

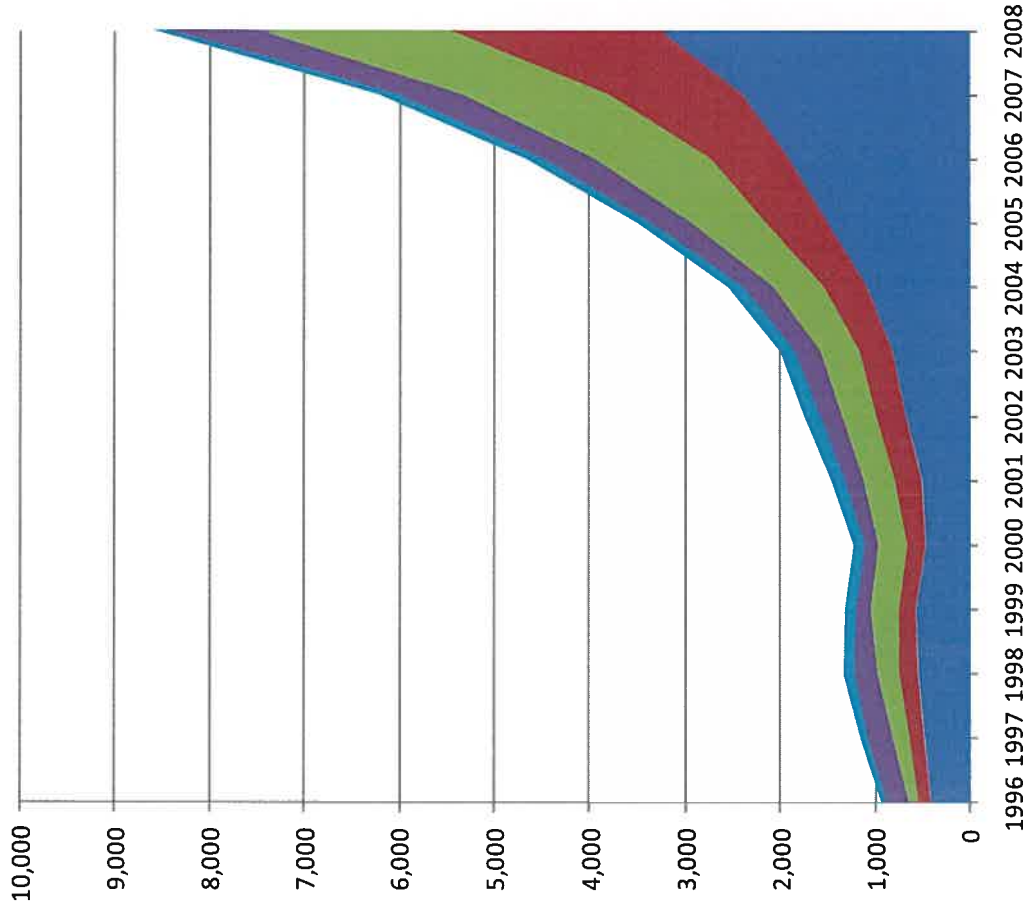


Forening for Fjernstyrt Undervannsteknologi, FFU
2009 seminar "Deep, cold and remote"
29 Januar 2009
IB senteret StatoilHydro
Forus Stavanger

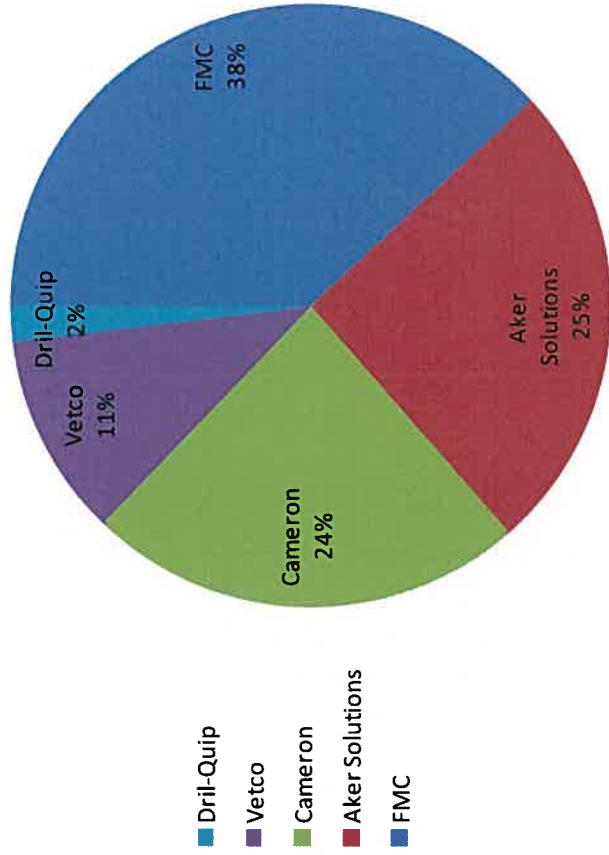
Tom Munkejord
FMC Technologies
Director Process System

*We put you first.
And keep you ahead.*

Historical subsea hardware revenues (\$ Mill)



Subsea hardware market shares 2008E



Source: Rystad Energy

Key Industry Macro Trends

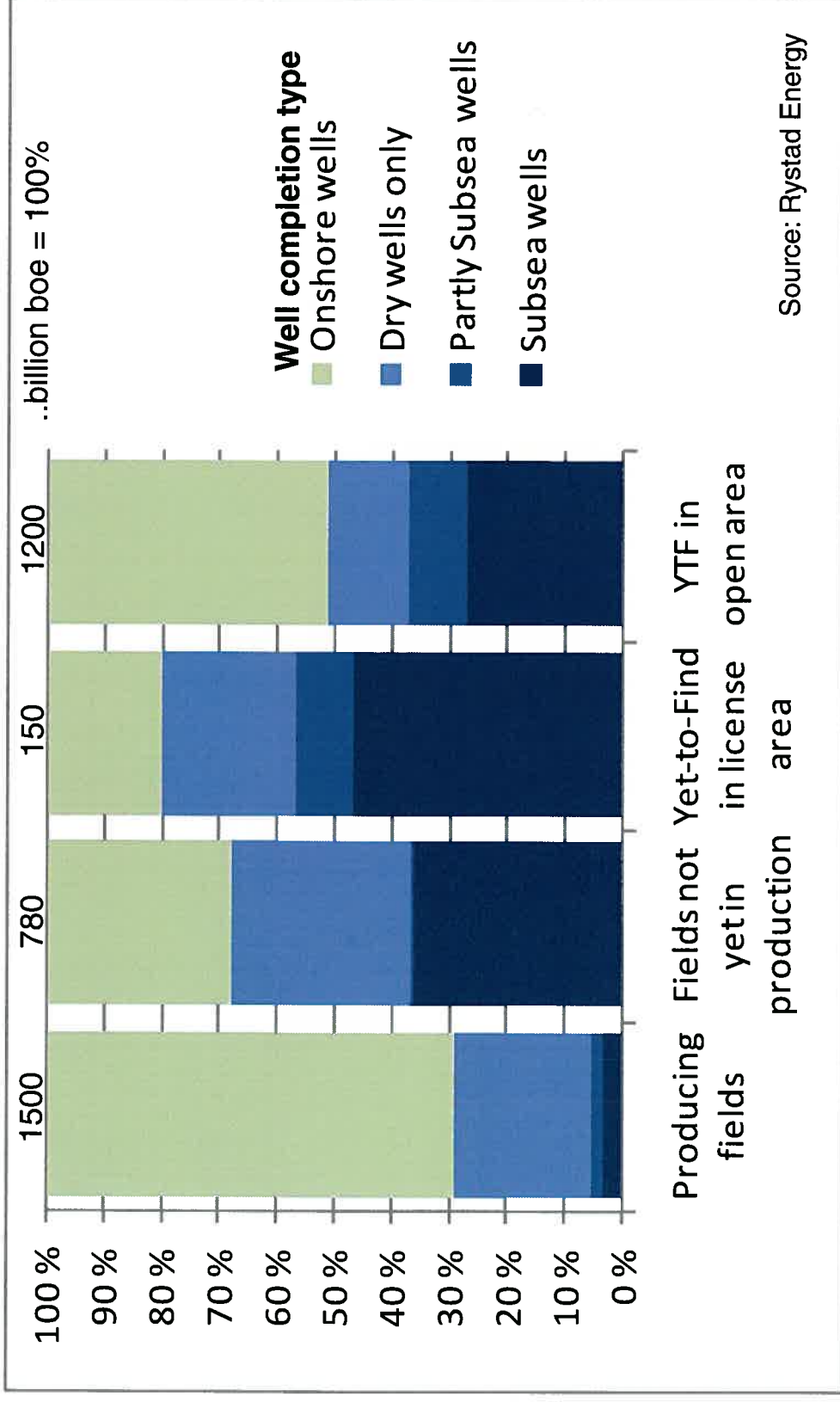
- Strong oil and gas price fundamentals..... until july 08
- Oil Companies struggling to meet shareholder production and reserves expectations:
 - Closed off to major reserves held by NOC's
 - Going after difficult reserves (heavy oil, sub-salt, ultra-deep, arctic)
 - Rising development costs
 - Lower recovery rates from subsea fields
- Subsea favored over other well completion methods, ie Spar and TLP's

Oil Companies' Priorities from now on

- Access to Frontier / Difficult Reserves
 - Deep Water, Heavy Oil, Long Distance, Sub-Salt, Arctic
- Increased Oil Recovery
- Production Optimization
- Acceleration of First Oil - Reduced Development Time
- Reduced Development and Operating Costs
- Enhanced Environmental and Safety Performance

Onshore to offshore – a shift soon to come

Remaining resources globally of oil, gas and condensate
Billion boe; share of all fields within category



IOCs Focus on Accessing Challenging Reserves – 90% of Investments in Difficult Areas

IOC New Field Development Focus Areas

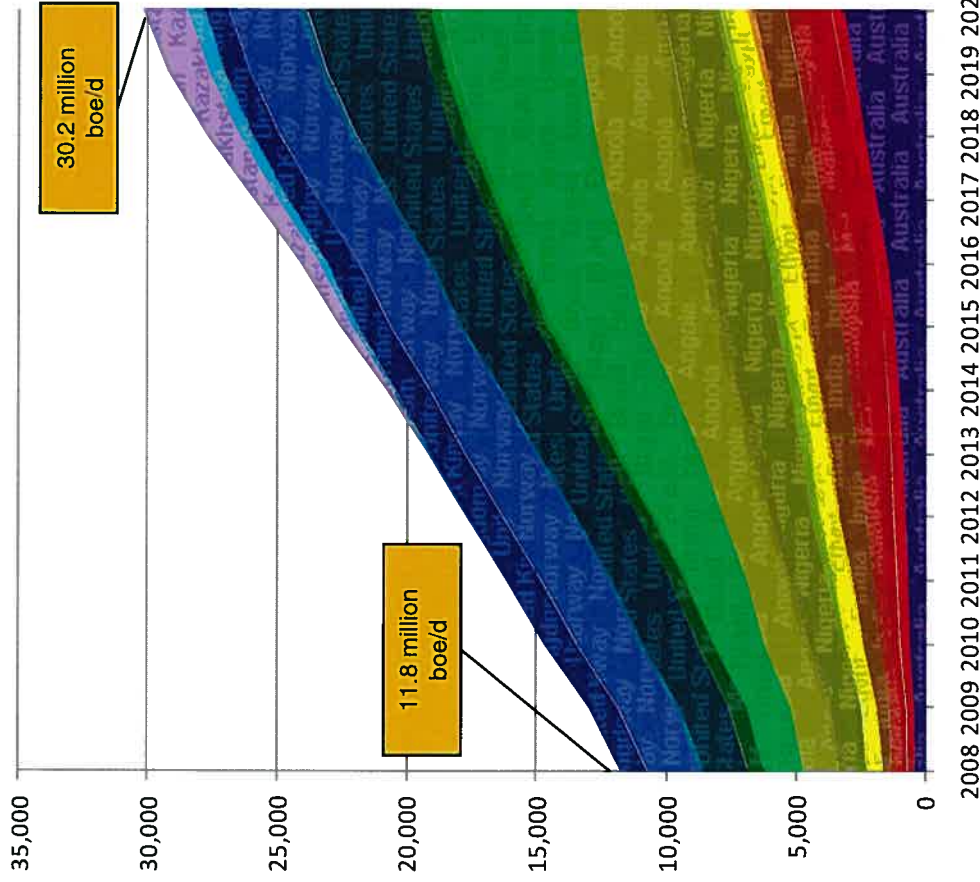
% Investment	Sector	Geographies	Characteristics
30%	Deepwater	<ul style="list-style-type: none"> • GOM • Brazil • W. Africa • North Sea 	<ul style="list-style-type: none"> • Enhanced seismic driving increased exploration success • Deeper waters, deeper wells, complex formation (sub-salt), heavy oil • Both large and small discoveries
22%	Stranded Offshore Gas	<ul style="list-style-type: none"> • Middle East • W. Africa • SE Asia • Australia 	<ul style="list-style-type: none"> • LNG – liquefaction and gasification • Floating LNG
20%	Shale / Tight Gas	<ul style="list-style-type: none"> • Canada • U.S. 	<ul style="list-style-type: none"> • Advanced fracing • Multi-laterals
18%	Heavy oil	<ul style="list-style-type: none"> • Canada • Venezuela • U.S. • Brazil • GOM 	<ul style="list-style-type: none"> • Steam injection/heat intensive • Produced hydrocarbons require significant upgrade

Subsea

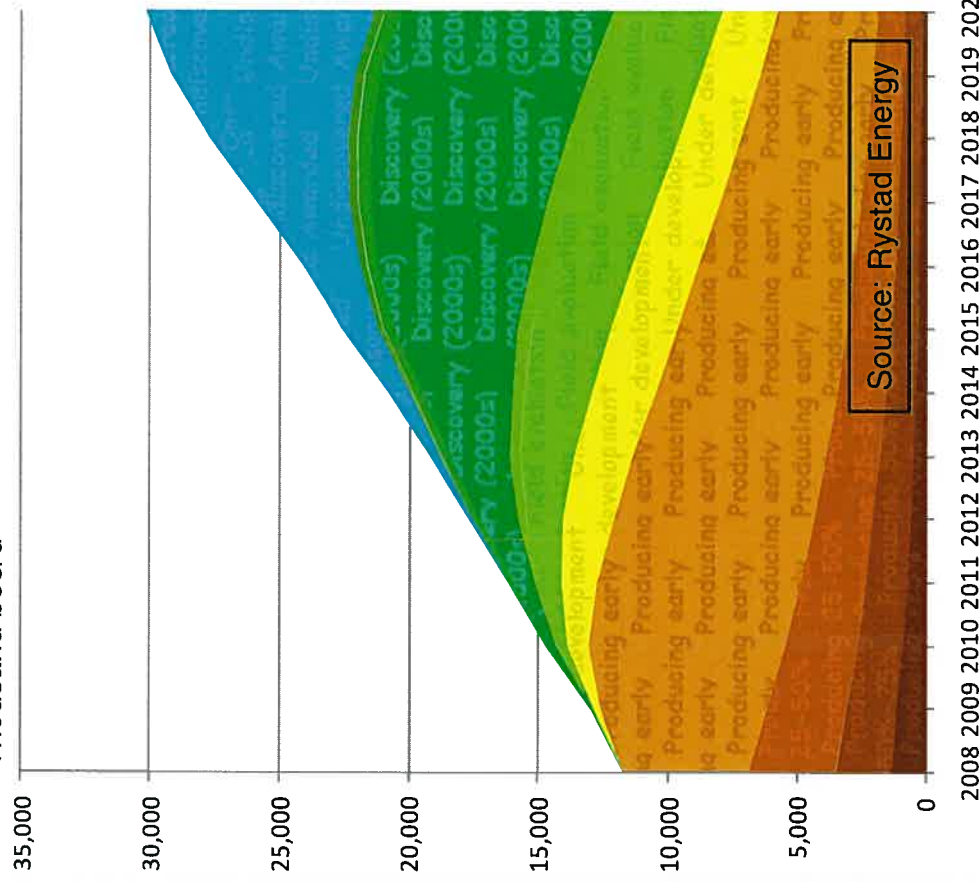
Surface

Production from subsea fields to grow by 8.1% annually to 2020

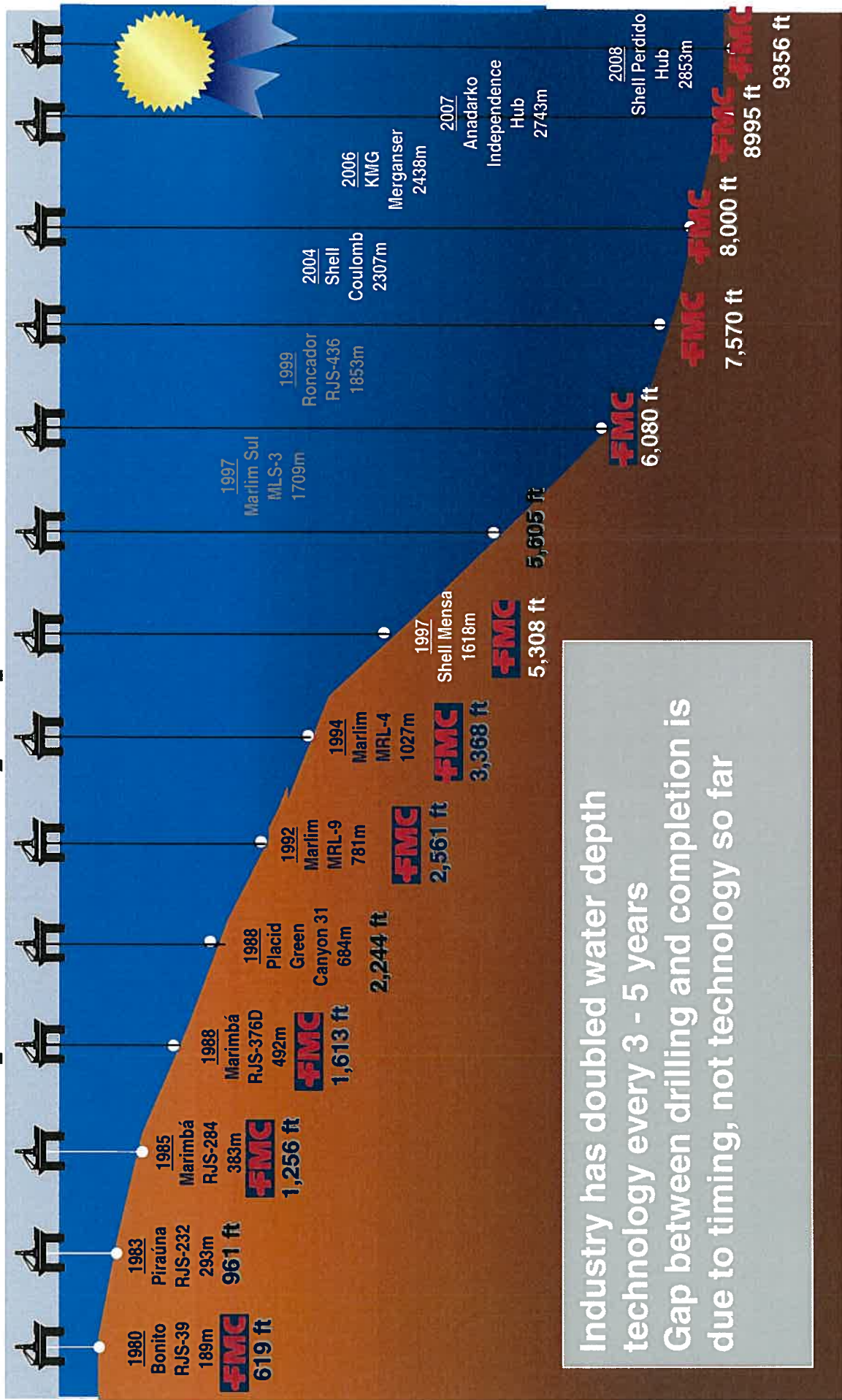
Global subsea oil and gas production by country
Thousand boe/d



Global subsea oil and gas production by lifecycle
Thousand boe/d



Water Depth – Easy up to now..



Industry has doubled water depth technology every 3 - 5 years
 Gap between drilling and completion is due to timing, not technology so far

Pre-salt Cluster

Consortia for the Pre-salt blocks in Santos Basin

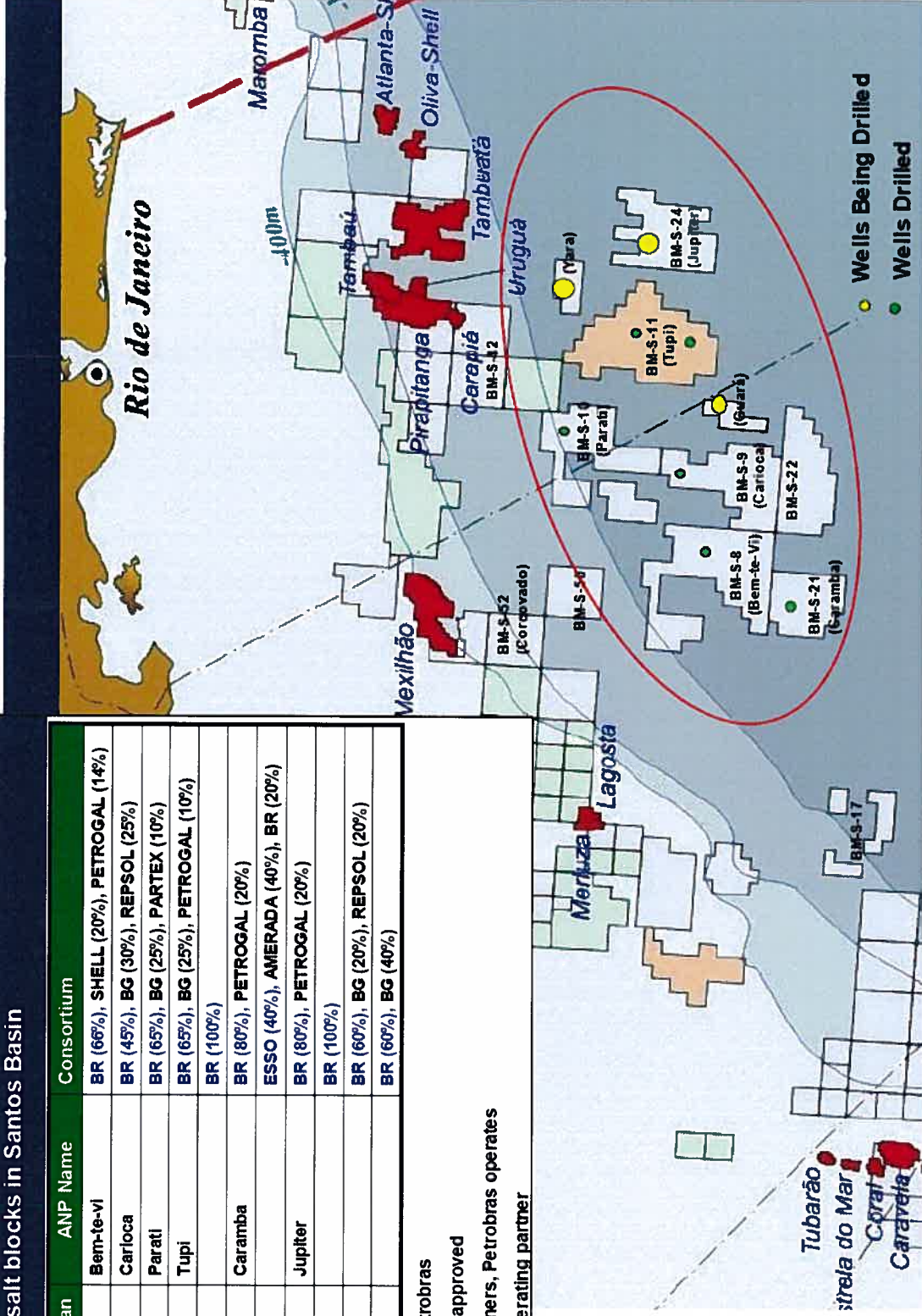
Block	Appraisal Plan	ANP Name	Consortium
BM-S-8		Bem-te-vi	BR (66%), SHELL (20%), PETROGAL (14%)
BM-S-9	SPS-50 Area	Carloca	BR (45%), BG (30%), REPSOL (25%)
BM-S-10	RJS-617 Area	Parati	BR (65%), BG (25%), PARTEX (10%)
BM-S-11	RJS-628 Area	Tupi	BR (65%), BG (25%), PETROGAL (10%)
BM-S-17			BR (100%)
BM-S-21	SPS-51 Area	Caramba	BR (80%), PETROGAL (20%)
BM-S-22			ESSO (40%), AMERADA (40%), BR (20%)
BM-S-24	RJS-652 Area	Jupiter	BR (80%), PETROGAL (20%)
BM-S-42			BR (100%)
BM-S-50			BR (60%), BG (20%), REPSOL (20%)
BM-S-52			BR (60%), BG (40%)

2 blocks 100% Petrobras

3 Appraisal Plans approved

5 blocks with partners, Petrobras operates

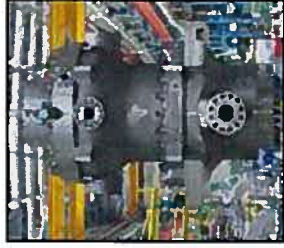
1 block as non-operating partner



Subsea Processing Evolution



Subsea to Market



Subsea Compression



Boosting Station



Raw Seawater Injection



Compact Separation



Heavy oil applications



Gravity Separation

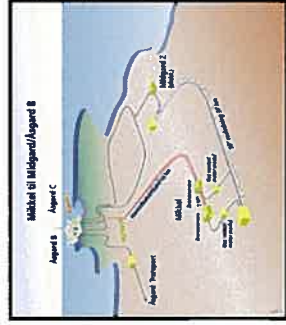
Inline and ultra-compact solutions

- Proven topside technology
- Ongoing qualification for subsea use

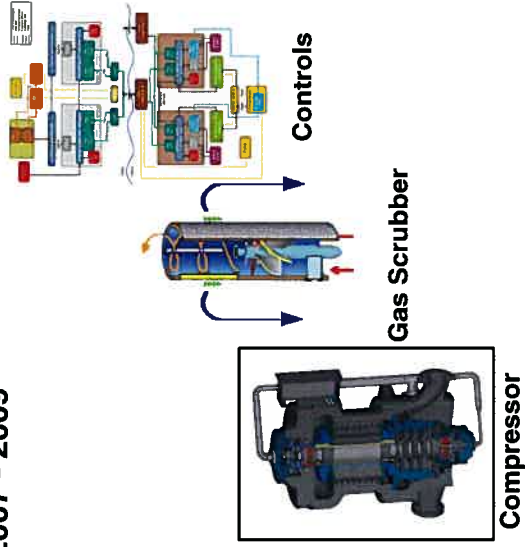


Roadmap to Subsea Gas Compression Qualifying Technology for Åsgard MFP

**Åsgard System
Concept Study and
Component evaluation
2005 - 2006**



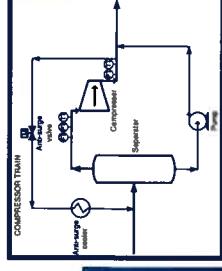
**Component Qualification and Testing Activities
2007 - 2009**



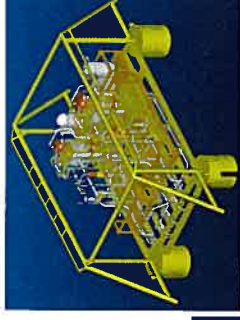
**Pre-FEED/FEED
System Studies
2007 - 2008**



**Onshore System Test
2009 - 2010**

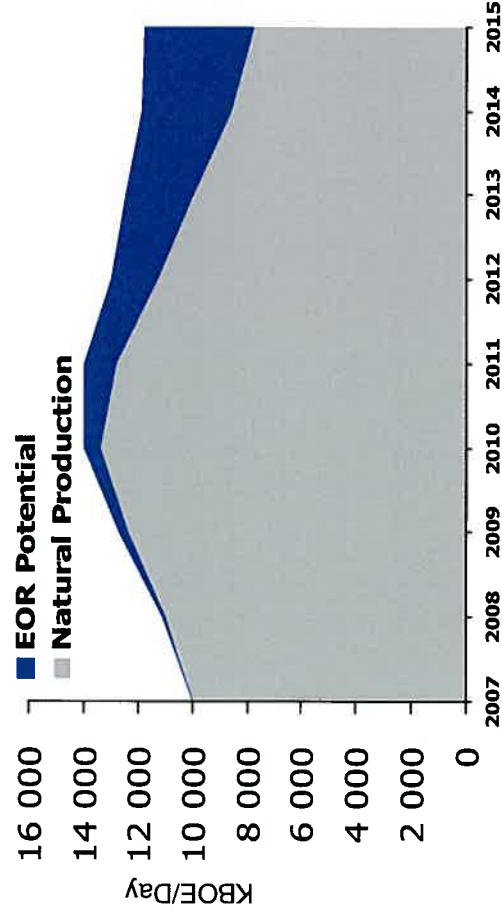


**Subsea Operation
2013**



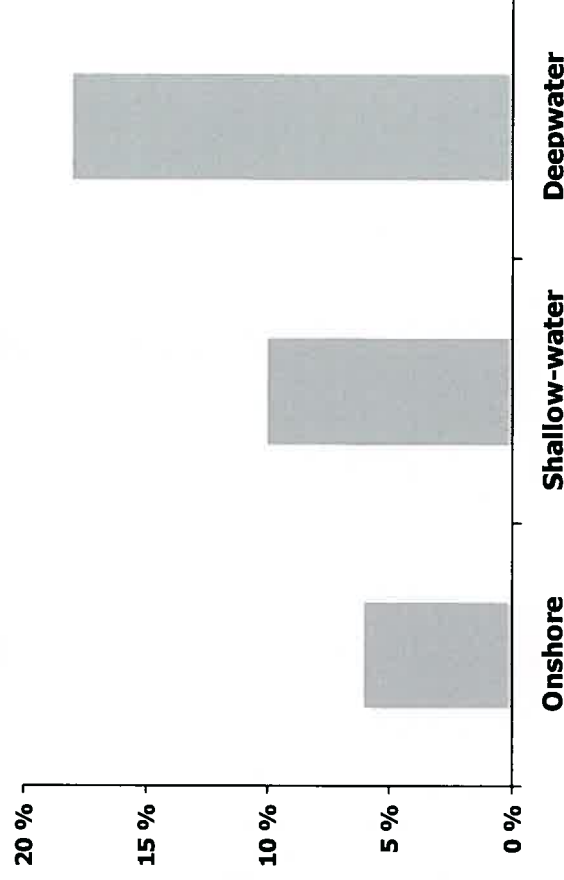
Strong Focus on Increased Oil Recovery Subsea

Subsea Field Production Profile



Source: Fystad Energy

Annual Field Decline Rates



Source: Cambridge Energy Research Associates (CERA); Jan 2008

Note: Includes natural decline plus EOR efforts

Onshore/Shallow water field declines lower due to EOR technologies

Implications

- Increased opportunities to push IOR on Subsea fields
- Increased need for processing and boosting capabilities
- Increasing need to conduct well interventions and extensions

Light Well Intervention

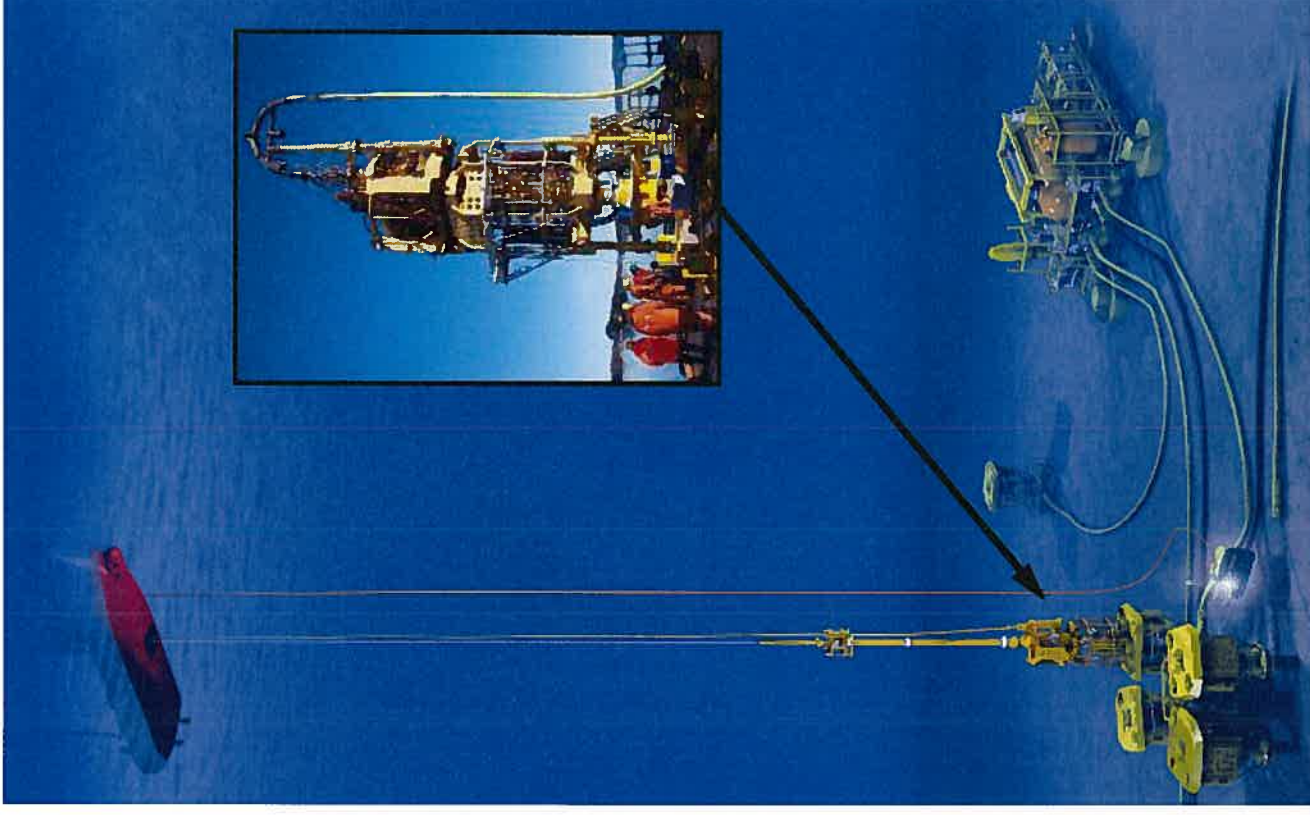
Patented Technology Solution

Light Well Intervention Benefits:

- Lower cost
- Shorter time
- Increased oil recovery

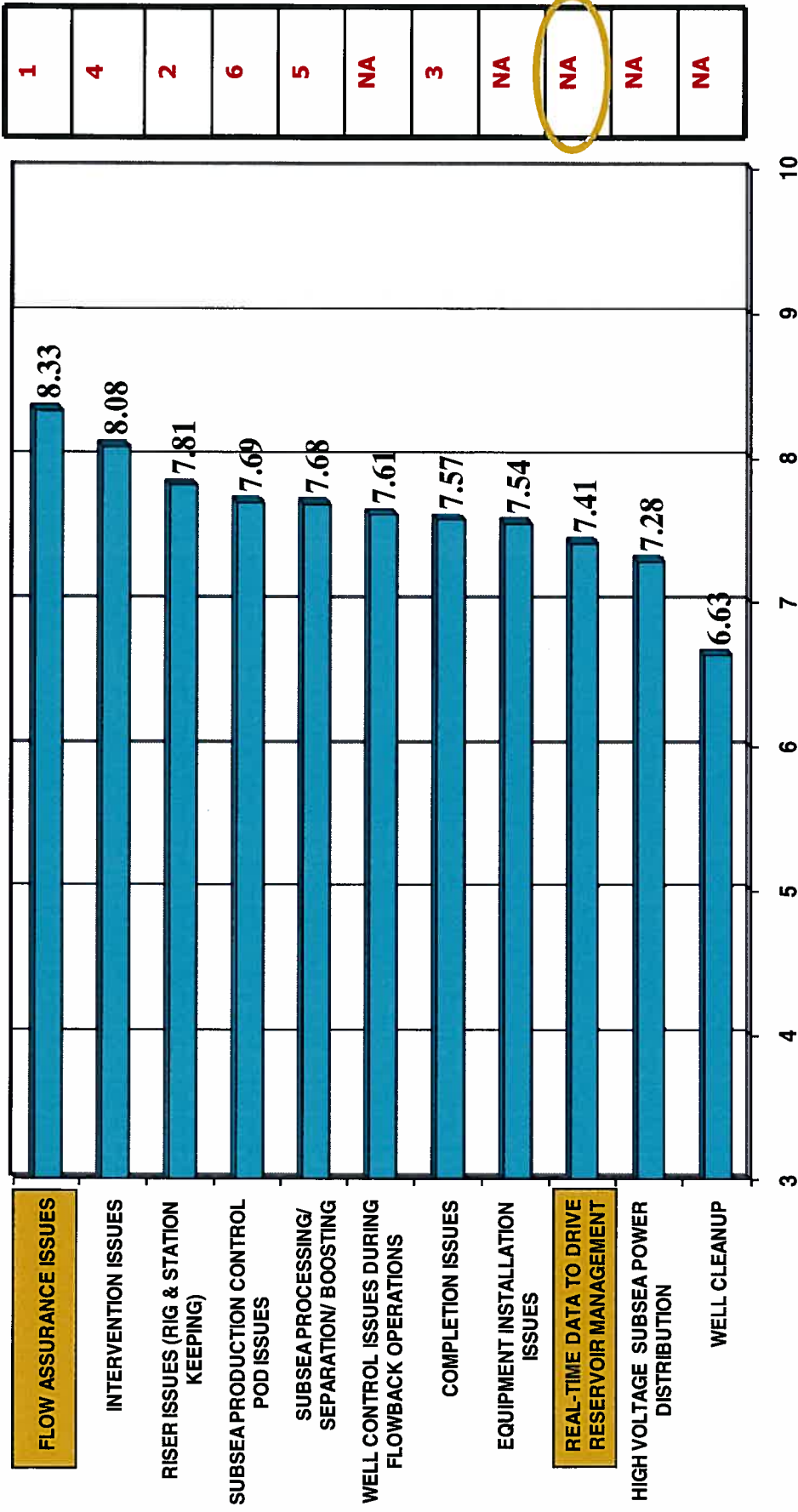
Contracts Awarded to FMC

Operator	Location	Term	Status
StatoilHydro	North Sea	6 Yrs	In-service
StatoilHydro	North Sea	4 Yrs	2009 Start-up
BP	North Sea	3 Yrs	2009 Start-up



IMPORTANCE OF VARIOUS TECHNICAL CHALLENGES TO EFFECTIVELY HANDLE COMPLETIONS IN DEEPER WATERS

**IMPORTANCE RANK
2006 SURVEY**



AVERAGE RATING, SCALE 1-10 (10=EXTREMELY IMPORTANT ISSUE TO ADDRESS) **We put you first. And keep you ahead.**

Ormen Lange Challenges

Gas Export

Slow dynamics and long time delay in pipelines

Slug Catcher Pressure Control

Liquid Surges (slugs)

30" Production pipelines
6" MEG injection lines

A - Template

MEG Distribution

B - Template

Formation Water

120 km to onshore plant

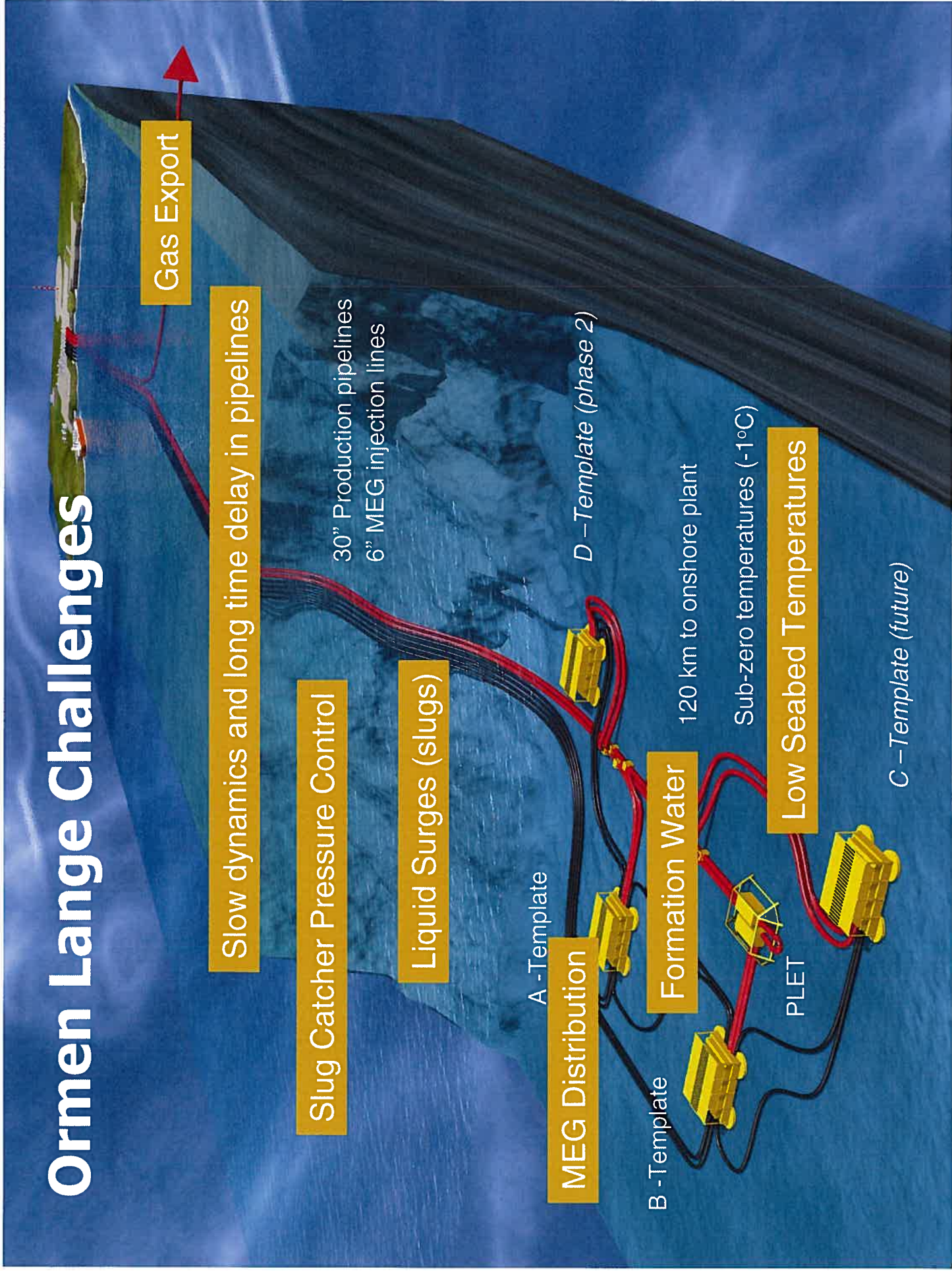
Sub-zero temperatures (-1°C)

PLET

Low Seabed Temperatures

D - Template (phase 2)

C - Template (future)

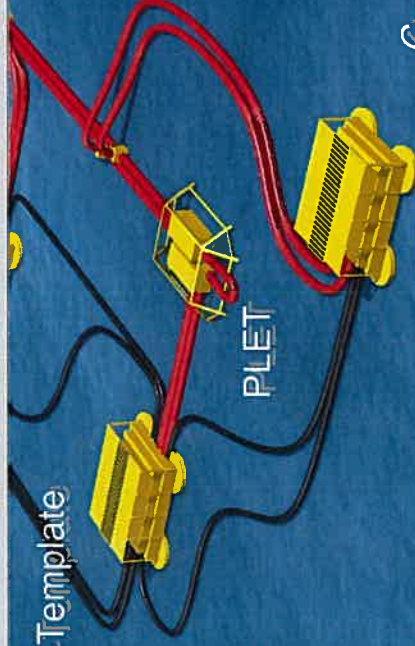


FMC's response;

Ormen Lange Flow Assurance System, FAS

- ✓ Pipeline Management System (PMS)
- ✓ Virtual Flow Meter System (VFMS)
- ✓ Production Choke Control System (PCCS)
- ✓ MEG Injection Monitoring and Control System (MIMCS)
- ✓ Formation Water Monitoring System (FWMS).

B: -Template



120 km to onshore plant

Sub-zero temperatures: (-1°C)

C: -Template (future)

FlowManager™ - Installations

Reference list

Client	Field name	Area	# of Wells	Functionality	Year
Hydro	Oseberg Delta	North Sea	4	Metering	2008
Statoil Hydro	SRI	North Sea	8	Virtual Flow Metering	2007
Norks Hydro /Shell	VEGA	North Sea	6	Production Optimisation	2007
Norsk Hydro	Ormen Lange	North Sea	16	iFAS	2006
Norsk Hydro	Oseberg C	North Sea		iFAS	2006
Burullus Gas	Oseberg Feltcenter	North Sea		Virtual Flow Metering	2006
Total	Simian, Sapphire and Sienna	Offshore Alexandria	6	Virtual Flow Metering	2005
Husky Energy	Rosa	West Africa	48	Virtual Flow Metering	2005
PetroCanada	White Rose	Canda	8	Virtual Flow Metering	2005
Norsk Hydro	Guillemot West, Clapham & Pict	UK	12	Virtual Flow Metering	2005
KNOC	Oseberg	North Sea	4	Virtual Flow Metering	2005
Statoil	DongHae	Offshore Korea	4	Virtual Flow Metering	2004
Burullus Gas	Gulfaks Sat	North Sea	7	Virtual Flow Metering	2003
Norsk Hydro	Scarab Saffron	Offshore Alexandria	7	Virtual Flow Metering	2003
Norsk Hydro	FramVest	North Sea	4	Virtual Flow Metering	2003
Norsk Hydro	Grane	North Sea	30	Virtual Flow Metering	2003
Norsk Hydro	Tune	North Sea	4	Virtual Flow Metering	2002
Norsk Hydro	Oseberg Sør	North Sea	11	Virtual Flow Metering	2001
PetroCanada	Kyle/ TerraNova	UK	4	Virtual Flow Metering	2001
Norsk Hydro	Oseberg East	Offshore Newfoundland	24	Virtual Flow Metering	2001
Norsk Hydro	North Sea TrollC/	North Sea	11	Virtual Flow Metering	1999
Norsk Hydro	North Sea	North Sea	48	Virtual Flow Metering	1998
Norsk Hydro	Njord North Sea	North Sea	15	Production Choke Control	1998
Statoil	Visund North Sea	North Sea	11	Virtual Flow Metering	1998
Norsk Hydro	TrollB/	North Sea		Virtual Flow Metering	1995
Norsk Hydro	North Sea	North Sea	63	Production Choke Control	1995

Ongoing service projects

Fields and wells served by Flow Management today

Client	Fields	Production wells	Injection wells
StatoilHydro	14	290	50
Petro Canada	2	31	9
Total	1	12	7
Husky	1	8	-
Shell	1	4	-
Sum	19	345	66

Services:

Oil 1.2 mill bbl/d

Gas 200 mill Sm3/d

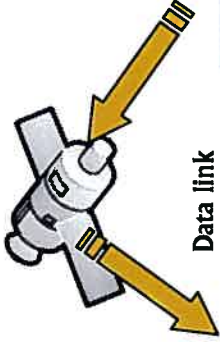
Life of Field Services Supports Oil Companies' Integrated Operation Strategies

In the Collaboration Room

- Data Interpretation
- Advice & Proactive Service

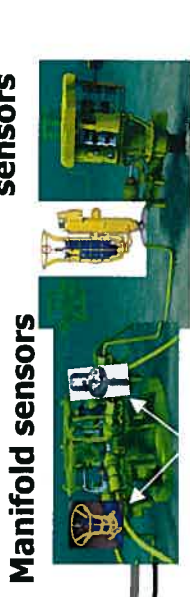
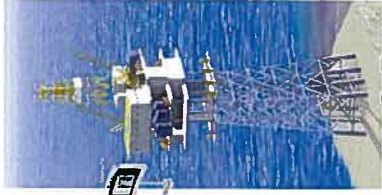


Data link
to shore



On the Platform

- Data Collector
- FlowManager
- Condition & Performance Monitoring
- SmartTool



Multiphase
FlowMeter

X-mas tree
sensors

Manifold sensors

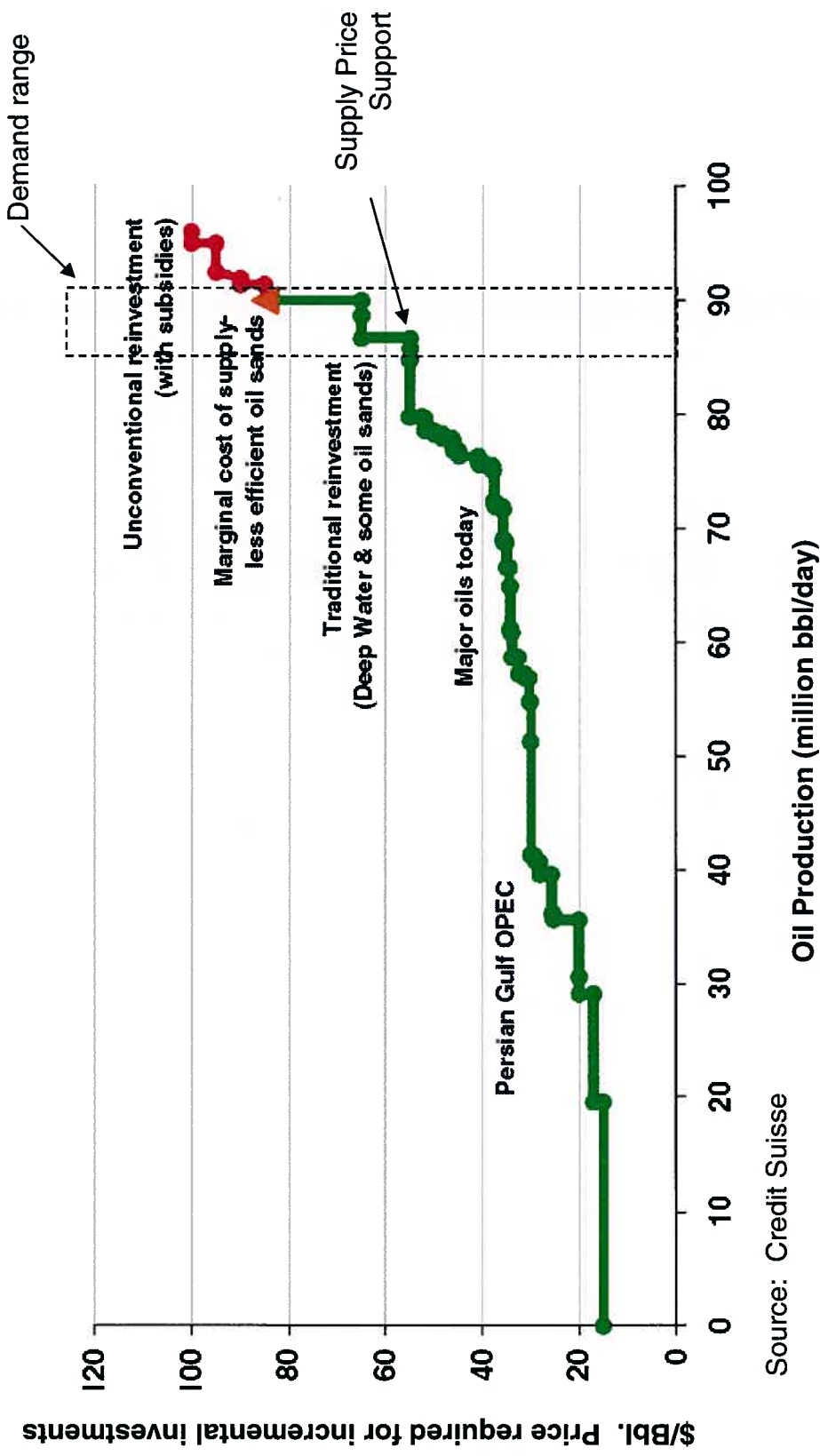
Subsea control system
"Data highway"

Downhole sensors

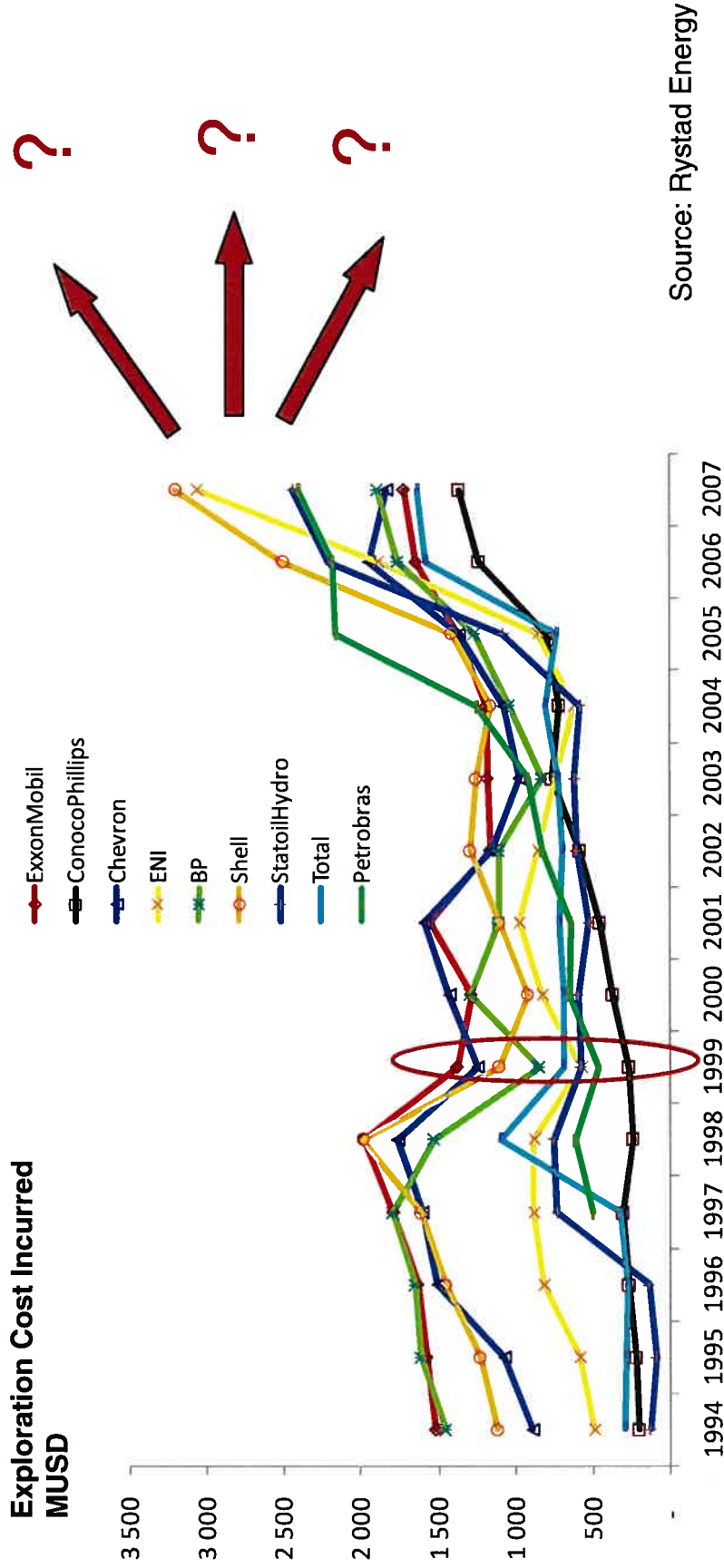
← Onshore →

← Offshore →

Global Crude – Supply Curve Economics



Major's global exploration investments down by 45% in 1999



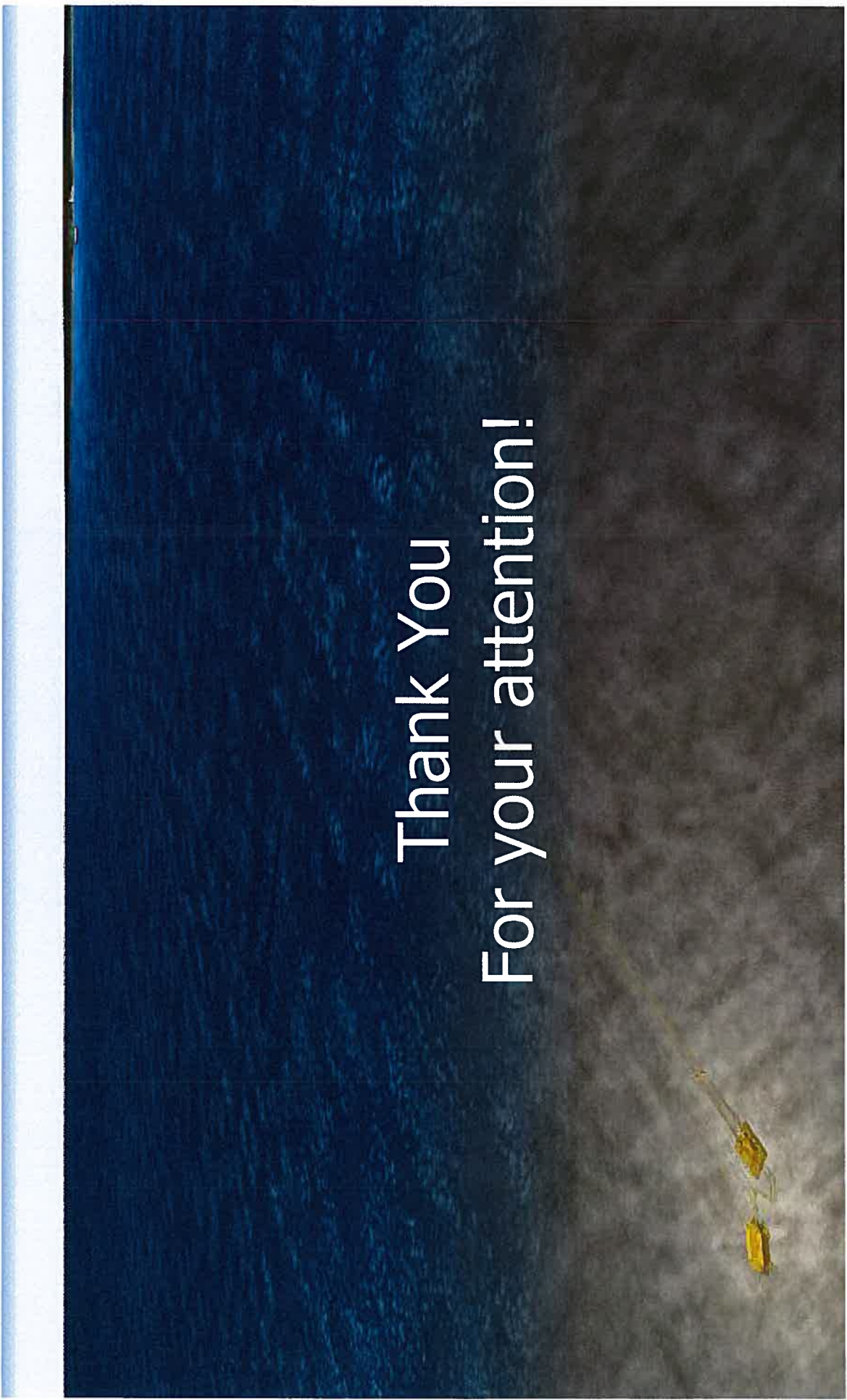
Source: Rystad Energy

Closing Remarks

- Production from subsea wells expected to grow by 8% pa to 2020
- Search for “Difficult Oil” is ahead
 - Pre-Salt, Ultra Deep Water, Heavy Oil, Long Distance and Arctic
- FMC is well established with a mature “Toolbox” for Next Generation Subsea:
 - Flexible Development Concepts
 - Enhanced Recovery
 - Subsea Processing, “Subsea – to – Market”
 - Life of Field Services

FMC IS READY TO SHAPE YOUR SUBSEA FUTURE

FMC vision - *The Invisible Dream – All Subsea*



**Thank You
For your attention!**