National Subsea Research Initiative

The case for stand alone facilities

NSRI – the focal point for Research and Development for the UK subsea industry

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Who we are

A ‘not for profit’, industry led, expertly guided organisation

To enhance the UK’s position as the leading technology provider for the subsea industry

The technology arm of Subsea UK
What we do

Subsea Industry Sectors

Oil & Gas
Defence
Wave and Tidal
Ocean Science
Mining
Offshore Wind

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Economics study : Size of Prize

Assumption $60/ bbl

Methodology
Economic viability measure determined from operators profitability discount index, post tax (discounted at 10%) > 0.3;

• Production profiles of small pools drawn from DECC and averaged
• Industry norms used to determine CAPEX; OPEX and Decom costs
• Deterministic and probabilistic approaches taken
Results

• The smallest size of pool that becomes economic is 11.1MBoe. (existing technology)
• If a cost (C&O) reduction of 25% can be achieved, all things remaining constant, that become 9.1MBoe. (new technology, efficiency measures)
• For a cost reduction of 50% then that becomes 5.8MBoe. (disruptive technology)

This corresponds to opening up approximately 150 of the pools, $19Billion of CAPEX & $16Billion of OPEX and recovers 1.06Billion barrels.
Subsea Storage overview, economic challenge and meeting objective
Pipeline

Subsea Storage overview, economic challenge and meeting objective
Pipeline – Focused Graph

Distance to Pipeline

Subsea Storage overview, economic challenge and meeting objective
Resources by area: Changing small pools to pools.

Total P50 (3 to 100mmboe) recoverable by Area
Solutions

Facility A - Production Buoy with Subsea Storage

Not To Scale

Facility A - Discounted Cash-flow Chart

Image courtesy Enegi Oil

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Facility B - Subsea Separation with Subsea Storage

Facility B - Discounted Cash-flow Chart

Not To Scale
Solutions
Conclusion - Solutions

Facility A = Production buoy
Facility B = Subsea factory -lite
Facility C = Compact FPSO
Profile 1 = 5.8 MBoe
Profile 2 = 9.1 MBoe
Profile 3 = 11.8 Mboe

Conclusion = Facility A & B economic at MEFS of 11.8 & 9.1 MBoe
PFD for Oil production system

Autonomous Subsea Production System
Employing Subsea Storage
For Marginal Oil Fields
Figure 25 - Process flow diagram for revised process configuration of subsea production system.
GustoMSC Production jack ups

Image courtesy GustoMSC
Conclusive Remarks

Very Coarse economics

- Oil price $50 /bbl
- Lifting costs (best case) $15/bbl
- Pre tax profit margin say 25%
  \[50 - (0.25 \times 50) - 15 = $22.5/bbl\]

- Capex for development of

<table>
<thead>
<tr>
<th>Pool size</th>
<th>$</th>
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<tbody>
<tr>
<td>10mmBoe</td>
<td>225 million</td>
</tr>
<tr>
<td>25mmBoe</td>
<td>563 million</td>
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<tr>
<td>50mmBoe</td>
<td>1,125 million</td>
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NSRI- the focal point for Subsea Research and Development activity in the UK

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