Subsea to Shore Gas Fields: Cost Reduction

**Authors:** Luc RIVIERE (TOTAL SA), Andrew MARPLE (TOTAL E&P UK), Dave MACKINNON (TOTAL E&P UK), Guillaume TOSI (TOTAL SA)

**Abstract:**

In the present-day low gas price environment, the development costs of small gas fields in Deep Offshore locations must be reduced, in order to keep them economically viable.

For these small Deep Offshore gas fields, the subsea to shore scenario is often the only economic solution, as the reserves are too limited for a stand-alone offshore facility development.

The development scheme for such marginal fields can either be a conventional one (i.e. by using proven subsea technologies and proven production strategies), or an innovative one – installing new subsea technologies, using subsea processing and implementing alternative production strategies that rethink the distribution of facilities between subsea and onshore.

Through a gas field example, this paper examines the impact on development costs of an innovative hydrate management strategy (continuous injection of LDHI Anti-Agglomerate instead of MEG); innovative production strategy (such as subsea pigging); innovative subsea technologies (such as all electrical technology); and subsea processing (such as subsea chemical storage and injection).

This paper shows that a combination of alternative production strategies and new subsea technologies can significantly improve the economics of gas fields, and their associated onshore plants, in the Deep Offshore environment without jeopardizing HSE performance or production availability.
Subsea to Shore Gas Field Cost Reduction

Luc RIVIERE - TOTAL SA
Andrew MARPLE – TOTAL E&P UK
Dave MACKINNON – TOTAL E&P UK
Guillaume TOSI – TOTAL SA
Introduction

- Remote gas fields: subsea to shore is one of the best options

- But cost remains high

- Is it possible to reduce the development costs to make them profitable in a 50 $/bbl environment?

- Example of Laggan-Tormore – West of Shetlands – to Shetlands Gas Plant (SGP)
Laggan-Tormore Development

Subsea to Shore Gas Field - Cost Reduction
Onshore: MEG storage & regeneration
Onshore : Slug Catchers
Subsea

Template

Audacia pipelay vessel

Subsea to Shore Gas Field - Cost Reduction
Base Case: As Built

MEG continuous injection
2 production lines for pigging & turndown
Umbilical for chemicals & well control

Facilities CAPEX = 100%

140 km

MEG Coated Lines 8" & 2"
Umbilical 5.1"

Template 2
Template 1

Production Concrete Coated Lines - 2x18"

600m WD

Onshore Plant

Subsea to Shore Gas Field - Cost Reduction
Optimized Base Case

Suppression of 2” MEG line (use spare liner in umbilical)
Common rock dumping for MEG line & umbilical

Facilities CAPEX = 96%

140 km
**Option 1 : Anti-Agglomerant Injection**

Replace continuous MEG injection by continuous AA-LDHI injection
Remove 8” MEG line & MEG onshore storage & regeneration
AA injected through umbilical

**Facilities CAPEX = 88%**

- Replace continuous MEG injection by continuous AA-LDHI injection
- Remove 8” MEG line & MEG onshore storage & regeneration
- AA injected through umbilical

No impact on OPEX

(AA injection OPEX = MEG plant OPEX)
Option 2: All Electrical Subsea

Replace Electro-Hydraulic by All Electric
Electric power & Fiber Optic through dedicated DC/FO cable

Facilities CAPEX = 84%

Subsea to Shore Gas Field - Cost Reduction
Option 3: One Single Production Line

- Suppression of 1 production line & 1 slug catcher
- Add Subsea Pig Launcher

Facilities CAPEX = 77%

140 km
Option 4: Subsea Chemical Storage

Umbilical for AA, Electric power and Fibre Optic
Subsea Storage for MEG and chemicals

Facilities CAPEX = 79%

Subsea to Shore Gas Field - Cost Reduction
Recap on Cost Reduction

Subsea to Shore Gas Field - Cost Reduction
Conclusion

- Yes, we can reduce the cost of subsea to shore gas field development by about 20%

- But we need to:
  1. Change the hydrate management strategy
  2. Implement All Electrical Systems
  3. Improve fluids modeling to better assess single line constraints
THANK YOU FOR LISTENING

Contact information
Luc RIVIERE – TOTAL SA
luc.riviere@total.com
DISCLAIMER and COPYRIGHT RESERVATION

The TOTAL GROUP is defined as TOTAL S.A. and its affiliates and shall include the person and the entity making the presentation.

Disclaimer

This presentation may include forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 with respect to the financial condition, results of operations, business, strategy and plans of TOTAL GROUP that are subject to risk factors and uncertainties caused by changes in, without limitation, technological development and innovation, supply sources, legal framework, market conditions, political or economic events.

TOTAL GROUP does not assume any obligation to update publicly any forward-looking statement, whether as a result of new information, future events or otherwise. Further information on factors which could affect the company’s financial results is provided in documents filed by TOTAL GROUP with the French Autorité des Marchés Financiers and the US Securities and Exchange Commission.

Accordingly, no reliance may be placed on the accuracy or correctness of any such statements.

Copyright

All rights are reserved and all material in this presentation may not be reproduced without the express written permission of the TOTAL GROUP.