The OSV Market - Today and Tomorrow

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North America

04 May 2011
The Market Today and Tomorrow

The Market Outlook Today
PSV – age profile

Age distribution of Platform Supply Vessels as of 2011.04.01
Average Age is 19.4 years. The orderbook comprises 10% of the existing fleet.
AHTS – age profile

Age distribution of Anchor Handling Tug Supply Vessels as of 2011.04.01
Average Age is 19.4 years. The orderbook comprises 14% of the existing fleet.

- In operation
- Scrapped or lost
- On order, pending contracts not included
Scheduled deliveries

Deliveries from the current orderbook
Number of vessels as of 2011.04.01; IHS Fairplay

- AHTS
- PSV

Scheduled delivery

Number of vessels

2011 2012 2013 2014
AHTS and PSV - Age profile

Age profile for PSV and AHTS vessels
Number of ships as of 2011.04.01; Source IHS Fairplay

Number of vessels

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of AHTS ships</th>
<th>Number of PSV ships</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>5-9 years</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>10-14 years</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>15-19 years</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>20-24 years</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>25+ years</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>
AHTS and PSV - Age profile

Age profile for PSV and AHTS vessels
GT as of 2011.04.01; Source IHS Fairplay

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Ships in operation vs. Orderbook

Number of vessels as of 2011.04.01; Source IHS Fairplay

- PSV: 9.4%
- AHTS: 13.6%
Ships in operation vs. Orderbook

GT as of 2011.04.01; Source IHS Fairplay

- PSV: In Operation = 23.7 %
- AHTS: In Operation = 21.8 %

0 1 2 3 4 5 6

Millions
PSV – contracting

Contracting of the Platform Supply Vessels
Annual contracting as of 2011.04.01
Based upon GT/DWT/Number of vessels

Contract Year

Milions

GT/DWT

0

0,05

0,1

0,15

0,2

0,25

0,3

0,35

0,4

0,45


Number of vessels

Number of vessels

0

20

40

60

80

100

120

140

160

180

GT

DWT

Number
AHTS – contracting

Contracting of the Anchor Handling Tug Supply Vessels
Annual contracting as of 2011.04.01
Based upon GT/DWT/Number of vessels

Contract Year

GT/DWT

0 0,1 0,2 0,3 0,4 0,5 0,6 0,7 0,8 0,9 1

GT
DWT
Number

0 50 100 150 200 250 300 350 400 450 500

Millions


Number of vessels

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AHTS Orderbook – builder mix

AHTS Orderbook by Builder - Total 375 ships
IHS Fairplay as of 2011.04.01

- China: 43%
- Indonesia: 4%
- Japan: 4%
- Singapore: 10%
- Others: 10%
- USA: 3%
- Vietnam: 2%
- UAE: 2%
- Brazil: 2%
- India: 10%
- Malaysia: 10%
PSV Orderbook – builder mix

PSV Orderbook by Builder - Total 196 ships
IHS Fairplay as of 2011.04.01

- China 20%
- Malaysia 18%
- India 10%
- Singapore 9%
- Indonesia 8%
- Others 14%
- Vietnam 3%
- UAE 3%
- Brazil 5%
- USA 5%
- Japan 5%
- Others 14%
Volatile market – still too low utilization – small vessels most difficult

Example: North Sea spot market ranges

(Rates in Pounds Sterling per day excl. fuel):

<table>
<thead>
<tr>
<th></th>
<th>January 2011</th>
<th>February 2011</th>
<th>March 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHTS 16,500 bhp +</td>
<td>5,000 - 28,500</td>
<td>5,500 - 22,000</td>
<td>7,000 - 32,500</td>
</tr>
<tr>
<td>AHTS 10-16,499 bhp</td>
<td>4,000 - 9,000</td>
<td>5,500 - 14,000</td>
<td>5,000 - 25,000</td>
</tr>
<tr>
<td>PSV (Deck 750m2 +)</td>
<td>2,600 - 17,000</td>
<td>3,000 - 18,000</td>
<td>4,000 - 21,500</td>
</tr>
<tr>
<td>PSV (Deck - 750m2)</td>
<td>2,500 - 11,000</td>
<td>5,500 - 15,000</td>
<td>3,800 - 21,000</td>
</tr>
</tbody>
</table>

(Rates in Pounds Sterling per day excl. fuel):

<table>
<thead>
<tr>
<th></th>
<th>April 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHTS 16,500 bhp +</td>
<td>8,000 - 48,500</td>
</tr>
<tr>
<td>AHTS 10-16,499 bhp</td>
<td>10,500 - 35,000</td>
</tr>
<tr>
<td>PSV (Deck 750m2 +)</td>
<td>5,000 - 25,000</td>
</tr>
<tr>
<td>PSV (Deck - 750m2)</td>
<td>5,500 - 20,000</td>
</tr>
</tbody>
</table>

Brokers predict oversupply for 1-2 years more. If higher oil price – fear for prolongation of oversupply – can take longer time to see the utilization rate climb to 85-90%

Source: Fearnley Offshore Supply
Current age distribution PSV & AHTS

**Age distribution of Anchor Handling Tug Supply Vessels as of 2011.04.01**
Average Age is 19.4 years. The orderbook comprises 14% of the existing fleet.

- Number of vessels
- In operation
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**Age distribution of Platform Supply Vessels as of 2011.04.01**
Average Age is 19.4 years. The orderbook comprises 10% of the existing fleet.

- Number of vessels
- In operation
- Scrapped or lost
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**Current age distribution PSV & AHTS**

- a large number of older vessels
- the smallest are commodity
- trend towards larger size
- multipurpose
- efficiency

**Still a market for older AHTS?**

**Will these be replaced?**

**When will some old be removed?**
What will be the future demand?

Key Drivers
Oil & Gas Supply

Global oil and gas supply forecast per region, Mboe
As of 2011 - Globaldata

- North America
- S & C America
- Europe & Eurasia
- Middle East & Africa
- Asia Pacific
- Change

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Oil & Gas Demand

Global oil and gas demand forecast per region, Mboe
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North America
S & C America
Europe & Eurasia
Middle East & Africa
Asia Pacific
Change

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Existing versus potential offshore fields

**Existing** offshore fields by water depths
As of 2011

- >1500 m: 2%
- 500-1499 m: 5%
- 200-499 m: 4%
- <200 m: 89%

**Potential** offshore fields by water depth
As of 2011

- >1500 m: 7%
- 500-1499 m: 14%
- 200-499 m: 9%
- <200 m: 70%
Discoveries by water depth

Source: Clarksons Research
E&P capital expenditures

Total Offshore E&P capex per region, $bn
As of October 2010 - GlobalData

- Asia Pacific
- Europe
- Middle East And Africa
- North America
- South & Central America

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What will be the future demand?

Key Drivers

- The oil price
- More remote access to oil: deeper and more harsh
- Diversified operation
- Changes in the regulatory environment
- Second hand value
A step-change for the industry?

Key Drivers for the future demand
Clear trend

The new opportunities are in deeper & more harsh environment

Ship operations:
- Deepwater anchor handling
- Handling of buoyancy neutral fiber ropes
- Wire / chain change
- Trenching
- Installation of subsea systems
- ROV surveys on bottom

Fields deeper and further from shore with new
.. cargos
.. capacities – larger vessels
.. functions – new equipment
.. expectations to service capability
.. areas of operation
.. consequences if mishap
Clear trend
New capabilities – new opportunities

- **Stronger:**
  - *World record, bollard pull 423 tonnes*
  - AH one of many advanced functions

Illustration: Farstad / PL3 by IHC EB, UK

Deep- & Ultradeep sea trenching (1500 m)
Clear trend
New capabilities – Ice Management for offshore installations in Arctic

New functions / New tasks
Clear trend
New vessel type - from jack-up windmill installation to large OCVs

Deep water energy challenges give many opportunities for innovation

Offshore wind + subsea work require advanced solutions & new designs
Clear trend
Utilize new equipment – create new storage solutions

Illustration: with permission from Odim (Rolls-Royce) & TTS
Clear trend
Characteristic for enhance efficiency and flexibility

Illustration: with permission from STX
Clear trend
Understanding the operational profile and optimizing the design

Typical OSV operation profile

Example: 300 t BHP AHTS operation profile

Reduced fuel consumption by a combination of:
- Improved hydrodynamic lines
- Hybrid system
- Power management

Clear trend
Understanding the operational profile and optimizing the design

50% fuel reduction possible – and proven
Regulatory changes – a game changer?
How to comply with environmental requirements?

**Existing fleets**

**Requirement**
- 2012: SOx < 1,0%
- 2015: SOx < 0,1%

**Compliance option**
- HFO + scrubber
- Distillate fuels
- LNG

**Newbuilds**

**Requirement**
- 2011: NOx Tier 2
- 2016: NOx Tier 3

**Compliance option**
- Scrubber + SCR
- LNG
Half the cargo volume in North America is transported on lakes, inland waterways.
Case example: *The economics clearly favor LNG*

Net present value
(negative: net saving / positive: net cost)

Price disparity – oil vs gas

![Graph showing net present value for MGO, HFO + Scrubber, and LNG.](image)

![Graph showing price disparity for Crude oil and Natural gas from 1990 to 2035.](image)
OSVs paving the way – LNG as fuel – bridge to the future

2003
Viking Energy
Stril Pioneer

2008
Viking Queen

2009
Viking Lady
(fuel cell installed)

2011
Skandi Gamma,

& 5 more new builds have been contracted
OSVs paving the way for LNG

- **LNG Fuelled OSVs**
  - **5 in operation**
    - Stril Pioner (Møkster - 2003)
    - Viking Energy (Eidesvik - 2003)
    - Viking Queen (Eidesvik - 2008)
    - Viking Lady (Eidesvik - 2009)
    - Skandi Gamma (DOF – 2011)
  - **5 under construction**
    - Solstad (2011)
    - Eidesvik (2012)
    - Island Offshore (2012)
  - **and several plans…**

- **Yards with LNG propulsion experience**
  - **Offshore Supply Vessels (OSV)**
    - Kleven Maritime (Norway)
    - West Contractors (Norway)
  - **Ferries and coastguard vessels**
    - Kleven Maritime (Norway)
    - STX Europe (Norway, France)
    - Remontowa (Poland)
  - **Others shipyards have LNG fuelled ships on order**
    - Fiskerstrand (Norway)
    - Bharati yard (India)
    - Tersan shipyard (Turkey)

- All OSVs currently in operation were delivered with Wärtsilä Dual Fuel engines
- The first OSVs with Rolls Royce gas engines were recently announced
Vessel delivered with fuel cell: OSV *Viking Lady*

Fuel cell (340 kW) with LNG for auxiliary power

Silent – Clean - Effective
Key Drivers for the future demand

**A step-change for the industry?**

*Some Challenges:*

- Who has the incentive for saving fuel cost (Opex)?
  - versus
- Who pay for the investment in technology (Capex)?
  - versus
- Second hand value?

- For LNG: Who pay for fuel infrastructure?
What will future demand require?

A quick peek at the Brazilian Market
Brazil O&G Offshore market – main trends

- E&P will be developed mostly in deep & ultra deep waters with complex technological challenges
- O&G production will continue to be dominated by Petrobras
- IOCs will continue having E&P operations (Shell, Chevron, BG, Repsol, Statoil, etc)
- Emerging 2nd tier Upstream companies with ambitious offshore development plans (OGX)
- Large gas reserves in PreSalt; room to grow gas market and become LNG exporter
- Existing infrastructure (yards, equipment manufacturers) need to increase to cope with the O&G demand and Local Content policy;
- New players coming to Brazil with increasing competition for resources
Example:
Challenges related to future Pre Sal development

Logistic aspects
- Approximate 300 km from shore

High demand for
- Transportation of personnel
- Transportation of fluids and cargos

Impact on vessel specifications
- Type, size, functional capabilities, speed, weather resistance, equipment & systems
- Operational aspects: >2000m water depth, total 5-7 km from sea level to oil resources (below 2 km of salt).

Source: Petrobras
## Oil & Gas Production in Brazil

<table>
<thead>
<tr>
<th></th>
<th>Jan 2011 (kboepd)</th>
<th>2020 (kboepd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrobras</td>
<td>2.356</td>
<td>5.097</td>
</tr>
<tr>
<td></td>
<td>93%</td>
<td>67%</td>
</tr>
<tr>
<td>OGX</td>
<td>0</td>
<td>1.400</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td>19%</td>
</tr>
<tr>
<td>Chevron Shell</td>
<td>180</td>
<td>360</td>
</tr>
<tr>
<td>Devon</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>Others (BG,</td>
<td>3</td>
<td>700</td>
</tr>
<tr>
<td>Statoil, etc)</td>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2.539</td>
<td>7.557</td>
</tr>
</tbody>
</table>

~90% offshore
Petrobras will need...

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>2013</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling Units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(water depth &gt; 2000m)</td>
<td>5</td>
<td>26</td>
<td>31</td>
<td>53</td>
</tr>
<tr>
<td>Production Units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Semis + FPSOs)</td>
<td>41</td>
<td>53</td>
<td>63</td>
<td>84</td>
</tr>
<tr>
<td>OSV</td>
<td>254</td>
<td>465</td>
<td>491</td>
<td>504</td>
</tr>
<tr>
<td>Jackets &amp; TLWPs</td>
<td>79</td>
<td>81</td>
<td>83</td>
<td>85</td>
</tr>
</tbody>
</table>
Shipyards in Brazil engaged in OSVs building

1. STX OSV Niteroi S.A.  
   - Niterói, Rio de Janeiro
2. Aliança S.A  
   - Niterói, Rio de Janeiro
3. Estaleiro São Miguel  
   - São Gonçalo, Rio de Janeiro
4. ETP Engenharia Ltda  
   - Niterói, Rio de Janeiro
5. EISA Estaleiro Ilha S.A  
   - Ilha do Governador, Rio de Janeiro
6. Wilson Sons Estaleiros  
   - Guarujá, São Paulo
7. Detroit Brasil S.A.  
   - Itajaí, Santa Catarina
8. NAVSHIP Estaleiros  
   - Navegantes, Santa Catarina
9. Keppel Singmarine S.A.  
   - Navegantes, Santa Catarina
Shipyards in Brazil engaged in OSVs building

STX OSV Niteroi S.A.
Aliança S.A.
Estaleiro São Miguel
ETP Engenharia Ltda
EISA Estaleiro Ilha S.A.
Wilson Sons Estaleiros
Detroit Brasil S.A.
NAVSHIP Estaleiros
Keppel Singmarine S.A.
Safeguarding life, property and the environment

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