Annual Offshore Oil & Gas Market Report 2018-2021

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Partner, Rystad Energy

Global Oil & Gas Market Update Roadshow – Bergen September 12th, 2017
1. Intro to Rystad Energy
2. Macro
3. NORWEP AOMR 2017 – Introduction
4. NORWEP Market Trends
5. Selected NORWEP Markets
Introduction to Rystad Energy – an energy database and advisory firm

- Rystad Energy is an independent oil and gas knowledge house, established in 2004
- Providing a range of upstream E&P and oilfield service business intelligence data solutions
- A leading advisor within strategy, market analysis and business development
- Publishing standard and customized research reports on high impact industry topics
- Insight and deliveries based on proprietary, fundamental research from primary sources

Source: Rystad Energy
1. Intro to Rystad Energy
2. Macro
3. NORWEP AOMR 2017 – Introduction
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5. Selected NORWEP Markets
Global upstream capital expenditure has declined by -41% from 2014 to 2016

* Excluding exploration expenditure. Source: Rystad Energy UCube
Shale revolution... what are we up against...

Shale production (crude and condensate) from United States and Canada by hydrocarbon

Million boe per day

- **Shale 1.0**
  - Condensate: +4.3 mmbblpd
  - Crude Oil: +4.3 mmbblpd

- **Downturn**
  - Condensate: +1.0 mmbblpd
  - Crude Oil: +1.0 mmbblpd

- **Shale 2.0**
  - Condensate: +6.1 mmbblpd
  - Crude Oil: +6.1 mmbblpd

- **Plateau**
  - Condensate: +1-2 mmbblpd
  - Crude Oil: +1-2 mmbblpd

Source: Rystad Energy UCube
Developing countries continue to drive demand growth towards the beginning of the 2020s.

OECD Asia:
- New Zealand, Australia, Japan, South Korea;
- Other Middle East includes Israel and Turkey among other countries;

OECD Americas:
- Chile, Mexico, Canada and United States.

Source: Rystad Energy research and analysis.
Current new field activity level insufficient to replace consumption of oil

**Discovery rates at unsustainable levels**

**Total discovered volumes vs. consumption (bnbbl)**

<table>
<thead>
<tr>
<th>Liquids, Billion barrels</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td>-31</td>
<td>-28</td>
</tr>
<tr>
<td>Total volumes discovered</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

**Sanctioning activity at unsustainable levels**

**Total sanctioned volumes vs. consumption (bnbbl)**

<table>
<thead>
<tr>
<th>Liquids, Billion barrels</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td>-26</td>
<td>-21</td>
</tr>
<tr>
<td>Total volumes sanctioned</td>
<td>14</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Rystad Energy research and analysis
Offshore projects with breakeven prices down 40-60% since 2013

Examples of breakeven reductions
USD/bbl (2016)

The chart on the right shows the ICE Brent crude historical front month price, in addition to the latest five year futures curve and Rystad Energy’s base case Brent forecast.

Following 2017 implied stock draws of nearly 0.7 mmbbl/d, Rystad Energy sees supply and demand balancing in at 57 USD Brent for 2018, as demand is estimated to grow by 1.6 mmbbl/d y/y, while supply is estimated to grow by 2.4 mmbbl/d y/y. The base case reflects an expectation that the market has confidence in prolonged OPEC cuts through 2018.

In the medium term (2020-2021), however, we expect the oil market’s long cycle to kick in from 2020 due to the lack of investments in new fields during 2014-2017. As a result, global supply growth struggles to meet demand growth from 2020, showing a supply deficit of 1 mmbbl/d in Rystad Energy’s 2021-balances.

Source: Rystad Energy research and analysis
Agenda

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NORWEP Annual Oil & Gas Market Report 2018-2021: Main content

NORWEP Oil & Gas Technology Areas

Oil & Gas Upstream
- NORWEP Markets: 18 offshore markets
  - Market descriptions
  - Market forecasts
  - Offshore well forecast
  - Priority Projects
- Shipyards in China, Singapore and South Korea
  - Shipyards descriptions
  - Rig construction forecast
  - Development projects
  - Drilling rigs
- Upstream Engineering Hubs
  - Forecast by hub
  - Description of main engineering companies
  - Awarded contracts

Oil & Gas Midstream
- Midstream/LNG
  - LNG market
  - Liquefaction and regasification projects
  - Top four FSRU providers
  - FSRU projects
  - Priority Projects
  - Small sale LNG
18 countries defined as NORWEP Markets in AOMR 2017 ...

- Canada
- US GoM
- Mexico
- Brazil
- Angola
- Nigeria
- Egypt
- KSA
- UAE
- Indonesia
- Malaysia
- Australia
- Russia
- China
- India
- Iran
- UK
- Azerbaijan
- Indonesia
- Malaysia
- Australia
… while 11 markets are currently under observation (NORWEP Monitoring Markets)
Agenda

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After 2-3 years with low project sanctioning, the activity is picking up – Eight offshore projects over 100 mmboe sanctioned so far in 2017

Source: Rystad Energy research and analysis
Several projects are in the pipeline and with expected FID within the next couple of years.

**Target of 2018 set for Vito**

**Rivals battle for Johan Castberg**
Heavyweights in bidding fight for main contracts but Hyundai ‘smarting’ after topsides scrub

**Upstream 27th of April 2017**

**ONGC launches delayed deep-water floater bid**
Indian major plans shortlist of up to four contenders for KG-DWN-98/2 east coast development FPSO

**Upstream 10th of May 2017**

**Mubadala eyes go-ahead for Pegaga plan this year**
Company hopes to take decision on large gas field project before 2018

**Upstream 10th of May 2017**

**Race on for next Liza FPSO**
SEM thought to be well placed but supermajor is scouting market for other offers

**Upstream 25th of April 2017**

**Petrobras launches Buzios FPSO tender**
Floater will be the fifth such production unit to be deployed in the Santos basin pre-salt development

**Upstream 16th of May 2017**

**Chevron starts Gorgon phase two FEED**
US supermajor reveals it has kicked off next stage of development at giant Australia LNG project

**Upstream 23rd of February 2017**

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Source: Rystad Energy research and analysis
Global offshore upstream expenditure expected to flatten out in 2018 followed by growth

Source: Rystad Energy research and analysis; Rystad Energy DCube
NORWEP Markets: All main service segments forecast to experience growth towards 2021

NORWEP Markets – Offshore upstream expenditure 2011-2021
USD billion

- Operations
- Well
- EPC and Topside Equipment
- Subsea
- Reservoir and seismic

Source: Rystad Energy research and analysis; Rystad Energy DCube
NORWEP Markets estimated to account for 70% of the total offshore market 2018-2021

Source: Rystad Energy research and analysis; Rystad Energy DCube
Market uncertainty indicator: Eight markets identified as «Medium/High» uncertainty

NORWEP Markets – Offshore upstream expenditure 2018-2021
USD billion

- Brazil: 111
- Norway: 98
- US GoM: 84
- United Kingdom: 77
- Saudi Arabia: 45
- Nigeria: 39
- Mexico: 39
- Iran: 38
- Angola: 36
- China: 34
- Malaysia: 32
- Australia: 29
- Indonesia: 26
- United Arab Emirates: 24
- India: 24
- Azerbaijan: 20
- Egypt: 18
- Canada: 11
- Russia: 11

* Medium/High: Project sanctioning uncertainty, low transparency, regulatory changes/uncertainty.

Source: Rystad Energy research and analysis; Rystad Energy DCube
Operations and Well account for over 60% of the offshore market 2018-2021

NORWEP Markets – Offshore upstream expenditure 2018-2021
USD billion

- Brazil: 111 billion
- Norway: 98 billion
- US GoM: 84 billion
- United Kingdom: 77 billion
- Saudi Arabia: 45 billion
- Nigeria: 39 billion
- Mexico: 39 billion
- Iran: 38 billion
- Angola: 36 billion
- China: 34 billion
- Malaysia: 32 billion
- Australia: 29 billion
- Indonesia: 26 billion
- United Arab Emirates: 24 billion
- India: 24 billion
- Azerbaijan: 20 billion
- Egypt: 18 billion
- Canada: 11 billion
- Russia: 11 billion

Source: Rystad Energy research and analysis; Rystad Energy DCube
Upstream Engineering Hubs: Distribution of offshore capex by hub region

Offshore E&P capex 2018-2021 by engineering hub/region where project is sanctioned, split by field location
USD billion

Source: Rystad Energy research and analysis; Rystad Energy UCube
UK and Norway estimated to account for 85% of the total offshore capex in Europe

Offshore E&P capex 2018-2021 by engineering hub/region where project is sanctioned, split by field location
USD billion

Offshore E&P capex 2018-2021 by engineering hub/country, USD billion

Source: Rystad Energy research and analysis; Rystad Energy UCube
USA (Houston) accounting for the major share of offshore capex in North America

Offshore E&P capex 2018-2021 by engineering hub/region where project is sanctioned, split by field location
USD billion

Source: Rystad Energy research and analysis; Rystad Energy UCube
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   - Australia
   - Brazil
   - India
   - Iran
   - Mexico
   - Mozambique
   - Nigeria
   - UAE
   - UK
   - US GOM
Several giant projects on-stream 2017-2018, market to bottom out in 2018

Source: Rystad Energy research and analysis

Offshore market in Australia 2012-2021
USD billion

Priority Projects in Australia

<table>
<thead>
<tr>
<th>Project</th>
<th>Type</th>
<th>Operator</th>
<th>Development solution</th>
<th>Phase</th>
<th>FID</th>
<th>Start-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater Enfield</td>
<td>Greenfield</td>
<td>Woodside</td>
<td>Subsea tie-back</td>
<td>Under dev.</td>
<td>2016</td>
<td>2019</td>
</tr>
<tr>
<td>Caldita-Barossa</td>
<td>Greenfield</td>
<td>CoP</td>
<td>FPSO</td>
<td>Concept</td>
<td>2019</td>
<td>2023</td>
</tr>
<tr>
<td>NWS Life Extension</td>
<td>Brownfield</td>
<td>Woodside</td>
<td>Fixed</td>
<td>Under dev.</td>
<td>-</td>
<td>2019</td>
</tr>
<tr>
<td>Gorgon Ph. 2</td>
<td>Greenfield</td>
<td>Chevron</td>
<td>Subsea tie-back</td>
<td>FEED</td>
<td>2019</td>
<td>2022</td>
</tr>
</tbody>
</table>

CAGR 2017-2021 2%
Development drilling activity to remain relatively flat towards 2021

Source: Rystad Energy research and analysis

Offshore wells in Australia 2012-2021

Number of wells

- Exploration
- Wet
- Dry

# exploration wells in 2016 the lowest in 30 years.
Several impediments to foreign investments lifted – Offshore market to grow by 3% p.a.

**Offshore market in Brazil 2012-2021**

USD billion

- Operations
- Well
- Subsea
- EPC and Topside Equipment
- Reservoir and Seismic

**Priority Projects in Brazil**

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<thead>
<tr>
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<tr>
<td>Libra</td>
<td>Greenfield</td>
<td>Petrobras</td>
<td>FPSO</td>
<td>Tender</td>
<td>2016</td>
<td>2021</td>
</tr>
<tr>
<td>Sepia</td>
<td>Greenfield</td>
<td>Petrobras</td>
<td>FPSO</td>
<td>Tender</td>
<td>2015</td>
<td>2021</td>
</tr>
<tr>
<td>Atlanta</td>
<td>Greenfield</td>
<td>QGEP</td>
<td>FPSO</td>
<td>Under dev.</td>
<td>2014</td>
<td>2021</td>
</tr>
<tr>
<td>Marlim Revitalization</td>
<td>Brownfield/Decom</td>
<td>Petrobras</td>
<td>FPSO</td>
<td>FEED</td>
<td>2017</td>
<td>2021</td>
</tr>
</tbody>
</table>

CAGR 2017-2021

3%
Number of wells expected to double towards 2021 driven by exploration activity

Offshore wells in Brazil 2012-2021
Number of wells

ANP has plans to hold 10 licensing rounds in the 2017-19 period

Source: Rystad Energy research and analysis
Several promising projects in the pipeline – market to grow by 12% p.a. towards 2021

Offshore market in India 2012-2021
USD billion

- Operations
- Well
- Subsea
- EPC and Topside Equipment
- Reservoir and Seismic

Priority Projects in India

<table>
<thead>
<tr>
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<th>Start-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>KG-DWN-98/2 Cluster 2</td>
<td>Greenfield</td>
<td>ONGC</td>
<td>FPSO</td>
<td>Tender</td>
<td>2016</td>
<td>2020</td>
</tr>
<tr>
<td>KG-D6 Enhancement</td>
<td>Greenfield</td>
<td>Reliance</td>
<td>Subsea tie-back</td>
<td>Tender</td>
<td>2017</td>
<td>R-Ser 2021</td>
</tr>
</tbody>
</table>

Source: Rystad Energy research and analysis
Offshore wells dominated by dry well completions – exploration to pick up towards 2021

Offshore wells in India 2012-2021
Number of wells

- Exploration
- Wet
- Dry

In 2016 government opened for companies to bid for exploration in any block. Previously, exploration was restricted to blocks opened for bidding by the government.

Source: Rystad Energy research and analysis
Despite political pressure from hardliners, the landmark contract for South Pars 11 was awarded Total in July 2017.
Increased development drilling activity due to additional phases on South Pars

the start-up of the first subsea/floater development (South Pars Oil Layer Phase 1, FPSO)

Offshore wells in Iran 2012-2021
Number of wells

- Exploration
- Wet
- Dry

Start-up of the first subsea/floater development (South Pars Oil Layer Phase 1, FPSO)

Source: Rystad Energy research and analysis
Increased interest from international players since the Energy Reform in 2013
– Three non-Pemex operated fields with expected FID 2018-2019

Offshore market in Mexico 2012-2021
USD billion

- Operations
- Well
- Subsea
- EPC and Topside Equipment
- Reservoir and Seismic

Priority Projects in Mexico

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<thead>
<tr>
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<th>Phase</th>
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<th>Start-up</th>
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</thead>
<tbody>
<tr>
<td>Trion</td>
<td>Greenfield</td>
<td>BHP Billion</td>
<td>FPSO</td>
<td>Concept</td>
<td>2019</td>
<td>2023</td>
</tr>
<tr>
<td>Amoca</td>
<td>Greenfield</td>
<td>Eni</td>
<td>Fixed</td>
<td>FEED</td>
<td>2018</td>
<td>2020</td>
</tr>
<tr>
<td>Ichalk il-Pokoch</td>
<td>Greenfield</td>
<td>Fieldwood Energy</td>
<td>Fixed</td>
<td>Concept</td>
<td>2019</td>
<td>2022</td>
</tr>
</tbody>
</table>

CAGR 2017-2021 8%

Source: Rystad Energy research and analysis
Offshore well activity to grow towards 2021 driven by greenfield developments and increased infill drilling

Source: Rystad Energy research and analysis
Coral FLNG will be the first offshore development in the country.

Source: Rystad Energy research and analysis
Political, legal and security issues have put several development projects on hold in a challenging market environment.

### Offshore market in Nigeria 2012-2021
USD billion

- Operations
- Well
- Subsea
- EPC and Topside Equipment
- Reservoir and Seismic

![Graph showing offshore market in Nigeria 2012-2021](image)

### Upcoming projects in Nigeria

<table>
<thead>
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<tbody>
<tr>
<td>Bonga Southwest</td>
<td>Greenfield</td>
<td>Shell</td>
<td>FPSO</td>
<td>FEED</td>
<td>2019</td>
<td>2023</td>
</tr>
<tr>
<td>Zabazaba-Etan</td>
<td>Greenfield</td>
<td>Eni</td>
<td>FPSO</td>
<td>FEED</td>
<td>2019</td>
<td>2023</td>
</tr>
</tbody>
</table>

Source: Rystad Energy research and analysis
Offshore drilling activity forecast to remain low towards 2021

Source: Rystad Energy research and analysis
Offshore market forecast to decline by -6% p.a. due to completion of Upper Zakum Expansion Project

Offshore market in UAE 2012-2021
USD billion

Priority Projects in UAE

<table>
<thead>
<tr>
<th>Project</th>
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<th>Phase</th>
<th>FID</th>
<th>Start-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Zakum</td>
<td>Brownfield</td>
<td>ZADCO</td>
<td>Fixed Prod.</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Lower Zakum</td>
<td>Brownfield</td>
<td>ADMA-OFCO</td>
<td>Fixed Prod.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Rystad Energy research and analysis
Offshore drilling activity expected to decline towards 2021 by development wells

Source: Rystad Energy research and analysis

Offshore wells in UAE 2012-2021
Number of wells

- Exploration
- Wet
- Dry

Source: Rystad Energy research and analysis
New wave of greenfield developments coming up in the UK

Offshore market in UK 2012-2021
USD billion

Priority Projects in UK

<table>
<thead>
<tr>
<th>Project</th>
<th>Type</th>
<th>Operator</th>
<th>Development solution</th>
<th>Phase</th>
<th>FID</th>
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<tbody>
<tr>
<td>Tolmount</td>
<td>Greenfield</td>
<td>Premier Oil</td>
<td>Fixed</td>
<td>FEED</td>
<td>2018</td>
<td>2021</td>
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<tr>
<td>Penguins (redev.)</td>
<td>Brownfield</td>
<td>Shell</td>
<td>FPSO</td>
<td>FEED</td>
<td>2018</td>
<td>2023</td>
</tr>
<tr>
<td>Captain EOR</td>
<td>Brownfield</td>
<td>Chevron</td>
<td>EOR</td>
<td>FEED</td>
<td>2018</td>
<td>2022</td>
</tr>
<tr>
<td>GLA</td>
<td>Greenfield</td>
<td>Hurricane</td>
<td>FPSO</td>
<td>Tender</td>
<td>2018</td>
<td>2020</td>
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<tr>
<td>Rosebank</td>
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<td>Chevron</td>
<td>FPSO</td>
<td>Tender</td>
<td>2018</td>
<td>2023</td>
</tr>
<tr>
<td>Cambo</td>
<td>Greenfield</td>
<td>Siccar Point</td>
<td>FPSO</td>
<td>Concept</td>
<td>2019</td>
<td>2022</td>
</tr>
<tr>
<td>Jackdaw</td>
<td>Greenfield</td>
<td>Shell</td>
<td>Fixed</td>
<td>Concept</td>
<td>2019</td>
<td>2023</td>
</tr>
</tbody>
</table>

CAGR 2017-2021
8%

Source: Rystad Energy research and analysis
Less exploration activity expected in the UK towards 2021

Offshore wells in UK 2012-2021
Number of wells

- Exploration
- Wet
- Dry

Source: Rystad Energy research and analysis
Four fields have been sanctioned in 2017 – market to grow by 6% p.a. towards 2021

**Offshore market in US GoM 2012-2021**
USD billion

- Operations
- Well
- Subsea
- EPC and Topside Equipment
- Reservoir and Seismic

**Priority Projects in US GoM**

<table>
<thead>
<tr>
<th>Project</th>
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<tbody>
<tr>
<td>Mad Dog Ph. 2</td>
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<td>BP</td>
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<td>Under dev.</td>
<td>2017</td>
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<td>Vito</td>
<td>Greenfield</td>
<td>Shell</td>
<td>Semi</td>
<td>Tender</td>
<td>2018</td>
<td>2022</td>
</tr>
<tr>
<td>Anchor/Tigris</td>
<td>Greenfield</td>
<td>Chevron</td>
<td>Semi</td>
<td>FEED</td>
<td>2019</td>
<td>2023</td>
</tr>
</tbody>
</table>

Source: Rystad Energy research and analysis

CAGR 2017-2021 6%
Shelf drilling activity expected to remain low towards 2021

Source: Rystad Energy research and analysis