Subsea Innovation : a key for cost reduction ?

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INTRODUCTION

DNV GL STRATEGIC RESEARCH & INNOVATION POSITION PAPER, 2015

ALL SUBSEA – CREATING VALUE FROM SUBSEA PROCESSING

IHS ENERGY

Upstream Technology and Innovation

Is Subsea Processing Technology the Next Game Changer for Deepwater Oil and Gas Exploitation?

19 November 2015

ihs.com
✓ **Topsides:**
  ✓ Power Generation, Chemicals Storage & Injection, Seawater Treatment & Injection, HPU Modules, Subsea Pumps Control

✓ **Subsea:**
  ✓ Production Flowline (Pipe in Pipe) + Service Line
  ✓ Water Injection Riser & Flowline
  ✓ Activation, Slug Management & Depressurization performed with SSU

✓ **But Preservation at high risk due to the long distance**
✔ **Topsides:**
  - Remove Preservation System (Dead Oil Circulation)
  - Add ETH Module

✔ **Subsea:**
  - Remove Service Line
  - Change Conventional PiP by Electrical Heat Traced PiP
  - Add Electrical Cable with 3 Subsea Distribution Units

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**Facilities CAPEX = 97%**

**Qualification in progress**
✓ **Topsides**:  
  ✓ Remove Seawater Treatment & Injection Module

✓ **Subsea**:  
  ✓ Remove Water Injection Riser & Flowline  
  ✓ Add Subsea Seawater Treatment & Injection Unit (SPRINGS)  
  ✓ Increase Electrical Cable Size & Modify Power Distribution

**Facilities CAPEX = 92%**

**Qualified 2017**
✓ **Topsides:**
  ✓ Remove Chemical Storage & Injection Module

✓ **Subsea:**
  ✓ Reduce Production Umbilical Size
  ✓ Add Subsea Chemical Storage & Injection Units (SCSI)
  ✓ Add Electrical Distribution for the SCSIs

**Facilities CAPEX = 84%**
✓ Topsides:
  ✓ Remove HPU Module for Wells and Valves Control

✓ Subsea:
  ✓ Remove Production & Injection Umbilicals
  ✓ Replace Hydraulic Actuators by Electric Actuators

✓ Qualified 2019
Topsides:
- Add AA Storage and Pumping Module

Subsea:
- Replace 12’’/18’’ ETH-PiP by 14’’ Wet Insulated Pipe (U=5)
- Add 2’’ AA Injection Line (Piggy-Back on Production Line)

Very High OPEX due to AA continuous injection

OPEX = up to 30 M$/y (year 2)

Facilities CAPEX = 69%
Topsides:
- Remove AA Storage and Pumping Module

Subsea:
- Add AA Subsea Storage & Injection *(for planned shutdowns only; no continuous injection of AA)*

But Risk of Hydrates Plugging for Long Unplanned Shutdowns *(typ. 12h+)*

Facilities CAPEX = 62%
CONCLUSION

• **Technology**
  - Each Subsea Technology improves slightly the economics
  - All Subsea Technologies have to be combined to obtain maximum benefit
    20% CAPEX cost reduction on this case due to subsea processing

• **Operating Philosophy**
  - Use of AA is the next game changer for Deep Water, but it implies a drastic change in Operating Philosophy
  - Extra 20% cost reduction by using AA but higher risk of hydrates plugging

**YES, we think Subsea Processing has a large potential for cost reduction in Deep Offshore**
THANK YOU FOR LISTENING

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