

Challenges in creating an infrastructure for transportation of gas

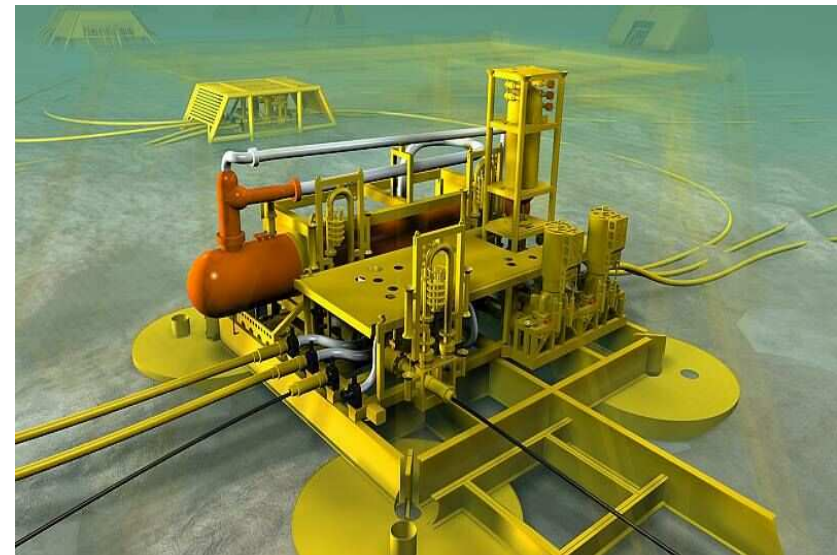
World Gas Conference

Amsterdam June 2006

Sigurd Hamre

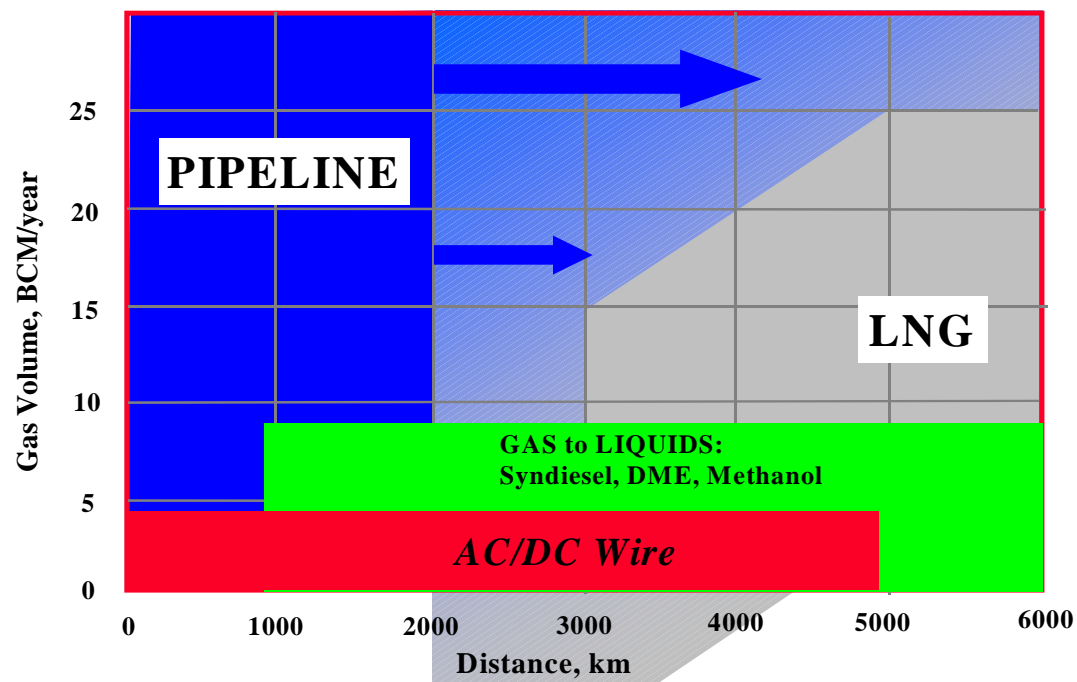
Objective of Presentation

**Put focus on future development of pipeline systems
for long-distance transport of natural gas**



Background

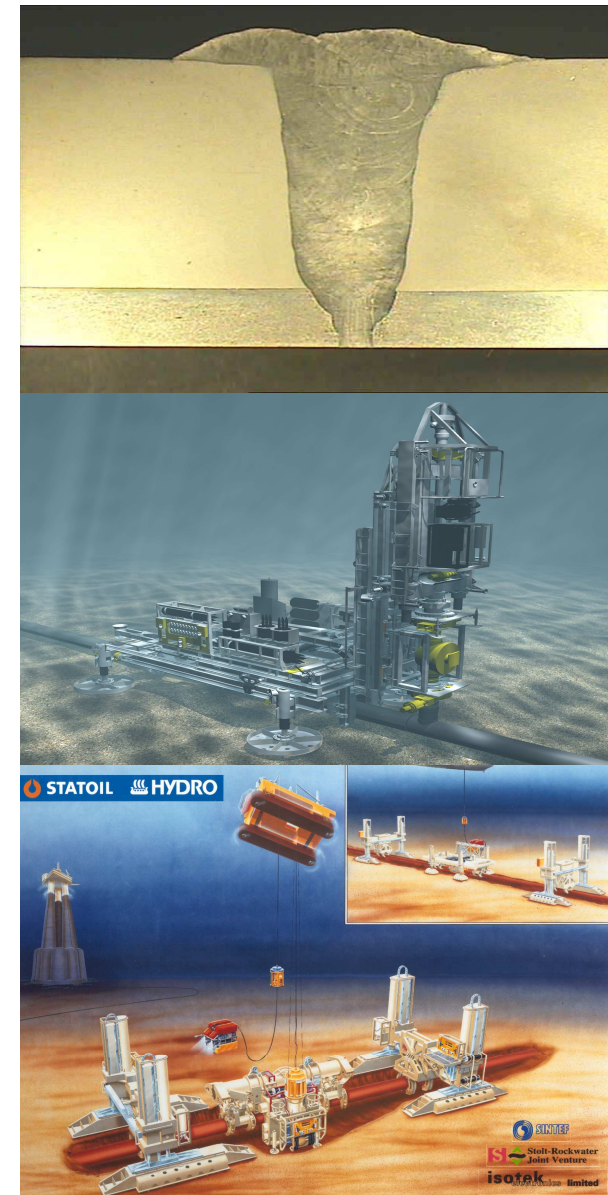
- Increasing natural gas demand
- Increasing distance from resources to key markets
- Development of alternative ways of transport (LNG, GTL, CNG, etc.)
- Could pipeline systems also meet the requirements for future demands?



Offshore trunkline systems

NEW CHALLENGES AHEAD

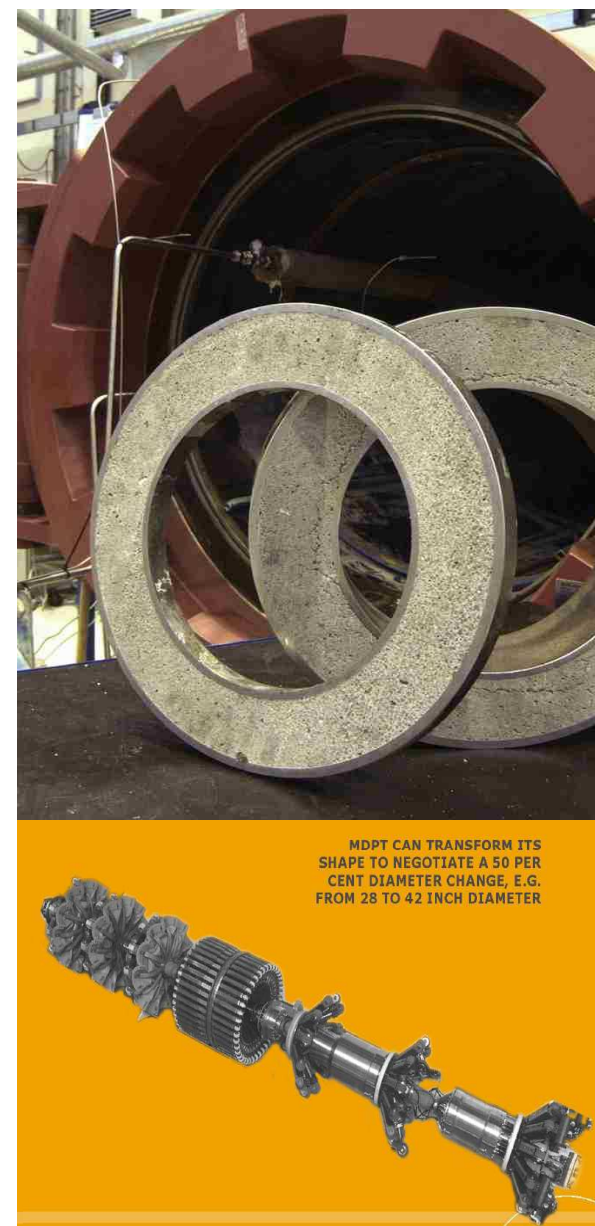
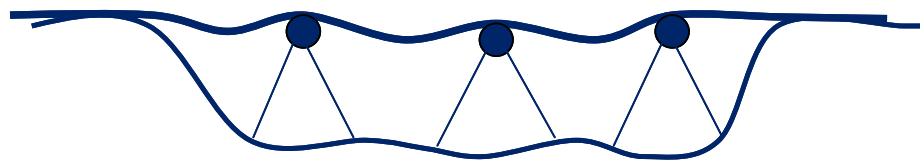
- System design
- Design criteria
- Material properties
- Installation and water depth
- Operational requirements
- CAPEX and OPEX



Offshore trunkline systems

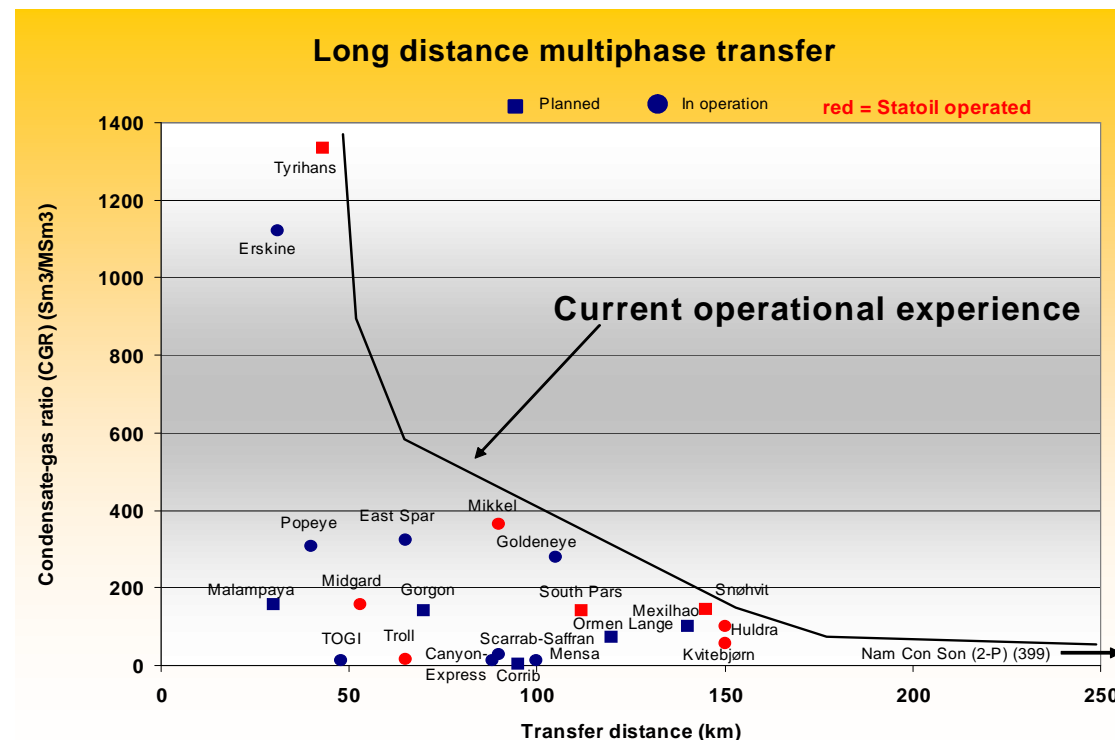
WHAT COULD BE LEAVERS FOR A STEPCHANGE

- Multi-diameter systems
- High operating pressures
- Material selection
- New installation methods
- Pipeline integrity management
- Low OPEX transport



Offshore tie-back to shore

- **Development of multi-phase transport technology**
 - **Step-change over the last few years**
- **Subsea facilities development**
 - **Compression**
 - **Processing**

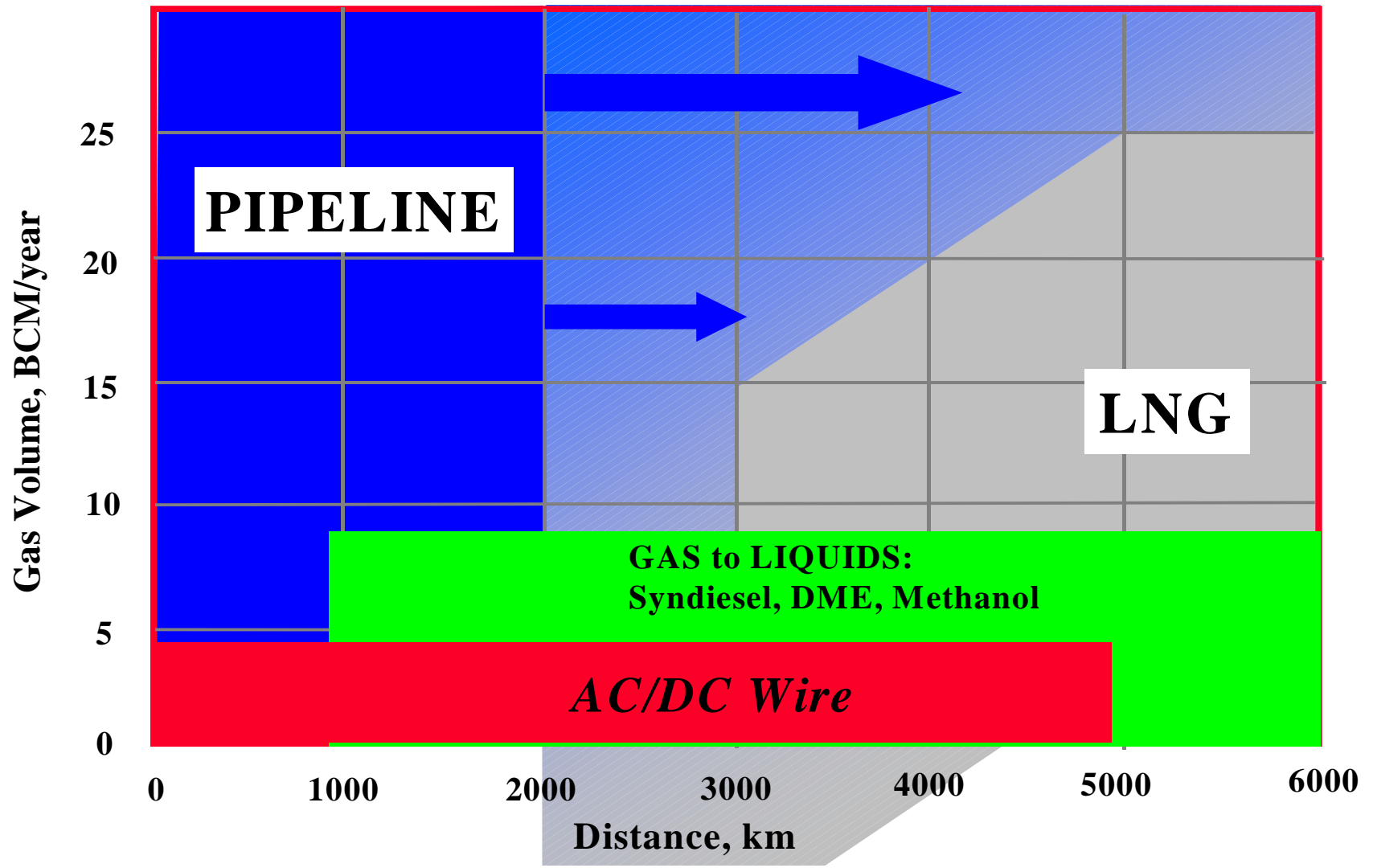


Onshore pipelines

- **What may contribute to more efficient transport systems?**
 - **Construction methods**
 - **High-grade steels**
 - **Operating pressure**
- **Challenges**
 - **HSE**
 - **Codes and standards**
 - **General conservatism**

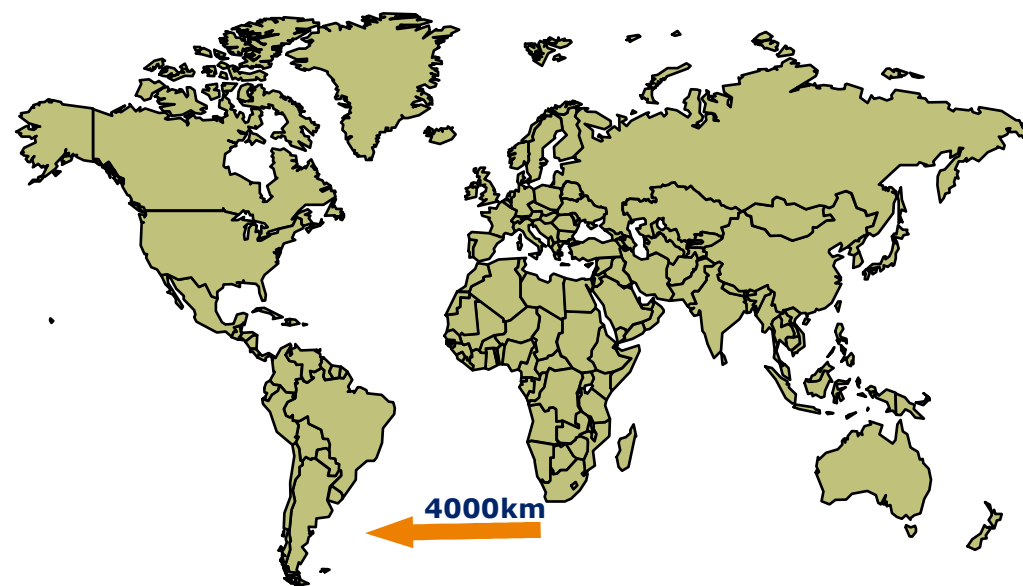


Transport solutions



What may be achieved?

- **More cost effective pipeline transport**
- **Longer tie-backs to shore**
- **Development solutions for new areas**
 - **Sub-ice**
 - **Harsh environment**
- **3-4000 km + offshore pipelines**
- **3-4000 m water depth**
- **Low OPEX solutions**



Summary

- **By challenging the pipeline industry new solutions has been developed in the past**
- **High ambitions very often result in remarcable results**

THANK YOU FOR YOUR ATTENTION

