

Deep offshore gas fields: a new challenge for the industry

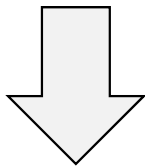
Emil Gyllenhammar
Aker Solutions



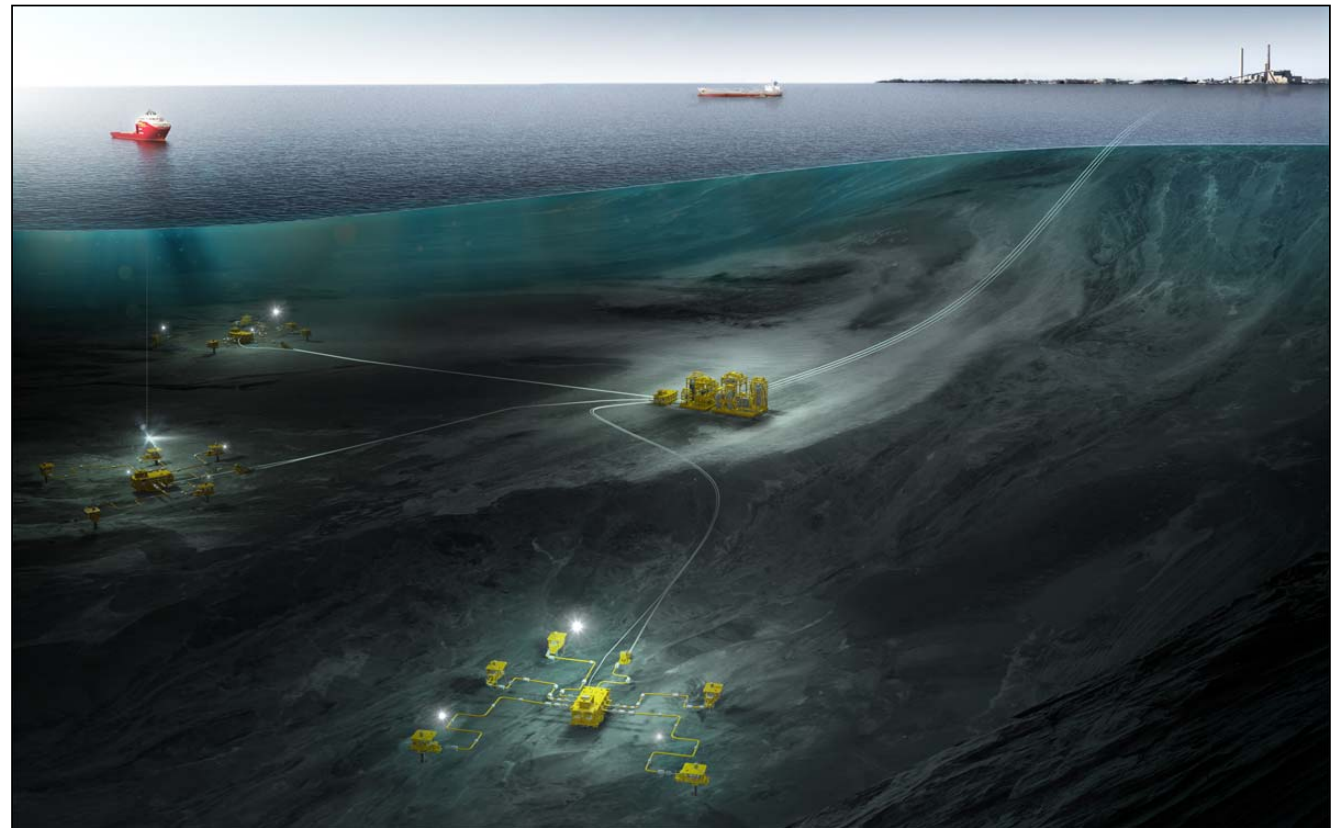
The challenge

- Remote gas fields in offshore depths of up to 3000 m
- Far away from the nearest coast
- Little or no oil and gas infrastructure

Finding cost effective field development strategies

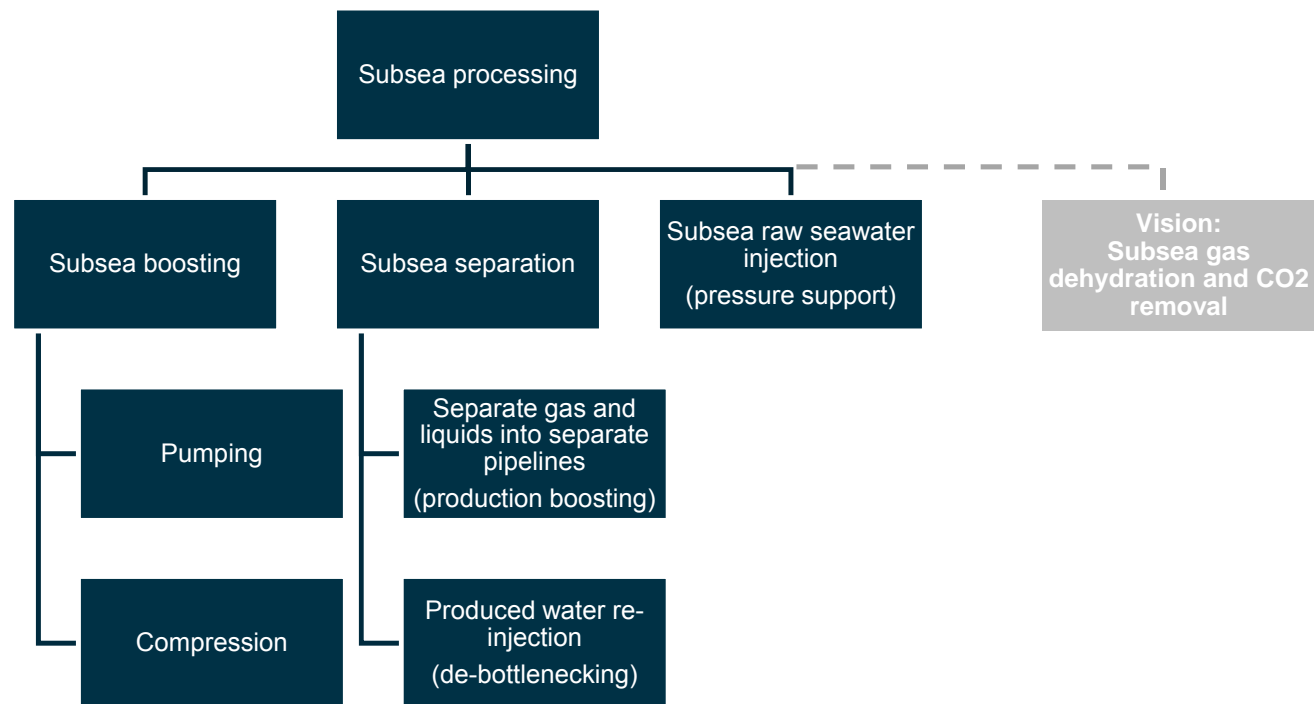


Subsea processing opens up new possibilities



Subsea processing toolbox

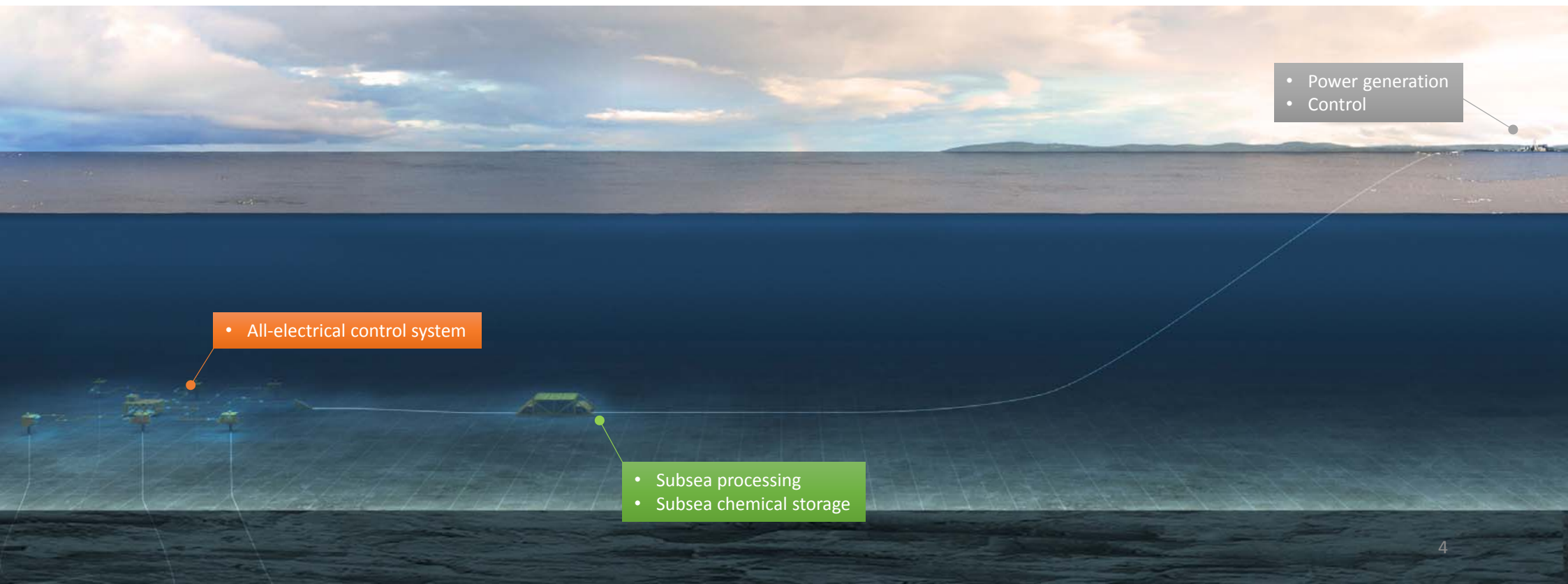
- Currently three separable categories of subsea processing exists in operation. The categorization is based on what the main purpose of the system is:



Stand-alone subsea solutions for gas fields

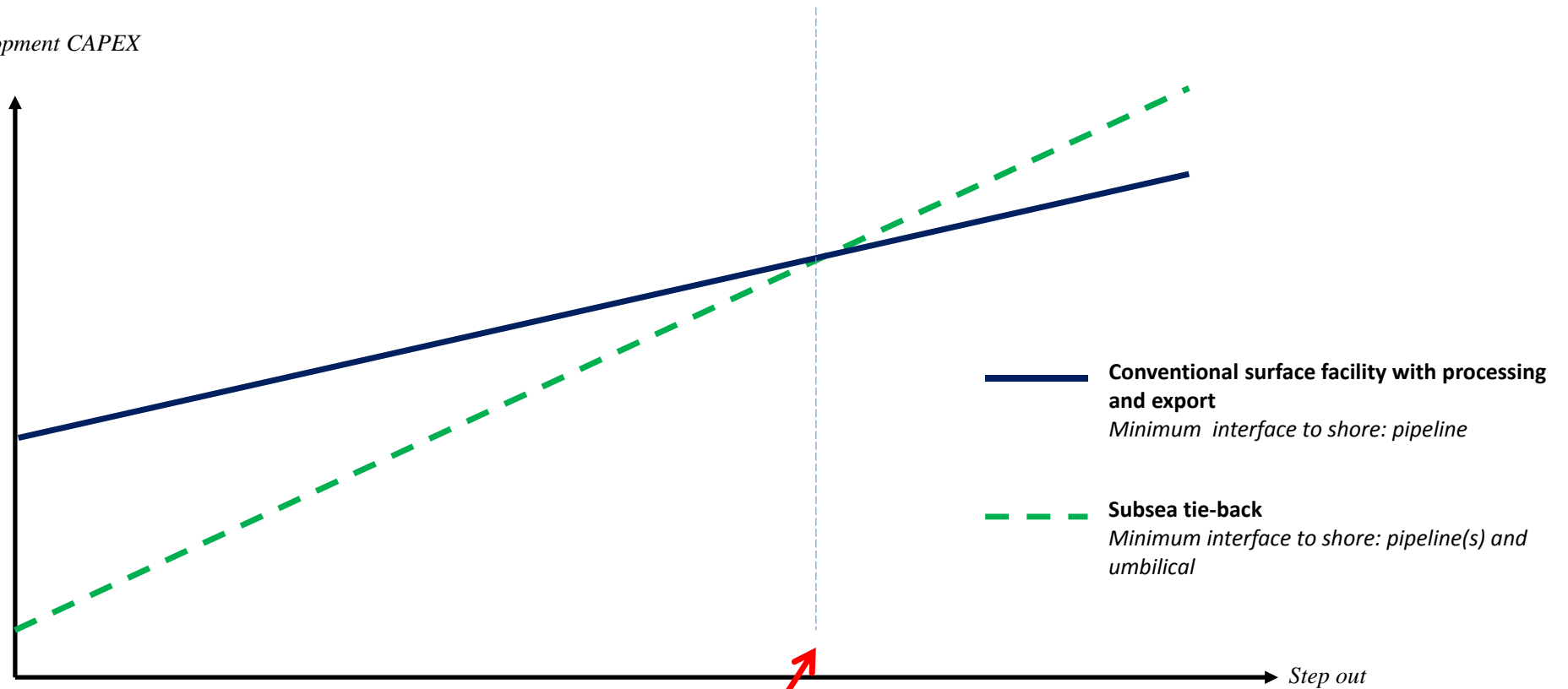
Autonomous subsea field development solution

- No surface facilities
- Tie back to shore / a surface facility far away → subsea compression needed



Long tie-backs and distance dependent cost

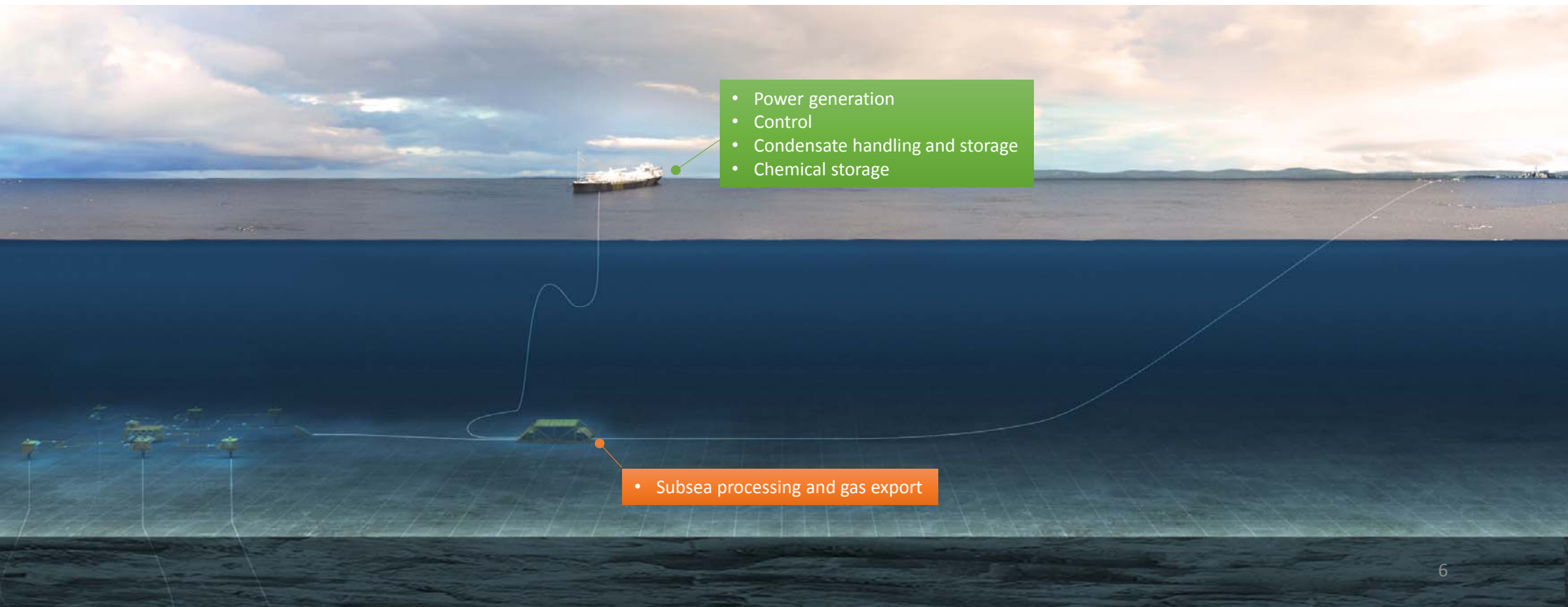
Field development CAPEX



At a certain distance the cost of pipelines and umbilical will dominate

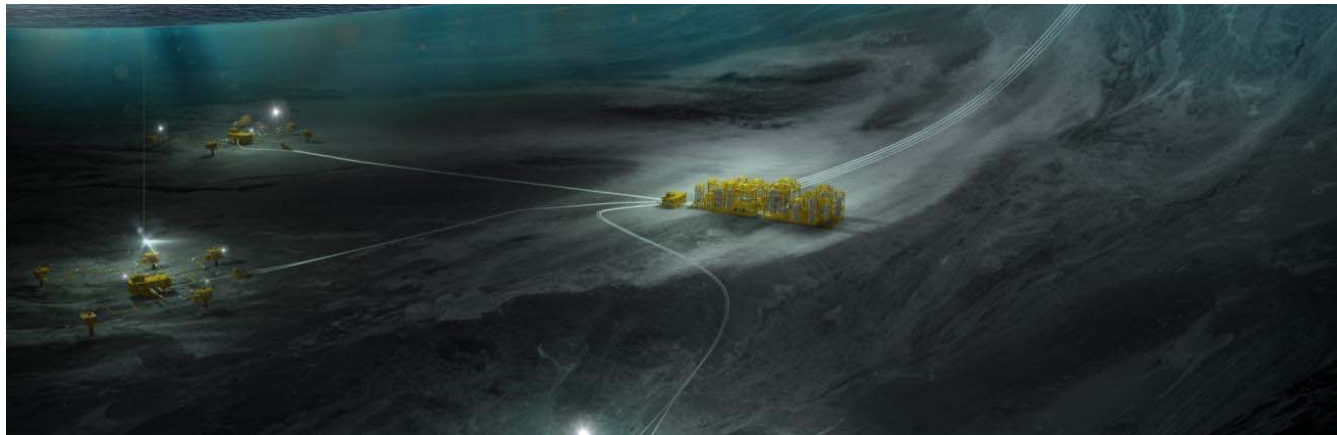
Hybrid subsea/floater solutions for gas fields

- Support from a small surface facility with reduced topside size, complexity, manning and cost compared to a conventional processing platform/FPSO



DEPTH[®] for Gas Fields – case overview

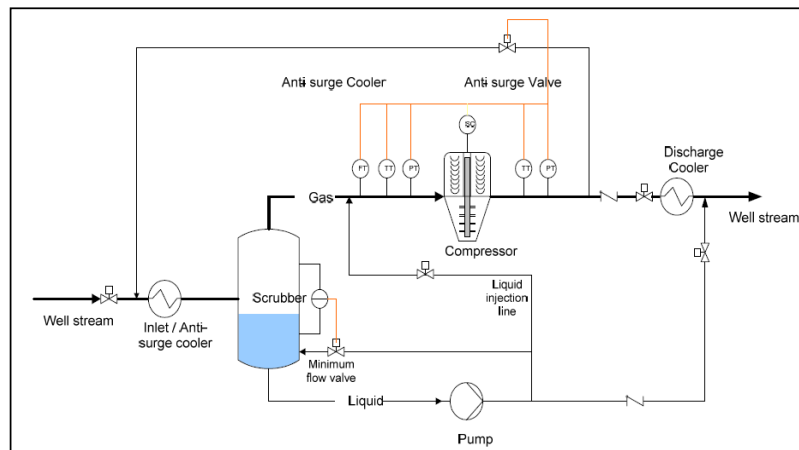
DEPTH[®] (Deep Export, Production and Treatment Hub) for Gas Fields is a joint effort between Total and Aker Solutions with the aim of identifying cost effective subsea field development solutions with long distance tie-backs to shore for deep offshore gas fields.



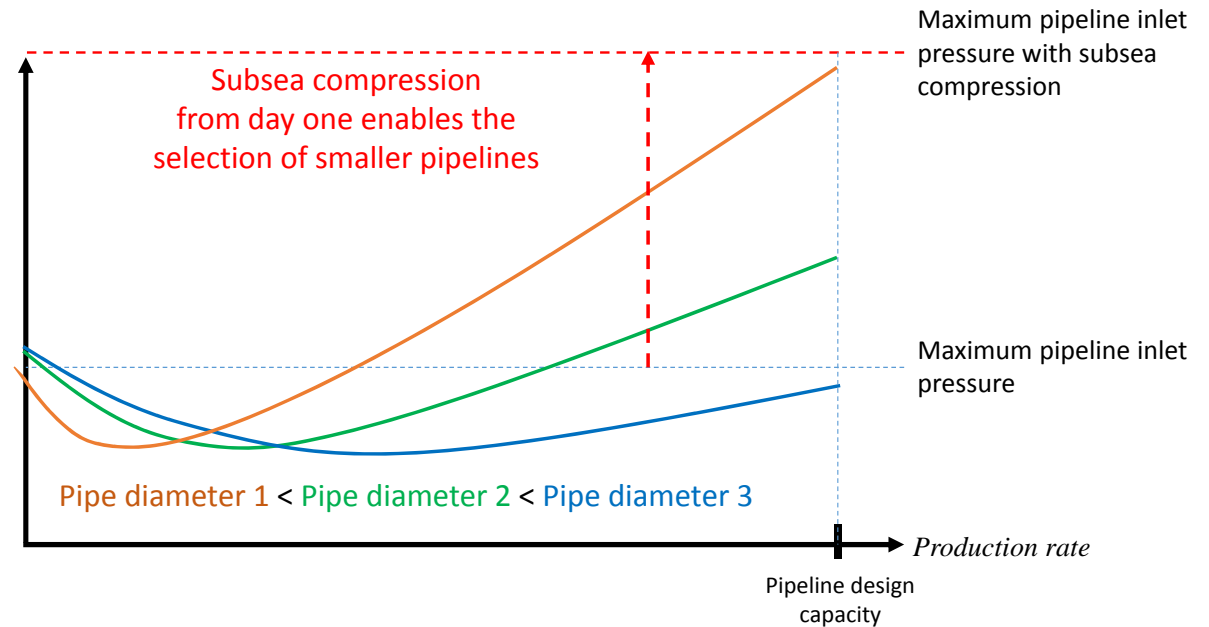
- Gas field: 500MMScf/d (CGR=40)
- 300 km step-out
- 2500m water depth
- No surface facilities - tie-back to shore



Subsea compression in DEPTH



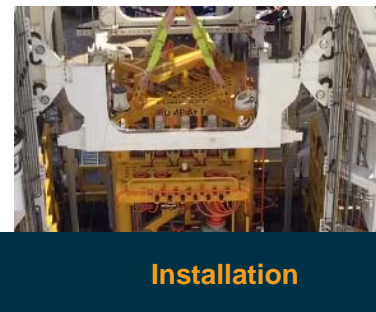
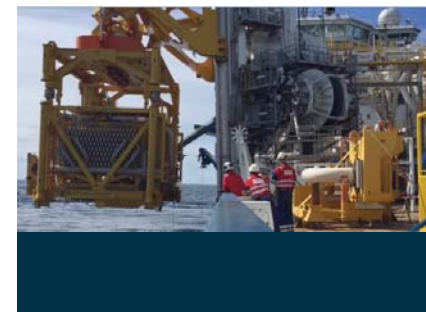
Åsgard Subsea Compression flow diagram



Two options for the installation of subsea compression:

1. Subsea compression installed late life / when minimum flow is reached to increase production
2. Subsea compression installed from day one to reduce pipeline size and cost

Åsgard Subsea Compression – On Stream



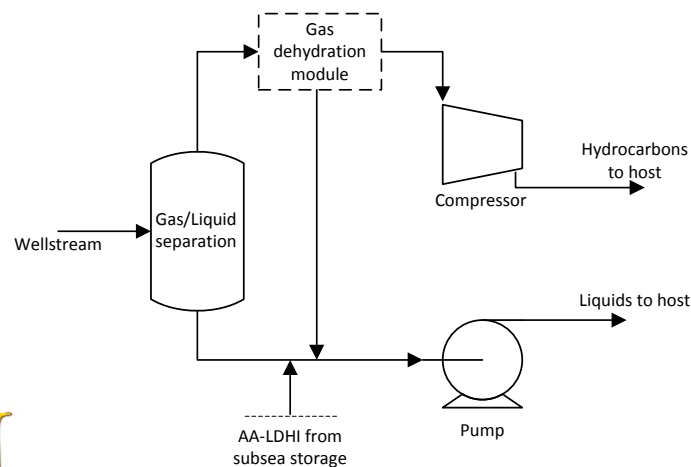
First Gas
17th Sept 2015
“operates like a Swiss watch”



Subsea gas dehydration in DEPTH

Removing both free water and water solved in the gas:

- Remove the need for continuous MEG injection from shore
- Reduce pipeline material requirements and avoid corrosion
- Reduce pressure drop and increase turndown flexibility



Technologies not requiring glycol for dehydration

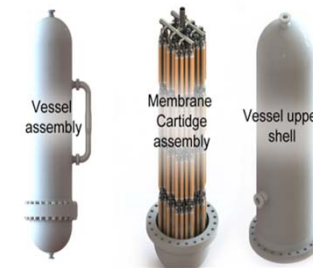
Adsorption

- Water removal using beds of **solid desiccants**
- Batch process
- No chemical required
- Require regenerations of the solid desiccants



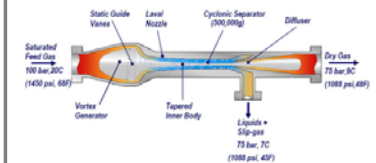
Membrane

- Water removal with **selective membrane**
- Continuous process
- No chemical required
- Low pressure drop



Supersonic separation

- Water removal with **low temperature**
- Continuous process
- No chemical required
- High pressure drop



Detailed screening of technology, system design and technology qualification planning performed



Conclusion

- Subsea processing offers **alternative development options** for deep offshore gas fields with cost saving potential
- With **subsea compression** installed and operating; it can now also applied in greenfield developments **from day one** to reduce pipeline cost
- Subsea dehydration **removes** the need for **continuous MEG injection** and offers advantages in pipeline operability and material cost

