使われているものもある。

セミサブリグ

油圧ラムと油井やぐら[87]

泥水システム

掘削の際には、ドリル用ビットの潤滑を行い、掘削を円滑に進めるために井戸に各種の流体を圧送する。掘削流体は、「マッド」または「掘削マッド」と呼ばれ、「マッド・ピット」に貯蔵される。マッドは、水性、油性あるいは合成系のものが使われる。泥水システムは、大型ポンプおよびマッドの混合・処理･搬送用の補器類から構成される。

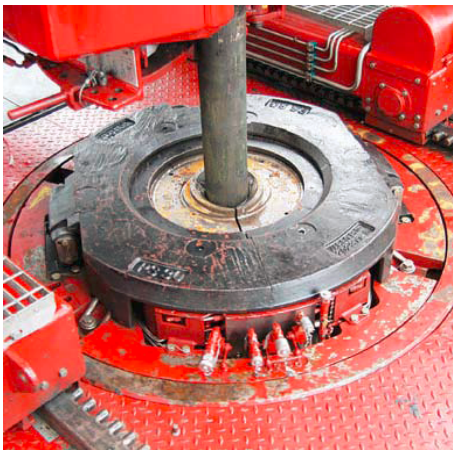
トップドライブ

[86] 巻上げシステムは、デリック内に収容される機器である。

[87] Aker Solutionsの掘削機器 2010 –MHラム･リグ

回転システム

掘削パイプを回転させるシステムである。主なタイプは、掘削リグの床面で掘削パイプに接続する回転テーブルと、掘削パイプの頭頂部に繋がるトップ･ドライブの 2 種類がある。ほとんどのリグは、回転テーブルを有している。一部のリグではそれに加えて、より効率の高い掘削を行うためにトップ･ドライブを備えるものもある。[88]



ロータリーテーブル

掘削パッケージの製造メーカー

掘削市場は、長年にわたり多くの小規模な企業を買収してきた 2 大メーカーがほぼ独占するところとなっている。一つは、National Oilwell Varco または略称 NOV。業界では、NOV は“No Other Vendor” （他の供給メーカーはいらない）とか“Number One Vendor” （No.1 供給メーカー）の略だと皮肉る向きもある。NOV は主力製品の掘削パッケージの他にも、傘下の 40 を超すブランドを通じてその他の機器も生産している。

2 番目に大きいメーカーは、Aker Solutions で、ここは主として Maritime Hydraulics （MH）ブランドを通じて掘削パッケージを供給する能力を持っている。

この市場には、より小規模な企業である Huismann と TTS Sense の 2 社が参入している。TTS Sense は TTS グループに属し、従来から主にジャッキアップ型リグを提供している。

HuisDrill 12000

Huismann は、独自のデザインの掘削パッケージを生み出し、オープン･デリック構造に代わってコンパクトな閉鎖型タワーを売り出している。同社の設計による小型掘削船は、この方式を採用することで寸法と重量を削減できる利点がある。現在、Noble Drilling 社が発注した 2 基が中国の STX 造船所で建造中である。

[88] Aker Solutions の掘削機器 2010 –トップ･ドライブ & Wirth油圧回転テーブル

表 3-1　HuisDrill 12,000 と在来型の掘削船の比較

	HuisDrill 12000	従来型の掘削船
全長	189m	228m
全幅	32m	42m
排水量	54,000mt	100,000mt
推進器出力	6×3.5 MW	6×5.5 MW

出所：Huismann 社ウェブサイト[89]

（2） 掘削ライザー

「掘削ライザー」とは、掘削パイプを中に収め、海底面の「噴出防止装置（BOP）」と掘削リグの間を結ぶ大口径パイプである。リグに戻される流体とガスはライザーを介して回収される。最新のリグで使われるライザーの全長は 10,000-12,000 フィートに達するものもある。[90]

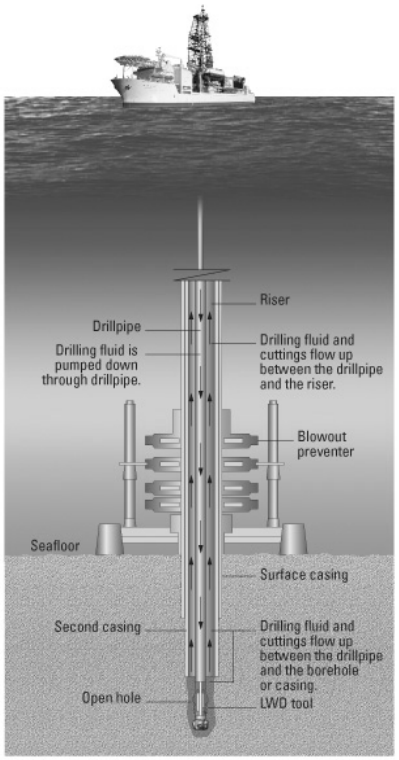


図 3-2　掘削ライザーの図解

（3） 噴出防止装置 （BOP）

BOP は、緊急時の坑井からの流体の噴出を掘削リグが止めることを可能にするために海底面に設置される安全装置である。BOP は、数層にわたる代理機能構造を組み込んだ一連の複数の弁とラムから構成される。「アニュラー・プリベンター（円形防止器）」は掘削パイプの周囲を密封するように設計されている。この部分が機能停止になると、「ブラインド･ラム」が作動して、流れを止め、最後の手段としては、掘削リグを切断する「せん断ラム」が使われることになる。BOP の制御機器は、掘削リグから操作される他にも、「遠隔作業機（ROV）」を使って遠隔操作することが出来る[91]。

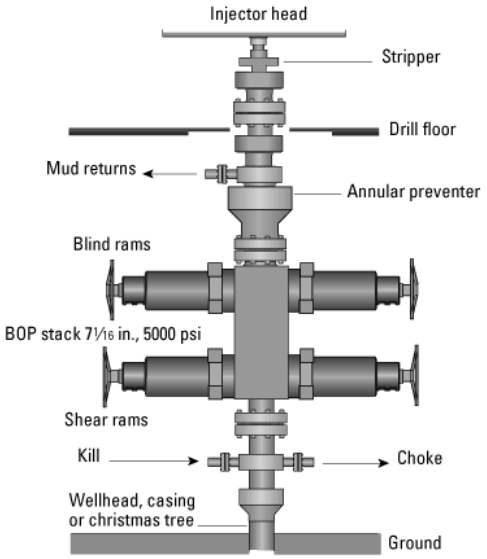


図 3-3　噴出防止装置の図解

[89] Huismann 12,000 掘削船 -

[90] シュランベルジャー油田用語集

[91] シュランベルジャー油田用語集

掘削ライザーと BOP の製造メーカー

BOP 市場のリーダーは、市場占有率約 50%を誇る Cameron である。その他のメーカーとしては、Shaffer ブランドを有する NOV ならびに Hydril ブランドを有する GE がある。

掘削ライザーの製造メーカーには、Cameron、NOV、Aker、Drill-Quip などがある。

（4） 測位システム

ジャッキアップ型リグは自分で位置決めができ、脚柱を伸ばして海底面に着地できる。浮体式掘削リグ（セミサブと掘削船）の位置決定システムの主なタイプとしては、自動船位保持と固定係留の 2 種類がある。

固定係留

「セミサブ」と「掘削船」は、通常はチェーン、ワイヤ及び／若しくはポリエステル･ロープなどの係留索でリグに繋がれたアンカー（錨）を海中に沈める固定係留によって一定の位置に船体を保持することができる。通常の係留設備では、天候状況にもよるが、8－12 本の係留索が使われる。係留作業には、アンカーを投下・巻上げるための揚錨船（AHT）と呼ばれる専門の支援船が必要になる。

（固定係留索のリグへの設置・接続の方法についての動画は、次のサイトを参照のこと。http://www.diamondoffshore.com/ourCompany/ourcompany_semiVideo.php）

自動船位保持

一部の「セミサブ」や「掘削船」では、固定係留に加えてあるいはそれに代えて、自動船位保持（DP）システムが使われている。DP システムは、プロペラや推進器に接続した精巧なコンピュータ制御機器を使って風や波の影響を打ち消してリグを同一位置に保持するものである。DP システムは、GPS（全地球測位システム）その他の測位システムに対して自動的に反応して、リグを正しい位置に保持する。DP システムが健全に働く限り、固定係留や付随する AHT などは不要になる。ただし、DP の推進器を作動させておくにはかなり燃料を消費する。DP システムは、代理機能の数によって、以下の 3 種類に分けられる：

DP 1 - 代理機能なし。単一の障害が起きるだけで位置を見失う可能性がある。

DP 2 - 作動システムの一つが故障しただけでは位置確定不能状態にはならないような代理機能を備える。そのためには推進器、発電機、配電盤などの追加の機器類が必要になる。

DP 3 - 一つの区画で火災や水害が起きた場合でも位置を確定できるような代理機能や隔離措置がとられている。これには独立した制御室と機器室が 2 つ必要になる。

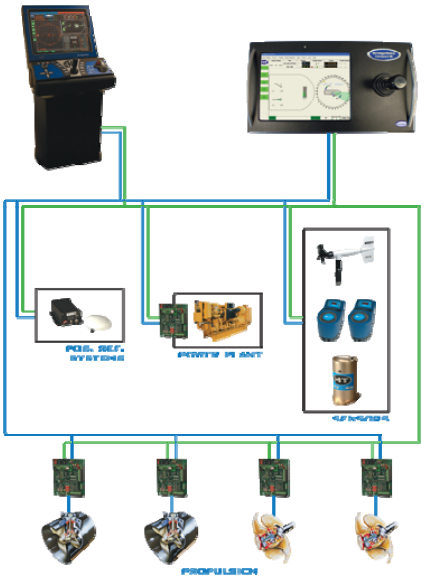


図 3-4　DP1 の図解[92]

船位保持システムの製造メーカー

固定係留設備については、数多くの企業がロープ（ワイヤまたは合成繊維）、チェーン及びウィンチを供給している。最大手の 4 社としては、ParkerScanrope、Bridon、Redaelli および ArcelorMittal がある。

Parker Scanrope - ロープ･メーカーの最古参企業の一つで、創業は 1796 年。ノルウェーの Tonsberg にある同社の係留索製造施設は、輸出用の施設として水深の深い埠頭と 250 トン級クレーンを備えている。この製造施設は独立した製造ラインを 2 本有している。同社は 2007 年に Parker Hannifin に買収されている。

Bridon - ワイヤ･ロープの最古参メーカーの一つで、創業は 18 世紀後半に遡る。同社は、世界中の 7 ヵ所に生産拠点を持ち、9 カ国（英国、米国、ドイツ、ロシア、インドネシア、中東、シンガポール、中国およびアンゴラ）に 12 の営業所を構えている。2006 年に同社は、Marlow Ropes のオフショアおよび実用船舶関連の資産を製造施設も含めて買収し、繊維系ロープの供給に足場を確保した。その後 2008 年に同社は Melrose PLC に買収されている。

Redaelli - イタリアの最古参の引抜鋼管メーカーで、創業は 1819 年に遡る。同社は、1970 年代にスチール･ワイヤ分野に進出して以来、オフショア部門へのワイヤの大手供給メーカーの地位を確保している。本社はミラノに置かれ、ワイヤ･ロープの工場は

[92] Marine-Technologies – DP パンフレット

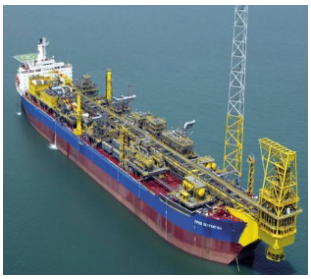
Gardone Val Trompia と Trieste にある。2008 年同社は、Severstal-Metiz グループに買収された。

ArcelorMittal - ArcelorMittal Wire Solutions 社の歴史は 20 世紀初頭にまで遡る。フランスの Bourg en Bresse にある同社のワイヤ生産プラントが操業を始めたのはは 1906 年である。同社は、2001 年に Arbed、Aceralia および Usinor との合併の後、さらに 2006 年に Mittal との再合併により生まれた ArcelorMittal の 100%子会社である。ArcelorMittal は現時点では世界最大の鉄鋼企業である。

船位保持の制御システムを製造するメーカーには、Kongsberg、Converteam、および Maritime-Technologies などがある。制御システムは、Rolls Royce や Wartsilla が供給する動力･推進機器に組み込まれる。

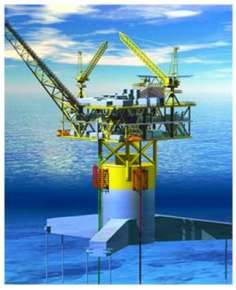
3.1.2 浮体式生産構造物（件）の機器類

現在、全世界では 200 基を超える浮体式生産設備が稼動中である。
FPS には主に次の 4 種類がある：



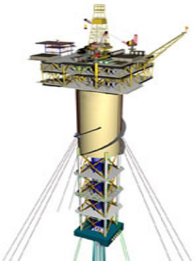
FPSO （65%） - FPS のほぼ 2/3 は、浮体式生産貯蔵積出設備（FPSO）によって占められている。FPSO は、既存の石油タンカーを改造するかもしくは新規に建造される。FPSO は、船体内部に石油を貯蔵できること、広いスペースと大きな重量トンを持ち、自前で推進できるとともに、ハリケーン／台風時には係留システムから切り離す設計など、数多くの利点を持っている。

セミサブプラットフォーム（18%） - 次に良く見られるのは、生産用セミサブプラットフォームである。これらのプラットフォームも既存のセミサブ掘削リグから改造するかあるいは新規に建造される。ただし、この設備は自前の貯蔵設備を持たないため、パイプラインまたは浮体式貯蔵積出（VSO）設備に接続する必要がある。セミサブは安定した構造であり、非常に多くの海底からのライザーを支えることができるが、デッキ･スペースと重量トンについては限られたものしか有していない。このタイプの設備が最も多いのは、北海、ブラジルおよびメキシコ湾である。



緊張係留式プラットフォーム（TLP）（9%） - セミサブと類似の設備であるが、セミサブではカテナリー係留であるのに対し、こちらは緊張係留方式である。緊張係留式プラットフォームまたは TLP は、貯蔵設備は持たず、最もよく見られるのはメキシコ湾である。TLP の場合、係留設備が障害を起こすと、転覆する可能性があり、実際、Typoon という TLP ではそうした事故が起きている。

SPAR （8%） - SPAR または「一点固定ライザー」は、大水深プロジェクト、その大半はメキシコ湾内で使用されている。TLP とは異なり、SPAR は、係留設備に障害が起きても転覆することはない。ただし、SPAR の設置には、船体とトップサイドを別個に運搬して海上で重量物クレーンや専用のフロートオーバー設備を使い組み立てるため、作業が複雑で費用もかかる。



上記 4 種類の FPS に搭載される機器類は、どの場合もほぼ同じであるが、係留システムには違いがある。それらの機器の沖合いでの設置・使用のために好適化するには、必要な付属装置とともに安全装置、通路や梯子などをすべて備えたスキッド上にモジュラー化する場合も多い。このモジュールを 1 つずつ持ち上げて FPS に載せて、各システム（水、火力、ガス、電力など）に接続する。モジュラー化は一部メーカーで行われるか、もしくは専門の組み立てヤードで建造される。

（1）ガス･タービン発電機およびガス･タービン圧縮機
坑井からの余剰ガスは、ガス･タービンで燃焼させてオフショアでの様々な用途に使うことができる。主要な 2 つの用途は、発電とガス圧縮である。

ガス･タービンは、航空機のジェット･エンジンに使われている。まず、エンジンに取り込まれた空気は圧縮され、燃料と混合してから点火される。そこから生じる高温ガスは高速で膨張し、燃焼で生じたエネルギーがブレードの間を通って出力軸を回転させる。高温の排気ガス中の残留熱エネルギーは、様々な産業プロセス用に利用できる。航空機の場合、排気ガスは推進力を生む。

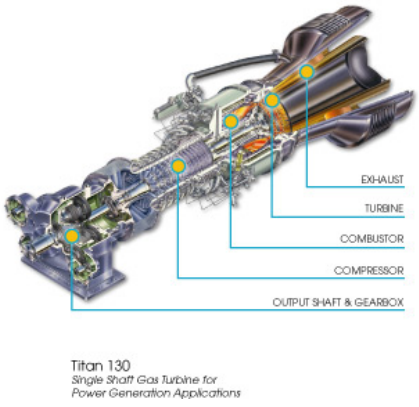


図 3-5　ガスタービン

オフショアでの用途としては、ガス･タービンの出力は発電機に接続され動力を発生させるか、圧縮機へ導いてガスを圧縮する。
（この過程の動画は次のサイトにある。
http://mysolar.cat.com/cda/files/252655/7/vchtw.wmv） [93]

[93] Solar Turbines

ガス･タービン発電機とガス･タービン圧縮機の製造メーカー

ガス･タービンの大手供給メーカーは、Rolls Royce、Solar、General Electric （GE）および Siemens である。これらのメーカーではタービンを発電機や圧縮機と組み合わせることもできる。

表 3-1　ガスタービンメーカー製品の型式と容量

会社名	型式	容量
Solar Turbines	Saturn 20 Centaur 40/50 Taurus 60/70 Mars 90/100 Titan 130 Titan 250	1 MW 3-5 MW 6-7 MW 8-10 MW 15 MW 20 MW
Rolls-Royce（Avon, Coberra, RB211）	501 Avon 200 RB211 Trent 60	5MW 15MW 30MW 60MW
Siemens	SGT-100 SGT-200 SGT-300 SGT-400 SGT-500 SGT-600 SGT-700 SGT-750 SGT-800	5 MW 7 MW 8 MW 13 MW 19 MW 25 MW 31 MW 36 MW 47 MW
GE	LM500 LM1600 LM2500 LM2500+ LM2500+G4 LM6000	5 MW 15 MW 25 MW 30 MW 35 MW 40 MW

出所：各社ウェブサイトより作成

Solar Turbines‐ヒューストン本社。オフショア市場向けガス･タービンの最大手の一つで、5MW 以下の市場では圧倒的な優位にある。同社は Caterpillar グループの 1 社である。

Rolls Royce‐英国企業。大容量タービンの主要メーカーである。同社のタービンは同社の航空機用ジェット･エンジンを応用したものである。

Siemens‐Westinghouse と Alstom 両社のタービン部門を買収している。それ以前に Alstom は、EGT と Ruston のタービン事業を吸収している。これらの事業は現在、統合されて Demag Delaval の名称のもとで引き継がれている。

GE‐米国の巨大コングロマリットである **GE** は、広範な石油・ガス事業を保有している。同社のガス・タービンも同社の航空機部門のものを利用している。

この他に、上記のようなガス・タービンと組み合わせられる圧縮機あるいは電気で駆動される圧縮機のメーカーも数多く存在する。このようなメーカーとしては、Cameron、Ariel、および Dresser-Rand などがある。

Cameron - 同社の歴史は、1800 年代末の Superior Engine and Compressor 社にまで遡ることができ、長年の間に買収を通じて企業規模を大きくした。同社の圧縮機部門は 11 のブランドを有する。

Ariel Corporation - 同社は、ガス圧縮機に特化した非公開企業である。1966 年に創業者の Jim Buchwald により設立された会社で、現在の CEO は同氏の娘が務めている。

Dresser-Rand - この会社も 1800 年代末まで遡る歴史を持っている。圧縮機の製造を開始したのは 1899 年で、やはり買収を通じで会社の規模を大きくしている。

MCO - オフショア圧縮機市場の新参企業である三菱重工コンプレッサー株式会社は、三菱重工業株式会社の 100%子会社である。2010 年 9 月、同社は、Solar 社からガス注入圧縮機の発注を得ている。この契約については、MCO が製造する圧縮機を Solar が自社のガス・タービンに組み込むことになっている。

（2） ボイラーと蒸気タービン

ガス・タービンによる電力を発生の代替案としては、ボイラーで水を沸騰させ（ガス、HFO（Heavy fuel oil の略。訳注：比重の高い燃料油で、C 重油相当）、MDO（Marine diesel oil の略。訳注：A 重油相当） あるいは油田からの原油さえ使って） 、その蒸気をタービンに通す方法がある。FPS 上では蒸気は、原油を温めたり、プロセス分離モジュールでの利用といった他の用途にも使えことができる。

ボイラーとガス燃焼システムの製造メーカー

FPS 用のボイラーとガス燃焼システムの主な供給メーカーは、Hamworthy、Aalborg、および Saake の 3 社である。3 社とも、既存ボイラーのガス燃焼システムへの改造、FPS に設置するモジュラー化ボイラー完成品の供給を行っている。市場で有力なのは Hamworthy と Aalborg の 2 社になる。

Hamworthy Combustion Engineering Limited - 英国企業である Hamworthy は、低圧から 220 トン／時の蒸気を発生する高圧のボイラーまでを製造している。独自開発したガス燃焼システムも持っている。

Aalborg Industries -Aalborg は、最大 130 トン／時の蒸気を発生する低圧ボイラーを製造しているデンマークの企業である。同社はまた、ガスを燃焼させるボイラー燃焼システムの製造メーカーの Gosfern を買収している。

Saake Marine Systems - ドイツ企業の Saake も従来から FPSO 用のボイラーとガス燃焼システムを数基納入した実績を持つ。

蒸気タービンの製造メーカー

船舶用タービンのメーカーの数は多い。しかし、FPS 用途のタービンについては、主要メーカーは次の 2 社である：

Dresser Rand - 2008 年に Dresser Rand が買収されるまでは、Peter Brotherhood という英国企業であった。1907 年以来、蒸気タービンを設計・製造している。また、FPS への設置を容易にするタービンのモジュラー化も行っている。FPSO 用としては最大 27MW までのタービン の納入実績がある。

株式会社シンコー -1-15MW の蒸気タービンを製造する日本企業。製品の信頼性は高いが、現在モジュラー化は提供していない。

（3） 係留

TLP、セミサブ、および SPAR は回転運動はしないが、一部の FPSO では風向きと天候によって 360 度向きを変えることができる。FPSO を回転させるにはタレットと呼ばれる専用の係留設備が必要で、タレットは海底にアンカーで固定される。船との接合は、船首に外部的に接続するか、あるいは船体下に内部的に接続するかいずれかの方法で行われる。

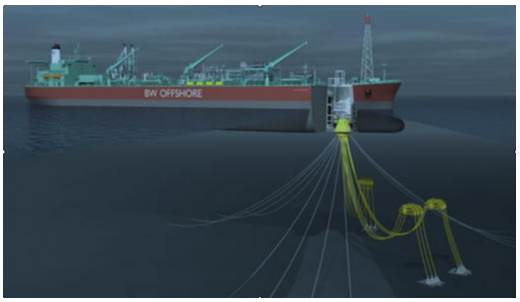


図 3-6　タレット係留の仕組み

図 3-7　FPSO のタレット

タレットの製造メーカー

タレットのメーカーとしては、SBM、Sofec、Bluewater、APL、および LMC の各社がある。

SBM - SBM または Single Buoy Moorings 社は、1970 年代に設立されたタレット市場のパイオニアでありリーダーである。現在までに、係留システム（タレット）の 80%以上を供給している。SBM は、自社のタレットを石油会社、他の FPSO 請負企業、あるいは自社が請け負う FPSO 用に供給している。本社はモナコにあり、オランダの証券市場に上場している。

Sofec - タレット供給メーカーとしては 2 番目の規模の Sofec はヒューストンに本社を置く企業であり、主に FPSO メーカーの MODEC（三井海洋開発株式会社）への製品納入が多いが、一部はサード･パーティへのタレット供給も行っている。同社は、過去には FMC グループの傘下にあったが、現在では FPSO メーカーMODEC に買収されている。

APL -APL または Advanced Production Loading は、北海向けの係留システムの開発のために 1993 年に設立されたノルウェー企業である。その後の成長を遂げ、2007 年に FPSO メーカーの BWOffshore1 に買収された。APL は、2010 年に 5 億米ドルで NOV に売却された。

Bluewater -Bluewater は、Heerema 家が株を保有するオランダ籍の非公開企業である。同社は、タレット係留、特に北海でのそれのパイオニアの一社である。Bluewater 社は FPSO の供給メーカーでもあり、従来からサード･パーティへの供給を行っている。

LMC - London Marine Consultants は、FSO および FPSO 用の簡単なタレットを設計している。2008 年に EMAS グループによって買収された。それ以前は、設計のみを行っていたが、現在ではタレット完成品をターン・キー契約で提供している。

（4）スイベル

スイベルと呼ばれる特殊機器を使うことで、流体、気体、制御信号および電力を地表面の静止物体から回転物体へと移動させることができる。スイベルは、複数を積み重ねて配置される。スイベル･スタックは、海上での修理が困難なため、FSO/FPSO 上の要素のなかでも最も重要なものの一つである。故障防止のために、スイベルには複数のシールや安全機構が組み込まれている。

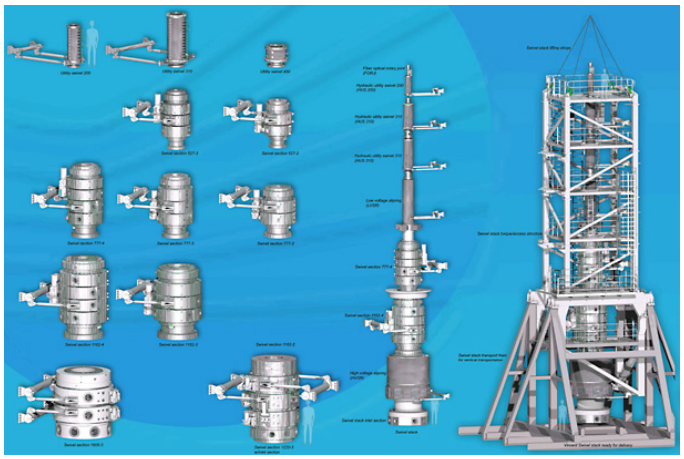


図 3-8 各種のスイベル

タレットは、FPSO を係留システムにつなぐ構造である。流体や気体はスイベルを通って流れる。スイベルはタレットの内部に納められている。

スイベルの製造メーカー

タレットの大手メーカーは、LMC を除いて、すべて自社製のスイベルを持っている。しかし、スイベル業界のリーダーであり最先端のスイベルを提供しているのは、ノルウェー企業の Framo Engineering AS である。同社のスイベルの信頼性は最も高い評価を得ているが、同時に価格も最も高い。

図 3-9
組み立てられたスイベル

（5） ダイナミック・ライザー

ダイナミック・ライザーとは、坑井から FPS へ、ならびに FPS から坑井（ガスまたは水の注入用）へと流体を搬送するためのフレキシブルなパイプである。ライザーは、層状に形成される。何層を重ねるかは適用用途によって異なる。単純な中程度圧力で水を搬送する場合なら 4 層程度になるし、より複雑な流体、温度および／もしくは圧力を扱う場合には 15 層かそれ以上になる。

一般的なライザーの構造を以下に示す。この例では、8 層構造になっている。

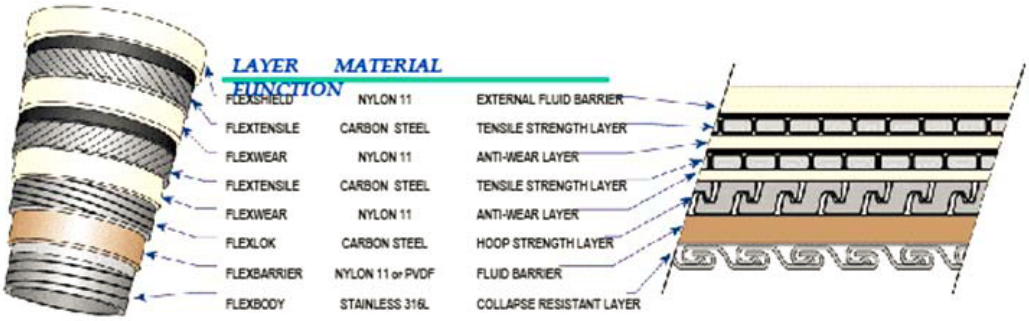


図 3-10　ライザーの構造

出所：MMS Workshop 2008

ダイナミック・ライザーは、掘削リグで使われるライザーとは別のものである。掘削ライザーは、水深にしたがってセクションごとに組み立てられる。また、掘削リグが水深の大きさに対して相対的に小さい動きしかしないことから、掘削ライザーはほとんど静止状態にあるということができる。

生産ライザーは、一つながりの連続したライザーで、潮汐や天候による FPSO の動きや回転につれて湾曲するように設計されている。

ライザーの製造メーカー

フレキシブル・ライザーの主要な製造メーカーとしては、Technip、Wellstream および NKT の 3 社がある。

Technip - ライザー設計のパイオニアでかつ最大の供給メーカーである。同社が最初にライザーを利用したのは、1973 年のコンゴの Elf のパイプライン用であった。それ以来、同社は延べ 9,000 キロメートル を超えるライザーを製造・設置している。ライザーは、同社がオフショア部門に製造･供給する数多くの製品の 1 つである。

Wellstream - ライザー･メーカーとして 2 番手に位置する同社は、1983 年に米国にて創業されて以来、オーナーが 4 回ほど変わっている。1995 年に買収した Dresser Industries は、1998 年に同社を Halliburton に売却した。2003 年に経営陣が親会社から事業を買収し、最終的には 2007 年にロンドン証券市場に上場する公開企業となった。Wellstream は、2010 年に 13 億米ドルで GE に買収されている。

NKT - 大手 3 番目のメーカーはデンマーク企業の NKT である。同社はライザーと自噴線用の高圧および中圧のフレキシブル･パイプの大手メーカーである。同社は 1960 年代末に設立された。NKT は自社をフレキシブル･パイプのメーカーとしては完全に独立した企業と喧伝しているが、その株式の 49%は供給パイプライン（umbilical）、ライザーおよび自噴線の設置における主要プレイヤーである AcergySubsea7 が保有している。

（6） アンビリカル（供給パイプライン）

アンビリカルは、FPS と海中システムの間を結ぶ供給ラインで、坑井作業を制御するための電力、油圧、注入薬剤を送り込むものである。基本的には一般的な外径が 140－170 ミリのフレキシブルなホースで、その中に高圧油圧ホース、電線、光ケーブル、薬剤注入ホースなどを収めたものである。

海中アンビリカルの大手供給メーカーとしては、Aker Solutions、Technip Duco、Oceaneering、Parker Hannifin、JDR および Nexans などがある。

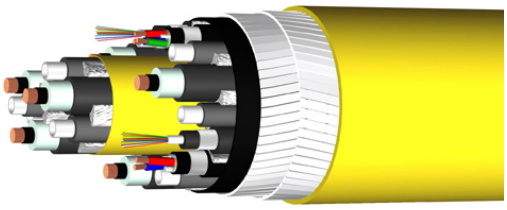


図 3-11　アンビリカル

Oceaneering - ヒューストンに本社をおく同社は、アンビリカルの供給者としては最大の企業である。アンビリカル製品ラインは Multiflex のブランドで提供している。製品ラインは、熱可塑性チューブとスチール･チューブの両タイプのアンビリカルが含まれる。

Aker Solutions - スチール･チューブ製アンビリカル･システムの大手供給業者であり、またカーボン繊維－スチール･チューブ製アンビリカル開発の第一人者である。同社の製品としては、電気油圧式アンビリカル、カーボン繊維強化大水深用アンビリカル、センター･チューブ統合型サービスまたは生産用アンビリカル、および高圧電源アンビリカルがある。アンビリカルは、海洋石油･ガス供給プロセス全体を包含する一大生産ラインの一部をなすものである。

Technip - 同社もアンビリカルの供給における主要プレイヤーの一つである。アンビリカルの生産は、同社の子会社である Duco ならびにそのなかの一部はさらにもう一つの子会社である Angoflex が管理している。

Parker Hannifin - Parker Hannifin 内の 2 つのグループ（Parker Scanrope と Parker Cabett）がアンビリカルの製造とオフショア産業への供給を行っている。

JDR - 同社は、海洋石油･ガス部門および海洋再生可能エネルギー市場向けに熱可塑性樹脂製のアンビリカルを製造している。製品ラインには、各種の海中送電線とアンビリカルが含まれる。JDR は、緊急時および改修時制御アンビリカルを石油･ガス部門へ供給する企業のなかでは最有力であると自認している。ヒューストンに本社を置く同社は、2007 年 9 月に英国の非公開投資会社の Vision Capital によって買収された。

Nexans - 同社は、石油･ガスその他産業部門向けの電源ケーブルとアンビリカルを供給するノルウェーの大手メーカーである。ノルウェーは Halden にある同社プラントでは、スチール･チューブ・アンビリカルと複合素材ケーブルの製造と供給を行っている。同社の発表によれば、同社のアンビリカル事業は、初期段階のエンジニアリングおよびスチール管の溶接などから、認定試験から連結接続までにわたる完全に統合化されているという。同社はまた、アンビリカルの設置に使われる極めて先進のケーブル敷設船や ROV も保有している。

（7） 浮きホース

石油を FPSO からオフテイク（引き取り）タンカーに移送するために使われるホースである。通常、このホースは FPSO の船首か船尾に接続し、さらにオフテイク･タンカー（普通の石油タンカーでは船体中央部、あるいは定期往復積出タンカーの場合は船首）のマニホールドへと繋がれる。

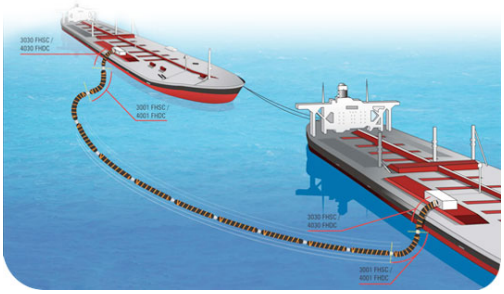


図 3-12　ホースの使われ方

浮きホースは主に単一カーカスと二重カーカスの 2 種類に分かれる。二重カーカス･ホースでは、内側のカーカスから漏洩が起きても外側のカーカスによって石油の漏出を防ぐように設計されている。二重カーカス･ホースは、内側のカーカスの障害を検知する特殊な電子センサー･システムを備えており、ホースの損傷部分を同定してそれを交換できる。浮きホースの主なメーカーは、**Dunlop**、**Yokohama**、**Trelleborg**、**Parker ITR**、**Manuli**、**Flexomarine**、および **SeaWing（グッドイヤー）**がある。

ホースでつないだ船

3.3 オフショア作業船で使用されている主な設備・機器

第２章で紹介したとおり、オフショア産業ではオフショア設備の建設および建設支援に携わる高機能船舶は、さまざまなものがある。これらの船舶でも固定式係留や、それよりも一般的なものとして自動船位保持システムが使われる。また、これら専用船舶のほとんどがクレーンを少なくとも 1 基は備えていることが多い。

重量物起重船

パイプ敷設船

（1） クレーン -建設、パイプ敷設、宿泊船

オフショアの過酷な環境下で人員と資材を安全に輸送するためには、特別に設計されたクレーンが必要となる。ほとんどの企業では、クレーンの設計と建造に関しては米国石油協会（API）の 2C 規格に適合させることを義務付けている。

クレーンにはさまざまなサイズのものがある。もっとも一般的なものとしては、以下のようなものがある。

- 人員輸送／資材運搬 - 5-20 トン、ブーム長 35 メートル
- 重量物揚重 - 500-2000+ トン、 ブーム長 100 メートル

クレーン関連用語 [94]

補巻き（ホイップ･ラインまたはファスト･ライン）：揚重能力が主ブロックより軽容量の補助的ロープ･システム。
ブーム: クレーンの上部構造に連結されて、巻上げ滑車装置を支える。
ブーム･ホイスト: ブームを上げ下げする。
ブーム支持装置: ブームを支持するために使われるワイヤ･ロープ、滑車、軸、ブロックその他の巻き揚げ部品。
キャブ:クレーン制御する操作員が納まる機室。
ガントリー: ブームを支えるロープを通すフレーム。
キングポスト: プラットフォームと連結する部分で、上部構造の回転中心線となる。
台座: 上部構造が載せられる下部構造。
回転上部構造: 回転する枠組み構造および搭載される作業機械。

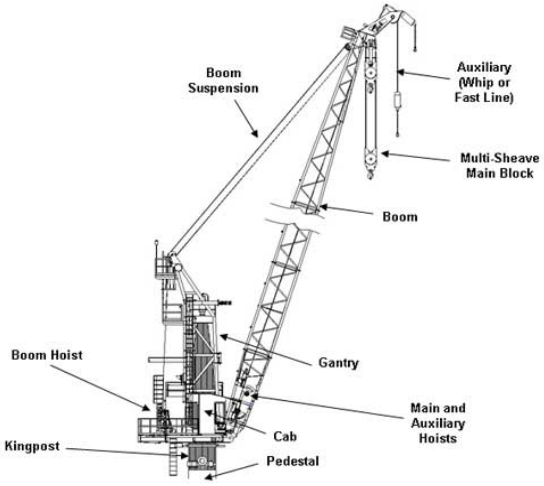


図 3-12　クレーンの図解

キングポスト型と非キングポスト型の間に、使われる部品や機能の点に関しては基本的には相違はない。主な違いは、静止している台座部分に回転部分を連結する方法である。

クレーンの製造メーカー
クレーンを製造するメーカーの数は多い。クレーン以外の吊上げ装置を製造する NOV、Aker、Huismann などでもクレーンも生産している。特殊専門用途のクレーン･メーカーには、陸上用と海上用の両方を製造するところもあるし、オフショア用クレーンに特化しているところもある。
Favelle Favco - マレーシアとオーストラリアの工場で年間約 80 基のオフショア用クレーンを製造している。製造するクレーンの揚重能力は 5-2000 トンである。
Liebherr - 最大揚重能力 2000 トンまでの重量物クレーンのメーカーとしてよく知られているオーストリア（欧州）の企業。ただし、揚重能力 5 トンといった小型のクレーンも製造する。
Seatrax - 回転する上部構造が静止台座からはずせないためにより安全と考えられているキングポスト型クレーンの大手メーカー。この型のクレーンを過去 35 年にわたりヒューストンおよび現在では英国でも製造し続けている。

[94] API 2C 規格

4. 海洋構造物・オフショア作業船への我が国舶用機器導入可能性

4.1 海洋構造物に対する舶用機器の潜在需要

（1） 掘削リグ

前述のように、オフショア石油ガス掘削は、さらに大水深へと向かっているが、その技術課題としては次のようなものがあげられている[95]。

- 地層圧力と地層破壊圧力の関係
- 地層温度および海水温度の影響
- 大水深の浅部地層の特徴
- 水深の影響
- リモートエリアであること
- 掘削コストへの影響

これらの課題を克服する為に、様々な技術開発への努力が続けられている。例としては次のものがある。

① MPD（managed pressure drilling）

掘削時において、坑壁と掘管の間（アニュラス、泥水の柱）の圧力を正確に制御できる適応性のある掘削プロセスのこと。坑井内環境の限界を把握して、それに対応したアニュラスの圧力プロファイルを掘削ウインドウ内に収めるのが MPD の目的。

MPD には次のような機器が使われる

RCD： アニュラスの圧力をしっかりと保持した上で、掘管の上げ下げができる。即ち坑井内圧力をコントロールするバリアとして機能する。

Non Return Valves： 掘削中に坑井内流体の戻りを制御することで坑井内圧力をコントロールする。掘管接続時にも坑底圧を一定に保つ働きをする。掘管編成に随時取り付ける。

Choke Manifold： アニュラスにかかる背圧をコントロールすることで、掘削に必要な坑底圧のコントロールへ結びつける。手動と自動のチョーク操作法がある。

CCS： Continuous Circulation System の略。掘管接続時のアニュラスの圧力

ECD: Equivalent Circulating Density 等価泥水比重に掘削泥水の摩擦圧力損失を加えたもの）を制御する装置のこと。泥水温度を維持できるので、高温・高圧下で有効とされる。Continuous Circulation Device（CCD）とも呼ばれる。[96]

② ケーシング計画

ケーシングとは掘削の進行に伴って、掘られたままで地層が露出している坑井（裸坑）に内枠をつけること。ケーシング材料としては丈夫な鋼管（ケーシング・パイプ）が使用される。ケーシングに際しては、その強度、長さを決めるために、石油会社は地質専門家や掘削技術者の提案や地球物理学的情報をもとにして、ケーシング計画を作成する。使用

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[95] 特集：深海へ向かう世界の石油・天然ガス開発事業　掘削分野の技術革新―水深 3,000m を克服。JOGMEC 2006 年 9 月

[96] 掘削技術の進歩： Managed Pressure Drilling （MPD）　JOGMEC2009 年 3 月

される情報で一番確かなのは近くに掘られた井戸の記録で、それがない場合には似たような地域での記録が使用されたり、物理探査で得られたデータなどが利用される。ケーシング計画を大きく左右するものは、坑の直径、目的層の深さ、そしてその潜在産出能力などである。これらはケーシングのサイズ、タイプ、材質の選択に大きな影響を与える。井戸が深くなり、掘進に日数がかかると、上部の坑壁は長期間裸坑のままにされ崩壊の可能性が高くなる。このため坑井の掘進にあたっては、ある深度あるいは日数まで掘進した後にいったんそこまでケーシングおよびセメンチングを施して、その後そのなかを通る径のビットでさらに下部を掘り進み、第 2 段のケーシングをする、というように、ケーシングは大口径から次第に径を減ずる複数段となるのが通常である[97]。

大水深掘削ではオペレーションウインドーが狭いため、このケーシング計画の面からの対策がなされる。正攻法としてはケーシングの段数を増やすことになるが、当然限界があり、ケーシング段数の増加は作業時間およびコストの増加につながる。できるだけ海底下深い深度までライザーレスで掘削[98]することによってケーシング計画に余裕を与えるという考え方もあるが、次に述べるジオハザード（geo-hazard）[99]を考慮に入れたケーシング計画が重要である。

最新の LWD/PWD（logging whiledrilling[100]/pressure while drilling[101]）ツールを使って坑内圧力管理を厳密に行い、MPD の実践を前提にすれば、ケーシング計画時の安全マージンを小さく取ってケーシング計画を楽にすることも可能になった。

③ ジオハザード（geo-hazard）対策 →シャローガス、シャローウォーターフロー、天然メタンハイドレート層などの浅部トラブル層を避ける。検地できない、避けられない場合の対策

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[97]Weblio ウェブサイト

[98]ライザーレス掘削は、二重比重（デュアルグラディエント）掘削システムに対して提案された最初のコンセプトで、海底上部の海水による水頭圧と坑内のアニュラス圧力を等しく制御するため、海底にマッドリフトポンプを使用するものである。これは裸坑部のオーバーバランスを維持するため、海底下には比重を高めた泥水を使う。

[99] 地質学上の観点から見られる危険因子。シャローガスやシャローウォーターフローは、ジオハザードに含まれる。（特集：深海へ向かう世界の石油・天然ガス開発事業　掘削分野の技術革新―水深 3,000m を克服。JOGMEC 2006 年 9 月）

[100] MWD（measurement while drilling：掘削同時計測伝送システム）技術を用いて、掘削作業中に坑内センサーで地質データを取得し、リアルタイムで地表に取得データを伝送するシステム。掘削作業の効率化および安全性向上に有効なシステム。（特集：深海へ向かう世界の石油・天然ガス開発事業　掘削分野の技術革新―水深 3,000m を克服。JOGMEC 2006 年 9 月）

[101] MWD 技術を用いて、掘削作業中に坑内センサーで坑内圧力データを取得し、リアルタイムで地表に取得データを伝送するシステム。掘削作業の効率化および安全性向上に有効なシステム。（特集：深海へ向かう世界の石油・天然ガス開発事業　掘削分野の技術革新―水深 3,000m を克服。JOGMEC 2006 年 9 月）

- パイロットホールの掘削
- LWD/PWD ツールを用いたトラブル層の検知
- ライザーレス掘削での加重泥水の使用
- 特別な設計の海底坑口装置（異常高圧層や出水層中でのケーシングセメンチング）

④ サブシー機器

大水深掘削に用いるサブシーシステムは、海底面から海上の掘削リグへ向かう順に、サブシーウェルヘッド（subsea well head）[102]、サブシーBOP スタック（subsea BOP stack）[103]、ライザーパイプ（riser pipe）[104]、ライザーテンショナー（riser tensioner）[105]、サブシーBOP コントロールシステム（subsea BOP control system）[106]などがある。これらの機器も大水深に対応したものが必要となる。

また、大水深でのサブシーシステムの運用には ROV[107]が不可欠である。

なお、メキシコ湾での事故を受け、米国政府は BOP（原油流出防止装置）の機能強化を義務付けており、新基準に沿った製品開発も大手メジャーが共同して実施中である。

⑤ 掘削リグ上の掘削機器

掘削リグ上に装備される各種掘削機器に関する大水深対応のために、大型化・大容量化および機械化・自動化される。長大なライザーパイプをはじめとするサブシーシステムのためのハンドリング機器、泥水ポンプをはじめとする泥水循環のための機器やパイプラインなどは、そのすべてが重量・容量のより大きなものに変わってきている。

⑥ 掘削リグの位置保持

ダイナミックポジショニングシステム（DPS）が主流だが、アンカー係留も有効なオプションである。アンカー係留方式の掘削リグは大水深対応のためのアップグレードが施

102　通常の坑口装置とは、坑井の地上部分をコントロールするために、ケーシング頭部に取り付けられる装置をいう。坑口装置は、図に示されるように、ケーシング・ヘッド、ケーシング・スプール、チュービング・スプール、クリスマス・ツリーなどから構成されている。
最近、水深の大きな海域でドリル・シップやセミサブマーシブル・リグを使用して海洋掘削を行う場合は、坑口装置を海底面に設置する。海底坑口装置（subsea wellhead assembly）と呼ばれている。

103 浮遊式掘削リグ（セミサブ型掘削リグやドリルシップ）では、数種類の BOP（防噴装置）を組み合わせて一体化させた形でサブシーウェルヘッドの真上に接続する。この一体化させた BOP 軍をサブシーBOP スタックという。

104 サブシーBOP スタックから掘削リグまで連結されている大径のパイプをさす。

105ライザーパイプの自重、ライザーパイプ内の泥水の重量、潮流などによる外力に見合った上向きの力でライザーパイプを吊り上げる機器

106 サブシーBOP スタックを制御するための装置。電気信号や流体圧力を介して BOP 及び各種バルブ BOP の種類の１つで 9-5/8“または 13-3/8”サイズのケーシングパイプを切断できるように開発された特殊なのの。一般的なシアラム BOP はドリルパイプの切断に限定される

107 Remotely Operated Vehicle = 船上・陸上から遠隔操作される 水中ロボット

されたものがほとんどであり、大水深での係留を可能にするために高把駐力アンカー、高強度合成素材の軽量係留索、アンカー・係留索の事前設置（pre-set mooring）[108]などさまざまな工夫がなされている。

一方、DPS 掘削リグは大型化・大容量化だけではなく、あらゆる面で冗長性の追加が施されて、信頼性が増している。

⑦ 安全管理、環境保全

大水深での掘削作業は、浅水深掘削に比べて安全管理や環境保全上、より問題が大きい。それらのリスクに対しては、ハードウェアに高い冗長性を求めること（特に DPS や BOP コントロールシステムなど）、危険作業から人間を遠ざけること（ドリルフロアのパイプハンドリングの機械化・自動化）、体系的なリスク管理を日常のものとすること、などにより対処している。

上述のような課題やその対策のための技術を取り入れた機器に対する潜在需要は高いと考えられる。

しかし、掘削リグに関連する機器は現在のところ、欧米企業がほぼ独占している。掘削パッケージは 1980 年代には三菱でも生産していたが撤退。その後の技術革新もあり、そう簡単には参入できない。

また、上記のほかにリグに使われる機器としては（オフショア作業船にも使われるが）、特殊な大型クレーンがある。ナックルブームクレーンというもので、重くて長尺もので、支点が複数あるタイプのものである。掘削パイプなどを持ち上げるためのものである。業界関係者によると、日本ではすぐに設計することは難しいのではないかとのことである。

掘削パッケージについては、前述のとおり、2 社が独占している。1980 年代には三菱グループが Continental EMSCO のライセンス生産をしていた。業界関係者によると、1980 年代の技術者が引退する前であれば、再参入も可能ではないかという。

その他、チェーンやポンプでは既に日本企業も参入している。（チェーン：浜中チェーン、ポンプ：SHINKO）

（2） 浮体式生産システム

浮体式生産システムのトップサイドで使われているのは、石油化学などのプラントの技術である。石油化学プラントでは日本のエンジニアリング会社も世界各国で活動をしている。

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[108]アンカー（anchor）および係留索（ワイヤロープやチェーンなど）を使用して位置保持を行うセミサブ型掘削リグでは、通常掘削ロケーションに到着してからアンカー設置のための作業を開始する。プリセットムアリングは、掘削リグが掘削ロケーションに到着する前にアンカー設置作業を終了しておく方法を指す。この方法を採用することにより、掘削リグはロケーション到着後、事前設置したアンカーと係留索を接続するのみの作業となるため、作業時間を短縮することができる。

東洋エンジニアリングは、資源大手の BHP ビリトン社向けにオーストラリアで操業している FPSO トップサイドを建造した実績（2006 年）があり、また、三井開発開発（MODEC）と共同でシンガポールに MODEC and TOYO Offshore Production Systems Pte. Ltd.を設立している。2008 年には西アフリカ・アンゴラ向け洋上原油処理設備設計業務を受注、また、2010 年 11 月にはブラジル向け FPSO の洋上原油処理設備の受注が内定した。さらに 2010 年 3 月には MODEC と共同で、ブラジルのペトロブラスと中小規模 GTL 開発の協力契約を締結し、実証設備の建設を開始した。ペトロブラスは、ブラジル国内における洋上原油生産に随伴するガスやへき地にある石油ガス田の天然ガスを GTL により液体転換することで原油の増産を意図している。

日揮は西アフリカのアンゴラで、カビンダ・ガルフ・オイル社向け洋上 LPG 処理設備（LPG FPSO:Floating Production Storage and Offloading）プロジェクトや、インドネシア領ナトゥナ海上の大型洋上ガス処理設備など、オフショア石油ガス生産設備を受注した実績がある。

また、千代田化工建設は 2009 年、SBM オフショア社と共同でブラジル向け年産 270 万トンの洋上天然ガス液化装置（洋上 LNG）の基本設計業務を受注した。

このように、日本のエンジニアリング会社は数はそれほど多くないものの、オフショア石油ガス開発の生産プロジェクトにも参入している。日本のプラント資材・機器メーカーが、日本のエンジニアリング会社を通じてオフショア石油ガス開発に参入することは可能である。しかし、これらの設備は設計仕様が、米国の API（American Petroleum Institute）の基準に即していることが多いため、日本のメーカーはその仕様にあわせなければならない。それでも、掘削リグに比べれば、技術力の高いプラント機器メーカーは既に日本にもあり、ビジネスチャンスはあるものと考えられる。業界関係者によると、コンプレッサーでは三菱重工、前川製作所などが対応可能であり、またコベルコも米国の会社を買収して参入を検討している。

また、前述のように、オフショア生産設備では電気をつくるため、ガスタービン発電機が使われるが、この分野では GE や Rolls Royce が強い。川崎重工や三菱重工も参入を希望しているが、実績重視であるため、参入はそれほど簡単ではないという。

一方、オフショア石油ガス設備は、地上のものよりさらに、腐食対策に投資を惜しまないという。20 年以上使用され、地上と異なり修理も大変であるし、5 年おきにドックに入って修理ができる普通の船舶とも事情が異なる。こうした腐食対策で、高い効果のある技術が開発できれば、市場参入も可能であろう。

また、大水深化がすすむ中、今後の技術ニーズとしては次のものが考えられる[109]。

① フレキシブルライザーの軽量化・高強度化（複合材料、高張力鋼）
② TLP のテンドンの軽量化・高強度化（複合材料、チタン合金）
③ 防熱・加温による流路保全（Flow Assurance）
④ 大水深の生産性向上を図る海底セパレーター[110]の開発

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[109] 特集：深海へ向かう世界の石油・天然ガス開発事業水深 2,000m を超えた生産井―油・ガス田開発の進歩、JOGMEC 2006 年 9 月

①のような素材の分野では日本精鉱など日本でも競争力の高い企業がある。ただし同じ素材でもテンドンの素材はカーボンスティールで、かつては住友金属がつくっていたが、価格競争が厳しく撤退している。また、この他にも、CO2 圧入攻法に代表される原油回収率向上技術、メタンハイドレートなどの非在来型石油ガス田開発技術、GTL, NGH などの油ガス有効利用技術、環境調和型石油ガス田開発技術などが注目されることになろう。こうした分野の研究や実現に使われる機械機器の需要は高まると思われる。

もう１つ、業界で最近注目の話題は、洋上 LNG プラント（FLNG）である。現在、ガスは陸上までパイプラインに持っていって、陸上で LNG 化し、輸出される。これに対し、海底石油ガス田から採掘した天然ガスをその場で液化天然ガス（LNG）にする設備である。パイプライン敷設が不要のため石油ガス田が小規模だったり、遠洋にあったりする場合でも機動的に事業化しやすい。逆に、基地上に建設する液化設備の大型化に限界があるため、大規模な石油ガス田では量産効果が十分に働かない。石油ガス田の規模や立地に応じて従来方式と洋上 LNG 基地のすみ分けが進むとみられている。日本企業も洋上ＬＮＧ基地の関連市場に相次ぎ参入している。三菱重工業や日揮、千代田化工建設などが設備の受注活動を本格化させている[111]。また、石川島播磨重工は、FLNG 向け貯蔵タンクを、従来の 3 分の 1 のコストで生産する技術を開発している。SPB 方式と呼ばれるタンクで、サムスン重工や大宇造船などに採用を持ちかけているという[112]。　FLNG の実用化には多くの解決すべき技術要素があり、複合的に絡みあっている。一つ一つの要素は既存の技術でも、それらを最適に組合せて全体を統合する技術が必要となる。特徴的な技術的課題として、波浪揺動による液化能力への影響（液化効率低下、プラント稼働率低下、寿命短縮、事故可能性）、貯蔵への影響（タンク内液面スロッシングによる事故可能性）、出荷への影響（稼働率低下、事故可能性）があり、これらの問題への対策が重要となる。限られた大きさの船体の上に液化・貯蔵・出荷設備を搭載しなければならないので、陸上基地よりも FLNG は設備密度が高くなり、事故の際のダメージが大きく、FLNG 特有の安全性対策が必要となる。また、限定されたスペースでは設備保全も困難である。 液化プロセスの選定一つをとっても液化効率・プラント稼働率・設備費･運転操業費・安全性・設備保全性等あらゆる面の検討を行って総合的に評価することが重要となる[113]。

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[110]坑井からの産出流体を油、水、ガス、砂に分離。例えば、海底でガスが分離できると貯留層へのガス圧入という（貯留層圧の維持を通して）採油増進につながる。砂の分離は、砂によるパイプライン・チョーク・バルブの侵食の防止や軽減につながる。また、洋上施設のセパレーター配管が砂により詰まることを防ぐ。水の分離は、配管内のハイドレート防止、小径パイプラインの適用、腐食の低減、貯留層への水圧入ほかにつながる。海底セパレーターは重力式（重力分離）とサイクロン式（各相がサイクロン内で加速され分離）に大別。（JOGMEC 2009 年 5 月）

[111] 日経やさしい経済用語の解説

[112] 2011 年 1 月 12 日　日経産業

[113] 千代田化工ウェブサイト

実用化にいち早く乗り出しているのは、シェルで、サムスン重工に 3 隻の FLNG を発注した。また、前述のように千代田化工と SMB オフショアは共同で、ペトロブラスから FLNG の基本設計業務を受注している。今後 5 年間で 10 隻の FLNG の建造が見込まれている[114]。

また、FPSO に GTL を搭載するマイクロ GTL（中小規模 GTL）という技術も開発が進められている。規模の小さい石油ガス田を対象に、圧力と化学反応を一緒に GTL の中で行うものである。GTL 設備の設置面積を従来の 6 分の 1 程度に小型化できる可能性があり、FPSO（浮体式海洋石油・ガス・生産・貯蔵・積み出し設備）上に搭載し、海洋石油ガス田開発の新たなツールを提供することができる。前述のように、三井海洋開発、東洋エンジニアリングがペトロブラス向けの実証実験を行うことになっている。また、両社は米国の技術開発ベンチャーでマイクロプロセス技術分野における先駆的開発会社である Velocys Inc.と共同で、洋上 GTL 設備の開発・商用化のための共同開発協定も 2007 年に締結している。

こうした分野で必要とされる素材、機器などは今後のニーズが見込まれる。

4.2 オフショア作業船に対する舶用機器の潜在需要

オフショア作業船には多くの種類があり、その従事する業務も多様だが、比較的共通して必要となる機器には大型クレーンがある。前述のように、オフショア石油ガス開発が大水深へとシフトし、オフショア構造物も大型化すると、オフショア作業船の大型クレーンの需要も増えることが考えられる。

オフショア作業船は 30 年ほど前までは、物資輸送だけだった。現在ではアンカーハンドリングの機能をつけた AHTS が増え、ジャッキアップリグや FPSO の錨をうつのに使われる。そのためには 100 トンくらいの大型のウィンチが使われる。ジャッキアップリグの場合、4 点で錨をうつが、FPSO は 24 本必要となる。AHTS やそれに搭載されるウィンチも、オフショア構造物の需要が増えれば、それに応じて増える。また、DPS、普通の船よりも大型の水深装置（Thruster）、救助、消防などの機能を持つ AHTS もある。

オフショア作業船にはパイプ敷設船があるが、ここではクレーンのほかに、テンショナーやパイプ芯出し機が使われる。テンショナーはパイプの張力を保つためのもので、ノウハウの塊であり、欧米企業で独占している。パイプ芯出し機は溶接の際にパイプをまっすぐに出していくためのもので、日本では日本車両が製造している。

欧米企業の中には、こうしたオフショア作業船の設計だけを行い、船舶の建造はアジアで行っているところもある。設計と機器は欧州から供給して、建造はアジアで、というパターンである。そうした設計専門会社の代表的なところでは、Ulstein などがある。

日本企業も、オフショア分野に参入する場合、設計に特化するなど発想の転換が必要となろう。

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[114] 2011 年 1 月 12 日　日経産業

5. 東南アジア主要国およびメキシコにおけるオフショア産業支援策

オフショア石油ガス産業が活発化する中、開発に使用される海洋構造物や支援船のニーズも高まっている。しかし、東南アジアでは、修繕やバージの建造などに従事しているヤードはあるものの、シンガポールや一部マレーシアの造船所を除き、高度な海洋構造物や支援船の建造ができるヤードは少ない。オフショア石油ガス産業向けの造船業に特化した支援策も少ない。以下、オフショア石油ガス産業向けの造船業にも適用可能な各国の支援策をまとめた。

5.1 シンガポール

シンガポールはリグ建造、FPSO の改造では世界トップクラスを誇る。セムコープマリンとケッペルオフショア&マリンという 2 つの政府系企業がオフショア構造物に強い造船所として、世界的にも有名である。また、支援船の建造や修繕に従事する中堅の造船所も多い。こうした造船所の活動をサポートする、船級協会、設計、エンジニアリング、舶用機械、サービスなどの企業が数多くあり、その多くは外資系企業の子会社や販売サービス代理店である。シンガポールの場合、こうした外資系企業が進出しやすい環境を整えている、という点も、オフショア石油ガス産業の振興に一役買っているといえる。
このようにシンガポールのオフショア産業の競争力は強いが、さらに競争力を強化するために研究開発や人材育成に力をいれている。例としては次のとおり。これらはオフショア産業に特化したものではないが、オフショア産業も対象となっている。

（1） シンガポール海事研究所（Maritime Institute）
2010 年 9 月にシンガポール海事港湾庁（MPA）が設立を発表したもの。海運、港湾、海事サービス、オフショア（海洋資源開発支援）、造船など多分野にわたる海事関連産業の研究開発（R&D）や学術研究、政策に関する戦略・計画を策定するシンクタンクとして新設される。シンガポールの海事関連業界の人材育成、研究開発力、競争力の底上げを目指すもので、MPA は新研究所に向こう 10 年間で 2 億シンガポールドルの資金拠出を行う方針。また経済開発庁（EDB）、科学技術研究庁（A*STAR）の両政府機関も助成を行う。

（2） 海事産業基金（Maritime Cluster Fund - MCF）
オフショア産業や造船だけでなく、海事産業全般（海運、船舶売買、船舶金融、海事仲裁法、港湾管理・開発、海事保険、船員など）が対象になる基金。2002 年に設立された。人材育成やビジネス開発を支援する基金。

（3） 海事革新・技術基金（Maritime Innovation & Technology （MINT） Fund）
MPA が 2003 年に創設した海運・造船業界のＲ＆Ｄ促進のための 1 億ドルの基金。この中には、学生向けの海事産業インターンシッププログラム（MIAP）、高等教育機関や研究機関における海事産業関連の研究開発に MPA が資金援助をする高等教育機関共同研究や MPR 研究開発プログラム、産学共同研究に MPA が資金援助をする海事産業技術プロ

フェッサーシップ、シンガポールの港や海事施設を使って海事産業関連の研究開発成果の実証実験を支援する海事産業新技術実証実験プログラムがある。

（4） 海事作業地場企業高度化プログラム（The Marine Group Local Industry Upgrading Programme -LIUP）
1995 年に EDB と大手造船所が立ち上げた、地場の造船裾野産業支援策。人材育成、生産性向上、新技術の導入、作業工程の改良などの面で、大手造船所による下請け企業育成を EDB が資金面を含み支援するもの。

5.2 マレーシア

マレーシアには約 70 の造船所があるが、小規模な造船所が大部分を占め、国内市場向けの新造船や修繕が多い。マレーシアは石油ガス産業が盛んなため、石油ガス向けの支援船の建造を専業としている造船所や、軍用など政府向けの建造や修繕を主業務としている造船所も多く、マレーシアの造船業は国内の石油ガス産業と政府調達への依存率が高い。石油ガス産業向けとはいっても、大型タンカーやオフショア開発向けのリグやオフショア生産プラットフォームの建造ができる造船所は少なく、オフショア供給船（Offshore Supply Vessels）で、大型のクレーンなどは積まない中型船である。一般にマレーシア国内の需要であっても、大型船や技術的に高度なものは、外国の造船所に発注されることが多い。

造船業はマレーシアの経済にとって重要で、工業化マスタープランでも造船業は対象となっているが、マレーシアでは超大型船の建造能力をつけることを目指しているわけではない。新造船では 3 万 DWT までの船舶に特化しその分野での能力を高めること、メインテナンス、オーバーホール、改装などの修繕能力も、大型化ではなく、既存の設備の改良などで技術力、人材の能力を高めることや、オフショア構造物建造の活動を拡大することが目標となっている。工業化マスタープランでは、こうした目標を達成するために次の点を掲げている。

① スキルアップ
- 地場造船所の技術レベルを向上するための技術プログラムの実施
- 船舶設計、エンジニアリング、金属学、腐食管理分野のスキル向上
- 教育機関への専門家の派遣、
- 造船業先進国との協力

② インフラ、サポート施設の充実
- 特別なグレード・仕様の鉄板の供給、金型の製造、機械加工、鋳造その他の造船作業向けサービスの強化。これを達成するために次を行う。
- 海洋設計、R&D、マーケティングのスキルと能力を開発する
- 必要とされる基準と品質の部品や部材を生産するために機械や機器のアップグレードを奨励する
- 生産コスト削減ができるよう、共同開発あるいは共同購入できるような部品や部材を探す。

③　資金支援
- 造船所や裾野産業の設計能力を高めるための活動に資金支援を行う。

④　オフショア構造物の建造拡大
- オフショア生産プラットフォームの設計の能力を高める。
- 国内のオフショア生産プラットフォーム建造業者の国際プロジェクト参画を支援する。

5.3　インドネシア

インドネシアの造船産業は旧オランダ植民地時代の修理ドックを政府が 1960 年に接収し、国営企業として運営を続けている造船所やその後新たに設立された国営造船所が中心となっている。中でも大手は、オランダから接収した造船所 3 ヶ所と 1960 年代に設立した造船所 4 ヶ所が合併した DKB Shipyard （Dok Perkapalan Kodja Bahari）で、同社は本社をジャカルタに置き、サバン（北スマトラ）、パダン（西スマトラ）、パレンバン（南スマトラ）、バンジャルマシン（南カリマンタン）、ジャカルタ（5 ヤード）、シレボン（西ジャワ）、スマラン（中部ジャワ）の各地に造船所を保有している。また、スラバヤの海軍造船所を改築して 1980 年に設立された国営の PT Pal は、最新の設備を有し、大型船、軍艦、特殊船舶、海洋オフショア構造物の建造能力を持つインドネシア屈指の造船所である。

一方、シンガポールからフェリーで 40 分に立地するバタム島では、多くのシンガポール系造船所が立地し、インドネシアでの一大造船集積地を形成している。シンガポールは土地面積や労働者数などの面で事業拡大がしにくくなっていたが、バタム島には土地があり、シンガポールの造船所の事業拡大には格好の選択肢となったわけである。1990 年以降、60 社を超える合弁企業が設立されたが、合弁の相手は多くがシンガポールの造船所である。シンガポールにはリグ建造、FPSO 改造、その他オフショア支援船の造船所があるが、バタム島にはシンガポールの造船所のサポートとして、リグの櫓の建造など、鉄鋼構造物に従事するヤードが多い。しかし、バタム島の造船業は民間主導で発達してきており、政府からの支援があったわけではない。

バタム島以外にある大手造船所は、政府系がほとんどであり、そのため、経営難に陥っても政府からの支援がある。例えば PT PAL は資金難に陥っているが、2010 年 9 月に 1700 億ルピーの財政支援を受けた。PT PAL 向けには総額 4500 億ルピアの財政支援が計画されており、残りは 2011 年に支払われる。しかしこれは業界支援というより国営企業救済である。

なお、インドネシア政府はカボタージュ政策導入を 2005 年に決定し、船舶種別ごとに順次、施行している。そのため、国内で船舶需要が高まっているが、国内の造船各社はあまり恩恵を受けていない。その理由としては、資金借入コストの高さ、資金不足、輸入原材料への過度の依存、土地所有権をめぐる紛争により、増産できずにいる。業界団体のインドネシア造船オフショア産業協会（IPERINDO）と産業省の試算によると、建造能力拡大のためにインドネシアの造船業界は 2009 年から 2014 年までに 28 兆 5000 億ルピアが必要だとされている。また、IPERINDO は、インドネシアの造船業界の競争力を高めるため、国内で建造した船舶に対する 10%付加価値税の政府負担を求めている。具体

的には工業省の予算で、造船所が支払うべき付加価値税の肩代わりをしてはどうかと言う提案で、2010 年 5 月 IPERINDO は提案の詳細を検討中である。

こうした中、カボタージュ原則のオフショア部門適用の特別措置を求める声が出ていた。リグ、パイプ敷設船などのＣ区分の船舶に対するカボタージュ適用が施行されると、現在稼動中の海洋構造物がインドネシア海域で操業できなくなり、インドネシアのオフショア石油ガス産業に打撃となる。これに対して、インドネシア国会は 2011 年 3 月に、オフショア石油ガス開発で使用される船、海洋構造物は、人や物資を運ばないのであれば、カボタージュ規制の対象外と法改正を可決した。これにより、オフショア石油ガス開発向けの海洋構造物の国内建造能力を早急に高める必要はなくなった。

5.4　タイ

タイには 200 余りの造船所が立地しているが、小規模零細企業がほとんどで、造船産業は発達していない。造船所の多くはチャオプラヤ川沿いに立地しており、環境の面からも問題となっている。また、浮きドックなどの造船に必要な施設・設備もタイには不足している。こうした中、タイでは 2006 年から 2008 年にかけて、造船振興政策の策定や、造船振興工業団地の設立が検討された。その際、国立経済社会開発庁（National Economic and Social Development Board：NESDB）は造船業振興のための提言と業界現状の調査結果を 2006 年 1 月に発表したが、そこではオフショア開発については言及していない。造船産業一般に対しては、2007 年に投資庁（BOI）がゾーン 2 とゾーン 3（*註）に造船所を設立する場合、8 年間の法人税を減免とする措置を導入した。前述のようにタイの造船所はゾーン 1 のチャオプラヤ川沿いで、拡張の余地はなく、造船産業を育成するには、ゾーン 1 以外の場所に立地することが望ましい。また、BOI は機械機器の輸入関税も免税とする。対象となるのは以下のとおり。

- 500GT 以上の鉄鋼製船舶を建造する造船所
- 500GT 以下の船舶（木造、鉄鋼以外）を建造する造船所

造船振興工業団地についてはその後の動きは見受けられない。タイでは政治の不安定な状況が続いたこともあり、進展していない可能性は高い。

註：タイのゾーニング[115]
第 1 ゾーン：バンコク首都圏 6 県
バンコク、サムットプラカーン、サムットサコーン、パトゥムターニー、ノンタブリー、ナコンパトム
第 2 ゾーン：首都圏周辺 11 県およびプーケット
サムットソンクラーム、ラチャブリ、カンチャナブリ、スパンブリ、アントーン、アユタヤ、サラブリ、ナコンナーヨック、チェチェンサオ、チョンブリ、ラヨーン、プーケット、レムチャバン工業団地
第 3 ゾーン：低所得とインフラの開発度が低い残り 58 県

[115] ジェトロウェブサイト

シーサケート、ノンブアランプー、スリン、ヤソトーン、マハサラカム、ナコンパノム、ローイエット、カラシン、サコンナコン、ブリラム、アムナートチャルーン、プレー、パヤオ、ナーン、サトゥン、パッタニ、ヤラー、ナラティワート、ノンカイ、 ウボンラチャタニ、チャイヤプーム、ムクダハーン、ウドンタニ、ルーイ、コンケーン、 ナコンラチャシマ、ペチャブーン、ピチット、スコタイ、チェンラーイ、メーホンソン、 ウッタラディット、タク、ピサヌローク、カムペーンペット、ランパーン、チェンマイ、ランプーン、トラート、チャンタブリ、プラチュアプキリカーン、プラチンブリ、ロッブリ、 シンブリ、チャイナート、ウタイタニ、ナコンサワン、サケーオ、パンガー、ソンクラー、 クラビ、スラータニ、チュンポーン、トラン、パッタルン、ナコンシータマラート、 ラノーン

5.5　フィリピン

フィリピンの造船所は零細企業が多い。外資系の大型造船所もあるが、オフショア石油ガス開発向けの構造物建造を主業務とはしていない。フィリピンでは 2006 年の「フィリピン造船･船舶修繕産業の強化および同産業の発展促進に向けた取組みの策定」と題する行政命令があるが、そこにはオフショア石油ガス産業向けの船舶や構造物については言及されていない。

5.6　ベトナム

ベトナムには国防省、漁業省、運輸省に属する造船所や民間の造船所があるが、造船所の総数については確かな統計がない。最大の造船所グループは、運輸省の管理下にあるベトナム造船公社ビナシン（Vietnam Shipbuilding Industry Corporation）である。
ビナシンは 1996 年に設立された国営造船所で、傘下の造船所の多くは北部のハイフォンに立地しており、同グループの主力造船所は北部のバクダン造船所、ハロン造船所、ナムチュー造船所である。ホーチミン郊外にもサイゴン造船所やサイゴンシップマリン等の造船所がある。この他、韓国の現代グループとの合弁の船舶修繕ヤードの現代ビナシン造船所を持つ。最近ではクアンガーイ省のズンクアット造船所をはじめとする中部の造船所も開発した。

ベトナム政府は造船業を戦略産業と位置づけているが、造船業の中核となっているのは、ビナシンであり、これまで、ベトナムの造船産業振興策＝ビナシンの拡張計画だった。しかしビナシンは、急速な拡張、事業の多角化、資金運用の失敗により、2010 年、負債総額 44 億ドルを抱え、破綻寸前にまで追い込まれた。報道によると、クレディ・スイスの取りまとめで 2007 年に設定された融資総額 6 億ドルのうち、最初の実行分である 6000 万ドルについて、2010 年 12 月の返済期限にデフォルト（返済不履行）に陥った。放漫経営の責任で、幹部が何人も逮捕された。政府はビナシンの再建を支援する方向で、現在ビナシンの再建計画策定中である。政府は 2012 年までにビナシンの赤字を食い止め、2015 年までに同グループが安定的に発展できるようにすることを目指しているという。
なお、報道などから収集したこれまでのビナシン傘下の造船所で建造している船は、貨物船が多く、オフショア石油ガス向けの船舶や構造物については、ほとんど経験がない。ビナシン傘下の中でも大手のナムチュー造船所で、ベトナム初の浮体式貯蔵積み出し施設

（Floating Storage and Offloading system：FSO）を、国営石油会社ペトロベトナムの子会社向けに建造したが、2008 年末には納入予定から大幅に遅れて、2010 年 8 月に完成した。

政府は今のところ、オフショア石油ガス開発や石油精製所の建設に力を入れているものの、造船業については、ビナシン再建に手一杯で、オフショア構造物などの振興策まで手が回らないものと思われる。

5.7　ブラジル

ブラジルは 1980 年代には世界でも有数の造船国であったが、その後、過度な保護主義が裏目に出て凋落した。しかし 1990 年代に入ると、国営石油会社ペトロブラスに、石油ガス開発に必要な船やオフショア構造物などに現地調達を求める州政府の動きなどが現れた。1998 年に Kellogg Brown & Root （KBR）が、Barracuda Caratinga プロジェクトを 150 億米ドルで受注した際には 40%の現地調達率が課された。

ブラジルの造船業界はさらに、1999 年のシンガポールの Keppel FELS による投資で進展することになる。世界有数のリグ建造ヤードである Keppel FELS は既存の造船所を長期リースして、名前を Brasfels と変更。Brafels は、Barracuda Caratinga プロジェクト向けに、2 つの FPSO 改造、トップサイドの建造とインテグレーションを手がけた。その後同ヤードは、Technip を共同でセミサブの建造も受注した。

さらに、ブラジル政府は、ブラジルにおける石油ガス開発産業における自国企業の参画の拡大、地元経済の活性化、人材育成を目指し、石油・ガス国内産業育成支援政策（Program of Mobilization of Brazilian Oil and Gas Industry：PROMINP）を 2003 年に立ち上げた。これは政府、国営石油会社のペトロブラス、エンジニアリング技術会社の AVEVA との協力によるもので、業界に必要なスキル人材の育成や、現地調達率の引き上げを行う内容となっている。ブラジルでは石油ガス開発が盛んになってきているが、人手不足の問題がある。人材コンサルタント会社の Hay Group の調査によると、ブラジルでは業界に必要な人材の 15%にあたる 35,000 人が不足しているという。

PROMINP はそのギャップを埋めるために、地場産業を育てるためのプログラムでもある。「ブラジルでできることはブラジルで」というスローガンの下、地場産業の育成して、石油ガス開発産業に必要なサービスや製品を輸入するのではなく、ブラジル国内で供給することを目指している。そのため、ペトロブラスの調達計画には、高い現地調達率が課されている。現状ではブラジルにはその全てに応えるだけのノウハウ、技術力が足りないため、海外企業との技術提携、合弁なども奨励している。シンガポールのケッペルは PROMINP プログラムの立ち上げ前からブラジルに進出しているが、最近、シンガポールの SembCorp や韓国の造船所がこぞってブラジル進出や提携に積極的なのは、こうしたブラジル政府の現地調達政策がある。

また、ペトロブラスは造船産業の育成のため、2006 年にブラジル南部の Rio Grande に、大型のドライドック施設を持つ造船所の建設・リースバックの入札を発表して、ブラジルの造船業界を驚かせた。今では Rio Grande は造船関連企業が集積しつつあるが、当時は造船産業の集積地といえば Niteroi と Rio De Janerio であり、Rio Grande はこれらの地域から何千キロも離れていたからである。この入札は、サンパウロの WToore

が受注した。同社は 2007 年に、SembCorp Marine 傘下のジュロン造船所と合弁で、建設、運営を行う MOU を結んでいたが、最終的には合弁には至らず、その 2009 年には Keppel に 70%の株式を売却すると報じられていた。しかし、納期の遅れ、資金難などから、2010 年 11 月に Engevix Engenharia に造船所を売却した。これにより、同造船所へのシンガポール勢の参画はなくなったようである。2010 年 11 月、Engevix Engenharia はペトロブラスから 8 隻の FPSO を受注。Engevix Engenharia に造船の経験がないことから、プロジェクト遂行能力を危ぶむ声もあるが、Engevix Engenharia はスウェーデンのオフショアエンジニアリング会社 GVA と中国の Cosco Shipyard から技術支援を受けてプロジェクトを遂行に当たる。ペトロブラスからは 70%の現地調達率が条件として課せられている。[116]

（1） 現地調達率

前述のように、PROMINP プロジェクトにより、石油ガス産業の現地調達率が規定されている。しかし、個々のプロジェクトの現地調達率条件をほとんど公開されていない。投資家はしばしば、どれくらいの業務を現地のサプライヤーに発注していいかわからないという。Prominp のウェブサイトには、現地調達比率の計算方法が細かく定められているが、それは非常に複雑でわかりにくい。さらに、探鉱と生産かによっても違い、またプロジェクトによっても異なる。一般的には、探鉱で、陸上のプロジェクトの場合は 70%、オフショアで 100 メートルまでの場合は 37%、100 メートルから 400 メートルのオフショアの場合は 37%だとされる。生産の場合は、陸上で 77%、100 メートルまでのオフショアで 63%、100 メートルから 400 メートルまでのオフショアで 55%といわれている。

また、ブラジルの現地調達率の枠組みは複雑であるで、現地調達率要件を満たさなければならない規制は複数ある。

- 国家石油庁（ANP）の現地調達比率
- ペトロブラスによるオフショア構造物・船舶など建造のユニットごとの現地調達率
- ブラジル開発銀行（BNDES）の融資を受ける場合の現地調達率要件

入札の際には、ブラジルの企業全てに同等の機会を与え、入札企業は、現地ベンダー、サプライヤー名をリストに加え、技術情報をポルトガル語で提出しなければならない。

他に、税制優遇もある。石油ガス関連の機器の輸入完全は平均 14%だが、1999 年に、2020 年までの免税の特別スキームが導入された。これにより、ウェットクリスマスツリー、ある種の船舶、浮きクレーン、tow boat、ライザー、ROV は輸入関税とのその他一部の税が免除される。

なお、ペトロブラスの 2006-2010 年の戦略における現地調達率の達成目標は、同社全体で 65%となっている。2011 年 1 月の報道ではペトロブラスはこの目標を 35%に引き下げるように政府に提言したとされるが、ペトロブラスはそれを否定している。実際に達成できた現地調達率は公表されていない。

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[116] 9 July 2010 Upstream, 19 November 2010 Upstream, 12 November 2010 Upstream

（2） 造船所融資

ブラジル政府は 2004 年に、ブラジルの造船所に対する融資スキーム、Merchant Marine Fund （FMM）を設立した。ブラジルの海運会社がブラジルの造船所で建造、改造、大型化、近代化、修繕などを行う場合のブラジルの海運会社に対する融資、同様の場合、ブラジルの造船所に融資するものとあり、いずれもプロジェクトコストの 90％を上限に融資が行われる。

さらに政府は、2008 年、FMM 融資を行う金融機関にリスクに対応する保証基金、造船保証基金（FGCN）を設立した。保証期間は、建造期間中に限定される。これにより政府は、ＦMMの運営機関による円滑な資金供給を目指している。

FGCN ファンンドはブラジルの造船所が、ブラジル国内で使用される船舶などを建造する場合に適用される。

別添１．　主なオフショア油ガス田のリスト

主要オフショア石油田

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Africa										
Angola										
Bl 17 Girassol + Jasmim + Rosa	1996 (Girassol), 1998 (Rosa), 2001 (Jasmim)	2001	II	Block 17 - 93 miles (150km) offshore Angola	1,350m (4,455 ft)	270,000 bopd (total average peak production)	FPSO	Total	http://www.subseaiq.com/data/Project.aspx?project_id=325	N.A.
Bl 04 Gimboa	2004	2008	V	Block 4/05 - 53 miles (85km) offshore Angola	700 m (2,310 ft)	60,000 bopd and 37 MMcf/d (1 MMcm/d) (2008)	FPSO	Sonangol	http://www.subseaiq.com/data/Project.aspx?project_id=306	N.A.
Bl 14 BBLT	N.A.	2006	IV	Block 14 - Lower Congo Basin	1,280ft	200,000 bpd (estimated peak production-2008)	Compliant Piled Tower (CPT)	Cabinda Gulf Oil Co. Ltd. (Chevron)	http://www.offshore-technology.com/projects/bblt/	N.A.
Bl 14 Kuito	1997	1999	IV	Block 14 - Offshore Cabinda Province	1,260 ft	100,000 bopd (2000)	Fuel production, storage and offloading (FPSO) vessel	Chevron Texaco	http://instrumentation.co.za/article.aspx?pklArticleId=1949&pklCategoryId=62	http://www.gasandoil.com/goc/company/cna94154.htm
Bl 14 Tombua-Landana	1997 (Tombua) 2001 (Landana)	2006	IV	Block 14 - Eastern section of deepwater Block 14	1,218 ft	17,000 bpd (Dec. 2009), with expected peak production of 100,000 bpd by 2011	Compliant Piled Tower (CPT)	Chevron Texaco	http://subseaiq.com/data/Project.aspx?project_id=539	http://www.rigzone.com/news/article.asp?a_id=84450
Bl 15 Kizomba A	1998	2004	II	Block 15	3,300 to 4,200 ft (1,006 to 1,280 m)	130,000 bpd (August 2005)	Combination of dry tree Extended Tension Leg Platform (ETLP) and subsea completions tied back to an FPSO	ExxonMobil	http://www.offshore-technology.com/projects/kizomba/	http://www.subseaiq.com/data/Project.aspx?project_id=639
Bl 15 Kizomba B	1998	2005	II	Block 15	3,300 to 3,400 ft (1,006 to 1,036 m)	250,000 bpd (targeted)	Combination of a surface wellhead platform and subsea wells tied back to an FPSO vessel.	ExxonMobil	http://www.offshore-technology.com/projects/kizomba/	http://www.subseaiq.com/data/Project.aspx?project_id=639
Bl 15 Kizomba C	2000	2008	III	Block 15	2,400 ft (732 m)	100,000 bpd (estimated)	2 FPSO vessels	ExxonMobil	http://www.offshore-technology.com/projects/kizomba/	http://www.subseaiq.com/data/Project.aspx?project_id=639
Bl 15 Xikomba	1999	Xikomba A-2003, Xikomba B-2006	IV	Block 15 - 230 miles (370 kilometers) northwest of Luanda	1,341m (4,425 ft)	80,000 bpd (estimated peak production)	FPSO vessel	ExxonMobil	http://www.offshore-technology.com/projects/xikomba/	http://www.subseaiq.com/data/Project.aspx?project_id=639
Bl 17 CLOV (Cravo, Lirio, Orquidea and Violeta)	1998 (Lirio), 1999 (Cravo, Orquidea and Violeta)	2011	III	Block 17	1,365m (4,505 ft)	N.A - Field under development. Expected peak production of 850,000 bopd.	FPSO vessel	Total	http://www.subseaiq.com/data/Project.aspx?project_id=324	N.A.
Bl 17 Dalia	1997	2006	III	Block 17 - 84 miles (135 kilometers) offshore Angola	1,500m (4,950 ft)	240,000 bopd (2007)	FPSO vessel	Total	http://www.offshore-technology.com/projects/dalia/	http://www.subseaiq.com/data/Project.aspx?project_id=248
Bl 17 Pazflor (Perpetia, Zinia, Acacia and Hortensia)	2000 (Perpetua), 2002 (Zinia), 2003 (Acacia and Hortensia)	2011	III	Block 17 - 150km off the coast of Angola	718 m - 1,030 m (2,369 to 3,399ft)	N.A - Field under development. Expected peak production of 200,000 barrels of oil and 150 MMcf/d of gas	FPSO vessel	Total	http://www.offshore-technology.com/projects/pazflorangola/	http://www.subseaiq.com/data/Project.aspx?project_id=326
Bl 18 Greater Plutonio (Platina, Plutonio, Galio, Paladio, Cromio and Cobalto)	1999 (Platina and Plutonio), 2000 (Galio, Paladio, Cromio and Cobalto)	2007	III	Block 18 - 160km northwest of Luanda	1,200 to 1,500m	250,000 bopd (expected peak production)	FPSO vessel	BP	http://www.offshore-technology.com/projects/greater_plutonio/	N.A.

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Nigeria										
Abo	1996	2003	IV	Nigerian Block Oil Prospecting License (OPL) 316 - North-Western sector	800m	9,000 bopd (2008)	FPSO vessel	ENI	http://www.eni.com/en_IT/media/press-releases/2003/04/Eni_Abo_Central_Field_on_stre_07.04.2003.shtml?menu2=media-archive&menu3=press-releases	http://www.pennenergy.com/index/petroleum/international-petroleum-encyclopedia/display/114960/ipes/online-research-center/volume-1998/issue-1/encyclopedia/africa/nigeria.html
Agbami	1998	2008	III	Nigerian Blocks Oil Mining License (OML) 127 and 128 - 70 miles (113 km) offshore Niger River Delta	1,462m (4,825 ft)	250,000bopd (estimated - end 2009)	FPSO vessel	Chevron	http://www.offshore-technology.com/projects/agbami/	http://www.subseaiq.com/data/Project.aspx?project_id=249
Akpo	2000	2008	III	Nigerian Block OML 130 - 124 miles (200 kilometers) from Port Harcourt	1,325m (4,373ft)	175,000 barrels of condensate a day and 320 MMcf/d of gas (estimated - 2009)	FPSO vessel	Total	http://www.subseaiq.com/data/Project.aspx?project_id=252	N.A.
Bolia + Chota	1998 (Chota), 2001 (Bolia)	2011	IV	Nigerian OPL 219	1,100 m	N.A. - Field under development. Estimated production capacity is 50,000 bpd	N.A. - Field under development	Shell - ConocoPhillips	http://www.thefreelibrary.com/The+Shell-Led+Group.-a0167520421	http://www.addaxpetroleum.com/media/Analysts_Day_Nov_Part3.pdf
Bonga & Bonga NW	1996	2005	II	Nigerian OPL 212 - 75 miles (120km) offshore Nigeria	1,030m (3,399ft)	200,000 bopd (July 2007)	FPSO vessel	SNEPCO	http://www.offshore-technology.com/projects/bonga/	http://www.subseaiq.com/data/Project.aspx?project_id=250
Bonga SW-Aparo	2001	2010	IV	Nigerian Oil Mining Lease (OML) 118	N.A.	350,000 bopd (estimated)	FPSO vessel	SNEPCO	http://www.offshore-technology.com/projects/bonga/	http://www.thenationonlineng.com/dynamicpage.asp?id=74149
Bosi	N.A.	2009	IV	OGL 209 - Offshore south, Southwest Coast of Nigeria	N.A.	120,000 bpd (estimated capacity)	N.A.	ExxonMobil	http://www.rigzone.com/news/article.asp?a_id=30193	http://www.oilgasarticles.com/articles/85/1/Investment-in-Nigeria-Oil-and-Gas-Sector/Page1.html
Egina (Egina 1, Egina 2, Egina 3, Egina 4 and Egina 5)	2003 (Egina 1), 2004 (Egina 2), 2006 (Egina 3 and 4) and 2007 (Egina 5)	2012	III	Block OML 130 - Niger Delta	1,550m (5,115ft)	N.A - Field under development. Peak production expected to reach 150,000 bpd. Start production expected in 2015.	FPSO vessel	Total	http://www.subseaiq.com/data/Project.aspx?project_id=662	N.A.
Erha (Erha and Erha North)	1999	2006	III	60 miles (97 kilometers) offshore Nigeria	1,200m (3,960ft)	190,000 bopd and 300 MMcf/d of natural gas (2006)	FPSO vessel	ExxonMobil	http://www.subseaiq.com/data/Project.aspx?project_id=658	N.A.
Usan-Ukat	1998 (Ukat), 2002 (Usan)	2011 (estimated)	III	Gulf of Guinea - Nigerian OPL 222 - 100km South of Port Harcourt	750m (2,475 ft)	N.A - Field under development. Peak production expected to reach 180,000 bpd by 2012.	FPSO vessel	Elf Petroleum Nigeria Ltd.	http://www.offshore-technology.com/projects/usan/	http://www.subseaiq.com/data/Project.aspx?project_id=341
Yoho & Awawa	N.A.	2002	IV	Nigerian OML 104	95 m (314 ft)	160,000 bopd	Combination of 2 wellhead platforms and 1 Fuel Storage Offloading (FSO) vessel	ExxonMobil	http://www.offshore-technology.com/projects/yoho/	http://www.subseaiq.com/data/Project.aspx?project_id=622
Other Africa										
Congo–Brazzaville										
Azurite Marine	2005	2009	V	Mer Profonde Sud Block - offshore Republic of the Congo	N.A. - Mooring depth of FPSO is at 4,594 feet (1,400 meters)	40,000 bopd (expected peak production)	FPSO vessel	Murphy	http://www.subseaiq.com/data/Project.aspx?project_id=370	N.A.
Moho-Bilondo	1995	2008	IV	50 miles (80 kilometers) off the coast of the Republic of Congo	1,100m (3,630ft)	90,000 bopd (peak production estimate - 2008)	Floating Production Unit (FPU)	Total	http://www.subseaiq.com/data/Project.aspx?project_id=305	N.A.
Cote D'Ivoire/Ivory Coast										
Baobab	2001	2005	IV	Block CI-40 - 16 miles (25 kilometers) offshore Cote d'Ivoire	1,219m (4,023ft)	70,000 bopd (estimated - 2009)	FPSO vessel	Canadian Natural	http://www.subseaiq.com/data/Project.aspx?project_id=278	N.A.

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Eq Guinea										
Ceiba	1999	2000	IV	Rio Muni Basin - Blocks G and F - 35km offshore Equatorial Guinea	2,200m (7,260ft)	More than 100,000 bopd (2006 combined total average production)	FPSO vessel	Hess	http://www.offshore-technology.com/projects/ceiba/	http://www.subseaiq.com/data/Project.aspx?project_id=295
NPG-Okume complex*		2007	IV						http://www.offshore-technology.com/projects/okume/	N.A.
Mauritania										
Chinguetti + Tevet	2001	2006	V	Block 4, PSC Area B - 80km west offshore Mauritania	800m (2,640ft)	8,844 bopd (June 2008)	FPSO vessel	Petronas	http://www.offshore-technology.com/projects/Chinguetti/	N.A.
Tiof	2003	2008	IV	N.A.	950-1,400 m	N.A.	N.A.	N.A.	http://events.rigzone.com/news/article.asp?a_id=31614	N.A.
South America										
Peru										
Albacora	1972	2000	II	Block Z-1 - offshore northwest Peru	N.A.	N.A.	Fixed platform - under construction	BPZ Energy	http://www.subseaiq.com/data/Project.aspx?project_id=550	N.A.
Brazil										
Barracuda	1989	1997	II	Campos Basin-57 miles (95 km) east of Macae	1,980 to 3,300 feet (600 to 1,100 meters)	170,000 bopd	FPSO vessel	Petrobras	http://www.offshore-technology.com/projects/barracuda/	http://www.subseaiq.com/data/Project.aspx?project_id=272
Bijupira-Salema	1990	2003	IV	250km east offshore Rio de Janeiro	1,575ft to 2,900ft	70,000bopd and 2 million MMcm per day of gas	FPSO vessel	Enterprise	http://www.offshore-technology.com/projects/bijupira/	N.A.
Caratinga	1994	2005	IV	Campos Basin-99 miles (160 km) east of Macae	1,100m (3,630ft)	141,000 bopd	FPSO vessel	Petrobras	http://www.offshore-technology.com/projects/barracuda/	http://www.subseaiq.com/data/Project.aspx?project_id=272
Espadarte	1988	2001	IV	Campos Basin-east of Bonito and Bicudo	2,461 to 4,921 feet (750 to 1,500 meters)	45,000 bopd (peak production 2003)	Subsea wells, tie-back to FPSO vessel	Petrobras	http://www.offshore-technology.com/projects/espedarte/	http://www.subseaiq.com/data/Project.aspx?project_id=282
Frade	N.A.	2008	IV	Northern Campos Basin - 75 miles (121 kilometers) from the coast of the state of Rio de Janeiro	1,128m (3,722ft)	85,000 boepd and 30 MMcf/d (1 MMcm/d) of natural gas (estimated peak production - 2011)	FPSO vessel	Chevron	http://www.subseaiq.com/data/Project.aspx?project_id=313	N.A.
Golfhino	2003	2006	III	Block BES-100 - Espirito Santo Basin - 50 miles (80 kilometers) away from Vitoria, Espirito Santo off souteastern coast of Brazil	1,350m (4,455ft)	200,000 bopd (combined production capacity)	2 FPSO vessels	Petrobras	http://www.subseaiq.com/data/Project.aspx?project_id=364	N.A.
Jubarte	2001	2003	IV	Northern Campos Basin in Block BC-60 - 70km offshore the state of Espírito Santo, Brazil	1,300m	18,000 bopd (2008)	FPSO	Petrobras	http://www.offshore-technology.com/projects/jubarte-field/	N.A.
Marlim	1985	1991	I	68 miles (110 kilometers) offshore Rio de Janeiro	910m (3,003ft)	390,000 bopd	Combination of 4 semi submersibles and 5 FPSO vessels	Petrobras	http://www.offshore-technology.com/projects/marlimpetro/	http://www.subseaiq.com/data/Project.aspx?project_id=299
Marlim Sul (South)	1987	1994	I	Campos Basin - 75 miles (120 kilometers) off the northern shore of Rio de Janeiro	1,920m (6,336ft)		Combination of 3 semi submersibles, 1 Floating Production Unit (FPU) and 1 FPSO vessel	Petrobras	http://www.offshore-technology.com/projects/marlim/	http://www.subseaiq.com/data/Project.aspx?project_id=371
Papa Terra	2003	2012	III	BC-20 Block - Campos Basin - 68 miles (110 kilometers) offshore Rio de Janeiro is the Papa Terra	1,200m (3,960ft)	N.A. - Production to commence in 2013	Combination of 1 Mini TLP and 1 FPSO - both under construction	Petrobras	http://www.subseaiq.com/data/Project.aspx?project_id=568	N.A.

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Parque de Conchas (BC-10)	2000	2011	IV	Campos Basin - offshore Espirito Santo state	1,780m (5,874ft)	100,000 boepd and 50 MMcfd (capacity)	FPSO vessel	Shell	http://www.offshore-technology.com/projects/bc-10/	http://www.subseaiq.com/data/Project.aspx?project_id=365
Peregrino	N.A.	2010	IV	BM-C-7 Block - Campos Basin - 53 miles (85 km) offshore Brazil	120m (396ft)	N.A. - Estimated minimum initial production capacity of 100,000 bopd, and 7.5 MMcf/d (0.22 MMcm/d) once production starts in Q4 2010.	Combination of 2 fixed platform and 1 FPSO vessel	StatoilHydro	http://www.subseaiq.com/data/Project.aspx?project_id=432	N.A.
Piranema	N.A.	2006	IV	Alagoas Basin - offshore Aracaju, Sergipe	1,200m to 1,600m	8,000bpd and a gas compression capacity of 800,000 cubic metres per day (end 2009)	Cylindrical FPSO	Petrobras	http://www.offshore-technology.com/projects/piramena/	http://www.sevanmarine.com/index.php?option=com_content&task=view&id=14&Itemid=140
Roncador	1996	1999	I	Campos Basin - 78 miles (125 kilometers) offshore Brazil	1,800m (5,940ft)	460,000 bopd (Nov. 2009)	Combination of pump platform, FSO, 2 semi submersibles and 2 FPSOs,	Petrobras	http://www.offshore-technology.com/projects/roncador/	http://www.subseaiq.com/data/Project.aspx?project_id=348
Gulf of Mexico										
Allegheny	1991	1999	V	Green Canyon Block 254 - south of New Orleans	328 m / 1,082 ft	27,500 bopd and 45 MMcf/d (1.27 MMcm/d) (production capacity)	Mini TLP	ENI	http://www.subseaiq.com/data/Project.aspx?project_id=116	N.A.
Allegheny South	2005	2006	V	Green Canyon 298	1,000 m / 3,300 ft		Mini TLP	ENI	http://www.subseaiq.com/data/Project.aspx?project_id=116	N.A.
Amberjack	1983	1991	V	Mississippi Canyon Blocks 108 and 109	314m (1,036ft)	2,400 bpd and 30 MMcfe per day (2009)	Fixed platform	Stone Energy	http://www.subseaiq.com/data/Project.aspx?project_id=168	N.A.
Anduin	1997	2007	V	Mississippi Canyon Block 755 - Outer Continental Shelf, Gulf of Mexico	914m (3,016ft)		Subsea tie-back to Gomez FPU	ATP	http://www.subseaiq.com/data/Project.aspx?project_id=161	N.A.
Angus	1997	1999	V	Green Canyon 113, 157	600 m / 1,980 ft	20,000 boepd	Subsea tie-back to Bullwinkle fixed platform	Dynamic Offshore Resources	http://www.subseaiq.com/data/Project.aspx?project_id=136	N.A.
Apen		2002	V							N.A.
Ariel	1995	2004	V	Mississippi Canyon 429	1,890 m / 6,237 ft	10,000 barrels of oil per day (estimated peak production)	Semi submersible	BP	http://www.subseaiq.com/data/Project.aspx?project_id=126	N.A.
Arnold	1996	1998	V	Ewing Bank 963	584 m / 1,927 ft	20,000 boep/d.	Fixed platform	Dynamic Offshore Resources	http://www.subseaiq.com/data/Project.aspx?project_id=136#imgDesc	N.A.
Atlantis	1998	2007	III	Green Canyon 698, 699, 700, 742, 743, 744 - 150 miles (241 kilometers) south of New Orleans	1,869 m / 6,168 ft	200,000 bopd and 180 MMcf/d (5.10 MMcm/d) (estimated peak production)	Moored Semi submersible	BP	http://www.offshore-technology.com/projects/atlantisplatform/	http://www.subseaiq.com/data/Project.aspx?project_id=144
Auger	1987	1994	IV	Garden Banks 426, 427, 470, 471	872 m / 2,878 ft	100,000 bopd and 300 MMcf/d (8.5 MMcm/d) (capacity)	Tension Leg Platform	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=139	N.A.
Balboa	2001	2006	V	East Breaks Block 597, 10km from Boomvang field	3,352ft	N.A. - The discovery well only completed in Nov. 2009, subsea tie back to Boomvang truss spar expected to be completed in Q4 2010.	Spar	Mariner	http://subseaiq.com/data/Project.aspx?project_id=118	N.A.
Baldpate	1991	1998	V	Garden Banks Block 259 and 260 -195 miles (314 kilometers) southwest of New Orleans	502m (1,657ft)	50,000b/d and 150,000MMSCFD (estimated 1999(	Compliant tower	Hess	http://www.offshore-technology.com/projects/baldpate/	http://www.subseaiq.com/data/Project.aspx?project_id=131
Blind Faith	2001	2008	V	Mississippi Canyon Blocks 696 and 695	6,500ft (1,981m)	65,000 bopd and 55 MMcf/d (1.6 MMcm/d) (2008)	Semi submersible	Chevron	http://www.offshore-technology.com/projects/blindfaith/	http://www.subseaiq.com/data/Project.aspx?project_id=119

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Boomvang	1997	2001	V	East Breaks 598, 599, 642, 643, 68 - South of Galveston, Texas	3,450ft	160 MMcf/d (4.5 MMcm/d) and 32,000 bopd (as at Feb 2010)	Truss spar	Anadarko	http://www.offshore-technology.com/projects/nansen/	http://subseaiq.com/data/Project.aspx?project_id=118
Boomvang East	1988	2002	V	East Breaks Block 688	3,795ft	N.A.	Subsea	Kerr Mcgee	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
BoomvangWest	1999	2001	V	East Breaks Blocks 641, 642 and 686	3,749ft	N.A.	Subsea	Kerr Mcgee	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Boris	2001	2002	V	Green Canyon 282	727 m / 2,399 ft	30,000 barrels of oil, 72 MMcf/d (2.03 MMcm/d) (capacity)	Floating Production Unit	Helix ERT	http://subseaiq.com/data/Project.aspx?project_id=607	N.A.
Brutus	1988	2001	IV	Green Canyon Blocks 158 and 202 - 165 miles (266 kilometers) southwest of New Orleans	1,036m (3,419ft)	60,000bpd and 90 MMcft of natural gas per day (Feb. 2002)	Tension Leg Platform (TLP)	Shell	http://www.offshore-technology.com/projects/brutus/	http://www.subseaiq.com/data/Project.aspx?project_id=140
Bullwinkle	1983	1989	IV	Green Canyon 65	412 m / 1,360 ft	4,000 boepd	Fixed platform	Dynamic Offshore Resources	http://www.subseaiq.com/data/Project.aspx?project_id=136	N.A.
Cascade	2002	2009	IV	Walker Ridge Blocks 205, 206, 249 and 250	8,250ft (2,500m)	80,000 bopd (estimated total average, Cascade+Chinnok - Production expected to begin in Q1 2010)	FPSO	Petrobras	http://www.offshore-technology.com/projects/cascadechinook/	N.A.
Chinook	2003	2009	IV	Walker Ridge Blocks 469 and 206 - 160 miles (257 kilometers) south of the Louisiana	8,250ft (2,515m)	80,000 bopd (estimated total average, Cascade+Chinook- production will only begin in Q1 2010)	FPSO	Petrobras	http://www.offshore-technology.com/projects/cascadechinook/	http://www.subseaiq.com/data/Project.aspx?project_id=124
Clipper	2005	2009	V	Green Canyon Block 299 and 300	1,055m (3,482ft)	N.A. - Field under development, no estimates yet.	Subsea tieback to Front Runner spa	ATP	http://www.subseaiq.com/data/Project.aspx?project_id=354	N.A.
Cognac	N.A.	1979	IV	Mississippi Canyon 108, 151, 194, 195	312 m (1,030ft)	N.A.	Fixed platform	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=137	N.A.
Constitution	2003	2006	IV	Green Canyon Blocks 679 and 680 - 190 miles southwest of New Orleans	1,554m (5,128ft)	40,000 bopd and 75 MMcf/d (peak production)	Truss spar	Anadarko	http://www.offshore-technology.com/projects/constitution/	http://www.subseaiq.com/data/Project.aspx?project_id=150
Cooper	N.A.	1996	V	Garden Banks Block 388	2,097ft	NA	Semi submersible	Newfield	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Crosby	1997	2002	V	Mississippi Canyon Block 898 and 899	4,400 feet (1,341 meters)	20,000 bopd	Tension Leg Platform (TLP)	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=149	N.A.
Deimos	2002	2007	IV	Mississippi Canyon 806	915 m / 3,020 ft	220,000 bopd and 220 MMcf/d (6 MMcm/d) (capacity)	Tension Leg Platform (TLP)	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=141	N.A.
Devil's Tower	2000	2004	V	Mississippi Canyon Block 773 - 140 miles south east of New Orleans	1,710m (5,643ft)	5,000 bopd and 5 MMcf/d (.14 MMcm/d). (2005)	Truss spar	ENI	http://www.offshore-technology.com/projects/devil/	http://www.subseaiq.com/data/Project.aspx?project_id=152
Diana	1990	2000	V	East Breaks 945, 946,988, 989- 160 miles (258km) south of Galveston	1,420 m / 4,686 ft	80,000 bopd and 200 MMcf/d (5.7 MMcm/d)	Subsea manifold, tie-back to Deep Draft Caisson Vessel	ExxonMobil	http://www.offshore-technology.com/projects/hoover/	N.A.
Entrada	2000	2007	IV	Garden Banks 782	1,417 m / 4,676 ft	N.A - Field development cancelled	N.A. - Field development cancelled	Callon Petroleum Co.	http://www.rigzone.com/news/article.asp?a_id=70083	N.A.
Europa	1994	2000	V	Mississippi Canyon 890, 891, 934, 935	1,189 m / 3,924 ft	220,000 bopd and 220 MMcf/d (6 MMcm/d) (capacity)	Tension Leg Platform (TLP)	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=141	N.A.
Fourier	1989	2003	V	Mississippi Canyon 522	2,137 m / 7,052 ft	110,000 bopd and 425 MMcfd (estimated peak production)	Semi submersible	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=126	N.A.

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Front Runner (Front Runner, Front Runner south, Quatrain, Daniel Boone)	2001	2004	IV	Green Canyon 338, 339	1,006 m / 3,320 ft	60,000 bopd and 110 MMcfp/d (3.1 MMcmp/d) (capacity)	Truss spar	Murphy	http://www.subseaiq.com/data/Project.aspx?project_id=120	N.A.
Genesis	1988	1999	IV	Green Canyon Blocks 160, 161 and 205 - 150 miles (241 kilometers) southwest of New Orleans	790m (2,607ft)	60,000 bopd and 72 MMcf/d (11 MMcm/d) (2000)	Truss spar	Chevron	http://www.offshore-technology.com/projects/genesis/	http://www.subseaiq.com/data/Project.aspx?project_id=159
Genghis Khan	2005	2007	V	Grand Canyon Block 652 - 120 miles (192km) offshore Louisiana	4,300ft (1,311m)	20,000 b/d and 300 MMcf/d (8 MMcm/d) (capacity)	Subsea manifold, tie-back to Marco Polo TLP	BHP Billiton	http://www.offshore-technology.com/projects/genghiskhan/	http://www.subseaiq.com/data/Project.aspx?project_id=130
Goldfinger	2004	2005	V	Mississippi Canyon Block 773	1,653 m / 5,455 ft	5,000 bopd and 5 MMcf/d (.14 MMcm/d) (2005)	Truss spar	ENI	http://www.subseaiq.com/data/Project.aspx?project_id=152	N.A.
Gomez (Anduin, Anduin West, Gomez, Gladden)	1997	2006	V	Mississippi Canyon Block 711	914 m / 3,016 ft	20,000 bopd and 60 MMcf/d (capacity)	Semi submersible	ATP	http://www.subseaiq.com/data/Project.aspx?project_id=161	N.A.
Great White	2002	2010	IV	Alaminos Canyon 812, 813, 814, 857, 858, 900, 901	2,438 m / 8,045 ft	100,000 bopd and 200 MMcf/d (6 MMcm/d) (capacity)	Spar	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=125	N.A.
Gunnison	2000	2004	V	Garden Banks 667, 668, 669	960 m / 3,168 ft	30,000 bopd and 180 MMcf/d (5 MMcm/d) (2003 peak production)	Spar	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=157	N.A.
Holstein	1999	2004	IV	Grand Canyon Block 645 - 200 miles South of New Orleans	1,324m (4,369ft)	100,000 bopd and 90 MMcf/d (2.5 MMcm/d) (estimated peak production)	Truss spar	BP	http://www.offshore-technology.com/projects/holstein/	http://www.subseaiq.com/data/Project.aspx?project_id=307
Hoover	1997	2000	V	Alaminos Canyon blocks 25 and 26 - 160 miles (258km) south of Galveston	4,800ft (1,463m)	80,000 bopd and 200 MMcf/d (5.7 MMcm/d) (as at Oct. 2009)	Subsea trees, tie-back to Deep Draft Caisson Vessel (DCCV)	ExxonMobil	http://www.offshore-technology.com/projects/hoover/	N.A.
Jolliet	1981	1989	V	Green Canyon Blocks 184 and 185 - Offshore Louisiana	1,718 ft		Tension Leg Well Platform (TLWP)	ConocoPhillips	http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=7117811	N.A.
K2	1999	2005	V	Green Canyon Blocks 518 and 562 - 175 miles south of New Orleans	4,326 ft	50,000 boepd (estimated peak production)	Subsea tie-back to Marco Polo TLP	Anadarko	http://www.offshore-technology.com/projects/k2-field/	http://www.subseaiq.com/data/Project.aspx?project_id=130
Kepler		2004	V							
King Kong	1989	2002	V	Green Canyon blocks 472 and 473 - 150 miles (241 km) southeast of New Orleans	3,900-ft (1,190-m)	NA	NA	ENI	http://www.epmag.com/archives/worldMap/3567.htm	GOM
King/HornMt	1999	2002	IV	Mississippi Canyon 127	1,653 m / 5,455 ft	65,000 bopd and 68 MMcf/d (2 MMcm/d)	Spar	BP	http://www.offshore-technology.com/projects/horn/	http://www.subseaiq.com/data/Project.aspx?project_id=146
Lena	1976	1984	V	MC 280	1,000 ft		Compliant tower	ExxonMobil	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Llano	1998	1998	V	Garden Banks Blocks 385 and 386 -200 miles southwest of New Orleans	2,600 ft	25,000 bopd and 75 MMcf/d (2.1 MMcm/d) (peak production)	Tension Leg Platform	Shell	http://www.offshore-technology.com/projects/llano/	http://www.subseaiq.com/data/Project.aspx?project_id=139
Lorien	2003	2006	V	Green Canyon 199	664 m / 2,191 ft	20,000 boep/d	Tension Leg Platform	Dynamic Offshore Resources	http://www.subseaiq.com/data/Project.aspx?project_id=136	N.A.
Macaroni	1995	1999	V	Garden Banks 602	1,128 m / 3,722 ft	100,000 bopd and 300 MMcf/d (8.5 MMcm/d)	Tension Leg Platform	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=139	N.A.
Mad Dog	1998	2005	IV	Green Canyon 825, 826, 738, 739, 781, 782, 783	2,073 m / 6,841 ft	100,000 bopd and 60 MMcf/d (1.7 MMcm/d) of natural gas	Spar	BP	http://www.subseaiq.com/data/Project.aspx?project_id=148	N.A.
Madison	1998	2002	V	Alaminos Canyon 24, 25	1,618 m / 5,339 ft	100,000 bopd and 325 MMcf/d (9.20 MMcm/d)(capacity)	Deep Draft Caisson Vehicle	ExxonMobil	http://www.subseaiq.com/data/Project.aspx?project_id=315	N.A.

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Magnolia	1999	2004	V	180 miles south of Cameron, Lousiana Garden Banks Blocks 783 and 784 - 180 miles south of Cameron	4,729 ft	50,000 bopd (estimated)	Tensions Leg Platform	ConocoPhillips	http://www.offshore-technology.com/projects/magnolia/	http://www.subseaiq.com/data/Project.aspx?project_id=151
Manta Ray	1988	1999	V	Ewing Bank Block 1006	1,850ft	N.A.	N.A	ExxonMobil	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Marco Polo	2000	2004	V	Green Canyon Block 608 - 160 miles south of New Orleans	4,300 ft	50,000 bopd and 150 million cfd of natural gas	Tension Leg Platform (TLP)	Anadarko	http://www.offshore-technology.com/projects/marcopolo/	http://www.subseaiq.com/data/Project.aspx?project_id=130
Marlin	1993	2001	V	Blocks 871 and 915 - Viosca Knoll - 75 miles offshore Louisiana	986 m / 3,254 ft	250 MMcf/d and 40,000 bpd (capacity)	Tension Leg Platform	BP	http://www.subseaiq.com/data/Project.aspx?project_id=147	N.A.
Marshall	1998	2001	V	East Breaks 948, 949	1,334 m / 4,402 ft	100,000 bopd and 325 MMcf/d (9.20 MMcm/d) (capacity)	Deep Draft Caisson Vessel platform (DDCV)	ExxonMobil	http://www.subseaiq.com/data/Project.aspx?project_id=315	N.A.
Mars	1989	1996	II	Mississippi Canyon 762, 763, 806, 807, 850, 851	896 m / 2,957 ft	21,000 bopd and 25 million cftd of natural gas.	Tension Leg Platform (TLP)	Shell	http://www.offshore-technology.com/projects/mars/	http://www.subseaiq.com/data/Project.aspx?project_id=141
Ursa	1991		II	Mississippi Canyon 808, 809, 810, 852, 853, 854	1,218 m / 4,019 ft	150,000 bpd and 400 Mmcf/d of gas (capacity) (peak production - 2000)	Tension Leg Platform (TLP)	Shell	http://www.offshore-technology.com/projects/ursa/	http://www.subseaiq.com/data/Project.aspx?project_id=149
Matterhorn	1999	2003	V	Mississippi Canyon Block 243 - 170km southeast of New Orleans	869 m (2,868 ft)	40,000 barrels of oil equivalent per day	Mini Tension Leg Platform	Total	http://www.offshore-technology.com/projects/matterhorn/	http://www.subseaiq.com/data/Project.aspx?project_id=171
Medusa	1998	2003	IV	Mississippi Canyon 538, 582	671 m / 2,214 ft	40,000 bopd and 110 MMcf/d (3 MMcm/d) (capacity)	Spar	Murphy	http://www.subseaiq.com/data/Project.aspx?project_id=158	N.A.
Mica	1990	2001	V	Mississippi Canyon 167, 211	1,326 m / 4,376 ft	15,000 bopd and 150 MMcf/d (4.2 MMcm/d)	Fixed platform	BP	http://www.subseaiq.com/data/Project.aspx?project_id=162	N.A.
Morpeth	1989	1998	V	Ewing Bank (EW) blocks 921, 964 and 965 - offshore Louisiana	1,709 ft (518m)	35,000 bopd (estimated peak production)	Mini Tension Leg Platform	ENI	http://www.offshore-technology.com/projects/morpeth/	http://www.subseaiq.com/data/Project.aspx?project_id=153
Nansen	1999	2001	V	East Breaks Block 602, 150 miles off Houston	3,678 ft	40,000 bopd and 200 MMcf/d (6 MMcm/d) (2002)	Truss spar	Anadarko	http://www.offshore-technology.com/projects/nansen/	http://subseaiq.com/data/Project.aspx?project_id=166
Neptune (Atwater)	1995	1997	V	Atwater blocks 573, 574, 575, 617, and 618, 120 miles off the coast of Louisiana	4,250 ft	50,000 bopd (July 2008)	Tension Leg Platform (TLP)	BHP Billiton	http://www.offshore-technology.com/projects/neptune/	http://subseaiq.com/data/Project.aspx?project_id=123
Nile	1997	2005	V	Viosca Knoll 914	1,077 m / 3,554 ft	40,000 bpd and 250 MMcf/d (capacity)	Tension Leg Platform (TLP)	BP	http://subseaiq.com/data/Project.aspx?project_id=147	N.A.
Oregano	1999	2001	V	Garden Banks 558, 559	1,036 m / 3,419 ft	100,000 bopd and 300 MMcf/d (8.5 MMcm/d) (capacity)	Tension Leg Platform (TLP)	Shell	http://subseaiq.com/data/Project.aspx?project_id=139	N.A.
Perseus	2003	2005	V	Viosca Knoll 830	1,116 m / 3,683 ft	50,000 bopd and 70 MMcf/d (2 MMcm/d) (peak production 2005)	Compliant tower	Chevron	http://subseaiq.com/data/Project.aspx?project_id=117	N.A.
Petronius (petronius + perseus)	1995	2000	IV	Viosca Knoll Block 786, 130 miles (208km) south-east of New Orleans	1,754 ft	50,000 bopd and 70 MMcf/d (2 MMcm/d) (peak production 2005)	Compliant tower	Texaco	http://www.offshore-technology.com/projects/petronius/	N.A.
Pilsner	N.A.	1987	V	East Breaks Block 161 and 205	1,108 ft	N.A.	Subsea	UNOCAL	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Pompano	1981	1994	IV	Viosca Knoll 989	1,290 ft	N.A.	Fixed platform + subsea	BP	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Pompano II	1998	2002	IV	Mississippi Canyon Blockn 029	2,032ft		Fixed platform + subsea	BP	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Puma	N.A.	2013	IV	Grand Canyon 823	4,129 ft	N.A - Field under development. Production expected to start in 2013	N.A - Field under development	BP	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Ram-Powell	1985	1997	V	Viosca Knoll 911, 912, 955, 956, 957	980 m / 3,234 ft	60,000 bopd and 200 MMcf/d (6 MMcm/d) (capacity)	Tension Leg Platform (TLP)	Shell	http://www.offshore-technology.com/projects/rampowell/	http://www.subseaiq.com/data/Project.aspx?project_id=188
Shenzi	2002	2008	IV	Green Canyon 609	1,341 m / 4,425 ft	120,000 bopd (2009)	Tension Leg Platform (TLP)	BHP Billiton	http://www.subseaiq.com/data/Project.aspx?project_id=133	N.A.
St Malo (Jack + St Malo)	2003 (St Malo, 2004 (Jack)	2010	IV	Walker Ridge 678, 758, 759	2,134 m / 7,042 ft	N.A. - Production to start end 2010. Estimated peak production of 150,000 bopd and 37.5 MMcf/d (1 MMcm/d) of natural gas.	Semi submersible	Chevron	http://www.subseaiq.com/data/Project.aspx?project_id=340	N.A.
Swordfish	2001	2005	V	Viosca Knoll 917, 961, 962	1,370 m / 4,521 ft	25,000 bopd and 100 MMcf/d (3 MMcm/d)	Spar	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=176	N.A.
Tahiti	2002	2008	III	Green Canyon 640, 641, 596, 597	1,219 m / 4,023 ft	125,000 bopd and 70 MMcf/d (2 MMcm/d) (estimated 2009)	Truss Spar	Chevron	http://www.subseaiq.com/data/Project.aspx?project_id=127	N.A.
Tahoe/SW Tahoe	1984	2002	V	Viosca Knoll Blocks 783 and 827 - 106 miles south of Mobile, Alabama	1,500 ft	30 MMcf/d (0.85 MMcm/d) of natural gas and 1,000 bpd of condensate.	Fixed platform	Shell	http://www.offshore-technology.com/projects/tahoe/	http://www.subseaiq.com/data/Project.aspx?project_id=175
Thunder Hawk	2004	2008	IV	Mississippi Canyon 734	1,745 m / 5,759 ft	60,000 bopd and 70 MMcf/d (1.9 MMcm/d) (capacity)	Semi submersible	Murphy	http://www.subseaiq.com/data/Project.aspx?project_id=368	N.A.
Thunder Horse (Thunder Horse and Thunder Horse North)	Thunder Horse (2008), Thunder Horse North (2009)	2008	II	Mississippi Canyon Blocks 776, 777 and 778 - 150 miles (241 kilometers) southeast of New Orleans	1,841m (6,075ft)	260,000 bopd (2009)	Semi submersible	BP	http://www.subseaiq.com/data/Project.aspx?project_id=129	N.A.
Ticonderonga	N.A.	2006	V	Grand Canyon Block 768	5,272ft		Subsea	Kerr Mcgee	US GOM deepwater fields.xls	GOM prod forecast > GOM Production Forecast 2009-2018.xls
Troika	N.A.	1997	IV	Green Canyon 244 unit-150 miles offshore Louisiana	2,700 ft		8 slot subsea manifold with tie back to Bullwinkle platform		http://www.offshore-technology.com/projects/troika/	N.A.
Typhoon	1998	2000	V	Green Canyon blocks 236 and 237-100 miles offshore Louisiana	2,000 ft	40,000 bopd and 60 million cfpd of gas (estimated peak production)	Mini Tension Leg Platform	Chevron	http://www.offshore-technology.com/projects/typhoon/	N.A.

Field name	Year of Discovery (Field)	First Oil	Reserve Group	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)
Asia Pacific										
Australia										
Enfield	1999	2006	IV	Permit Block WA-28-L in Offshore Northwestern Australia		74,000 bopd (Sept. 2006)	FPSO vessel	Woodside Energy Ltd.	http://www.mitsui.co.jp/en/release/2006/1175500_1210.html	http://www.mitsui.co.jp/en/release/2007/1176465_1769.html
Stybarrow + Eskdale	2003	2008	IV	Block WA-32-L, Exmouth sub-basin - 65km from Exmouth offshore north-western Australia	825m	72,900 bpd (Sept. 2008)	FPSO vessel	BHP Billiton	http://www.offshore-technology.com/projects/stybarrow/	
Indonesia										
Janaka North	1999	2009	V	Offshore East Kalimantan, Indonesia	4,319 ft	N.A.	N.A.	Chevron	http://www.gasandoil.com/goc/discover/dix93068.htm	
Merah Besar	1996	2011	V	Northeast of Balikpapan - Makassar Strait	2,000 feet (609.47 meters)	N.A.	N.A.	Chevron	http://www.atimes.com/atimes/Southeast_Asia/GG20Ae03.html	
West Seno	1998	2003	IV	Mahakam Delta, Makassar Strait PSC off Kalimantan	2,400ft to 3,400ft	40,000b/d	Combination of 2 TLPs and 1 FPU	Chevron	http://www.offshore-technology.com/projects/west_seno/	http://www.pennenergy.com/index/petroleum/international-petroleum-encyclopedia/display/113949/ipes/online-research-center/volume-2000/issue-1/encyclopedia/asia-pacific/indonesia.html
Malaysia										
Kikeh	2002	2008	IV	120km northwest of the island of Labuan, offshore Sabah	1,341m (4,425 ft)	120,000 bpd (2008)	Combination of FPSO vessel and truss spar (Dry Tree Unit (DTU))	Murphy	http://www.offshore-technology.com/projects/kikeh/	http://www.subseaiq.com/data/Project.aspx?project_id=283
Gumusut+Kakap	2003	2010	IV	Blocks J and K - offshore Sabah	1,220m	135,000 bpd (production capacity)	Semi submersible	Shell	http://www.shell.com/home/content/aboutshell/our_strategy/major_projects_2/gumusut/	http://www.bergen-chamber.no/uploads/240407DeepwaterMalaysia.pdf

Remarks:
1 This list is not exhaustive.

2 This list of oil and gas fields is based on the tables first published in " Giant Oil Fields - The Highway to Oil", written by Fredrick Robelius, and published by Uppsala Universitet.
2.1 The source weblink is: http://uu.diva-portal.org/smash/record.jsf?pid=diva2:169774

2.2 The list is based on the following tables published in "Giant Oil Fields - The Highway to Oil":
2.2.1 Table 2: Deepwater projects in Angola (OFN) (page 150)
2.2.2 Table 3: Deepwater projects in Nigeria (OFN) (page 150)
2.2.3 Table 4: Deepwater projects in other Africa (OFN) (page 151)
2.2.4 Table 5: Deepwater projects in Asia–Pacific (OFN) (page 151)
2.2.5 Table 6: Deepwater projects in Brazil (OFN, GF) (page 152)
2.2.6 Table 7: Deepwater projects in the US Gulf of Mexico (page 153)
2.2.7 Table 8: Deepwater projects in the US Gulf of Mexico (pages 154 to 155)

2.3. The list of oil and gas fields listed are picked based on their "Reserve Group" i.e their Ultimate Recoverable Reserves (URR), defined as follows:

Reserve Group	URR Range
I	>2Gb
II	1<URR<2Gb
III	0.5<URR<1Gb
IV	0.1<URR<0.5Gb
V	<0.1 Gb

Source: page 149, Appendix A - Projects Included in Deepwater Oil Production Forecast, "Giant Oil Fields - The Highway to Oil", Fredrick Robelius, Uppsala Universitet

3. All information are gathered from publicly available sources only.

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Middle East												
Qatar												
North Field (also knows as North Dome field or Dolphin Project)	1971	2007	239 trillion cubic feet (tcf) of recoverable natural gas reserve (2002 estimate)	80 km offshore Qatar northeast coast - Khuff Zone - Persian Gulf	N.A	1.3 billion cubic feet per day (bcfpd) of natural gas; expected to increase to 20 bcfpd by 2012	Combination of 2 fixed platform	Dolphin Energy Ltd.	http://www.subseaiq.com/data/Project.aspx?project_id=612	http://www.eia.doe.gov/emeu/cabs/Qatar/NaturalGas.html		
Iran												
North Pars	1967	N.A - Field under development	47.2 tcf of natural gas (2002 estimate)	120 kilometers south east of Bushehr - Persian Gulf	2 to 30 meters	3.6 bcfpd of gas (estimated)	N.A - Field under development	N.A - Field under development	http://www.eia.doe.gov/cabs/pgulf2.html	http://www.pogc.ir/NorthParsGasField/tabid/155/Default.aspx		
South Pars Project(consist of 24 phases of development detailed below)	1990	From 2003 onwards (various - refer below)	14 trillion cubic meters of natural gas and 18 billion barrels of condensates (whole field)	62 miles offshore Iran - Persian Gulf	70m / 231 ft	820 MMcmpd (estimated total natural gas production for whole field - refer below)	Fixed platforms (various phases - refer below)	Pars Oil and Gas Company- owner, developer and operator for whole field	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.eia.doe.gov/emeu/cabs/Iran/NaturalGas.html		
South Pars Phase 1	N.A	2004	N.A	Persian Gulf	70m / 231 ft	28 MMcmpd (2004) of gas	Combination of 3 fixed platforms (1 x production platform, 1 x processing platform and 1 x residential platform)	Petronas	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 2 & 3	N.A	2001	N.A	Persian Gulf	70m / 231 ft	2 bcfd of natural gas and 80,000 barrels of condensate per day	Combination of 2 fixed platforms (2 x offshore gas production platforms)	Total	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 4 & 5	N.A	2004	N.A	Persian Gulf	70m / 231 ft	14 MMcmpd of natural gas	Combination of 2 fixed platforms (2 x offshore gas production platforms)	ENI	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 6, 7 & 8	N.A	2008	N.A	Persian Gulf	70m / 231 ft	104 MMcmpd of natural gas	Combination of 3 fixed platforms (3 x offshore gas production platforms)	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 9 & 10	N.A	2008	N.A	Persian Gulf	70m / 231 ft	50 MMcmpd of natural gas and 80,000 barrels of gas condensate	Combination of 2 fixed platforms (offshore gas production platforms)	JV - GS Group, Oil Industries Engineering and Construction (OIEC) and Iranian Offshore Engineering and Construction Company (IOEC)	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phase 11	N.A	Estimated first gas 2008, delayed	N.A	Persian Gulf	70m / 231 ft	2,000 MMcfpd of gas (estimated)	Combination of 2 fixed platforms (offshore gas production platforms)	JV - Total and Petronas; project now taken over by China National Petroleum Corp. (CNPC), awarded in 2009	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.rigzone.com/news/article.asp?a_id=87312		
South Pars Phase 12	N.A	2010 (estimated)	N.A	Persian Gulf	70m / 231 ft	78 MMcmpd of natural gas (estimated)	Combination of 3 fixed platforms (offshore gas production platforms)	Petropars	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.petropars.com/tabid/64/Default.aspx		
South Pars Phases 13 & 14	N.A	2012 (estimated)	N.A	Persian Gulf	70m / 231 ft	N.A	Combination of 4 fixed platforms (offshore gas production platforms) (planned)	JV - Shell and Repsol	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 15 & 16	N.A	2012 (estimated)	N.A	Persian Gulf	70m / 231 ft	50 MMcmpd of natural gas and 80,000 b/d of condensate (estimated)	Combination of 2 fixed platforms (offshore gas production platforms)	Gharargah Khatam-ol Anbia	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 17 & 18	N.A	2012 (estimated)	N.A	Persian Gulf	70m / 231 ft	50 MMcmpd of natural gas and 80,000 b/d of condensate (estimated)	Under development phase- 4 drilling platforms	Industrial Development and Renovation Organization of Iran (IDRO), Oil Industries Engineering and Construction (OIEC) and Iranian Offshore Engineering and Construction Company (IOEC)	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 19, 20 & 21	N.A	2019 (estimated - project still at bidding stage)	N.A	Persian Gulf	70m / 231 ft	80 MMcmpd of treated gas (estimated)	Combination of 5 fixed platforms (planned)	Still at bidding stage	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
South Pars Phases 22, 23 & 24	N.A	2019 (estimated - project still at bidding stage)	N.A	Persian Gulf	70m / 231 ft	75 MMcmpd of treated gas (estimated)	Combinations of 3 fixed platforms (planned)	Still at bidding stage	http://www.subseaiq.com/data/Project.aspx?project_id=284	http://www.offshore-technology.com/projects/southpars/		
Khuff (Dalan)	N.A	N.A	6.4 Tcf of gas	Persian Gulf	N.A	500 Mmcf/d of non-associated gas, along with the 120,000 bbl/d of crude oil (estimated)			http://www.eia.doe.gov/cabs/pgulf2.html			

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Golshan	N.A	N.A	N.A	70 KM offshore Iran - Persian Gulf	N.A	2,000 MMcfd of gas (targeted production)	2 platforms (type not mentioned)	SKS Oil & Gas International (SKSOG, a wholly-owned subsidiary of Petrofield)	http://www.pogc.ir/Default.aspx?tabid=156			
Ferdowsi	N.A	N.A	N.A	70 KM offshore Iran - Persian Gulf	N.A	500 MMscfd of gas (targeted production)	1 platform (type not mentioned)	SKS Oil & Gas International (SKSOG, a wholly-owned subsidiary of Petrofield)	http://www.pogc.ir/Default.aspx?tabid=156			
Oman												
Bukha (part of Block 8 project)	1979	2008	N.A	Offshore Oman - Persian Gulf	90 m / 297 ft	28 MMcf/d (.79 MMcm/d) and 5,000 to 10,000 bpd of condensate	Subsea tie back to Bukha fixed platform	RAK Petroleum	http://www.subseaiq.com/data/Project.aspx?project_id=380			
UAE												
Zakum	1963	1966	N.A.	50 miles (80 kilometers) northwest of Abu Dhabi, the oil field spans more than 288,000 acres (450 square miles)	24 m / 79 ft	600,000 bopd	installing two compressors and de-bottlenecking the GTP	ADOC (NOC)	http://www.subseaiq.com/data/Project.aspx?project_id=592			
Egypt												
Taurt	2004	2008 (Phase 1, Phase 2 under development)	N.A	Ras El Bar concession - 44 miles (70 kilometers) offshore in the northeast of Part Said, East Nile Delta - Mediterranean sea	100 m / 330 ft	N.A	Subsea tie back	Gulf of Suez Petroleum Company (Gupco)	http://www.subseaiq.com/data/Project.aspx?project_id=491			
North Bardawil	2003	2009	N.A	North Bardawil Concession - Nile Delta offshore Egypt - Mediterranean sea	350 m / 1,155 ft	95 MMcf/d (2.7 MMcm/d) (estimated)	Subsea tie back to Barboni platform	Petrobel	http://www.subseaiq.com/data/Project.aspx?project_id=519	http://www.rigzone.com/news/article.asp?a_id=79605		
West Delta Deep Marine Concession (Scarab and Saffron fields)	1998	2003	4 tcf of gas	Block WDDMC - 56 miles (90 kilometers) from the Nile Delta shoreline - Mediterranean sea	850 m / 2,805 ft	750 MMcf/d (21.23 MMcm/d) and roughly 3,000 barrels per day of condensate (production capacity)	Subsea tie back to Idku onshore terminal	Burullus Gas Co.	http://www.subseaiq.com/data/Project.aspx?project_id=602			
Saudi Arabia												
Safaniya (oil)	N.A	N.A	19 billion barrels of oil	265 km north of Saudi Aramco headquarters, Dhahran - Persian Gulf	N.A	1.4 million bopd (2007)	N.A	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.saudiaramco.com/irj/portal/anonymous?favlink=/SaudiAramcoPublic/docs/Our+Business/Oil+Operations/Oil+Fields+%26+Reserves/Safaniya&ln=en		
Zuluf (oil)	N.A	N.A	N.A	Persian Gulf	N.A	>500,000 bpd (2002)(production capacity)	N.A	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.eia.doe.gov/cabs/pgulf2.html		
Marjan (oil)	N.A	N.A	N.A	Persian Gulf	N.A	270,000 bpd (2002) (production capacity)	N.A	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.eia.doe.gov/cabs/pgulf2.html		
Karan	2006	2012 (estimated)	N.A	Persian Gulf	N.A	1.8 Bcf/d (estimated)	N.A - Field under development	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.eia.doe.gov/cabs/pgulf2.html		
Arabiyah	N.A	2014 (estimated)	N.A	Persian Gulf	N.A	1.0 Bcf/d (estimated)	N.A - Field under development	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html			
Hasbah	N.A	2014 (estimated)	N.A	Persian Gulf	N.A	0.8 Bcf/d (estimated)	N.A - Field under development	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html			
Middle East Multi Country												
Dorra		2017 (estimated)	13 tcf of natural gas	Saudi Arabia Neutral Zone, Kuwait - Persian Gulf		800 mmftpd (production capacity)		Al-Khafji Joint Operations (KOJ)	http://www.zawya.com/middle-east/projects/project.cfm/pid240210013526	http://www.eia.doe.gov/cabs/pgulf2.html		
Al - Khafji	N.A	N.A	N.A	Saudi Arabia & Kuwait Neutral Zone	N.A	600,000 bopd	N.A	Al-Khafji Joint Operations (KJO)	http://www.zawya.com/middle-east/projects/project.cfm/pid130307120958	http://www.eia.doe.gov/cabs/pgulf2.html		
Central Asia												
Azerbaijan												
Shah Deniz	1999	2006	30 Tcf (1 Tcm) of gas and 1.5 billion barrels of condensates	Caspian Sea	164 and 1,969 feet (50 and 600 meters)	110 Bcf (3 Bcm) and 9 tons (0.8 tonnes) of condensate (2007)	Fixed platform	BP	http://www.subseaiq.com/data/Project.aspx?project_id=415			
Kazakhstan												
Kashagan	2001	Under Construction since 2007	16 billion (potential recoverable reserves)	North Caspian Sea approximately 50 miles (80 kilometers) offshore Atyrau	3 m / 10 ft	N.A.	A shallow draft barge rig was contracted to drill five exploration wells	Eni	http://www.subseaiq.com/data/Project.aspx?project_id=418			
Russia												
Russia												
Shtokman (Shtokmanovskoe)	1988	2013 (estimated)	19 billion barrels of oil equivalent (boe) (3.8 trillion cubic meters of gas and 53.3 million tons of gas condensate)	600 km northeast off the city of Murmansk, Russia - Barents Sea	320 - 340 m	70 bcm of natural gas and 0.6 mln tonnes of gas condensate (estimated annual production)	Combination of 2 semi submersibles	Shtokman Development AG	http://www.subseaiq.com/data/Project.aspx?project_id=476	http://www.gazprom.com/production/projects/deposits/shp/		
Sakhalin II (consist of Piltun-Ashtokhskoye and Lunskoye fields)	1984 (Lunskoye), 1986 (Piltun-Ashtokhskoye)	1999 (Piltun-Ashtokhskoye), 2008 (Lunskoye)	1 billion barrels of oil and 17.6 trillion cubic feet (500 billion cubic meters) of natural gas (total, both fields)	Offshore Sakhalin Island - Sea of Okhotsk	30m / 99ft	395,000 boed (estimated peak production)	Combination of 3 fixed platform and 1 FSO	Sakhalin Energy Investment Company Ltd. (Sakhalin Energy)	http://www.gazprom.com/production/projects/deposits/sakhalin2/	http://www.subseaiq.com/data/Project.aspx?project_id=293		
Sakhalin III (Kirinsky, Ayashsky, Vostochno-Odoptinsky and Kirinskoye fields)	N.A	N.A	1.4 trillion cubic meters	Offshore Sakhalin Island - Sea of Okhotsk	N.A	N.A - field under development	N.A - field under development - Exploratoration works estimated to last until year 2020	Gazprom	http://www.gazprom.com/production/projects/deposits/sakhalin3/			

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Kirinskoye field (Part of Sakhalin III Project)	1992	2014 (estimated)	75.4 billion cubic meters of gas and 8.6 million tons of gas condensate	Offshore Sakhalin Island - Sea of Okhotsk	N.A	N.A - field under development	N.A - field under development - Exploratory drilling started in July 2009 via semi submersible drilling platform	Gazprom	http://www.gazprom.com/production/projects/deposits/sakhalin3/			
Rusanovsky (Rusanovskoe)	N.A	N.A	N.A	Kara Sea	N.A	N.A	N.A	N.A	http://www.offshore-environment.com/russianoil.html			
Leningradsky (Leningradskoe)	N.A	N.A	N.A	Kara Sea	N.A	N.A	N.A	N.A	http://www.offshore-environment.com/russianoil.html			
Safaniya (oil)	N.A	N.A	19 billion barrels of oil	265 km north of Saudi Aramco headquarters, Dhahran - Persian Gulf	N.A	1.4 million bopd (2007)	N.A	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.saudiaramco.com/irj/portal/anonymous?favlnk=/SaudiAramcoPublic/docs/Our+Business/Oil+Operations/Oil+Fields+%26+Reserves/Safaniya&ln=en		
Zuluf (oil)	N.A	N.A	N.A	Persian Gulf	N.A	>500,000 bpd (2002)(production capacity)	N.A	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.eia.doe.gov/cabs/pgulf2.html		
Marjan (oil)	N.A	N.A	N.A	Persian Gulf	N.A	270,000 bpd (2002) (production capacity)	N.A	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.eia.doe.gov/cabs/pgulf2.html		
Karan	2006	2012 (estimated)	N.A	Persian Gulf	N.A	1.8 Bcf/d (estimated)	N.A - Field under development	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html	http://www.eia.doe.gov/cabs/pgulf2.html		
Arabiyah	N.A	2014 (estimated)	N.A	Persian Gulf	N.A	1.0 Bcf/d (estimated)	N.A - Field under development	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html			
Hasbah	N.A	2014 (estimated)	N.A	Persian Gulf	N.A	0.8 Bcf/d (estimated)	N.A - Field under development	Saudi Aramco	http://www.eia.doe.gov/emeu/cabs/Saudi_Arabia/NaturalGas.html			
Al - Khafji	N.A	N.A	N.A	I	N.A	600,000 bopd	N.A	Al-Khafji Joint Operations (KJO)	http://www.zawya.com/middle-east/projects/project.cfm/pid130307120958	http://www.eia.doe.gov/cabs/pgulf2.html		
Dorra		2017 (estimated)	13 tcf of natural gas	Saudi Arabia Neutral Zone, Kuwait - Persian Gulf		800 mmftpd (production capacity)		Al-Khafji Joint Operations (KOJ)	http://www.zawya.com/middle-east/projects/project.cfm/pid240210013526	http://www.eia.doe.gov/cabs/pgulf2.html		
North America												
Canada												
SABLE OFFSHORE ENERGY PROJECT (SOEP)												
Sable Offshore Energy Project (SOEP) consist of 6 fields, detailed as follows:	Refer below	Refer below	85 billion cubic meters of recoverable gas reserves (total for all fields)	99 to 186 miles (160 to 300 kilometers) off the east coast of Nova Scotia - Canadian Atlantic	66 to 262 feet (20 to 80 meters)	400 MMcf/d (11 MMcm/d) (2009 total production for all fields)	Combination of 5 fixed platforms (refer below)	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
Thebaud	1998	1999	N.A	Canadian Atlantic	30m / 99ft	N.A	Fixed platform	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
Venture	1979	1999	N.A	Canadian Atlantic	22m / 73ft	N.A	Fixed platform	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
North Triumph	N.A	1999	N.A	Canadian Atlantic	76m / 251ft	N.A	Fixed platform	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
South Venture	N.A	2004	N.A	Canadian Atlantic	23m / 76ft	N.A	Fixed platform	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
Alma (Sable Project)	N.A	2003	N.A	Canadian Atlantic	67 m / 221 ft	N.A	Fixed platform	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
Glenelg (Sable Project)	N.A	N.A - Field under development	N.A	Canadian Atlantic	N.A	N.A	N.A - Field under development	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=492			
USA												
Independence project (consist of Atlas, Atlas North West, Spiderman, Q, Merganser, Jubilee, Mondo North West, San Jacinto, Vortex, Cheyenne and Callisto fields, detailed below)	Refer below	2007	N.A	Mississippi Canyon Block 920 - Mississippi Canyon - 110 miles (180 meters) from the Mississippi River Delta - US Gulf of Mexico	8,000 feet (2,439 meters)	900 MMcf/d (2008 total production for all fields)	Subsea tie back from all wells to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Atlas and Atlas North West	2003	2007	N.A	Blocks 5,49 & 50 -Llyod Ridge Blocks - US Gulf of Mexico	2,700 m / 8,910 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Spiderman	2003	2007	N.A	Blocks 620 & 621 - DeSoto Canyon - US Gulf of Mexico	2,700 m / 8,910 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Q Field	2005	2007	N.A	Block 961 - Mississippi Canyon - US Gulf of Mexico	2,416 m / 7,973 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Merganser	2002	2007	N.A	Blocks 36 & 37 - Atwater Valley	2,408 m / 7,946 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Jubilee	2003	2007	N.A	Blocks 305 & 349 - Atwater Valley & Blocks 265 & 309 - Lloyd Ridge - US Gulf of Mexico	2,682 m / 8,851 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Mondo North West	2005	2007	N.A	Blocks 1 & 2 - Lloyd Ridge	2,549 m / 8,412 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
San Jacinto	2004	2007	N.A	Blocks 618 & 619 - DeSoto Canyon - US Gulf of Mexico	2,392 m / 7,894 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Vortex	2002	2007	N.A	Blocks 217 & 261 - Atwater Valley & Blocks 177 & 221 - Lloyd Ridge - US Gulf of Mexico	2,543 m / 8,392 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Cheyenne	2005	2008	N.A	Block 399 - Lloyd Ridge - US Gulf of Mexico	2,739 m / 9,039 ft	N.A	Subsea tie back to Independence Hub semi submersible	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		
Callisto	2001	N.A - Field under development drilling	N.A	Block 876 - Mississippi Canyon - US Gulf of Mexico	2,406 m / 7,940 ft	N.A - Field under development drilling	N.A - Field under development drilling	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=121	http://www.offshore-technology.com/projects/independence/specs.html		

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Canyon Express (consist of Aconcagua, Camden Hills and King's Peak fields)	1993 (King's Peak), 1995 (Aconcagua & Camden Hills)	2002	900 Bcf (25 Bcm) (total reserves for all fields)	Blocks 173, 217, 305 & 348 - Mississippi Canyon and Blocks 177 & 133 - DeSoto Canyo - US Gulf of Mexico	1,890 m / 6,237 ft to 2,404 m / 7,933 ft	500 MMcf/d (14 MMcm/d) (estimated peak production)	Combination of subsea tie back from all fields to Canyon Station fixed platform	ATP	http://www.subseaiq.com/data/Project.aspx?project_id=115			
Geauxpher	2008	2009	100 Bcf (3 Bcm) of gas	Block 462 - Garden Banks - US Gulf of Mexico	823 m / 2,716 ft	115 MMcf/d (3 MMcm/d) (2009)	Subsea tie back to Spectacular Bid (GB 72 Platform A)	Mariner	http://www.subseaiq.com/data/Project.aspx?project_id=414			
Red Hawk	2001	2004	250 bcf of natural gas	Block 877 Garden Banks - southeast of Sabine Pass, Texas - US Gulf of Mexico	1,615 m / 5,330 ft	120 MMcf/d (3 MMcm/d) (estimated peak production)	SPAR platform	Anadarko	http://www.subseaiq.com/data/Project.aspx?project_id=173			
Falcon Corridor (consist of Falcon, Harrier, Raptor and Tomahawk fields	2001 (Falcon), 2003 (Harrier, Raptor & Tomahawk)	2003 (Falcon), 2004 (Harrier, Raptor & Tomahawk)	175 to 240 Bcf (5 to 7 Bcm) in gas and condensate reserves (Falcon), 55 to 80 Bcf (1.6 to 2.3 Bcm) of natural gas reserves (Harrier)	Blocks 579, 580, 623, 668 & 759 - East Breaks - US Gulf of Mexico	1,052 m / 3,472 ft to 1,269 m / 4,188 ft	175 MMcf/d (5 MMcm/d) of natural gas equivalent (peak production)	Fixed platform	Enterprise	http://www.subseaiq.com/data/Project.aspx?project_id=163			
Lost Ark	2001	2002	N.A	Block 464 - East Breaks - US Gulf of Mexico	823 m / 2,716 ft	40 MMcf/d (1.1 MMcm/d)	Subsea tie back to East Breaks 110 fixed platform	Samedan Oil	http://www.subseaiq.com/data/Project.aspx?project_id=170			
Devil's Tower (consist of Devil's Tower, Goldfinger, Basslite and Triton fields)	2000 (Devil's Tower), 2001 (Bass Lite), 2004 (Goldfinger & Triton)	2004 (Devil's Tower), 2005 (Goldfinger & Triton), 2008 (Bass Lite)	80 to 150 Mboe	Blocks 771, 772 & 773 - Mississippi Canyon and Blocks 380,381, 425 & 426 - Atwater Valley - US Gulf of Mexico	1,653 m / 5,455 ft to 2,028 m / 6,692 ft	5,000 bopd and 5 MMcf/d (0.14 MMcm/d) (2005)	SPAR platform	ENI	http://www.subseaiq.com/data/Project.aspx?project_id=152			
Dulcimer	1998	1999	N.A	Block 367 - Garden Banks - 150 miles (241 kilometers) offshore Louisiana - US Gulf of Mexico	329 m / 1,086 ft	60 MMcf/d (1.7 MMcm/d) of natural gas	Tie back to GB 236 Platform	Mariner	http://www.subseaiq.com/data/Project.aspx?project_id=169			
Central and South America												
Mexico												
Cantarell	1976	1979	35 billion	62 miles (100 kilometers) off the coast of the Yucatan Peninsula in the Gulf of Mexico	35 m / 116 ft	N.A (estimated that Cantarell will continue to decline roughly 10% a year)	tied to a total of 38 wellhead platforms	Peltex	http://www.subseaiq.com/data/Project.aspx?project_id=535			
Brazil												
Belem	N.A.	N.A.	Drilling is still in progress	53 miles (85 kilometers) off the coast in Block BM-S-56	135 m / 446 ft	Drilling is still in progress	Drilling is still in progress	OGX	http://www.subseaiq.com/data/Project.aspx?project_id=827			
Columbia												
Chuchupa	1972	1979	more than 800 million cfpd	N.A.	N.A.	350 and 400 million cfpd	N.A.	Chevron	http://www.eia.doe.gov/emeu/cabs/Colombia/NaturalGas.html	http://www.bnamericas.com/news/oilandgas/Low_Demand_Keeps_Chuchupa_Gas_Field_Output_Low	http://www.chevron.com/Documents/Pdf/ColombiaFactSheet.pdf	
Europe												
Norway												
SLEIPNER PROJECT												
Sleipner East (part of Sleipner project)	1981	1998		Block 15/9 - 149 miles (240 kilometers) west of Stavanger - North Sea	82 m / 271 ft	40,000 barrels of condensate daily and 777 MMcf/d (22 MMcm/d)	Combination of 3 fixed platforms	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=374			
Sleipner West (part of Sleipner project)	1974	1996		Block 15/9 - 149 miles (240 kilometers) west of Stavanger - North Sea	110 m / 363 ft	55,000 barrels of condensate daily, and 777 MMcf/d (22 MMcm/d)	Combination of 3 fixed platforms	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=374			
Gungne (part of Sleipner project)	1982	1996		Block 15/9 - 149 miles (240 kilometers) west of Stavanger - North Sea	83 m / 274 ft		Subsea tie back to Sleipner A platform	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=374			
Loke (part of Sleipner project)	N.A	1993		Block 15/9 - 149 miles (240 kilometers) west of Stavanger - North Sea	N.A	N.A	Subsea tie back to Sleipner A platform	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=374			
Alpha North (part of Sleipner project)	N.A	2004	45 Bcf (13 Bcm) of gas and 32 million barrels of condensate.	Block 15/9 - 149 miles (240 kilometers) west of Stavanger - North Sea	N.A	N.A	Subsea tie back to Sleipner T platform	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=374			
Ormen Lange	1997	2007	14 Tcf (397 Bcm) of natural gas	Blocks 6305/4, 6305/5, 6305/7, 6305/8 - 75 miles (120 kilometers) northwest of Kristiansund - Norwegian Sea	1,100 m / 3,630 ft	2.5 Bcf/d (70 MMcm/d) of natural gas and 50,000 barrels of condensate a day	Subsea tie back	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=222			
Snohvit	1984	2007	6.8 Tcf (193 Bcm) of natural gas, 113 million barrels of condensate and 5.6 million tons (5.1 million tonnes) of natural gas liquids (NGL)	Blocks 7120/6, 7120/7, 7120/8, 7120/9, 7121/4, 7121/5, 71 - 7 miles (140 kilometers) northwest of Hammerfest-Hammerfest Basin-North Sea	340 m / 1,122 ft	201 Bcf (5.7 Bcm) of LNG (estimated total annual production)	Subsea tie back	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=223			
OSEBERG CENTRE PROJECT												
Tune (part of Oseberg Centre project)	1996	2002	N.A	Blocks 30/5, 30/6, 30/8 - 6 miles (10 kilometers) west of the Oseberg Center - North Sea	312 feet (95 meters)	N.A	Subsea tie back to Oseberg D platform	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=479			
Tune South (Tune Sor) (part of Oseberg Centre project)	1995	2009	N.A	Block 30/8, PL 190 - miles (10 kilometers) southwest of the Oseberg field - North Sea	N.A	1.5 MMcm/d (estimated peak production)	Subsea tie back to Tune subsea system	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=479	http://www.rigzone.com/news/article.asp?a_id=78363		
Yttergryta	2007	2009	11 Mmboe of gas	Block 6507/11 - Haltenbanken area - Norwegian Sea	297 m / 980 ft	123.6 MMcf/d (3.5 MMcm/d) (peak production)	Subsea tie back to Asgard B semi submersible	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=359			
Sigyn	1982 (east), 1997 (west)	2002	N.A	Block 16/7 - North Sea	70 m / 231 ft	64 MMcf/d (1.8 MMcm/d) and 21,000 barrels of condensate per day	Subsea tie back to Sleipner A platform	Exxonmobil	http://www.subseaiq.com/data/Project.aspx?project_id=203			

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Mikkel	1987	2003	989 Bcf (28 Bcm) of dry gas and 40 million barrels of condensate	Haltenbanken area - Norwegian Sea	722 feet (220 meters)	205 MMcf/d (5.8 MMcm/d) of natural gas (peak production)	Subsea tie back to Asgard B semi submersible	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=358			
Troll (consist of Troll East and Troll West fields)	1979	1995 (Troll West - first oil), 1996 (Troll East)	1.8 trillion cubic metres of natural gas and 2 billion barrels of oil	Blocks 31/2, 31/3, 31/5 and 31/6 - 65km west of Kollsnes, near Bergen - North Sea	315-345m	138,000 bopd and 120Mmscm/d of gas (2008)	Combination of 1 condeep platform and 2 semi submersibles	Statoil	http://www.offshore-technology.com/projects/troll/			
Kristin	1997	2005	43 billion cubic meters	southwestern part of the Halten Bank in the Norwegian Sea	370 m / 1,221 ft	10 MMcm/d (353 MMcf/d)	semisubmersible production platform which is fully equipped with processing facilities for gas and condensate	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=202			
Greater Gullfaks Area	1978	1986	N.A. (estimated that roughly 90% of the reserves have been produced)	Blocks 34/7, 34/8, 34/10 and 33/12 (Norwegian North Sea)	138 m / 455 ft	N.A	Three gravity-base concrete and steel topside production platforms	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=198			
Snohvit	1984	2007	N.A.	87 miles (140 kilometers) northwest of Hammerfest, Norway, in the Hammerfest Basin	340 m / 1,122 ft	N.A.	six remotely operated subsea manifolds	Statoil	http://www.subseaiq.com/data/Project.aspx?project_id=223			
Netherland												
M7-A	1996	2009	32 Bcf (1 Bcm) of gas	Offshore Netherlands - North Sea	30 m / 99 ft	21.7 MMcf/d (average production 2009)	Fixed platform	Cirrus Energy	http://www.subseaiq.com/data/Project.aspx?project_id=391			
UK												
Goldeneye	1996	2004	500 billion cubic feet of gas reserves and 17 million barrels of gas condensate	UKCS Blocks 14/29a, 20/4b, 20/3b - 65 miles (105 kilometers) from Northeast Scotland - Outer Moray Firth - North Sea	122 m / 403 ft	100 MMcf/d (2.8 MMcm/d), and more than 10,000 barrels of gas condensate a day (estimated)	?? Platform	Shell	http://www.subseaiq.com/data/Project.aspx?project_id=309			
GREATER ALWYN PROJECT												
Ellon (part of Greater Alwyn project)	1973	1994	N.A	Blocks 3/15 and 3/14A - 6 miles (9 kilometers) south of Dunbar - North Sea	135 m / 446 ft	N.A	Subsea tie back to Dunbar platform	Total	http://www.subseaiq.com/data/Project.aspx?project_id=227			
Nuggets (part of Greater Alwyn project)	1972	2001	N.A	Blocks 3/19a, 3/20a, 3/24a, 3/25a, 3/18, 3/19b, 3/24c - 12 miles (20 kilometers) south of Dunbar - North Sea	125 m / 413 ft	153 MMcf/d (4.3 MMcm/d)	Subsea tie back to Alwyn B platform	Total	http://www.subseaiq.com/data/Project.aspx?project_id=227			
Jura (part of Greater Alwyn project)	2006	2008	170 Mmboe of gas	Block 3/15 - 6 miles (10 kilometers) east of the Dunbar field - North Sea	113 m / 373 ft	50,000 boepd (estimated)	Subsea tie back to Alwyn B platform	Total	http://www.subseaiq.com/data/Project.aspx?project_id=227			
Elgin / Franklin	1986 (Franklin), 1991 (Elgin), 2003 (West Franklin)	2001 (Elgin & Franklin fields), 2007 (West Franklin)	800 Mmboe (total reserves for all fields)	Blocks 29/5b, 22/30b and 22/30c - 149 miles (240 kilometers) east of Aberdeen - North Sea	93 m / 307 ft	175,000 bpd of condensate and 547.4 MMcf/d (15.5 MMcm/d) of gas	Combination of 3 fixed platforms	Total	http://www.subseaiq.com/data/Project.aspx?project_id=287			
South East Asia												
Indonesia												
Kambuna	1986	2009	30 Mmboe of gas	Glagah Kambuna Technical Assistance Contract (TAC) - offshore North Sumatra	40 m / 132 ft	40 MMcf/d and roughly 4,000 bopd of condensate (estimated peak production)	Fixed platform	Salamander Energy	http://www.subseaiq.com/data/Project.aspx?project_id=498			
Tangguh	1990s	2009	14.4 trillion cubic feet	centered on the Bintuni Bay area of Papua	N.A.	N.A.	collecting gas from the reservoir, then send it through sub-sea pipelines to an LNG processing facility on the south shore	BP	http://www.hgs.org/attachments/calendarevents/90/Abstract_Tangguh.pdf	http://www.bp.com/sectiongenericarticle.do?categoryId=9004779&contentId=7006759	http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7054378	
Gajah Baru	2000	Under Development	325 Bcf (9 Bcm)	West Natuna Block A in the West Natuna Sea	82 m / 271 ft	N.A.	subsea wells tied-back to a central processing platform and a wellhead platform that are connected by a bridge, and gas being exported via a 16-inch-diameter export pipeline measuring 2 miles (3 kilometers) long	Premier	http://www.subseaiq.com/data/Project.aspx?project_id=403			
Arun	1971	N.A.	N.A. (estimated that it has depleted 90 percent of the recoverable reserves)	N.A.	N.A.	10 MMt/y (487 Bcf/y)	N.A.	Pertamina	http://www.eia.doe.gov/cabs/Indonesia/NaturalGas.html	http://www.thejakartapost.com/news/2010/11/01/arun-faces-options-survival-after-no-more-gas.html		Operation will be ceased in 2014
Bekapai	1972	1974	N.A.	15 km off the Mahakam delta	1,300 to 1,600 m	26 kb/d	N.A.	Total	http://www.total.com/en/about-total/our-businesses/upstream/exploration--production/asia-pacific-922629.html	http://search.datapages.com/data/open/offer.do?target=/specpubs/fieldst2/data/a012/a012/0001/0450/0459.htm		
Kuala Langsa	1992	Under Development	Under Development	N.A.	2,500m	Under Development	N.A.	Premier	http://www.slideshare.net/plsderrick/premier-oil-indonesia-north-sumatra-block-a-update			

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Terang/Sirasun	N.A.	2001	N.A.	N.A.	150-300 m	N.A.	N.A.	BP	http://www.slideshare.net/FrostandSullivan/strategic-review-of-the-asia-pacific-offshore-rigs-market	http://docs.google.com/viewer?a=v&q=cache:L6eg0bSwoP4J:www.kgu.or.kr/download.php%3Ftb%3Dbbs_017%26fn%3Dday3_0502b.pdf%26rn%3Dday3_0502b.pdf+EAST+JAVA+GAS+PIPELINE+RECTIFICATION+PROJECT,+A+CHALLENGE+FROM+TECHNICAL+TO+PROJECT+MANAGEMENT&hl=en&gl=sg&pid=bl&srcid=ADGEESiF8LpBj26BpS4GocEZdnHpfUBl2-xOCSL8bTAgHxa911NkfwvF1w8x3FznU7-QaPrTigPCxW1-TjTVhvWLZfNCtWFaBow2Wl4bWc7IudKg1neNlIx5chhUY6u_L_3Ug9Lu7dDe&sig=AHIEtbQQcUytrh2ViN3yADYrtLnKiqS8Nw		
Malaysia												
Jerneh B	N.A.	N.A.	N.A.	N.A.	N.A.	150 MMcf/d	production from the unmanned facility will be transported by a 16-in. pipeline to the main manned Jerneh A platform	ExxonMobil	http://www.exxonmobil.com/Malaysia-English/PA/Newsroom/MY_NR_20070503_Jerneh-B-Award-Contract.asp			
Lawit	N.A.	N.A.	N.A.	150 miles (240 kilometers) offshore Terengganu	N.A.	900 million cubic feet	N.A.	Exxon	http://www2.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/84301&EDATE=			
Bintang	N.A.	2003	1 Tcf	N.A.	N.A.	335 Mmcf/d	N.A.	ExxonMobil	http://www.oilgasarticles.com/articles/266/1/Malaysias-Natural-Gas-Reserves---Production-and-Consumption/Page1.html			
Resak	N.A.	2000	N.A.	N.A.	N.A.	120.0 mmscfd	N.A.	Petronas	http://www.icis.com/Articles/2000/02/14/105053/petronas-arm-starts-up-resak-gas-field-for-chem-feedstock.html			
Duyong	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Petronas	http://www.thejakartapost.com/news/2002/07/25/indonesia-ready-export-gas-malaysia.html			
Belumut area consists of four fields, East Belumut, West Belumut, Lerek and Chermingat in the Malay Basin	N.A.	2008	20 to 25 MMbbl (East Belumut); 7 MMbbl (Chermingat); 4 MMbbl (West Belumut)	335,000 acres about 185 miles (298 kilometers) offshore Kemaman, Terengganu	61 m / 201 ft	N.A.	N.A.	Serving as operator of the permit is Newfield, owning a 60% interest; Carigali owns 40%.	http://www.subseaiq.com/data/Project.aspx?project_id=785&AspxAutoDetectCookieSupport=1			
Brunei												
Maharaja Lela / Jamalulalam field	N.A.	N.A.	N.A.	N.A.	18,583 feet (5,664 meters)	10 MMcf/d	N.A.	Total	http://www.rigzone.com/news/article.asp?a_id=99990			
Thailand												
Arthit	N.A	2008	N.A	Blocks B14A, B15A and B16A - 143 miles (230 kilometers) offshore Songkhla - Gulf of Thailand	80 m / 264 ft	370 MMcf/d (10.5 MMcm/d) of natural gas and 19,800 bpd of condensate (2008)	Combination of 1 fixed platform and 1 FPSO	PTT Exploration & Production (PTTEP)	http://www.subseaiq.com/data/Project.aspx?project_id=288			
South Asia												
India												
Gujarat State Petroleum	2005	Under Development	Under Development	KG-OSN-2001/3 Block in the Krishna Godavari basin off the coast of Andhra Pradesh in the Bay of Bengal in 358 feet (109 meters) of water	109 m / 360 ft	Under Development	Under Development	Gujarat State Petroleum	http://www.subseaiq.com/data/Project.aspx?project_id=444			
North Asia												
China												
Peng Lai	1999	2002	N.A.	1.6 million-acre (6,475 square-kilometer) Bozhong Block 11/05 in approximately 75 feet (23 meters) of water	23 m / 76 ft	28,200 bopd	subsea pipe that is connected to the facilities	ConocoPhillips	http://www.subseaiq.com/data/Project.aspx?project_id=336			
QHD 32-6	1995	2001	N.A.	central to northern part of the Bohai Bay, 81 miles (130 kilometers) from the city of Tianjin	31 m / 102 ft	N.A.	46 production wells tied-back to six producing wellhead platforms with production transported to the Bohai Shi Ji FPSO	CNOOC China Limited	http://www.subseaiq.com/data/Project.aspx?project_id=417			
JinZhou (JZ 20-2N)	2009	N.A.	N.A.	East China's Bohai Bay	16 m / 53 ft	N.A.	N.A.	CNOOC China Limited	http://www.subseaiq.com/data/Project.aspx?project_id=481			
QHD 35-4	2009	N.A.	N.A.	north central Bohai Bay	26 m / 86 ft	N.A.	N.A.	CNOOC (NOC)	http://www.subseaiq.com/data/Project.aspx?project_id=503			
Yacheng 13-1	N.A.	N.A.	10.6 Tcf	N.A.	N.A.	124 Bcf/y	N.A.	CNOOC	http://www.eia.doe.gov/emeu/cabs/China/NaturalGas.html			
Oceania												
Australia												
Bassgas (Yolla gas field)	1985	2006	28 million barrels of condensate and LPG liquids	T/L1 and T/RL 1 - 91 miles (147 kilometers) from Kilcunda - Bass Strait	80 m / 264 ft	17.6 petajoules (PJ) of sales gas, 726,000 barrels of associated condensate and 50,000 tonnes of LPG	Fixed platform	Origin Energy	http://www.subseaiq.com/data/Project.aspx?project_id=591	http://www.rigzone.com/news/article.asp?a_id=82332		
Casino Henry (Casino, Henry and Netherby fields)	2002 (Casino), 2005 (Henry)	2006 (Casino), Henry & Netherby under development	N.A	VIC/P 44 and VIC/L 24 - 19 miles (30 kilometers) off the coast of Victoria	184 to 236 feet (56 to 72 meters)	10 Bcf (annual production - Casino only)	SPAR platform	Santos Ltd.	http://www.subseaiq.com/data/Project.aspx?project_id=554			
Bayu Undan	1995	2004	400 million barrels of condensate and 3.4 Tcf of gas	Timor Gap PSC 03-12, 03-13 - 310 miles (499 kilometers) northwest of Darwin - East Timor Sea	80 m / 264 ft	1.1 Bcf of gas and 115,000 barrels of combined condensate, propane and butane (production capacity)	Combination of 2 fixed platforms and 1 FSO	ConocoPhillips	http://www.subseaiq.com/data/Project.aspx?project_id=665			

Field name	Year of Discovery (Field)	First Gas	Estimated Reserve	Sea Area	Water depth	Production Volume	Production Type	Developer	Weblink	Additional Reference (if any)	Additional Reference (if any)	Remarks
Blacktip	2001	2009	933 billion standard cubic feet of gas and 5.7 million barrels of condensate	WA-279-P - Bonaparte Basin - offshore Australia - Timor Sea	50 m / 165 ft	22 Bcf/d (650 MMcm/d) (estimated initial production)	Fixed platform	ENI	http://www.subseaiq.com/data/Project.aspx?project_id=445			
Longtom	1995	2009	N.A	VIC/P54 - Gippsland Basin	56 m / 185 ft	30 terajoules per day and 430 bpd of condensates	Subsea tie back	Nexus	http://www.subseaiq.com/data/Project.aspx?project_id=454			
Gorgon	1981	Under Development	N.A.	43 to 87 miles (70 to 140 kilometers) off the northwestern coast of Western Australia	1,300 m / 4,290 ft	N.A.	subsea developments will be tied-back to the onshore Barrow Island LNG plant via pipelines and control umbilicals	Chevron	http://www.subseaiq.com/data/Project.aspx?project_id=271			
New Zealand												
Kupe	1986	2009	14.7 million barrels of light oil/condensate and 1.1 million tonnes of LPG	PML 38146 - Kupe Central Field Area (CFA) - Taranaki Basin - offshore New Zealand	35 m / 116 ft	254 petajoules (PJ) of natural gas, 1.1 million tones of LPG and 14.7 million barrels of light crude oil	Fixed platform	Origin Energy	http://www.subseaiq.com/data/Project.aspx?project_id=448			
Afruca												
Equatorial Guinea												
Ceiba	1999	2000	N.A.	22 miles (35 kilometers) offshore Equatorial Guinea, 150 miles (241 kilometers) south of Malabo	2,200 m / 7,260 ft	100,000 bopd	subsea pipeline connecting the buoy to the floating production, storage and offloading (FPSO) and the subsea flexible hoses linking the FPSO and buoy to each end of the pipelin	Hess	http://www.subseaiq.com/data/Project.aspx?project_id=295			
Akom	1999	2000	N.A.	34 miles (55 kilometers) southwest of Bata and 155 miles (250 kilometers) south of Malabo, Blocks G and F are located in the Rio Muni Basin	500 m / 1,650 ft	60,000 bopd	TLPs and platforms to a central processing platform on the shallow-water Elon field and, then, through a 15-mile (24-kilometer) subsea pipeline to the already existing Sendje Ceiba FPSO nearby	Hess Corp	http://www.subseaiq.com/data/Project.aspx?project_id=295			
Nigeria												
Amenam Kpono	1990	2003	N.A.	131 feet (40 meters) of water 19 miles (30 kilometers) offshore Nigeria	40 m / 132 ft	125,000 bopd (Phase I); additional 50,000 boepd or 300 Mcf/d of natural gas (Phase II)	transporting natural gas via pipeline to shore	Total	http://www.subseaiq.com/data/Project.aspx?project_id=318			
Egina	2003	expected to commence in 2015	N.A.	roughly 500 square miles in the Niger Delta in Block OML 130	1,550 m / 5,115 ft	N.A.	N.A.	Total	http://www.subseaiq.com/data/Project.aspx?project_id=662			
Agbami	1998	2008	900 million barrels	45,000 acres and is located some 70 miles (113 kilometers) offshore the Niger River Delta	1,462 m / 4,825 ft	250,000 barrels	N.A.	Chevron	http://www.subseaiq.com/data/Project.aspx?project_id=249			
Angola												
Girassol	1996	2001	725 million barrels	Block 17, Girassol is located 93 miles (150 kilometers) offshore	1,350 m / 4,455 ft	200,000 bopd	subsea wells are connected via flowlines to three riser towers, which deliver recovered hydrocarbons to the FPSO, then, oil is exported via two rigid midwater pipelines to an export buoy	Total	http://www.subseaiq.com/data/Project.aspx?project_id=325			
Kizomba, Block 15	1999	2003	100 million barrels	Block 15 (4,000 square kilometers)	1,203 m / 3,970 ft	80,000 bopd	wells tie-back to the leased Xikomba FPSO	Esso	http://www.subseaiq.com/data/Project.aspx?project_id=639			
Pazflor	2000	N.A.	N.A.	90 miles (150 kilometers) offshore Angola	762 m / 2,515 ft	N.A.	N.A.	Total	http://www.subseaiq.com/data/Project.aspx?project_id=326			
CLOV	1998	N.A.	N.A.	northwest sector of Angola's offshore Block 17	1,365 m / 4,505 ft	N.A.	N.A.	Total	http://www.subseaiq.com/data/Project.aspx?project_id=324			
Cabaca Norte	2009	N.A.	N.A.	Block 15/06 in 1,640 feet (500 meters) of water, 217 miles (350 kilometers) North of Luanda, offshore Angola	500 m / 1,650 ft	N.A.	N.A.	Eni	http://www.subseaiq.com/data/Project.aspx?project_id=681			
Sangos	2008	N.A.	N.A.	Block 15/06, which is located 217 miles (350 kilometers) north of Luanda	1,349 m / 4,452 ft	N.A.	N.A.	Eni	http://www.subseaiq.com/data/Project.aspx?project_id=333			
Manganes	2009	N.A.	N.A.	Block 18/06 in deep waters offshore Angola, roughly 124 miles (200 kilometers) away from the city of Luanda	N.A.	N.A.	N.A.	Petrobras	http://www.subseaiq.com/data/Project.aspx?project_id=597			
PSVM	2002	N.A.	N.A.	northeast sector of the license about 249 miles (400 kilometers) from Luanda and in waters measuring 6,562 feet (2,000 meters)	2,000 m / 6,600 ft	N.A.	N.A.	BP	http://www.subseaiq.com/data/Project.aspx?project_id=253			

Remarks:
1 This list is not exhaustive.
2. The names of the fields are compiled from Energy Information Administration of the US government (www.eia.gov) and other information is supplemented with desk research.

別添２．　石油ガス開発企業の主な試掘開発案件

ExxonMobil

Project Name	Operator	Owners/Interests	Field	Block	Place	Country	Proven Reserve	Status	Start of Development	Water Depth/(m)	
Angola — Block 15	Esso Angola	Agip Angola Production BV (30%) BP Angola (26.67%) ExxonMobil Corporation (40%) Mavuka Engineering (Pty) Ltd Statoil (13.33%)	Xikomba field,Kizomba A, Kizomba B, and Kizomba C *The development of two of the remaining fields is progressing		Angola coast	Angola	5 billion oil equivalent barrels	Production / Development	1994	Kizomba B - 3,300 to 4,200 ft (1,006 to 1,280 m)	
Russia — Sakhalin-1	Exxon Neftegas Limited (ENL), a subsidiary of Exxon Mobil Corporation, is operator of the Sakhalin-1 Project	Exxon Neftegas Ltd. (30% interest) Partners - Japan's Sakhalin Oil and Gas Development Co. Ltd.-principal shareholders INOC, JAPEX, Itochu, and Marubeni (30%); Russia's Rosneft affiliates: RN-Astra (8.5%) and Sakhalinmorneftegas (SA4NG)Shelf (1 1.5%); and National Oil Co. of India, ONGC Videsh Ltd. (20%)	Chayvo, Odoptu, and Arkutun Dagi. Future phases: Arkutun-Dagi fields and Chayvo Phase 2		offshore eastern Russia	Russia		Production / Development	1995	10 to 60 meters	http://www.sakhalin1.ru/Sakhalin/Russia-English/Upstream/about.aspx
U.S. Gulf of Mexico	Exxon Mobil	ExxonMobil holding 100 percent equity interest.	Rockefeller Field		160 miles off the coast of Texas	USA	5.4 million barrels of oil-equivalent	Development	2007	NA	
Hebron	ExxonMobil	ExxonMobile 36%, Chevron Canada Resources (26.7%), Petro-Canada (22.7%), StatoilHydro (9.7%) and the public-sector Energy Corporation of Newfoundland and Labrador (4.9%)	Hebron Field		offshore Newfoundland.	Canada	designed to recover over 600 million barrels of oil	Development	Originally 2002 by Chevron, shen shelved. Restarting 2009	92m	

OTher info : ExxonMobil has many fields in GOM. Six miles from the company's Hoover Diana development in the Gulf of Mexico, a new well is expected to more than triple existing natural gas production. The gas pockets are in a field called Rockefeller, one of several surrounding the Hoover Diana offshore platform, which began production in 2000.

Shell

Project Name	Operator	Owners/Interests	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)
Gumusut	Shell	Shell 33% (operator), ConocoPhillips Sabah 33%, Petronas Carigali 20%, Murphy Sabah Oil 14%	Gumusut		offshore Malaysia	Malaysia		Development	Development drilling commenced in January 2008	1,220m
Prelude and Concerto gas fields	Shell	Shell 100%	Prelude and Concerto gas fields	WA-371-P	Browse Basin, 475km north-northeast of Broome, Western Australia.	Australia	Containing an estimated 2 to 3 Tcf of recoverable gas,	Development	In July 2009, Shell awarded a consortium of Technip and Samsung Heavy Industries the contract for the design, construction and installation of multiple FLNG facilities over a period of up to 15 years, based upon Shell's proprietary design.	
Beaufort Sea	Shell				Alaska	USA	The Beaufort Sea is estimated to contain 8.22 billion barrels of oil and 27.64 trillion cubic feet of natural gas, according to MMS.	Exploration approved		
Chukchi Sea	Shell				Alaska	USA		Exploration approved		
Walker Ridge 508		Shell 35% Marathon and Petrobras 25% ENI 15%	Stones	N.A.	Gulf of Mexico	USA	N.A.	Exploration	N.A.	2,300 m

Shell is planning to develop its Prelude and Concerto gas fields off the northwest coast of Western Australia using its exciting Floating Liquefied Natural Gas (FLNG) technology.

BP

Project Name	Operator	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)	
Liberty	BP	100%	Liberty (light oil field)	N.A.	some five miles offshore in the Beaufort Sea, Alaska	USA	N.A.	Development	2011 (Scheduled)	N.A.	
Pazflor	Total	16.67%	Perpetua, Hortensia and Zinia (Upper Miocene), and Acacia (Oligocene)	17	Lower Congo Basin -150 kilometres off the coast of Angola	Angola	N.A.	Development	2011 (Scheduled)	up to 1200	
CLOV	Total	16.67%	Cravo and Lirio (Oligocene), and Orquidea and Violeta (Miocene)	17	Lower Congo Basin -150 kilometres off the coast of Angola	Angola	N.A.	Development	2014 (Scheduled)	up to 1400	
Clochas Mavacola	ExxonMobile	26.67%	N.A.	15	north of the Congo basin -150 kilometres off the coast of Angola	Angola	N.A.	Development	2012 (Scheduled)	up to 1400	
Kizomba Satellites Phase 2	ExxonMobile	26.67%	N.A.	15	north of the Congo basin	Angola	N.A.	Exploration	N.A.	N.A.	
Block 18 West	BP	N.A.	Platina, Chumbo and Cesio fields	18	Lower Congo Basin	Angola	N.A.	Evaluation for development	NA	up to 1700	
PSVM	BP	26.67%	Plutão, Saturno, Vênus and Marte (PSVM) fields	31	offshore Angola	Angola	N.A.	Development	2011 (Scheduled)	approximately 2000	
WND Gas	BP	60% (North Alexandria); 80% (West Med Deepwater Concession)	North Alexandria and West Med Deepwater Concession	N.A.	West Nile Delta	Egypt	estimated 5 trillion cubic feet of gas	Development	Agreement with Egypt government in 2010	N.A.	In July 2010 BP announced a major agreement with the Egyptian Ministry of Petroleum and Egyptian General Petroleum Corporation (EGPC) to develop an estimated 5 trillion cubic feet of gas at an estimated $9 billion of investment in the two deepwater conces

BP

Project Name	Operator	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)	
Nile Delta	BP		Satis	N.A.	N.A.	Egypt	N.A.	Development	90m	N.A.	
Tangguh Expansion	BP	37.16%	N.A.	N.A.	Berau-Bintuni Bay, West Papua	Indonesia	N.A.	Production / Development	The project commenced LNG production in June 2009. BP and its partners are reviewing options to expand Tangguh operations.	N.A.	The project commenced LNG production in June 2009. BP and its partners are reviewing options to expand Tangguh operations.
Sanga Sanga CBM	VICO	37.80%	N.A.	Sanga Sanga block	N.A.	Indonesia	N.A.	Exploration	The first step towards CBM production at Sanga-Sanga is an appraisal programme commenced in 2010 to determine the CBM production capacity of the block.	N.A.	The first step towards CBM production at Sanga-Sanga is an appraisal programme commenced in 2010 to determine the CBM production capacity of the block.
Chirag Oil Project (COP)	BP	37.43%	the Azeri-Chirag-Deepwater Gunashli field	N.A.	Chirag - Deep Water Gunashli (DWG) area	Azerbaijan	N.A.	Development	COP was sanctioned in February 2010.	approximately 170	COP was sanctioned in February 2010.
Galapagos	BP (Isabela), Noble (MC519/563)	67% (Isabela); 46.5% (MC519/563)	N.A.	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.	
Na Kika Phase 3	BP	50%	Kepler and Ariel fields, Fourier field	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.	
Mad Dog Phase 2	BP	60.50%	Mad Dog field	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.	
Na Kika Phase 4	BP	50%	Fourier field	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.	
Kaskida	BP	100%	N.A.	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.	

BP

Project Name	Operator	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)
Horn Mountain Phase 2	BP	100%	N.A.	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.
Atlantis Phase 3	BP	56%	N.A.	N.A.	the Gulf of Mexico	USA	N.A.	Development	N.A.	N.A.
Mississippi Canyon 771	BP		Kodiak	N.A.	Gulf of Mexico	USA	N.A.	Exploration	NA	1,500 m
Skarv	BP	30%	Skarv and Idun fields	N.A.	North Sea	UK	120 mmbbl oil/condensate and 1.4 tcf wet gas	Development	2011 (Scheduled)	N.A.
Valhall Redevelopme	BP	35.95%	N.A.	N.A.	North Sea	UK	N.A.	Development	2011 (Scheduled)	N.A.
Devenick	BP	88.70%	N.A.	9/29a and 9/24b	North Sea	UK	N.A.	Development	N.A.	N.A.
Kinnoull	BP	77%	N.A.	N.A.	North Sea	UK	N.A.	Development	2012 (Scheduled)	N.A.
Clair Ridge	BP	28.60%	N.A.	N.A.	North Sea	UK	N.A.	Development	N.A.	N.A.
Q204	BP	36%	N.A.	N.A.	North Sea	UK	N.A.	Development	N.A.	N.A.
Serrette	BPTT	70%	N.A.	N.A.	Northern Area of the Columbus Basin	Trinidad and Tobago	N.A.	Development	N.A.	285 feet
Juniper	N.A.	N.A.	Corallita and Lantana fields	N.A.	N.A.	Trinidad and Tobago	N.A.	N.A.	N.A.	N.A.

Chevron

Project Name	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)
Mafumeira Sul	N.A.	N.A.	Block 1	31 km off the Angolan coast	Angola	N.A.	Front-end engineering and design	N.A.	less than 61
Gorgon Project	47.3	N.A.	N.A.	130 kilometres off the north-west coast of Western Australia	Australia	N.A.	Develoment	2014	N.A.
Wheatstone natural gas project	75	Wheatstone	N.A.	offshore northwest Australia	Australia	N.A.	Develoment	N.A.	N.A.
Papa-Terra Field	37.5	Papa-Terra	N.A.	offshore northeast of Rio de Janeiro	Brazil	N.A.	Develoment	2013	1,189
Maromba	30	N.A.	N.A.	offshore northeast of Rio de Janeiro	Brazil	N.A.	Evaluation	N.A.	N.A.
Atlanta and Oliva	20	Atlanta and Oliva	N.A.	off the southeastern shore of Brazil	Brazil	N.A.	Evaluation	N.A.	N.A.
Buckskin	55	Buckskin	N.A.	Gulf of Mexico	USA	N.A.	Develoment	N.A.	N.A.
Usan Project	30	Usan	N.A.	100 km off the coast in the eastern Niger Delta region	Nigeria	N.A.	Develoment	late 2011	750
Aparo Field and the Bonga SW Field	20	Aparo and Bonga SW	N.A.	113 km off the coast of the western Niger Delta region	Nigeria	N.A.	A preliminary unitization agreement was extended	N.A.	1,131
Nsiko	95	N.A.	N.A.	145 km off the coast of the western Niger Delta region	Nigeria	N.A.	exploration	N.A.	1,768
Alder	70	N.A.	N.A.	27 km to the west of the Britannia Field, North Sea	UK	N.A.	Develoment	N.A.	N.A.
Rosebank/Lochnagar	40	N.A.	N.A.	130 km northwest of the Shetland Islands	UK	N.A.	Feasibility studies	N.A.	1,115

Eni

Project Name	Operator	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)	
Marine XII	Eni	90%	N.A.	N.A.	N.A.	Congo	N.A.	Exploration	N.A.	N.A.	
Block 15/06	Eni	35%	Cabaça Norte-1; Nzanza-1 and Cinguvu-1	15-Jun	N.A.	Angola	N.A.	Exploration	2012	1,400 m (Nzanza-1 and Cinguvu-1)	
Area 4	Eni	70%	N.A.	Area 4	N.A.	Mozambique	N.A.	Exploration	N.A.	2,600 m	
North Port Said	Eni	100%	Faryouz deposits	N.A.	N.A.	Egypt	N.A.	Development	N.A.	N.A.	
Mississippi Canyon 459 Block	Eni	100%	Appaloosa	N.A.	Gulf of Mexico	US	N.A.	Exploration	N.A.	853m	
Walker Ridge 508	Eni	N.A.	Stones-3	N.A.	Gulf of Mexico	US	N.A.	Exploration	N.A.	NA	
Keathley Canyon Block 1008	Eni	100%	Hadrian South prospect	N.A.	Gulf of Mexico	US	N.A.	Exploration	N.A.	2419m	
Appaloosa	Eni	100%	Appaloosa	blocks MC 459 and 460 and a part of blocks MC 503 and 504	Gulf of Mexico	US	N.A.	Development	2008	850 m	
Alaska	Eni	100%	Nikaitchuq	N.A.	Beaufort Sea	US	180 million barrels	Development	N.A.	N.A.	
Cardón IV	Operator Cardón IV S.A., a joint operating company formed by Eni and Repsol	50%	Cardón IV	N.A.	Gulf of Paria	Venezuela	N.A.	Exploration and appraisal	N.A.	N.A.	600,000 cubic metres (equal to 3,700 boe) and 500 barrels
Block BM-S-4	Eni	100%	Belmonte Gas Field etc	N.A.	offshore area of the Santos basin	Brazil	N.A.	Development / Exploration	N.A.	N.A.	
Block BM-CAL-14	Eni	100%	N.A.	N.A.	offshore area of the Camamu-Almada basin	Brazil	N.A.	Development	N.A.	N.A.	
Marulk project	Eni	20%	Marulk		Nor	Norway	80 and 120 million boe	Development	2010	365m	
Golliat Project	Eni	65%	Goliat		Barents Sea	Norway	estimated reserves of 174 Mmbo	Development	2009	400m	
Norwegian North Sea	Eni	45%	Afrodite gas and condensate deposit	N.A.	165 kilometres from the town of Bergen	Norway	N.A.	Development	N.A.	373 m	
Shetland Islands	Total	Total E&P UL Ltd (operator, 80%), Dong E&P UK Ltd (20%),	Laggan- Tormore		1,969 feet (600 meters), roughly 87 miles (140 kilometers) northwest of the Shetland Islands			Development	2010	600 m / 1,980 ft	
Abruzzo offshore area	Eni	N.A.	Colle Sciarra 1	N.A.	Abruzzo offshore area	Italy	N.A.	Exploration	N.A.	N.A.	
Cassiopea 1	Eni	N.A.	Cassiopea 1	N.A.	approximately 22 kilometres off the Agrigento coast	Italy	N.A.	Exploration	N.A.	560 m	

Eni

Project Name	Operator	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)
Argo 2 well	Eni	60%	Argo 2	N.A.	20 kilometres off the coast of Agrigento	Italy	N.A.	Exploration	N.A.	N.A.
JPDA 06-105	Eni	41%	Kitan 1 & Kitan 2		Timor Sea	Australia	N.A.	Development	2009	Discovery at 3,658 metres
Area C	Eni	50%	N.A.	N.A.	N.A.	Saudi Arabia	N.A.	Exploration	N.A.	N.A.

Petrobras

Project Name	Operator	Working Interest	Field	Block	Place	Country	Reserve	Status	Start of Development	Water Depth(m)	海底深さ(m)
Santos Basin	Petrobras		Varius fields			Brazil		Production / Development		300-1,500	7,500
Campos Basin	Petrobras		Garoupa, Nomorado, Enchova, Albacora, Marlim, Roncador, Barracuba, Caratinga, Jabarte and Cachalote fields		off the northern coast of Rio de Janeiro	Brazil		Production / Development		100(Garoupa); greater than 2000(Albacora)	
Santos Basin Southern Pole Discoveries	Petrobras		Tiro e Sídon, Cavalo Marinho, Caravela, Estrela do Mar	block BM-S-4		Brazil		Development		2,100 m (6,889 ft), 250 m (820 ft) from the water line.	
Cascade and Chinook development	Petrobras	50% and 66.67%	Cascade Field Chinook Field	Walker Ridge block	300km (180 miles) south of the Louisiana coast	USA		Development	Development / Started production in Dec2010	2,690 m / 8,877 ft	27,000ft
Tupi Oilfield	Petrobras	Petrobras 65% BG Group 25%, Galp Energia 10%	Tupi Field		offshore province crossing the Espírito Santo, Campos and Santos basins	Brazil	14 billion barrels	Development	NA	2,170 m / 7,161 ft	
Sergipe-Alagoas Basin	Petrobras		Piranema Field and surrounding areas other discoveries	NA	28 km off the coast of the State of Sergipe, Northeastern Brazil	Brazil	15 million barrels	Exploration, Developent, Production	NA	800m	
Guara	Petrobras	Petrobras, 45%; BG Group 30%; Repsol 25%.	Guara	Block BM-S-9	Santos basin pre-salt offshore Brazil in B	Brazil	NA	Development	2010	2,141 m / 7,065 ft	
Raukumara Basin	Petrobras	NA	NA		East Coast of NZ	NZ	NA	Exploration	NA	NA	

別添３．　主な試掘企業の概要

Drilling Companies

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Transocean_Fleet_Directory_January.2010.pdf
Noble Corporation_FleetStatus.xls
Nabors Industries marketed_rigcount3Q_2010.xls
SEADRILL FLEET STATUS REPORT.pdf
Ensco Fleet Status Report 15Dec2010.pdf
KCA rig list.xls
Diamond offshore rig report.xls

Transocean

We are the world's largest offshore drilling contractor and leading provider of drilling management services worldwide. With a fleet of 140 mobile offshore drilling units, plus three announced ultra-deepwater newbuild units, our fleet is considered one of the most modern and versatile in the world due to its emphasis on technically demanding sectors of the offshore drilling business. We have approximately 19,300 personnel worldwide.
Since launching the offshore industry's first jackup drilling rig in 1954, we have achieved a long history of "firsts." These innovations include the first dynamically positioned drillship, the first rig to drill year-round in the North Sea, the first semisubmersible rig for Sub-Arctic, year-round operations and the latest generations of ultra-deepwater drillships and semisubmersibles.
(AR 2009)

The company's ordinary shares are traded on the New York Stock Exchange under the symbol "RIG" and on the SIX Swiss Exhange under the symbol "RIGN."
(web site)

Transocean Ltd. (together with its subsidiaries and predecessors, unless the context requires otherwise, "Transocean," the "Company," "we," "us" or "our") is a leading international provider of offshore contract drilling services for oil and gas wells. As of
February 2, 2010, we owned, had partial ownership interests in or operated 138 mobile offshore drilling units. As of this date, our fleet consisted of 44 High-Specification Floaters (Ultra-Deepwater, Deepwater and Harsh Environment semisubmersibles and drillships), 26 Midwater Floaters, 10 High-Specification Jackups, 55 Standard Jackups and three Other Rigs. In addition, we had five Ultra-Deepwater Floaters under construction. We believe our mobile offshore drilling fleet is one of the most modern and versatile fleets in the world. Our primary business is to contract our drilling rigs, related equipment and work crews predominantly on a dayrate basis to drill oil and gas wells. We specialize in technically demanding segments of the offshore drilling business with a particular focus on deepwater and harsh environment drilling services. We also provide oil and gas drilling management services on either a dayrate basis or a completed-project, fixed-price (or "turnkey") basis, as well as drilling engineering and drilling project management services, and we participate in oil and gas exploration and production activities.
Transocean Ltd. is a Swiss corporation with principal executive offices located at Blandonnet International Business Center, Chemin de Blandonnet 2, Building F, 7th Floor, 1214 Vernier, Switzerland. Our telephone number at that address is +41 22 930-9000. Our shares are listed on the New York Stock Exchange ("NYSE") under the symbol "RIG." On February 16, 2010, we announced our intention to list our shares on the SIX in the second quarter of 2010, subject to the approval of the SIX. Our shares will continue to be listed on the NYSE. For information about the revenues, operating income, assets and other information related to our business, our segments and the geographic areas in which we operate, see "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and Notes to Consolidated Financial Statements—Note 23—Segments, Geographical Analysis and Major Customers.
(AR 2009)

Sales

Operating Revenues and Long-Lived Assets by Country

Operating revenues and long-lived assets by country are as follows (in millions):

	Years ended December 31,		
	2009	2008	2007
Operating revenues			
U.S.	$ 2,239	$ 2,578	$ 1,259
U.K.	1,563	2,012	848
India	1,084	890	761
Other countries (a)	6,670	7,194	3,509
Total operating revenues	$ 11,556	$ 12,674	$ 6,377

Please refer to
Transocean_Fleet_Directory_January.2010.pdf
For the details of rig fleet of Transocean.

Noble Corporation

Noble Corporation begins its 90th year in 2010. Very few companies, and even fewer drilling contractors, can claim this milestone. The Company's proactive style of management has guided it from a one rig operation in 1921 to one of the largest offshore drilling contractors in the world today. The Company's growth since the time of its spin-off from Noble Affiliates in 1985 has come about through a series of strategic acquisitions of offshore drilling assets and ancillary, non-capital intensive businesses around the world.
Noble is a leading offshore drilling contractor for the oil and gas industry. Noble performs, through its subsidiaries, contract drilling services with a fleet of 69 offshore drilling units (including five drilling rigs currently under construction or to be constructed), located worldwide, including in the Middle East, India, the U.S. Gulf of Mexico, Mexico, the Mediterranean, the North Sea, Brazil, West Africa and Asian Pacific. Noble also owns and operates a dynamically positioned floating production, storage, offloading vessel. Noble's shares are traded on the New York Stock Exchange under the symbol "NE".

(In thousands, except per share amounts and percentages)	Year Ended December 31,		
	2009	2008	2007
Operating revenues	$3,640,784	$3,446,501	$2,995,311
Operating income	2,010,744	1,908,403	1,490,862
Income before income taxes	2,015,902	1,912,458	1,488,902
Net income	1,678,642	1,560,995	1,206,011

Please refer to
Noble Corporation_FleetStatus.xls
For the company’s rig fleet

Nabors Industries

http://www.nabors.com/Public/Index.asp?Page_ID=3

The Nabors companies own and operate approximately 554 land drilling and approximately 728 land workover and well-servicing rigs in North America. Nabors' actively marketed offshore fleet consists of 38 platform rigs, 13 jack-up units and 3 barge rigs in the United States and multiple international markets. In addition, Nabors manufactures top drives and drilling instrumentation systems and provides comprehensive oilfield hauling, engineering, civil construction, logistics and facilities maintenance, and project management services. Nabors participates in most of the significant oil, gas and geothermal markets in the world.

Please refer to
Nabors Industries marketed_rigcount3Q_2010.xls
For the company’s rig fleet

Seadrill Ltd

http://www.seadrill.com/
The company operates a versatile fleet of 54 units for operations in shallow to ultra-deepwater areas in harsh environment and benign environments,

•Semi-submersibles
•Deepwater drillships
•Jack-ups
•Semi-tender rigs
•Tender rigs
Seadrill has some 9,300 skilled and highly competent employees, representing some 50 nationalities, operating in 15 countries on four continents.

Seadrill is listed on the New York Stock Exchange and the Oslo Stock Exchange.

Sales

	Year ended December 31,				Period from May 10, 2005 (inception) to December 31,
	2009	2008	2007	2006	2005
	(in millions of U.S. dollars except common share and per share data)				
Statement of Operations Data:					
Total operating revenues	3,254	2,106	1,552	1,155	27
Net operating income	1,372	649	489	226	(15)
Net income (loss)	1,353	(123)	515	245	(8)
Earnings per share, basic	$ 3.16	$ (0.41)	$ 1.28	$ 0.62	$ (0.04)
Earnings per share, diluted	$ 3.00	$ (0.41)	$ 1.20	$ 0.61	$ (0.04)
Dividends declared	199	688	-	-	-
Dividends declared per share	$ 0.50	$ 1.75	-	-	-

Fleet activities

Please refer to the attached fleet status report
SEADRILL FLEET STATUS REPORT.pdf

Ensco Plc

http://www.enscous.com
Ensco plc (NYSE: ESV) brings energy to the world as a global provider of offshore drilling services to the petroleum industry. Our fleet of eight ultra-deepwater semisubmersible rigs (including three under construction) and 40 premium jackup rigs are strategically located in the most prolific oil and gas markets around the world and are managed through four major business units: Deepwater, Asia & Pacific Rim, Europe & Africa and North & South America. Nearly 4,000 Ensco employees work around the clock for our customers.

Highlights

We recently achieved important milestones in its ultra-deepwater expansion. In 2009, ENSCO 8500 and ENSCO 8501, the first two of seven ultra-deepwater semisubmersibles in the $3 Billion+ ENSCO 8500 Series® newbuild program, commenced drilling operations in the Gulf of Mexico.

The proprietary design of the ENSCO 8500 Series® ultra-deepwater semisubmersibles was developed with extensive input from customers to address the drilling requirements of virtually all deepwater fields around the world. Rated for work in 8,500' of water, the new ultra-deepwater semisubmersible rigs may be modified to operate in water depths up to 10,000'. The uniform design streamlines operations across all of the 8500 Series rigs to control costs and enhance reliability for our customers.

Ensco’s 40-rig premium jackup fleet is one of the world's largest and most capable. Ten new jackup rigs were added over the past decade and more than $1.3 billion has been invested to upgrade the capability of the jackup fleet.

In December 2009, Ensco redomesticated to the UK and, in March 2010, we changed our name to Ensco plc to commemorate the opening of our new global headquarters in London.

Summary Financial Information
(in millions, except per share data)

Income Statement	Three Months Ended 30 Sep 2010	Three Months Ended 30 Sep 2009
Revenues	$428	$409
Operating Income	158	171
Net Income	131	150
Diluted EPS	0.91	1.05
Diluted EPS - Continuing Operations	$0.92	$1.01

Please refer to
Ensco Fleet Status Report 15Dec2010.pdf
For the company's rig fleet.

KCA Deutag Drilling

http://www.kcadeutag.com/
Head Office Country: Scotland

KCA DEUTAG is a wholly-owned subsidiary of Abbot Group. In March 2008, Abbot Group plc was acquired by First Reserve Corporation, a US-based private equity firm. As a consequence, Abbot Group plc was re-registered as a private company and changed its name to Abbot Group Limited.

First Reserve is the largest, most experienced energy industry focused private equity company in the world. The company is committed to investing in KCA DEUTAG and its sister company, Bentec, to ensure that we continue to grow in our key markets worldwide. This will give us the opportunity to expand our portfolio of rigs to meet client demand, and to further enhance our performance improvements systems and key support functions to the benefit of our clients.

KCA DEUTAG's headquarters are in Aberdeen, Scotland. We have a major hub office in Bad Bentheim, Germany, where our central technical support function is located, and regional offices in all of our key operational areas - Russia, the Middle East, the Caspian region and Norway.

History
The company has a history of over 100 years of drilling and engineering activities across the globe, and undertakes projects in some of the most harsh and demanding environments in the world, including the deserts of the Middle East and North Africa, arctic conditions in Siberia and Kazakhstan, tropical regions, and the challenging offshore conditions in the North Sea and offshore Sakhalin Island, far Eastern Russia.

Services
KCA DEUTAG is one of the few contractors with its own facilities and engineering services group, RDS, which has a workforce of 500 with a track record spanning 30 years, making it one of the leading providers of greenfield and brownfield rig design engineering for platforms and mobile units.

KCA DEUTAG currently manages more than 100 drilling and workover rigs.

KCA DEUTAG is responsible for over 30 managed offshore platforms in the North Sea, Caspian, Angola, and Sakhalin. We also own and operate the North Sea's only modular drilling and well workover rig, and have 10 mobile offshore drilling units (MODU) under management, including three wholly-owned jack-up rigs, and four part-owned and three managed self-erect tender assist rigs.

KCA DEUTAG owns a fleet of more than 60 land rigs.

Operations

MODUs

KCA DEUTAG has 10 mobile offshore drilling units (MODUs) under management. The company wholly owns three cantilever jack-up rigs - the Ben Avon, Ben Loyal and Ben Rinnes, rated at 250ft, 300ft and 350ft water depth respectively.

The Ben Loyal is currently contracted to PEMEX in the Gulf of Mexico for two years.

The Ben Rinnes is contracted to CABGOC for three years offshore Angola until September 2010, and the Ben Avon commenced a three-year contract with CNR on the Olowi field, offshore Gabon, in 2008.

Self-erect tender rigs

We are also a part owner with Marlin Offshore of the Charley Graves, WD Kent, Searex IX and Searex X tender assist rigs; and with Global Tender Barges of three more tender rigs, Global Sapphire (ex. Alligator), Global Jade (ex. Barracuda), Global Emerald (ex. Al Baraka - 1). KCA DEUTAG provides management services for each of these rigs.

Petronas has awarded a contract for the Searex IX and Global Sapphire (ex. Alligator) tender assist rigs to work offshore Malaysia, commencing Q1 2009 and Q3 2009 respectively. The Charley Graves is in Thailand under contract to Chevron, and in Indonesia, the Global Jade (ex. Barracuda) commenced a two-year contract with Total E&P Indonesia in April 2008. The Global Emerald (ex. Al Baraka -1) started a three-year contract with Brunei Shell Petroleum in Q4 2008 and the Searex X is working under a two-year contract to Sonangol in Angola from April 2008.

Offshore Platforms

KCA DEUTAG has a long history of offshore operations. The company has been operating platform rigs in the North Sea for more than 30 years and in the BP/AIOC Azeri Field in the Caspian Sea, since 1998.

KCA DEUTAG is the largest platform drilling contractor in the North Sea and Caspian Sea.

Currently, KCA DEUTAG is responsible for more than 30 managed offshore platforms in the North Sea, Caspian, Angola, and Sakhalin. Many of these platforms have been designed by our engineering division RDS, which continues to support our clients with rig refurbishment and upgrade projects ranging from minor modifications to large detailed design projects.

North Sea clients

We work for a wide range of North Sea clients including BP, CNR International, ExxonMobil, Nexen, StatoilHydro, Talisman, Lundin and Total; other international clients include Agip KCO, AIOC/BP, Chevron and Sakhalin Energy Investment Company.

KCA DEUTAG also owns and operates the North Sea's only modular drilling and well workover rig, the Rubicon 2000, which is currently under contract to Talisman for its Montrose platform.

Please refer to the
KCA rig list.xls
for details of rigs and its operation area.

Diamong Offshore

http://www.diamondoffshore.com/

Diamond Offshore Drilling, Inc., a leading deepwater drilling contractor, owns and operates one of the largest fleets of offshore drilling units in the world. The company's diverse fleet consists of 32 semisubmersibles, 13 jack-ups and one dynamically positioned drillship.

Diamond Offshore provides contract drilling services to the energy industry around the globe and is a leader in deepwater drilling. Configured to achieve the optimum balance of flexibility and performance, Diamond Offshore's fleet has built its reputation on more than four decades of real-world global drilling experience. Its crews have honed their skills in the harshest environments. From the North Sea, the Gulf of Alaska, the Straits of Magellan, the south China Sea and Australia's Bass Strait, Diamond Offshore's industry veterans know how to meet the most formidable challenges.

Diamond Offshore employs approximately 5,500 men and women worldwide to offer a complete spectrum of offshore drilling services tailored to our customers' needs. Headquartered in Houston, Texas, the Company also maintains primary regional offices in Australia, Brazil, and Scotland, with local offices in other countries as required to support operations.

Our History
Diamond Offshore traces its beginnings to the earliest days of the offshore drilling industry. Today, after decades of innovation and multiple company and rig acquisitions, Diamond Offshore provides contract drilling services to the energy industry around the globe and is a leader in deepwater drilling.

The predecessor companies: ODECO, Zapata, and Diamond M

ODECO
Diamond Offshore’s roots date back to May 1953, when Alden J. (Doc) Laborde founded Ocean Drilling and Exploration Co. (ODECO) in New Orleans. Laborde had designed what was probably the first submersible drilling rig. After finding a financial backer in Charlie Murphy of Murphy Oil Co., a grateful Laborde built the rig in 1954 and named the unit Mr. Charlie in honor of his benefactor. Today, the Mr. Charlie is a museum and training facility in Morgan City, La.

After noticing the stability of submersible rigs when they were only partially submerged for relocation, Laborde designed and constructed the first purpose-built semisubmersible rig, Ocean Driller, in 1964.
ODECO rigs continued to rack up “firsts” in the industry in the 1970s, with Ocean Viking discovering the giant Ecofisk Field for Phillips Petroleum in the North Sea, and Ocean Victory discovering the Piper and Claymore fields, also in the North Sea, for Occidental Petroleum.

Zapata Petroleum Corp.
Zapata Petroleum Corp. was an oil exploration company formed in West Texas in the early 1950s by a partnership of young entrepreneurs, including George H.W. Bush (the 41st U.S. President), John Overbey, J. Hugh Liedtke, and his brother William (Bill) Liedtke.

The fledgling company formed an offshore exploration company, Zapata Off-Shore Co., in 1954, with Bush as its president. The company split in 1959 into Zapata Petroleum (headed by the Liedtke brothers and later to become a part of Pennzoil) and Zapata Off-Shore (headed by Bush). The offshore company's name was changed to Zapata Corp. in 1982, and it was purchased by Arethusa (Offshore) Ltd. in the early 1990s.

Diamond M Drilling Co.
In the early 1960s, an onshore drilling company, Brewster-Bartle, went bankrupt. The banks that had become the owners of the company's rigs contacted Don McMahon, a Texas rancher and oil man, and asked him to take over the failed company. McMahon accepted the challenge and formed Diamond M Drilling Co. in 1964. He named the company after Diamond M Acres, his ranch near Simonton, Texas.

McMahon took his company public in 1970 and expanded into offshore waters with the building and purchase of jack-up, barge, and semisubmersible rigs. In the early 1970s, Diamond M was one of the largest owners of barge rigs in the energy industry. The company continued to drill both on land and offshore.

In the late 1970s, Western Oceanic tendered an offer to buy Diamond M. Unwilling to be purchased, Diamond sought and found a "white knight" in Kaneb Services, Inc.

Putting together the pieces
After the oil collapse of the 1980s, Kaneb was fighting bankruptcy. Jim Tisch of Loews Corp., New York, (a diversified holding company) had been buying drilling rigs at distress prices. He approached Diamond M's president, Bob Rose, in 1989 with an offer to buy a rig. Rose instead suggested that Tisch buy substantially all of the company's assets, which Tisch did.

In an opportunistic transaction in 1992, Diamond M Corporation, under Loews' ownership, purchased all of the outstanding stock of ODECO Drilling Inc. from ODECO Oil and Gas Co., a subsidiary of Murphy Oil. Through the transaction, Diamond M acquired a total of 39 rigs – almost half of which remain in our fleet today. Among the 39 rigs were 19 semisubmersibles, 14 jack-ups, one drillship, three platform units and two submersibles. [Note: Diamond acquired only a 50 percent leasehold interest in the Ocean Alliance] The total price was approximately $372 million, roughly half the cost of a single new-build deepwater semisubmersible today. Shortly thereafter, Diamond M Corp. briefly changed its name to Diamond M-ODECO Drilling Inc. before becoming Diamond Offshore Drilling, Inc., in 1993.

Until October 1995, Diamond Offshore remained a wholly owned subsidiary of Loews Corp. Then Loews sold 30 percent of the company in an initial public offering, and Diamond Offshore began trading on the New York Stock Exchange under the ticker symbol "DO."

In April 1996, Diamond Offshore acquired Arethusa (Offshore) Ltd. (including eight semisubmersibles and three jack-up rigs) with stock, reducing Loews' ownership in the

company to 54 percent. Since that time, Loews' share in the company has remained constant, and the remaining public shares have been reduced through stock buybacks. In December 1996, Diamond Offshore sold its land division, Diamond M Onshore, to DI Industries, Inc.

Diamond Offshore Drilling, Inc.:
A world leader in offshore drilling

All of the barge, platform, and land rigs acquired in earlier transactions have been sold, and additional semisubmersibles have been acquired. As a result, our fleet stands today at 46 rigs, including 32 semis, one drillship and 13 jack-up rigs, making Diamond Offshore one of the largest drilling contractors in the world.
Please refer to the Diamond offshore rig report.xls for the details of the rig and operation area.

Please refer to
Diamond offshore rig report.xls
For the details of the rig fleet by the company.

別添４．　主な生産プラットフォーム運営会社の概要

Production Platform Operators

SBM Offshore 2
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Bluewater 12
MODEC 13
SOFEC 18

SBM Offshore

http://www.sbmoffshore.com/
Headquarter country : Holland

SBM Offshore N.V. is a pioneer in the offshore oil and gas industry. Worldwide, we have over 5,000 employees representing 47 nationalities, and are present in 15 countries. Our activities include the engineering, supply, and offshore installation of most types of offshore terminals or related equipment. In addition, SBM Offshore owns and operates its own fleet of Floating (Production) Storage and Offloading units. SBM Offshore has a track record of developing innovative, cost-effective solutions for the ever-changing needs of its Clients. Each company of the group contributes its technical expertise, making SBM Offshore a market leader.

SBM Offshore N.V.

All of the following companies are 100% owned by SBM Offshore N.V.

Gusto BV

Marine Structure Consultants (MSC) BV

Schiedam, Netherlands

SBM Atlantia Inc

Houston, USA

Single Buoy Moorings Inc

Marly, Switzerland Principality of Monaco

SBM Malaysia Sdn Bhd

Kuala Lumpur, Malaysia

Turnkey Supply
Since 1959, SBM Offshore has been involved in the supply of a great number of tanker loading and offloading mooring points. Over the years SBM Offshore supplied various types of mooring systems but the most common mooring point is the Catenary Anchor Leg Mooring (CALM) system. In 1972, SBM Offshore provided the first system to permanently moor a tanker based Floating Storage and Offloading System. Since that date the company has been involved in the supply of numerous FSOs and FPSOs. SBM Offshore also supplies seabed pre-tensioned Tension Leg Production (TLP) units, Semi-submersible Production Units and seabed fixed Mobile Offshore Production Units (MOPU). These systems are supplied on a turnkey basis.

Lease and Operate
SBM Offshore provides the offshore oil and gas industry with high quality production services through the leasing and operation of Floating Production Storage Offloading (FPSO) units, Floating Storage and Offloading (FSO) units, Mobile Production Units (MOPU) and Semi-Submersible Production units (Semi-sub).

Capitalising on the resources of the Group, the Company provides safe, reliable, and cost-effective solutions for offshore oil field development needs, minimizing capital and operational expenditure for its clients.

SBM Offshore provides tailor-made solutions for both short term and life-of-field needs based on:

- cumulative vessel operating experience of more than 145 years, during which in excess of 2,200,000,000 barrels of oil were exported;
- financial strength enabling attractive financing of large capital intensive units;
- a large pool of experienced project managers;
- in-house availability of all engineering disciplines required for the design of total integrated production and storage facilities;

SBM Offshore manages the fleet operations from its Monaco office and through shore bases in the countries where the units are located.

This specific approach to leasing and operating fit-for-purpose production and storage facilities has proved to be most successful in addressing the needs of the industry throughout the world.

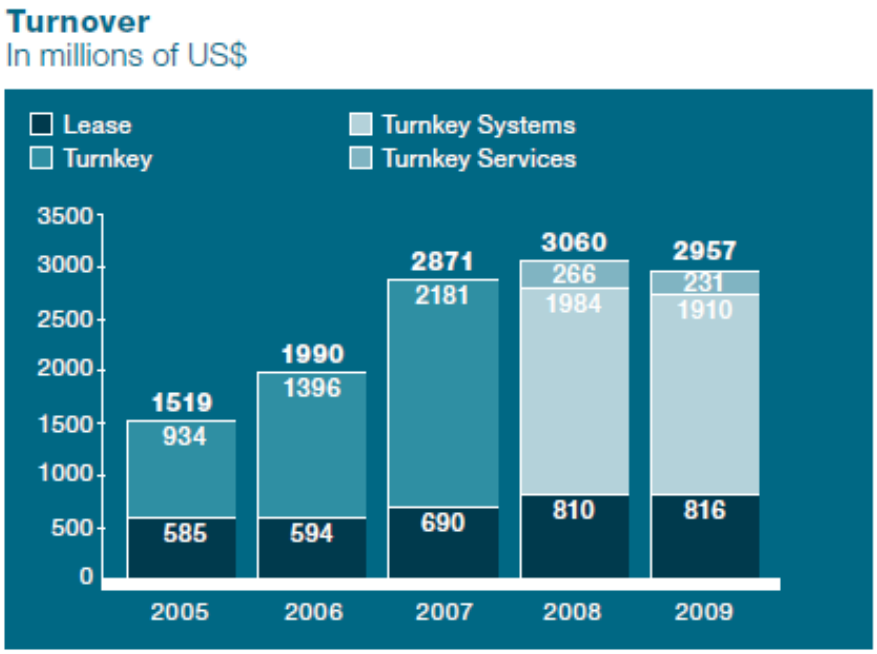
List of Floating Structure Leased and Operated
a. Leased units 19
- Nkossa II
- Kuito
- Yetagun FSO
- Espadarte FPSO
- FPSO Brasil
- FPSO XIKOMBA
- FPSO Marlim Sul
- Sanha LPG FPS
- FPSO Kikeh
- FPSO Mondo
- FPSO Saxi Batuque
- Thunder Haw
- FPSO Espirito Santo
- FPSO Capixaba
- YME MOPUstor
- Deep Panuke
- FPSO Aseng
- FPSO Cidade de Paraty
- FPSO Falcon

b. Operating units 4
- FSO Unity
- FPSO Serpentina
- FPSO Frade

c. Previously leased units 12
- FPSO VI
- FSO XV Domy
- Nkossa I
- Tantawan Explore
- FPSO II
- FPSO Firenze
- FPSO Rang Dong I
- Okha
- Jamestown
- FPSO Mystras
- MOPU Saparmyrat Türkmenbaş
- FSO Oguzhan

d. Future operated units
- P-57

Others
TLP, FPSO, MODU, DeepDraft Semi-submersible Floating Production Unit, FSO, Mooring System などのターンキーも手がける



Period ending 31 December 2009

In thousands of US$	Lease and Operate	Turnkey Systems	Turnkey Services	Other	Eliminations and adjustments	**Consolidated**
REVENUES						
Third party	815,995	1,909,679	230,871	-	-	2,956,545
Inter-segment	-	14,817	30,704	-	(45,521)	0
Total revenues	**815,995**	**1,924,496**	**261,575**	**-**	**(45,521)**	**2,956,545**
PROFIT						
Gross margin	195,344	187,255	69,735	-	0	452,334
Other operating income	207	688	-	185	-	1,080
Selling and marketing	(9,046)	(38,924)	(9,132)	-	-	(57,102)
General and administrative	(8,201)	(36,330)	(4,099)	(31,442)	-	(80,072)
Other operating expenses	(3,473)	(15,855)	(3,473)	-	-	(22,801)
EBIT	**174,831**	**96,834**	**53,031**	**(31,257)**	**0**	**293,439**
Net financing costs						(59,970)
Income tax expense						(3,673)
Share of profit of associates						185
Profit						**229,981**

BW Offshore

http://www.bwoffshore.com
Headquarter country : Norway

BW Offshore is one of the world's leading FPSO contractors and a market leader within advanced offshore loading and production systems to the oil and gas industry. BW Offshore has 25 years' experience and has successfully delivered 14 FPSO projects and more than 50 turrets and offshore terminals.

BW Offshore's technology division APL is a market leader and has delivered solutions for production vessels, storage vessels and tankers in a wide range of field developments. Adapting through competence, in-house technology, solid project execution and operational excellence, BW Offshore ensures that customer needs are met through versatile solutions for offshore oil and gas projects. BW Offshore has as a global network with offices in Europe, Asia Pacific, West Africa and the Americas. The company has app. 1,100 employees and is listed on the Oslo Stock Exchange with ticker code BWO. BW Offshore is part of the BW Group, one of the world's largest maritime groups.

Our business

BW Offshore is one of the world’s leading Floating Production Storage and Offloading (FPSO) contractors and a market leader within advanced offshore loading and production systems to the oil and gas industry. BW Offshore has more than 25 years’ experience and has successfully delivered 14 FPSO projects and more than 50 turrets and offshore terminals.

Adapting through competence, in-house technology, solid project execution and operational excellence, BW Offshore ensures that customer needs are met through versatile solutions for offshore oil and gas projects. BW Offshore’s technology division APL delivers solutions for production units, storage vessels and tankers in a wide range of field developments. The APL STP technology is the world's leading disconnectable turret system with an unparalleled track record of more than 1,700 disconnect/connect operations.

(Annual Report 2009)

FINANCIAL INFORMATION	2009	2008
P&L		
Operating revenue	408.8	474.3
Operating expenses	(274.6)	(433.8)
Transactions related to associates	(45.6)	(84.7)
EBITDA	88.6	(44.2)
Depreciation	(42.2)	(29.8)
Amortisation, gains/loss and write downs	(23.2)	(355.5)
Operating profit (EBIT)	23.2	(429.5)
Net financial items	(20.6)	(87.9)
Profit before tax	2.6	(517.4)
Income tax expense	(11.4)	(15.2)
Net profit	(8.8)	(532.6)

List of Floating Structure Leased and Operated
Leased

- Sendje Berge
- Berge Helene
- YÙUM K'AK'NÀAB
- BW Cidade De São Vicente
- Belokamenka
- BW Pioneer

Operated

- BW Nisa
- BW Athena (former BW Carmen)

Note: BW Ara is currently a conversion candidate. It is a VLCC vessel type with a storage capacity of 2m barrels.

関連会社の APL は、オフショア石油ガス生産向けのテクノロジープロバイダー

APL
http://www.apl.no/Our-Business/

Our Business
APL is a world class provider of technology to offshore oil and gas production developments. Based on its cost efficient and innovative cutting edge technology APL has become a leading player within the growing market for system development for offshore production and transfer of oil and gas. APL is showing a substantial growth, with deliveries of more than 50 production and terminal systems and close to 130 shipboard and vessel systems.

Industry know-how
For more than two decades, APL has been envisioning the possibilities and capabilities of technology relative to the needs and aspirations of our clients and the industries in which they compete – from system development, design and engineering, fabrication, marketing and sales.

Maresk FPSOs

http://www.maersk-fpsos.com/
Headquarter country : Denmark

Maersk FPSOs owns and operates mobile oil and gas production units for oil companies around the world.

We develop, build, install and operate systems that match the needs of each field, thus reducing investment costs for our customers before production begins.

Maersk FPSOs – formerly named Maersk Contractors – was established in 1995.

Fleet

Maersk FPSOs owns and operates a fleet 4 Floating Production, Storage and Offloading (FPSO) and Floating Gas Storage and Offloading (FGSO) vessels around the world. One additional FPSO is currently under construction for delivery in 2009.

We work closely with customers to build solutions and vessels for specific fields and environments. As an example of our creative solutions our fleet also includes a combined drilling and production unit.

Maersk FPSOs are also experienced in management of operator-owned vessels. Our latest project included assisting Marathon Petroleum in Norway in converting the tanker ODIN into an FPSO, and we are now operating the vessel.

List of platforms owned and operated by Maersk FPSO are
3 FPSOs
- MAERSK Curlew
- North Sea Producer
- MAERSK NGUJIMA-YIN

1 FGSO
- NKOSSA II

1 Production Jackup
- MAERSK Inspirer

Financials not available

Prosafe

http://www.prosafeproduction.com/
Headquarter country : Singapore

Prosafe Production is a leading owner and operator of Floating Production, Storage and Offloading vessels (FPSOs). Prosafe Production has 25 years of operational experience from several of the world's largest oil and gas provinces. The company has a good operational uptime track record and possesses a range of proprietary FPSO-related technologies. Prosafe Production operates globally and employs approximately 1,000 employees from more than 40 countries. Headquartered in Limassol, Cyprus, Prosafe Production is listed on the Oslo Stock Exchange with ticker code PROD.

Prosafe Production's core business lies in the design, engineering, conversion and operation of FPSO/FSO vessels. The company currently operates a fleet comprising eight FPSOs and two FSO units.

Fleet

	Oil production capacity (in bbl/d)	**Gas compression capacity (in mmscfd)**	**Storage capacity (bbl)**	**Water depth (m)**	**First oil**	**Contract Period**	**Operator**	**Country**
FPSO Cidade de Sao Mateus	35,000	353	700,000	763	2009	9+6	Petrobras	Brazil
FPSO Espoir Ivoiries	40,000	60	1,100,000	120	2002	10+10	CNR	Cote d'Ivorie
FDPSO Azurite	40,000	18	1,400,000	1,400	2009	7+8	Murphy	Congo
FPSO Petroleo Nautipa	20,000	3	1,080,000	142	2002	13+2	Vaalco	Gabon
FPSO Ningaloo Vision	63,000	80	650,000	350	2010	7+8	Apache	Australia
FSO Madura Jaya	n/a	n/a	633,000	n/a	2000	11	Kodeco	Indonesia
FPSO Polvo	90,000	7,5	1,600,000	100	2007	7+8	Devon	Brazil
FSO Endeavor	n/a	n/a	550,000	n/a	1997	14	Aban	India
FPSO Umuroa	50,000	25	773,245	120	2,007	8+7	AWE	New Zealand
VLCC M/T Takama	n/a	n/a	1,939,983	n/a	n/a	n/a	n/a	n/a
FPSO Abo	44000	44	930,000	550	2003	8+2	Agip	Nigeria

Key financial figures

		Note	2009	2008	2007	2006
Income statement						
Operating revenues	USD million		315.0	264.7	150.4	92.6
EBITDA	USD million	1	184.9	142.6	92.8	53.5
EBIT	USD million		54.5	-111.8	59.2	37.8
Net profit	USD million		-10.3	-203.6	53.0	43.0
Net profit adjusted	USD million	2	36.4	49.0	53.0	43.0
EPS*	USD	3	-0.04	-0.80	0.21	0.17
EPS adjusted	USD	2	0.14	0.19	0.21	0.17

Bluewater

http://www.bluewater-offshore.com/
Headquarter country : the Netherlands

Company Profile

Since its foundation in 1978, Bluewater has built a technological lead specialising in design, development, lease and operation of tanker-based production and storage systems, and has become a leading provider of innovative Single Point Mooring systems.

Bluewater currently owns and operates a number of Floating Production Storage and Offloading Systems (FPSOs): the Glas Dowr, the Uisge Gorm, the Bleo Holm, the Hæwene Brim, the Munin and the Aoka Mizu, which are producing in the UK, Norwegian Sector, South Africa and China.

Bluewater also designs and supplies innovative Mooring and Transfer Systems for clients worldwide including:
Single Point Mooring (SPM) Systems such as Catenary Anchor Leg Mooring (CALM) Buoys
External and Internal Turret Mooring Systems complete with their fluid Swivel Assemblies
Tower Mooring Systems
Conventional Buoy Mooring Systems (CBMs)

Fleet list

- Bleo Holm FPSO
- Glas Dowr FPSO
- Haewene Brim FPSO
- Munin FPSO
- Uisge Gorm FPSO
- Aoka Mizu FPSO

No financial available

MODEC

http://www.modec.com/
Head Office Country : Japan

Founded in 1968, MODEC is a general contractor specializing in engineering, procurement, construction and installation of floating production systems including Floating Production Storage and Offloading (FPSO) vessels, Floating Storage and Offloading (FSO) vessels, Tension Leg Platforms (TLPs), Production Semi-Submersibles, Mobile Offshore Production Units (MOPUs) and other new technologies which will meet the challenges of various types of gas production floaters.

MODEC provides Floating Production System operation and maintenance services around the world.

MODEC is headquartered in Tokyo, Japan and three main offices are located in Tokyo, Houston and Singapore. MODEC has regional offices in Angola, Australia, Brazil, Belgium, China, Cote d'Ivoire, Ghana, Indonesia, Mexico, Nigeria, Thailand and Vietnam.

MODEC has some 2,000 employees with citizenship from more than 25 countries.

MODEC holds 51% of the shares in SOFEC, Inc and 20% of the shares in Cameron Japan Ltd.

MODEC, Inc. is traded on the Tokyo stock exchange under the symbol 6269.
Floating Production Storage and Offloading (FPSO)

MODEC FPSO/FSO Projects

MODEC has delivered more than 20 FPSO/FSOs – quite a track record in the industry – and more are under construction.

TLP
MODEC is a leader in TLP Technology.
MODEC has designed and delivered five TLPs.
.
Semisubmersibles
The MODEC CP Semi (Central Pontoon Semi-submersible) is a cost-efficient new generation design for deep and ultra deepwater oil and gas production. This low-cost platform is designed to operate in hurricane, cyclonic or mild environments.

The CP Semi is easily scalable for the desired payload and can be used for a stand-alone or a hub facility. It can be used with wet and/or dry trees.

The CP Semi consists of a continuous octagonal central pontoon structure and four radially oriented columns outboard of the pontoon. The radial orientation of the columns enhances the stability of the platform during quayside integration of the topsides while minimizing the displacement needed. Because the pontoon structure is inboard of the columns, the compartmentation requirement is less onerous, which allows the hull steel weight to be substantially reduced.

A box girder system at the top connects the four columns, which in turn support a conventional truss deck. The box girders enhance the fatigue strength at the connections between the column and the deck as well as columns and pontoon.

The MODEC CP Semi design is a result of a continued working relationship between MODEC and WorleyParsons Sea.

.Hull Advantages

Optimal displacement/payload ratio:
For the same payload, the CP Semi requires less displacement than conventional production semis.

Optimal mooring design:
For the same payload and environment, the CP Semi requires smaller-sized moorings.
Cost savings:
The CP Semi is less expensive than comparable conventional designs due to efficient displacement/steel weight ratio and optimal mooring. The pontoon structure is inboard of the columns, which makes the compartmentation requirement less onerous, thereby resulting in a substantial reduction of lower hull steel weight.
Optimal stability:
The radial orientation of the columns enhances the stability of the platform during quayside integration of the topsides while minimizing the displacement needed.
High SCR fatigue lives:
The deep draft during operation provides for Steel Catenary Risers (SCR) friendly motions.
Topsides Advantages
Efficient deck structure:
Optimal deck supports minimize deck steel weight.
Efficient design process:
The deck and hull designs can be performed independently of each other resulting in a more efficient design process. This is due to a box girder system employed at the top of the columns which sustains the pry and squeeze loads.
Deck design:
Can be modular or integrated.
Schedule/Construction Advantages
Construction-friendly design:
Maximizes schedule efficiencies.
Flexibility:
Payload changes can occur during the project without impacting hull design/topsides design and ultimately, the construction schedule. Talk to us about the unique advantages that the CP Semi design has in this area.
Flat panel fabrication:
Ideal for the shipyard panel line and results in better quality/faster construction schedule.
Conventional truss deck
Installation/Operation Advantages
Flexibility:
Topsides can be mated to column tops by lifting or float-over methods.
Inboard or outboard:
SCR's or flexible risers can be supported inboard or outboard of the pontoon structure.
Central moonpool:

Allows for SCR pull-in and CT interface.
Wet trees and/or dry trees:
The CP Semi can be used with either or both.
No seachests:
This eliminates the possibility of inadvertent and uncontrolled flooding.
Constant draft:
The CP Semi constant draft provides sufficient air gap and eliminates the need for de-ballasting to a storm draft.

Gas Processing and Storage
With more than 20 years of experience in the FPSO industry, MODEC is capable of delivering floating facilities for gas processing and storage such as:

Floating LNG (FLNG) / LNG FPSO
Floating LPG (FLPG) / LPG FPSO
Floating Storage Regasification Unit (FSRU)

実績

Type	Unit Name	Field Name	Country	First Oil	Current Status	Owned by MODEC	Operated by MODEC
FPSO	Anoa Natuna	Anoa	Indonesia	1990	In Operation	O*999	O*999
FPSO	Baobab Ivoirien MV10	Baobab	Cote d'Ivoire	2005	In Operation	O	O
FPSO	Buffalo Venture	Buffalo	Australia	1999	Relocated	O*2	O*2
FPSO	Cidade de Angra dos Reis MV22	Tupi	Brazil	2010	In Operation	O	O
FPSO	Cidade de Niteroi MV18	Jabuti	Brazil	2009	In Operation	O	O
FPSO	Cidade de Santos MV20	Urugua /Tambau	Brazil	2010	In Operation	O	O
FPSO	Cidade de Sao Paulo MV23	Guara	Brazil	2012	Under Construction	O	O
FPSO	Cidade do Rio de Janeiro MV14	Espadarte Sul	Brazil	2007	In Operation	O	O
FPSO	Cuulong MV9	Su Tu Den	Vietnam	2003	In Operation	O*5	O*5
FPSO	Fluminense	Bijupira-Salema	Brazil	2003	In Operation	O*999	O
FPSO	Jasmine	Jasmine	Thailand	2005	In Operation	O	O

Type	Unit Name	Field Name	Country	First Oil	Current Status	Owned by MODEC	Operated by MODEC
	Venture MV7						
FPSO	Kakap Natuna	Kakap KH	Indonesia	1986	In Operation	O*6	O*999
FPSO	Kwame Nkrumah MV21	Jubilee	Ghana	2010	Under Construction	O*999	O
FPSO	MODEC Venture 1	Elang/Kakatua /Kakatua North	Australia /East Timor	1998	Decommissioned	O*4	O*4
FPSO	MODEC Venture 11	Mutineer-Exeter	Australia	2005	In Operation	O	O
FPSO	MV8 Langsa Venture	Langsa	Indonesia	2001	In Operation	O	O
FPSO	Nanhai Sheng Li	Liuhua 11-1	China	1996	In Operation	O*999	O*999
FPSO	PSVM	Plutão, Saturno, Vênus and Marte	Angola	2011	Under Construction	O*999	O*999
FPSO	Pyrenees Venture	Pyrenees	Australia	2010	In Operation	O*999	O
FPSO	Ruby Princess	Ruby	Vietnam	2002*1	In Operation	O*999	O*1
FPSO	Song Doc Pride MV19	Song Doc	Vietnam	2008	In Operation	O	O
FPSO	Stybarrow Venture MV16	Stybarrow	Australia	2007	In Operation	O	O
FPSO	Whakaaropai	Maui B	New Zealand	1996	Relocated	O*999	O*999
FSO	Cidade de Macae MV15	Marlim Sul, Roncador and Marlim Lestes	Brazil	2007	In Operation	O	O
FSO	Escravos LPG FSO	Escravos	Nigeria	1997	In Operation	O*999	O*999
FSO	Kome Kribi 1	Offshore Cameroon	Cameroon	2003	In Operation	O*999	O*999
FSO	Madiela	Tchatamba Marine-1	Gabon	1998	Decommissioned	O*3	O*999
FSO	Nanhai Sheng Kai	Lufeng 13-1	China	1993	In Operation	O*999	O*999

Type	Unit Name	Field Name	Country	First Oil	Current Status	Owned by MODEC	Operated by MODEC
FSO	Pathumabahaa	Bongkot	Thailand	2003	In Operation	O*999	O*999
FSO	Rang Dong MV17	Rang Dong	Vietnam	2008	In Operation	O	O
FSO	Rong Doi MV12	Rong Doi /Rong Doi Tays	Vietnam	2007	In Operation	O	O
FSO	Ta'Kuntah	Cantarell	Mexico	1998	In Operation	O	O
FSO	Vietsovpetro 01	White Tiger	Vietnam	2000	In Operation	O*999	O*999
MOPU	Tchatamba A MOPU	Tchatamba Marine-1	Gabon	1998	In Operation	O*999	O*999
TLP	Marco Polo TLP	Marco Polo	USA	2004	In Operation	O*999	O*999
TLP	Okume/Eban o TLP	Okume/Eban o	Equatorial Guinea	2006	In Operation	O*999	O*999
TLP	Oveng TLP	Oveng	Equatorial Guinea	2006	In Operation	O*999	O*999
TLP	Prince TLP	Prince	USA	2001	In Operation	O*999	O*999
TLP	Shenzi TLP	Shenzi	USA	2009	In Operation	O*999	O*999

*1 FPSO Ruby Princess

MODEC provided operation and maintenance services from 2002 to 2006.

*2 FPSO Buffalo Venture

MODEC provided time charter service from 1999 to 2004.The unit was renamed FPSO Jasmine Venture MV7.

*3 FSO Madiela

Decommissioned in 2003.

*4 FPSO MODEC Venture 1

MODEC provided time charter service from 1998 to 2007.

*5 FPSO Cuulong MV9

MODEC provided time charter service from 2003 to 2008. The FPSO was purchased by the client in October 2008.

*6 FPSO Kakap Natuna

MODEC owned the unit until 2009.

SOFEC

Subsidary
http://www.sofec.com/

SOFEC, Inc. is a leader in the development and supply of Single-Point Mooring (SPM) systems, and is engaged in research involving new and improved tanker mooring systems and associated components. Projects range from preliminary design studies to major engineering, fabrication, and procurement projects that include installation and commission.

Projects supplied by SOFEC include marine terminals for product import / export and turret and spread moorings for tanker based floating production, storage and offloading (FPSO / FSO) systems installed in water depths ranging from 30 feet to 5,000 ft.

SOFEC, Inc. (previously FMC Technologies Floating Systems Inc.) became part of the MODEC Group on January 1, 2007.

MODEC and SOFEC have enjoyed a 26-year relationship and look forward to future growth.

Products and Services

•Floating production systems for FSOs and FPSOs including:
•Permanent and disconnectable internal turret moorings
•External turret moorings
•Spread moorings
•Marine import/export terminals (CALM and SALM buoys)
•Riser systems
•Swivel systems
•Control and service buoys
•LNG transfer systems
•KIT (Keel Integrated Transfer) systems
Quality, Health, Safety, Environment

•ISO-9001 certified quality systems
•Designed and executed in accordance with international quality standards
•Committed to protecting the health and safety of employees as well as the environment
Global Experience

•Wide range of world class projects, completed on time and on budget
•Systems in operation in most major oil and gas producing areas of the world
•Extensive project management experience, including design, fabrication, integration, installation and commissioning
•Unsurpassed commitment to customer service

別添５．　主なエンジニアリング・設計会社の概要

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McDermott

http://www.mcdermott.com/
（エンジニアリング）

McDermott is a leading engineering, procurement, construction and installation (“EPCI”) company focused on executing complex offshore oil and gas projects worldwide.

Providing fully integrated EPCI services for upstream field developments, we deliver fixed and floating production facilities, pipelines and subsea systems from concept to commissioning.

Our customers include national and major energy companies.

Operating in more than 20 countries across the Atlantic, Middle East and Asia Pacific, our integrated resources include more than 16,000 employees and a diversified fleet of marine vessels, fabrication facilities and engineering offices.

McDermott has served the energy industry since 1923.

Turnkey Services
We have dedicated more than 85 years to engineering and constructing offshore production facilities in every oil and gas producing region of the world.
Through our integrated engineering, procurement, construction and installation services, we understand what it takes to deliver certainty for our clients’ complex and demanding offshore project requirements.

Our project management approach to project execution complements our strong commitment to a superior safety culture, proven processes and procedures, and a culture of strong business ethics.

This solid framework and our performance driven behavior ensures safe, efficient, cost-effective solutions for our clients.

Our engineering, procurement, construction and installation services; our comprehensive knowledge and experience, our assets, and shared lessons learned bring a depth and breadth to our project execution abilities that are unmatched in the industry.

Engineering Excellence

McDermott is well-versed in most every type and size of offshore project around the world. From shallow-water structures to floating facilities and subsea systems in waters thousands of feet deep, our engineers help bring offshore exploration into production.
We have pioneered many innovations that have become industry standards, and earned hundreds of U.S. and international patents. Our engineering capabilities cover the entire project life cycle: from Concept Studies to Commissioning.

Engineers experienced in all disciplines deliver solutions for fixed platforms, floating facilities and SURF projects. Our teams located in Houston, New Orleans, Singapore, Dubai and Chennai – closely coordinate with project management and our other EPCI resources throughout the company to ensure project success.
Our technical capabilities are strengthened by our engineers' inherent familiarity and close association with fabrication and installation practices.

Our project cost estimates are based on data from our years of offshore experience worldwide, and our designs reflect actual construction and installation practices to ensure reliable, efficient, quality project delivery.

Construction Capabilities

Strategically positioned in established oil and gas producing regions of the world, our facilities can fabricate or loadout nearly any size module or substructure. The capabilities of each facility are multiplied when combined across regions, enabling fast-track, complex project completion that may not otherwise be possible.
We are renowned for dependable fabrication capabilities and the ability to handle multiple, large-scale, fast-track projects worldwide.

Supporting our vast construction capability through pre-commissioning of multiple structures, large integrated topsides and subsea components are robust management systems, standardized fabrication processes and procedures, advanced welding technology, superior material handling and comprehensive craft training.

Our modern, fully equipped fabrication facilities promote an industry-leading project-centric culture, aggressive controls and consistent attention to quality and productivity.

Our commitment to continuous improvement of equipment and infrastructure, material flow and management of our existing facilities, provides the blueprint for new yards in our expanding market regions.

Throughout our operations, our exemplary safety performance is world class. It is accomplished through a relentless pursuit of excellence, comprehensive training and an in-depth, far-reaching culture dedicated to safety.

McDermott fabrication facilities are located throughout the Atlantic, Asia Pacific, the Middle East and Caspian:

- ■Atlantic: Morgan City, Louisiana, USA and Altamira, Mexico
- ■Asia Pacific: Batam Island, Indonesia and Qingdao, China
- ■Middle East: Jebel Ali, Dubai, UAE and in the Caspian: Baku, Azerbaijan

Installation Fleet

Our fleets' capability to perform pipeline, subsea and above-surface facility installation, and to mobilize where needed, optimizes productivity, reduces costs and mitigates risks across our operations and our clients' projects.

Active in the shallow, coastal waters of the Gulf of Mexico during the 1950s, our offshore operations expanded to greater depths around the world, installing almost every structure in Qatar's North Field and setting pipelay records throughout the South China Sea. In the Caspian, our installation services have played a dynamic role supporting offshore field developments since the early 1990s.

Our versatile fleet of construction, pipelay, cargo and support vessels is growing. Plans are under way to further enhance our subsea and deepwater capabilities by upgrading our derrick/pipelay vessel DB50. Additionally, we have added the subsea specialty marine construction vessel North Ocean 102 (NO102) and are building a second specialty marine construction vessel North Ocean 105 (NO105). Our new pipelay vessel (LB32) supports shallow-water work that still dominates many areas of the world.

We perform installation, repair and salvage of substructures, topsides, pipelines and subsea systems, and our DB50 has a single lifting capacity of 4,400 tons. For structures above this weight, alternative, economically viable solutions from our installation engineers include dual lifts and float overs for large topsides. As a core technology with an 18-year history, our float-over capability has advanced through upgrades and customization of our I-650 installation barge.

Pipelay systems include S-Lay, J-Lay, Flex-Lay and Reel-Lay. Our high-quality welding and excellent production rates meet stringent welding criteria through our advanced Automatic Welding Systems (AWS), complemented by welding development centers worldwide and a dedicated Multi-Joint Welding facility.

A team of professional divers assists on worldwide projects. Three saturation diving systems are transferable to all our major construction vessels and dive support vessels are strategically based across our regions.

Today, our installation services are expanding to deeper waters of the Atlantic region, offshore Brazil and West Africa.

Construction Vessels in the Fleet:

■DB50 - dynamically positioned, premier heavy-lift (up to 4,400 tons) and pipelay vessel; Reel-Lay and J-Lay installation up to 12-inch and 20-inch diameter, respectively.

■DB16 - shallow and deep-water flexibility in installing structures or laying pipe with dynamic positioning, and S-Laying up to 48-inch diameter pipe.

■DB30 - derrick/lay vessel with 3,080-ton lift and 60-inch diameter pipelay capability.

■DB101 - semisubmersible structural installation vessel with 3,500-ton lift capacity.

■DB27 - versatile, 2,400-ton lift capacity combination barge for S-Laying pipe up to 72 inches in diameter.

■DB26 - versatile, mid-size combination barge with a lift capacity up to 900 tons and 48-inch pipelay capability
■KP1 - medium water depth vessel for S-Laying pipe up to 60-inch diameter, and joints of 40 and 60 feet, with a 660 ton lift capacity.
■LB32 - new-build vessel designed to S-Lay pipe up to 60-inch diameter.
■NO102 - modern, high payload, dynamically positioned, fast transit, flexible-product, horizontal-reel (7,700-ton-capacity carousel) cable and pipelay vessel for subsea construction and installation, and deepwater moorings installation for floating facilities. Upgrades planned for 2011 will increase its deepwater capabilities.
■NO105 - high-capacity, rigid-reeled vertical pipelay vessel, with 2,976-ton payload reel capacity for subsea construction and installation, and deepwater moorings installation; expected to be available 2012.
■Agile, Bold Endurance, Emerald Sea and Thebaud Sea - dynamically positioned construction and dive support vessels for worldwide SURF activities.
■Fleet of harsh-weather, multifunctional support vessels, including standby, tow, ROV and supply through Secunda Marine Services, a McDermott company.
■Intermac 600 - ideally configured to launch heavy jackets (up to 17,472 tons) and transport large structures (up to 22,000 tons) worldwide.
■Intermac 650 - large float-over installation vessel, modified with rapid ballast system and capable of handling float over of large decks and deepwater jacket launch, typically up to 22,000 tons and 27,500 tons, respectively.

Technip

http://www.technip.com/en
（エンジニアリング、設計）

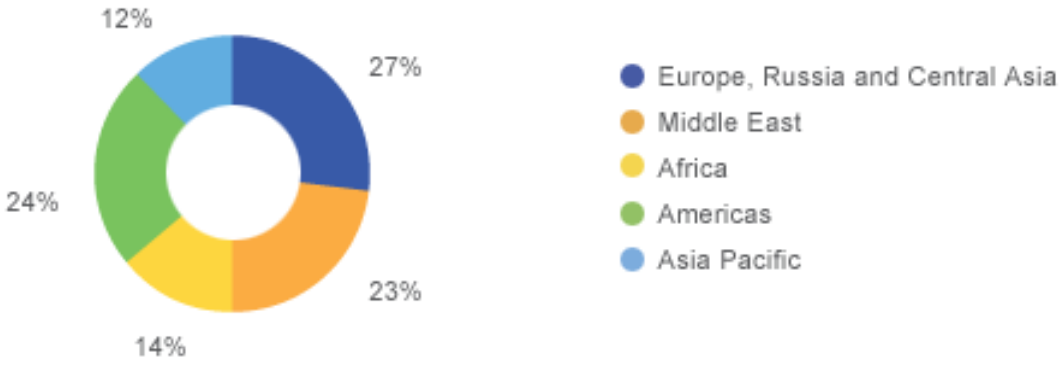
At a Glance

A world leader in engineering, technologies and project management for the oil and gas industry.

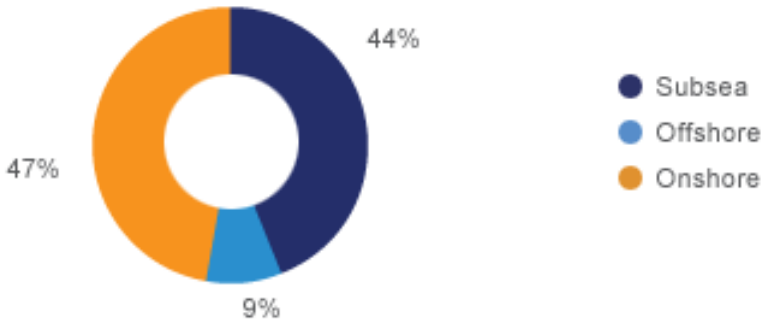
Backed by more than 50 years of experience and thanks to the expertise and know-how of its teams, Technip is a key contributor to the development of technologies and sustainable solutions for the exploitation of the world's energy resources.

Technip is listed on Euronext Paris (EURONEXT: FR0000131708).

Key Figures 2009
A workforce of 23,000 people in 48 countries
Industrial assets on five continents
A fleet of 19 vessels by 2011
Operating income from recurring activities: €677 million
Revenues: €6.5 billion
A Worldwide Presence
Technip executes projects throughout the world.
Breakdown of 2009 revenues by region



Our Sector: Oil and Gas
Technip operates in three segments of the world oil and gas market: Subsea, Offshore and Onshore.
This market represents 97% of the Group's revenues.
On behalf of its clients, for the most part international and national oil companies; Technip executes infrastructure projects that are increasingly ambitious, complex and demanding: ultra-deep waters, extreme climates, mega-sized projects, non-conventional resources and optimization of environmental performance.
Breakdown of 2009 revenues by activity



Broad Technological Expertise

The increasing complexity of the projects in which Technip is involved requires the implementation of state-of-the-art technologies. The Group's technological portfolio and its recognized expertise are strategic assets, essential to its competitiveness.

The Group has made a strong commitment to the development of innovative technologies and expertise, in each of its segments of activity.

In the Subsea segment, Technip engineers work to develop equipment capable of withstanding the extreme pressure and temperature conditions of hydrocarbon fields at water depths beyond 3,000 meters.

In the Offshore segment, the Group is developing platform installation methods that reduce installation time and cost, as well as new platform models adapted for the exploitation of hydrocarbon fields in extreme climates such as the Arctic Ocean.

In the Onshore segment, research and development efforts have enabled the capacity of mega-sized LNG complexes to be increased, the upgrade and refining of non-conventional resources and improvements in the environmental performance of industrial installations.

Fields of Activity

Subsea

- Subsea field development
- Subsea products
- Pipelay and subsea construction
- Subsea maintenance
- Subsea field decommissioning
- Special applications

Offshore

- Offshore field development
- Fixed platforms
- Floating platforms
- Technology
- Mooring services

Onshore

- Onshore field development
- LNG / GTL - Gas monetization
- Oil refining
- Hydrogen - Syngas
- Onshore pipelines
- Refining and onshore applications
- Ethylene
- Petrochemicals / Fertilizers
- Biofuels and Renewable Energies
- Mining and Metals
- Advanced systems engineering
- Other industries

Range of Services
Full-range services from basic engineering to global solutions
Technip provides all or part of the services for basic and detail engineering, procurement, construction and project management, at optimized costs. The Group has a long track record in implementing large turnkey contracts and arranging related international financing on behalf of its clients. In particular, in the offshore segment, Technip is in a position to fulfill the expectations of operators wanting to entrust the largest possible range of services to a single contractor able to manage all aspects of a major field development.
The Group frequently works with partners of various nationalities and has developed an international shopping around policy, notably through an e-procurement site which allows it to obtain the most competitive prices.

Feasibility studies and master plans
Process studies
Floaters, fixed platforms and topsides design and construction
Project management and execution
Basic and detailed engineering
Procurement
Fabrication and laying of subsea rigid and flexible pipelines and umbilicals
Construction

Installation works and maintenance of subsea equipment
Start-up
Personnel training
Operation and maintenance
Financial engineering

Area of Activity - Offshore

Offshore field development

Technip is one of the few groups able to provide at the lowest cost, either on an integrated or segmented basis, the near totality of services for offshore oil and gas production.

The Group is well positioned to carry out subsea construction works, it holds proprietary technologies for the fabrication of platforms, including the Spar, the type most commonly used in the Gulf of Mexico, and the TPG 500, a self-installed fixed platform suitable for shallow waters. In addition, Technip has the capabilities to design and construct FPSO units.

Areas of activity

Field architecture:
Development solutions screening/benchmarking.

Production facilities:
Design, fabrication, installation and commissioning of offshore platforms

Fixed platforms (jackets)

FPSOs

Dry completions units

Topsides

Thanks to this full suite of capabilities and global coverage, the Group is able to provide on any offshore field development the optimal solution to its clients anywhere in the world. Multi-disciplinary teams in a global project approach allow best management of critical interfaces, pipeline systems/platforms, topsides/structures, fabrication/offshore installation. Technip solutions are based on standard technologies but also supported by a suite of proprietary innovations, results of a sustained R&D effort combined with more than 25 years of operational experience in all regions of the world.
Proprietary technologies

Spar (Truss and Cell Spar)

TPG 500

MOSS

Unideck

EDP

IDV

Jackdeck

Fixed platforms
Technip designs, constructs and installs in shallow waters, fixed platforms for the production and processing of oil or gas.

The Group is well positioned on this market and holds outstanding proprietary technologies for shallow water environments.
Areas of activity
Production units
Design, fabrication, installation and commissioning of offshore platforms
Fixed platforms (jackets)
FPSO's
Dry completion units
Topsides
Technip solutions are based on standard technologies and are also supported by a suite of proprietary innovations, results of a sustained R&D effort combined with more than 25 years of operational experience in all regions of the world.
Proprietary technologies
TPG 500, self-installing platform
Unideck®, topsides installation method by floatover a nd jacking
IDV, floating installation unit for large topsides
Jackdeck, production deck self-installing system

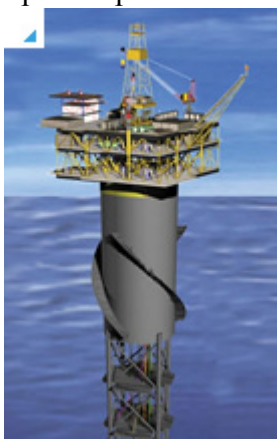
TPG 500
The TPG 500 is a self-installing fixed platform which is constructed, equipped and tested onshore and then towed to site.
In 2006, Technip delivered its third operational TPG 500 platform, in the Caspian Sea.

Surface installations (Topsides)
With the Unideck® technology for the installation of topsides by floatover and hydraulic jacking, platform decks are completely assembled and tested onshore, thus reducing hook-up and commissioning operations at sea.
In the last 20 years, Technip has performed 13 floatover installations, including 4 by the Unideck® floatover method. At the end of 2005, Technip broke a world record with the floatover of an 18,000-tonne deck in the Gulf of Guinea.

Floating platforms
Technip designs, constructs and installs in deep or ultra deepwater, floating platforms for the production and processing of oil or gas. These floating platforms are anchored at the offshore

production site and are mainly of two types: those designed for developments with wet trees, and those using dry trees.
Technip holds proprietary technologies for the fabrication of platforms, including the Spar, the type most commonly used in the Gulf of Mexico. In addition, Technip has the capabilities to design and construct FPSO units.
Areas of activity
Production facilities
Design, fabrication, installation and commissioning of offshore platforms
Dry completion units
Topsides
Semi-submersible platforms
FPSO's
Technip solutions are based on standard technologies and are also supported by a suite of proprietary innovations, results of a sustained R&D effort combined with more than 25 years of operational experience in all regions of the world.
Proprietary technologies
Spar (Truss and Cell Spar)
EDP

Spar deep water floaters



The SPAR is a deepwater production and/or drilling platform. The structure comprises a hull with a circular cross-section that sits vertically in the water, stabilized by a midsection structure hanging from the hard tanks. If necessary, stability may be supplemented by solid ballast placed in compartments at the keel. The vessel is held in place by a taut catenary mooring system, providing lateral station keeping. The SPAR platform allows 'dry-tree' technology, where the wellhead equipment is principally located on the platform rather than on the seabed, reducing the cost and time involved in common maintenance work.

Technip has engineered 12 out of the 15 Spars installed in the Gulf of Mexico, and is currently building its thirteen Spar.

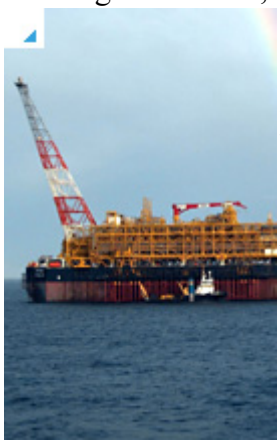
Furthermore, Technip designed and installed the first-ever Spar platform outside the Gulf of Mexico, offshore Malaysia.

Semi-submersible floaters

Semi-submersible floating platforms were conceived as a response to the oil industry's interest in seeking potential oil resources in deep water. The main advantages of this type of platform compared to a more conventional floating platform (vessel) are that they are very stable during operations and the deck surfaces are adapted to receive the type of equipment required for drilling and or production operations.
One of the largest semi-submersible production platforms ever built, and the first assembled by Technip, has been installed off the coast of Brazil, for the development of the Roncador field in the Campos basin. The mating of the 17,500-tonne hull with the 25,000-tonne topsides was completed for the first time ever in open but protected seas close to Rio de Janeiro in June 2006. This operation, which was carried out

successfully, was one of the most delicate phases of the project. The platform is now installed at a water depth of 1,800 meters and went into production in the second half of 2007.
A contract for a second similar platform (P-51) was awarded to Technip in May 2004. It is installed offshore Brazil in 1,255 meters of water and started production during the first half of 2009.

Floating Production, Storage and Offloading Systems



In addition to the large fixed and semi-submersible platforms described above, Technip is also active in the design and installation of Floating Production, Storage and Offloading Systems (FPSO). These systems, in which production and storage facilities are housed in a ship hull, are appropriate for developing large deposits in deep or ultra deepwaters, in order to start early production for operators' needs, and also adapted to regions where few subsea export infrastructures exist such as in West Africa or offshore Canada, in Newfoundland.

Technology

The objective of Technip's Research and Development activities is to anticipate future client needs and to improve the Group's competitiveness. The Group draws up development and engineering programs in advanced technical domains related to oil and gas production and transformation, in particular deep offshore activities.

TPG 500: a fixed platform

The TPG 500 is a proprietary technology for a self-installing fixed platform. It is constructed, equipped and tested onshore and then towed to site.
Once on site, the platform's legs are jacked down to the seabed up to 500 feet below the surface (suitable for many North Sea fields) and the hull is subsequently raised into its final position. Although the TPG 500 is a fixed and not floating structure, the installation can be reversed and the platform re-installed at a new site.

Deepwater floaters

Spar platforms

The Spar is a drilling and production platform suitable for deepwater environments.

In May 2005, Technip and Kerr-McGee received the prestigious Offshore Technology Conference (OTC) award in Houston. The Distinguished Achievement Award rewards the partnership developed between Technip and Kerr-McGee for the development of three generations of Spar platforms for the deep waters of the Gulf of Mexico.

EDP: a semi-submersible floating unit

The EDP (Extendable Draft Platform) is a new concept in easily installed, high capacity, deep-draft, semi-submersible platforms designed for deep waters or the harsh environments of the North Sea. Wellheads can be placed on the surface. The seabed-to-surface liaisons developed for the Spar platform are directly applicable to this concept. This type of platform is designed for use in West Africa, the Gulf of Mexico, in the North Sea, in the Asia Pacific region or in Brazil. This new technology allows the onshore construction, assembly and preliminary commissioning of the platform and deck, thus minimizing the use of a crane barge at sea.

Floatover of surface installations (topsides)

Thanks to the vast technological expertise of its engineers and highly skilled technicians, Technip develops its own technologies, designs and builds its own products and associated equipment for shallow or deepwater applications.

With the Unideck® technology engineered for the installation of topsides by floatover and hydraulic jacking, platform decks are completely assembled and tested onshore, thus reducing hook-up and commissioning operations at sea. The Unideck® technology is entirely reversible during installation and is particularly well suited to the African long swell.

In November 2006, Technip successfully completed the world's first open sea catamaran floatover topsides installation on the first-ever Spar outside the Gulf of Mexico, in the deepwater field of Kikeh, offshore Malaysia. The catamaran concept is based on 2 barges, with the topsides resting on top. The catamaran is centered above the submerged Spar hull which is anchored at its final production site. The Spar hull is ballasted, then deballasted as fast as possible. The hull can lift the deck up and separate the topsides from the catamaran barges.

Advantages of this installation method are several. It allows a high proportion of the hook-up and pre-commissioning work to be completed onshore prior to load-out, significantly reducing both the duration and cost of the offshore commissioning phase. The significance of Technip's success of this world first operation is that the technique can also be used for future large deck integrations well beyond lifting contractors' capacities.

The Floatover High Air Gap (FOHAG) concept is derived from the Unideck® and TPG 500 technologies. It allows deck floatover installation where a higher air gap is required, ie. when platforms are exposed to large wave amplitudes (Canada, Sakhalin island) or cyclonic conditions like in South East Asia. During installation, the deck is elevated well above the air gap, it is positioned above the jacket and lowered down in place.

Mooring services

Technip provides mooring installation services, mainly in the Gulf of Mexico.
These services include:
Pre-set mooring installation
Mooring design and installation engineering
Permanent moorings for floating production systems.
Technip has also developed a patented anchoring system : the SectionEmbedded Plate Anchor (SEPLA)

Aker Solutions

http://www.akersolutions.com

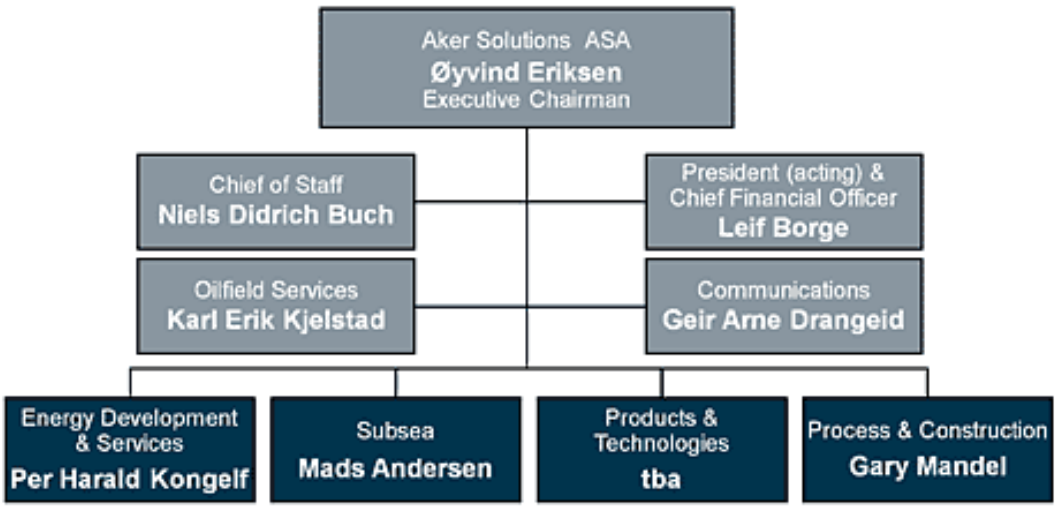
（エンジニアリング、設計）

Corporate structure

Aker Solutions ASA, through its subsidiaries and affiliates ("Aker Solutions"), is a leading global provider of engineering and construction services, technology products and integrated solutions. Aker Solutions' business serves several industries, including oil & gas, refining & chemicals, mining & metals and power generation. The Aker Solutions group is organised in a number of separate legal entities. Aker Solutions is used as the common brand/trademark for most of these entities.

Aker Solutions' parent company is Aker Solutions ASA. Aker Solutions has aggregated annual revenues of approximately NOK 54 billion and employs approximately 22 000 people in about 30 countries.

Aker Solutions is part of Aker (www.akerasa.com), a group of premier companies with a focus on energy, maritime and marine resource industries. The Aker companies share a common set of values and a long tradition of industrial innovation. As an industrial owner controlling 40.27 percent of the shares in Aker Solutions through Aker Holding AS, Aker ASA takes an active role in the development of Aker Solutions.



Products and Services

Drilling, offshore and marine equipment

- Drilling equipment
- Drilling lifecycle services
- Deck machinery, mooring and loading systems
- Loading arms
- Steering gear

Energy and environmental

- Direct hire non-union construction - North America
- Direct hire union construction
- Environmental
- Nuclear
- Power
- Renewable and sustainable energy
- Vapour recovery units and systems
- Water and wastewater management

Field development

- Studies & front end services
- FEED and EPC contracts
- Offshore topsides facilities
- Floating oil & gas facilities
- Concrete GBS for offshore platforms
- Steel jackets for offshore platforms
- Onshore receiving and processing facilities
- Marine operations
- Riser systems

Mining and metals

- Direct hire non-union construction - North America
- Direct hire union construction
- Foundation drilling and offshore mining
- Hard rock tunnelling
- Non-ferrous metals and iron & steel
- Sulphuric acid technology
- Technical papers

Onshore, oil, gas and process

- Coal chemicals and gasification
- Direct hire non-union construction - North America
- Direct hire union construction
- Inorganic chemicals
- LNG regasification terminals
- Petrochemicals
- Refining
- Surface trees and wellheads
- Underground gas storage and treatment

Subsea and subsurface

- Reservoir evaluation services
- Subsea installation services (SURF)
- Subsea lifecycle services
- Subsea production systems and technologies
- Well intervention technologies and services

Floating oil & gas facilities

Floating oil and gas exploration and production facilities developed and delivered by Aker Solutions are a central part of some of the largest offshore field developments projects taking place around the world today. This is no coincidence.

Aker Solutions has more than 40 years' experience from the design and construction of floating facilities, including some of the world's most advanced semi-submersible drilling and production platforms, floating production storage and offloading vessels and tension leg platforms
"

Aker Solutions has more than 40 years' experience from the design and construction of floating facilities, including some of the world's most advanced semi-submersible drilling and production platforms, floating production storage and offloading vessels and tension leg platforms.

We have delivered in deep and shallow waters, in harsh and benign environments. We have provided complete and integrated floating facilities, hulls, topside production and drilling systems, complemented by leading-edge in-field systems.

We are using this heritage as a basis for continuing to innovate and provide effective and safe products and services for the energy sector. Consequently we are able to meet the ever greater challenges posed by developments in deep waters and harsh environments.

Our customers show commitment and vision when they seek to reach and exploit hydrocarbon reserves in increasingly challenging conditions. We respond by demonstrating the same qualities and offering the proven solutions they seek.

Our portfolio of products and services is testimony to a proud track record of technological innovation. As a global company, we have a large network of offices and facilities in key locations. And we call on the expertise and resources of the wider Aker Solutions family to offer integrated solutions when needed.

Most importantly, we have the people. What we offer our customers is based first and foremost around our staff. Our expertise, experience and diligence are behind the success story that is Aker Solutions. All our people operate in a safe and healthy environment, as HSE is a core value in everything we do.

Our priority is to use all these resources at our disposal to sustain Aker Solutions as a leading provider of floating facilities worldwide. We offer value-added service to make sure operators have the best possible support throughout the entire lifecycle of these facilities.

Semisubmersible production platforms

Aker Solutions is a leading provider of semisubmersible production platforms. Our track record includes world-class projects such as Gjøa and Kristin in the North Sea, Blind Fai...

Semisubmersible drilling rigs

Over a period of more than 40 years, Aker Solutions has been responsible for the design and construction of a large number of the semi-submersible drilling rigs delivered for...

Tension-leg platforms (TLP)

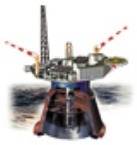
Aker Solutions has broad experience from a number of installed tension leg platforms (TLP) and working with a number of prospects. The team can perform sizing, design and analys...

Floating production storage and offloading (FPSO)

Aker Solutions is a frontrunner in the development of purpose-built floating production, storage and offloading (FPSO) facilities for oil and gas. The company has a comprehensiv...

Buoy platform concepts

Aker Solutions has a long history in development of buoy concepts. One of the current concepts, the Tentech ™ Buoyform, saw its first conceptualisation in the mid 1970's as the...



Sevan Marine

http://www.sevanmarine.com/index.php/company
（設計）

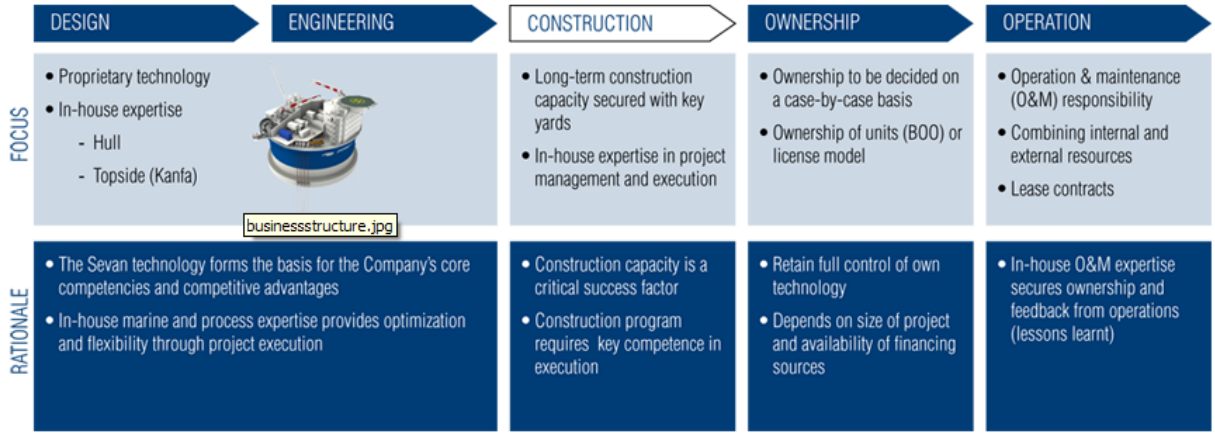
Business Model
Sevan Marine ASA (the 'Company') is listed on Oslo Børs (ticker SEVAN) and has developed a cylinder shaped floater, suitable for all offshore environments. Presently, Sevan Marine has four FPSO contracts, including the Goliat Sevan 1000 FPSO, and three drilling contracts with clients.

The Company's primary focus is to create value for its shareholders by delivering products and solutions to the offshore industry, utilizing its core competencies within the areas of design, engineering and project execution. The basis for the products and solutions is the Sevan technology.

So far, the Company has concentrated its efforts in utilizing the Sevan technology for floating production and drilling applications. However, due to its versatility, the Sevan design may also be used for other applications, including Gas to Wire (GTW), FDPSO (Floating Drilling & Production), floating LNG (FLNG) and accommodation. Going forward, the Company will evaluate the potential for such complementary uses of the Sevan technology.

The business model has traditionally been based on a build-own-operate scheme, whereby the Company takes the responsibility for the construction, ownership and operation of the Sevan units. Co-ownership with third-party partners may be considered if deemed beneficiary. Operations may be carried out by in-house personnel or in cooperation with recognized operations and maintenance contractors. Under the build-own-operate scheme, the Sevan units will typically be leased to clients under multi-year contracts, under which the Sevan Marine Group undertakes to carry out the production or drilling activities on a specific offshore location. Under this model, the Company's remuneration typically consists of an agreed day rate, which the client (i.e. the oil company) pays for the bareboat or time charter of the unit. Such day rate will typically consist of one operating element and one capital element. The Company aims at minimizing the amount of reservoir risk in the remuneration it receives.

The license model is an alternative business model which may be attractive for some projects. Should the client prefer to be the owner of a Sevan unit, the Company will evaluate this on a case-by-case basis, taking into consideration factors such as risk, profitability, availability of financing and construction and engineering capacity.



Business Areas

Floating Production

The activities within the Floating Production area relate to the design, engineering, construction, and operation of the Sevan platforms. This includes the project phase of the Sevan 1000 Goliat FPSO as well as FPSO Sevan Piranema which has been operating for Petrobras since October 2007; FPSO Sevan Hummingbird which has been operating for Centrica Energy Upstream since September 2008; FPSO Sevan Voyageur which is contracted to E.ON, and the FPSO hulls Sevan 300 no. 4 and 5.

Drilling

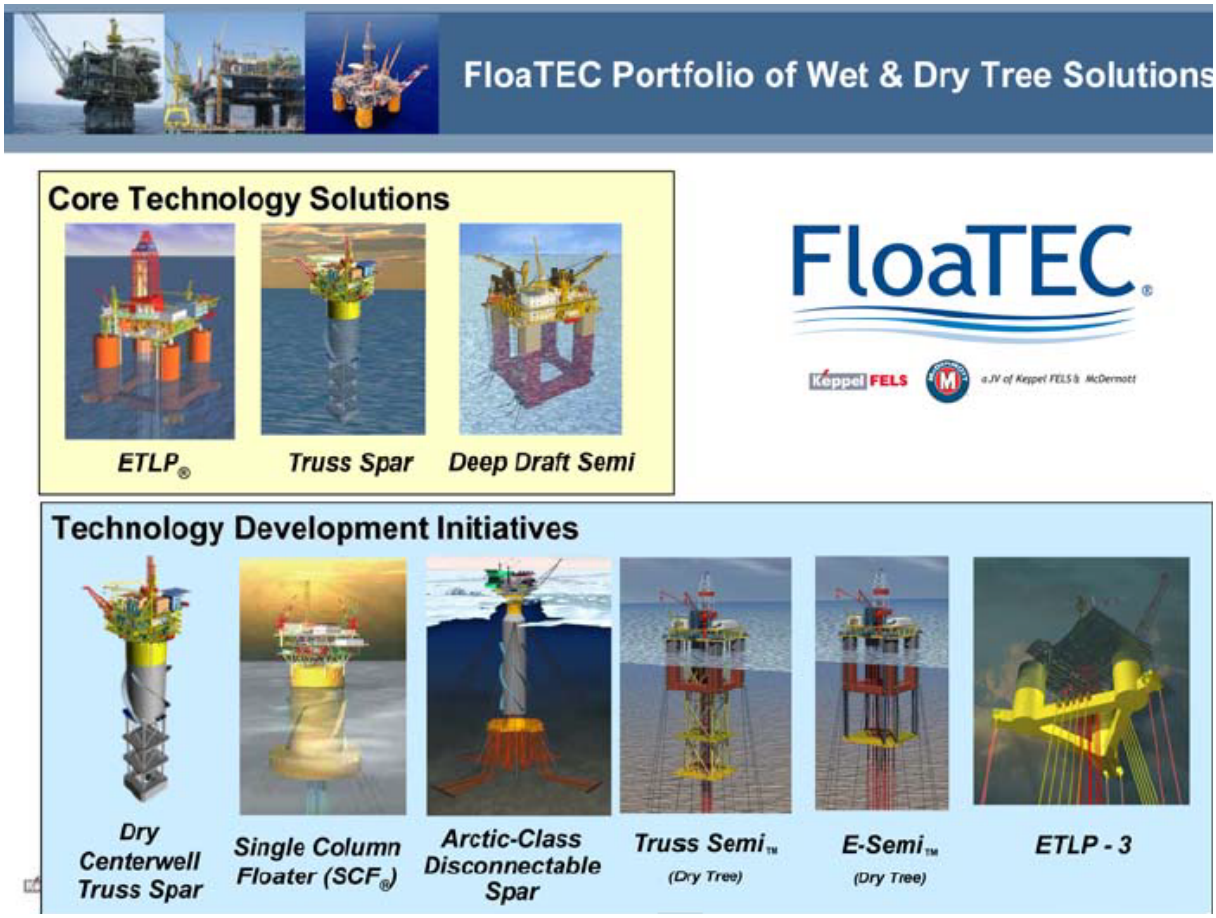
The activities within Drilling mainly relate to the design, engineering, construction and operation of the Sevan drilling units. This includes Sevan Driller which has been operating for Petrobras since June 2010 under a 6-year contract and Sevan Driller II which has been contracted to Petrobras on a 6-year contract. Topside and Process Technology

The Topside and Process Technology area consists of the activities of KANFA AS and its subsidiaries KANFA Mator AS, KANFA-TEC AS (49.9% owned by KANFA AS) and KANFA Aragon AS (50% owned by KANFA AS). The primary business activities of the Kanfa group relate to the provision of services and equipment to the processing plants of the Sevan FPSOs and external clients.

FloaTEC LLC

http://www.floatec.com/
（設計）

FloaTEC, LLC is a 50:50 joint venture company created by McDermott and Keppel FELS to design, build and deliver deepwater floating production systems (FPS). FloaTEC, LLC is the only company to offer a full complement of FPS solutions for its clients - encompassing Spar, Semi, and TLP technology solutions.



FloaTEC, LLC's Project Execution Philosophy

FloaTEC, LLC provides unbiased and concept-neutral engineering to support early decision making. Whether the field development dictates a TLP, Spar, or Semi FPS solution, FloaTEC, LLC can take an unbiased look at what works best. FloaTEC, LLC has built an industry recognized capability regarding the technology related to its products. The highly efficient tools and procedures for design and analysis of hulls, risers and moorings produce efficient fit-for-purpose floating system designs with optimum performance. The tools can assess the individual components, combinations of components or the fully integrated system.

After the facility selection process is complete, FloaTEC, LLC can transition a project seamlessly from Front-End Engineering Design (FEED) to actual EPC Project Execution and

Delivery. Through execution of technical feasibility studies, conceptual design and FEED, FloaTEC, LLC's objective is to ultimately capture EPC contracts and create pull through opportunities for its parents through a structured approach of developing a winning execution and contracting strategy, fully aligned with our client's goals and values. FloaTEC, LLC has the distinct advantage of having its parents' respective fabrication and shipyard facilities at its disposal, enabling FloaTEC, LLC to optimize execution planning and strategy. FloaTEC, LLC is unique in that it represents a partnership that enables the fabrication of any hull form to be executed in multiple locations.

Spar Project Deliveries

Devils Tower

Front Runner

Medusa

TLP Project Deliveries

Kizomba A

Kizomba B

Magnolia

Worldwide Shipyards & Fabrication Facilities

FloaTEC, LLC has the distinct advantage of having its parents' respective fabrication and shipyard facilities at its disposal. This enables FloaTEC, LLC to optimize execution planning and strategy. FloaTEC, LLC is unique in that it represents a partnership that enables the fabrication of any hull form hull to be executed in multiple locations. Click on the links below for an overview of these facilities.

New Deepwater Construction Capabilities in Mexico
McDermott and KOM both have firm plans to invest in and operate major new fabrication and shipbuilding facilities in Altamira. Both companies are investing substantial amounts of money and resources to develop world-class yards. They have identified the Port of Altamira, as the preferred site for the strategic expansion of their worldwide network of yards. The Port

provides export proximity to the global deepwater E&P customer base, good infrastructure, a skilled labor work force, and room for future expansion.

The Port of Altamira is the most modern port on the East coast of Mexico. With a total area of 9,695 hectares, it is the largest port development in the country. The port is also the site of a significant petrochemical industrial hub in Mexico. The airports and ports of Tamaulipas (specifically, the Port of Altamira) will provide the necessary logistical support for the yards.

IntecSea

http://www.intecsea.com
（エンジニアリング、設計）

About Us
INTECSEA is a global company within the WorleyParsons Group and offers all the Group's capabilities for floating systems, offshore pipelines and subsea production systems. Combined with WorleyParsons Group, we offer clients complete project expertise from subsea wellhead through onshore processing and distribution.

INTECSEA's diverse geographical locations and highly skilled professional staff of over 800 enables the company to execute multi-office international projects, providing clients with the highest level of technical excellence, execution efficiency and local content.

For over 25 years, INTECSEA has provided frontier technology leadership for the energy industry's most challenging offshore field development and pipeline projects. INTECSEA has designed pipelines and subsea production systems in water depths once thought impossible to reach and in locations as diverse as the Black Sea, the Arctic Ocean, the Gulf of Mexico, offshore West Africa and the South China Sea.

When the industry considered "deepwater" to be 600 ft (190 m), we were developing technologies for 3,000 ft (900 m). We designed the current world record depth for subsea production at the Atlas field in 9,200 ft (2,700 m).

INTECSEA's core areas of expertise include:

•Subsea Systems
•Offshore Pipelines
•Marine Riser Systems
•Floating Systems
•Arctic Development

Expertise
For 25 years, INTECSEA has provided frontier technology leadership for the energy industry's most challenging offshore field development and pipeline projects. INTECSEA brings innovative and cost effective solutions to clients around the world, from studies to full scope Engineering, Procurement, Project, and Construction Management (EPCM) services on major projects.

•Offshore Pipelines
•Subsea Systems
•Floating Systems
•Systems Engineering
•Flow Assurance
•Marine Production Riser Systems
•Tendon and Mooring Systems
•Arctic Development

•Marine and LNG Terminals
•Survey and GIS
•Pipeline Equipment Design
•Materials Engineering
•Interface Management
•Construction Management
•Project Management
INTECSEA is a global company within the WorleyParsons Group and combines all the group's capabilities for floating systems, offshore pipelines and subsea production. We offer our clients a full service solution for any offshore application.

Floating Systems
INTECSEA has more than 20 years of extensive experience on all types of floating systems—TLP, Spars, Monohulls, Semi-Submersibles, and Small Waterplane Area Twin Hull (SWATH). Key INTECSEA technical staff has 30+ years of experience on various types of floating systems and are considered to be industry leaders and pioneers in their respective field of expertise.

INTECSEA engineers were active participants in the design of sixteen (16) of the twenty-one (21) TLPs sanctioned to date. INTECSEA project experience includes project in all continents and the Arctic region. This experience puts INTECSEA in a unique position to handle projects in varying environmental conditions and provides the ability to handle issues arising out of varying cultural, economic and political situations. Our staff has extensive experience in working on projects with multiple stake holders and simultaneously interfacing with regulatory agencies without compromising our corporate commitment for quality and safety.

INTECSEA assists owners from the conceptual evaluation phase to installation of the floating system facility. This ability to serve our clients in all phases of the project provides a vital link for project knowledge, avoids unnecessary delays and saves project schedule and budget.

INTECSEA has worked with small oil companies to very large companies on projects with construction costs as small as $5 million to more than $2 billion. INTECSEA staff is required to follow internal processes (Quality Control and Quality Assurance Program) and tools (Computer Hardware and Software, including proprietary software) to achieve the desired project quality and results within the project schedule and budget.

SBM Atlantia

http://www.sbmatlantia.com
（設計）

SBM Atlantia is one of a group of multinational companies, known as SBM Offshore N.V., which sells systems and services to the global oil and gas industry. We provide mooring technology, process engineering, project management, after-sales services, design and supply of deepwater production systems, and the design and supply of deepwater semisubmersible drilling units. Our engineering, procurement, construction and installation services are offered primarily to customers with deepwater operations in the Gulf of Mexico and in the Atlantic offshore North and South America.

Products & Services

Capitalizing on the resources of our parent company, SBM Atlantia provides safe, reliable and cost-effective solutions for offshore oil and gas field development needs, minimizing capital and operational expenditure for our clients.

Floating Solutions

Whether the waters are shallow, ultra-deep, benign, harsh, or anywhere in between, SBM Atlantia offers the oil and gas industry floating solutions that feature project-specific technologies designed to meet the challenges encountered in the field.

SBM Atlantia has a long track record in the supply of floating production, storage and offloading (FPSO) facilities, tension leg platforms (TLP), semi-submersible platforms, mobile offshore production units (MOPU), and turrets and mooring systems. More than 100 of these various systems have been delivered to date, each engineered to suit client specifications and the meet the rigors of the offshore environment in which they operate.

Drilling Solutions

GustoMSC, a pioneer in the offshore industry, and a leading design and engineering company, is involved in all types of drilling units, both onshore and offshore, including the delivery of associated equipment. GustoMSC is an alliance of Gusto B.V., Gusto Projects B.V., Marine Structure Consultants (MSC) B.V. and GustoMSC Houston (a division of SBM Atlantia).

Our projects are aimed at the offshore exploration, construction and production markets. The innovative solutions are centered on all types of jackup units, semisubmersibles, mono-hull vessels as well as non-vessel based solutions.

GustoMSC is committed to building strong relationships with clients and developing solutions to meet Clients' requirements to provide high integrity, cost effective and safe answers to the toughest challenges. Successfully following this strategy has allowed GustoMSC to achieve an industry leading position.

Terminals

With more than 500 systems installed to date, the Catenary Anchor Leg Mooring or CALM is the most popular and widely used type of Offshore Loading Terminal. CALMs have been deployed worldwide for a variety of applications, water depths and vessel sizes ranging from small product carriers to Very Large Crude Carriers (VLCC). The CALM's safe and easy berthing and un-berthing operations have made it the preferred offshore terminal of Mooring Masters and Tanker Captains.

SBM Offshore pioneered the development of the CALM more than six decades ago. Since then, we have delivered over 400 CALM Offshore Terminals and remain the principle innovator and market leader in loading and offloading terminals in the oil and gas industry today.

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Fluid Transfer Systems

Fluid Transfer Systems are integrated in all the SBM Offshore products. As exploration and production moved to deeper waters, we discovered there was a need to transfer both unstabilized and stabilized fluid products between deepwater systems near the surface. Based on in-house technology, two type of fluid transfer systems were developed: the Gravity Actuated Pipe or GAP™ for unsterilized crude, and Trelline™, an oil offloading line or OOL, for stabilized crude.

Services

SBM Atlantia has the knowledge, expertise, and experience to carry out a thorough FEED study, not only to ensure a more accurate estimate of project costs, but also identify and address potential problems early on, when potential impact to the project is less. SBM Atlantia's design and project execution team has unequaled experience and in-house capabilities including metocean, naval architecture, process facility, riser design and integration specialists, and fabrication and installation teams.

SBM Atlantia provides full-service, turnkey project capabilities. We manage, hold, and integrate the contracts for all subcontractors, so we can effectively manage project costs. Whether you're looking for a company to conduct a FEED study, EPC/EPCI services, operations services, or maintenance, parts, and repair, SBM Atlantia has the tools to get the job done.

Friede & Goldman

http://www.fng.com/about-us
（設計）

Building upon innovative spirit and experience, F&G has maintained its place as an engineering leader throughout Oil's dynamic evolution. Each new generation of Friede & Goldman drilling units was designed based upon the lessons learned from the operation of earlier units.

The small cooperation that began over 60 years ago between Vladimir M. Friede and Jerome L. Goldman is today a thriving company of over 90 employees. More than 100 mobile offshore drilling and production units have been built according to F&G designs for operation around the world. Currently, there are over 40 units under construction in shipyards that span the globe, from Singapore, India & China in the East, to Mexico and throughout the Middle East. The long and productive lives of these structures bear witness to F&G's commitment to quality.

Designs

Jack-up

Towards the end of the 1990's, F&G began designing the JU2000 class jack-up in order to meet the industry's requirement for jackups that could drill deeper and withstand harsher environments. While F&G's L-780 series, introduced during the 80's was a resounding success, these new requirements called for more than a simple upgrade to the design.

One of the first and most important enhancements designed by F&G for the JU-2000 was a result of trying to include a larger and farther-reaching cantilever. The task of keeping the rig to a minimum size for cost efficiency while at the same time making room for a larger cantilever on board required F&G to produce innovative solutions to numerous design challenges. The F&G engineers designed the deckhouse quarters, traditionally located amidship, to wrap around the forward leg. This concept made it possible to keep the rig at a minimum size and thereby reduced not only the initial cost of the rig, but the operating cost as well.

Enhanced Leg Design

•Reduced leg drag and storm loads
•Reduced leg weight that maintains a high stiffness to weight ratio
•Reduced number of welded connections in leg construction
•Increased strength to cost ratio

Extended Reach Cantilever

•Provides maximum reach of 75 feet aft of transom

•Accommodates maximum combined drilling load of 2600 kips on centerline at 75 feet extension
•Designed for 40’ x 40’ derrick to accommodate state-of-the-art drill string handling tools
•Drill floor can be skidded 15’ either side of longitudinal center line of rig
•Increased pipe rack space allows for option of horizontal pipe handling system

Modular Hull Design

•Comprised of three basic modules
•Streamlines construction process
•Provides for cost effective construction.

Semisubmersibles

Friede & Goldman’s presence in the category of semi-submersible design is long and well established in the offshore industry. During the 70’s, 80’s, and 90’s, F&G’s world-class Pacesetter and Trendsetter designs enjoyed unparallel success with over 48 semi-submersibles of these types built.

With the approach of the new millennium, however, the operational requirements for semi-submersible designs were changing. Accommodating the increasing demands for rigs to drill deeper and in harsher environments, while keeping the exploration costs to a minimum, brought new challenges to the industry, and F&G undertook to design a new class of semi-submersibles.

One of the primary challenges for F&G in accommodating the demand for deeper drilling was the need to increase deck space to allow for additional riser storage and mud capacity. More deck space meant increased cost to build and operate, potentially making this an unaffordable option for the drilling contractors. However, the F&G engineers came up with the innovative idea of storing the risers vertically in the upper hull.

This major change in deck design was just the beginning of many new advancements F&G made to their new Millennium Class semi-submersible design.

DPS-3, DPS-3 Limited, or DPS-2 Classification – Enhanced riser and pipe handling:

•Vertical riser handling
•Dual load paths for enhanced open water operations
•HPPH System – three-way tubular handling and moonpool hand off capability
•Rotary table versatility – 120” and 60.5” with dedicated spider storage
•Riser fairing handling capability at rig floor or moonpool levels

•Enhanced moonpool functionality:
•Two way access to moonpool area

•Efficient completion tree staging, testing, and handling capability
•Tubular make-up and hand off capability
•FSR (free-standing riser) handling ready with secondary riser spider support facility
•In-line slip joint riser tensioning ready
•High capacity wire-line riser-tensioning system
•Centralized high capacity mud handling AC powered drilling equipment
•Centralized BOP and MOCOMP auxiliaries and controls
•Enhanced mud storage capabilities
•Dedicated brine and base oil storage
•Ergonomic quarters arrangement
•Pontoon shape optimized for low current drag thereby reducing station keeping loads

Floating Production Systems

During the mid to late 1990s, Friede & Goldman engineers recognized the focus on marginal field development was becoming an industry priority. The development of such discoveries would depend greatly on F&G's capability to develop new and better technology that allowed cost-effective field development with innovative solutions. To achieve this goal, F&G developed and designed the Floating Production Facility called the Centurion MVP.

The primary goal of the new F&G FPF design was to keep new-build construction costs and operating costs to a minimum, without sacrificing functionality, flexibility, or design life.

The Centurion was designed with most of the machinery and equipment located above deck so that the costs and time for construction would be significantly reduced. In addition, the modular production facilities can be installed and pre-commissioned alongside the construction pier. F&G's superior knowledge of fabrication gave them the ability to create hull designs with the most efficient construction and minimal costs.

In an effort to maintain F&G's hallmark design feature of flexibility, provisions have been included to facilitate the future addition of production modules and risers to meet specific needs of future fields. The Centurion was designed for ease of movement to different locations, but also has the ability to remain at an operating site for 20 years without drydocking.

LeTourneau Technologies

http://www.letourneautechnologies.com/about/
（設計）

LeTourneau Technologies, Inc. (”LeTourneau”) is a global group of best-in-class organizations specializing in the design, manufacture, implementation, and effective use of advanced technologies for onshore and offshore oil and gas drilling, forestry, mining, and steel markets.

Although LeTourneau has evolved significantly throughout the past, the company’s core values, customer focus, and dedication to leadership through innovation have not changed.

Today more than ever, LeTourneau represents a better way of doing business, and a dedication to progress. Supporting this vision, LeTourneau exemplifies advancements in technology, regardless of industry or application.

While the company is comprised of six distinct organizations, it is committed to one singular focus: to remain centered on its customers by ensuring its advanced products and systems meet their specific challenges day in and out.

Altogether, LeTourneau stands for innovation, commitment, product performance, and customer focus.

Businesses

Offshore Products
Strong Rigs. Stronger Company.
Since the fabrication of the first LeTourneau jack-up rig in 1955, LeTourneau has built rigs that lead the industry for strength and longevity. In fact, there are LeTourneau jack-up rigs that have been providing superior service for more than 30 years and are still going strong.

Whether it is design, engineering, fabrication, rig kits and licensing packages, or components and renovation, LeTourneau provides systems, products, and services that set the industry standard for performance and reliability. LeTourneau offers five distinct rig models designed to operate in even the harshest offshore environments, and drilling in depths that range from 300 feet to 550 feet of water.

Rig Design

Drilling Equipment

Reliable Drilling Equipment
LeTourneau Technologies Drilling Systems, Inc. possesses a strong dedication to building equipment and systems with advanced technology, high performance, strength and reliability for customers.

No matter how challenging the environment, you can count on equipment from LeTourneau Technologies Drilling Systems, Inc. ("LeTourneau Drilling Systems") which offers a range of drilling equipment designed for high-performance, high-reliability, and low-maintenance operation. From the direct-driven top drive designed without a gearbox, to advanced AC gear-driven drawworks, to the heavy duty mud pumps, LeTourneau Drilling Systems builds reliable drilling equipment to meet the challenges of today's drilling market.

LeTourneau Drilling Systems builds equipment and systems for one purpose: enhanced drilling performance. The main focus at LeTourneau Drilling Systems is to build advanced equipment for customers' drilling needs.

この報告書は競艇の交付金による日本財団の助成金を受けて作成しました。

オフショア産業向け舶用市場調査

2011 年（平成 23 年）3 月発行

発行　社団法人 日 本 舶 用 工 業 会

〒105-0001 東京都港区虎ノ門 1-15-16　海洋船舶ビル
TEL 03-3502-2041　FAX 03-3591-2206

財団法人 日本船舶技術研究協会

〒107-0052 東京都港区赤坂 2-10-9　ラウンドクロス赤坂
TEL 03-5575-6426　FAX 03-5114-8941