Rice Global E&C Forum
Engineering & Construction

RICE GLOBAL ENGINEERING & CONSTRUCTION FORUM

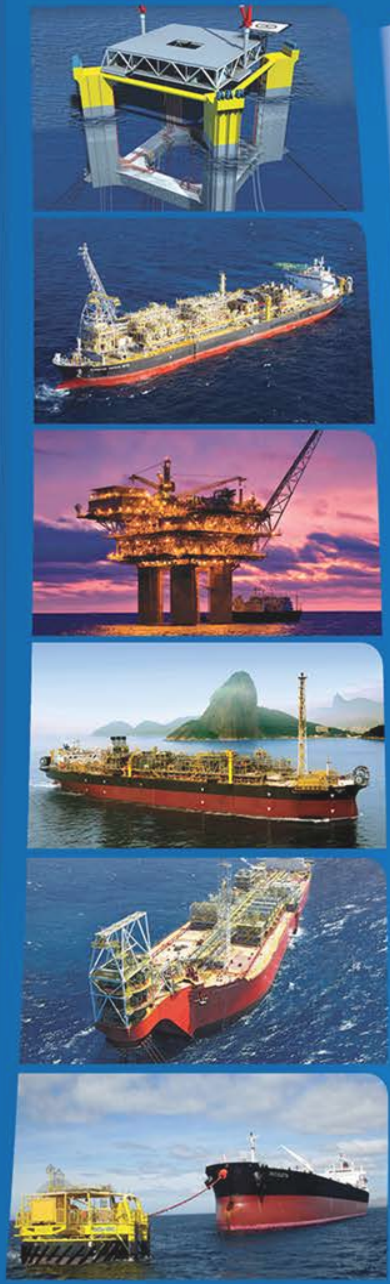
RICE

Puneet Sharma, P.E.

Vice President, FPSO Project Development

MODEC

"Random Thoughts (a view of the FPSO industry)"



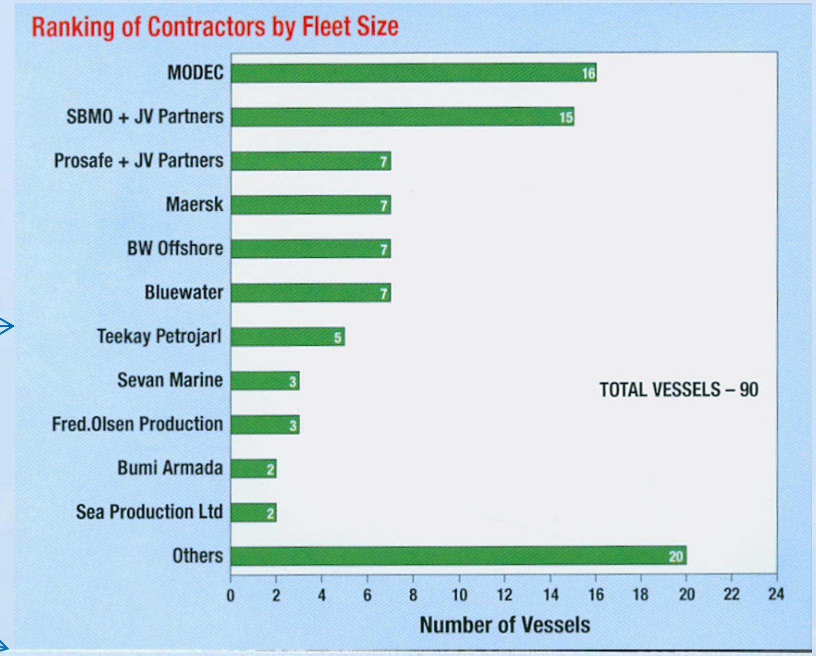
Random Thoughts

by Puneet Sharma

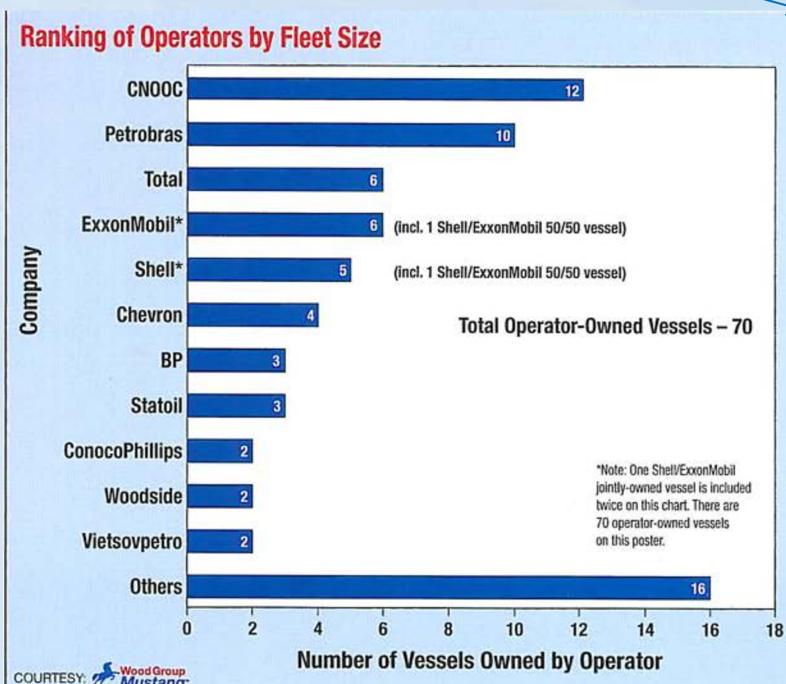
- Who is in the FPSO Space
- Functional Spec vs Prescriptive Spec
- Hmmm … so where is the Risk
- I see .. So what happened
- What is coming up
- Parting Thoughts

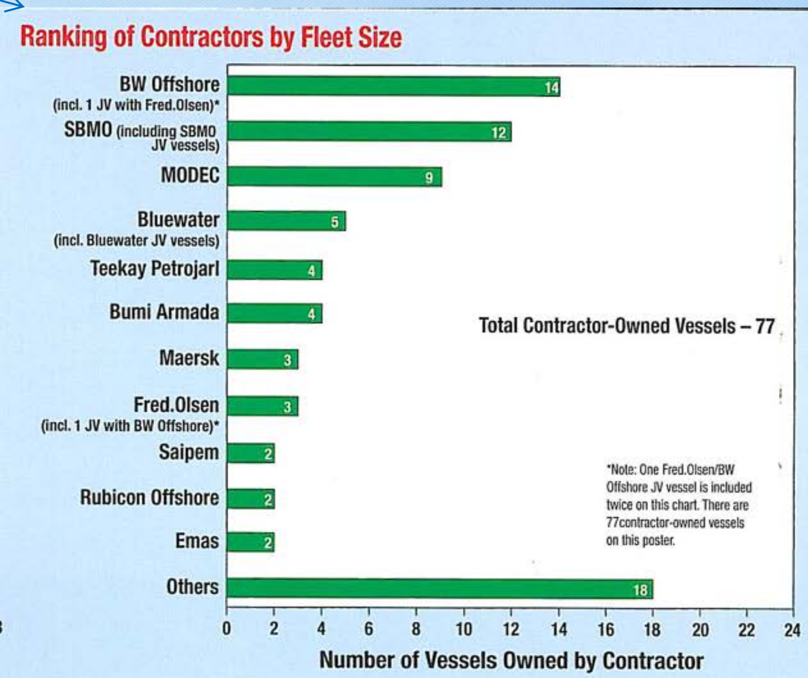
FPSO Market Share

Source: 2009 FPSOs of the World wall chart by Offshore Magazine.

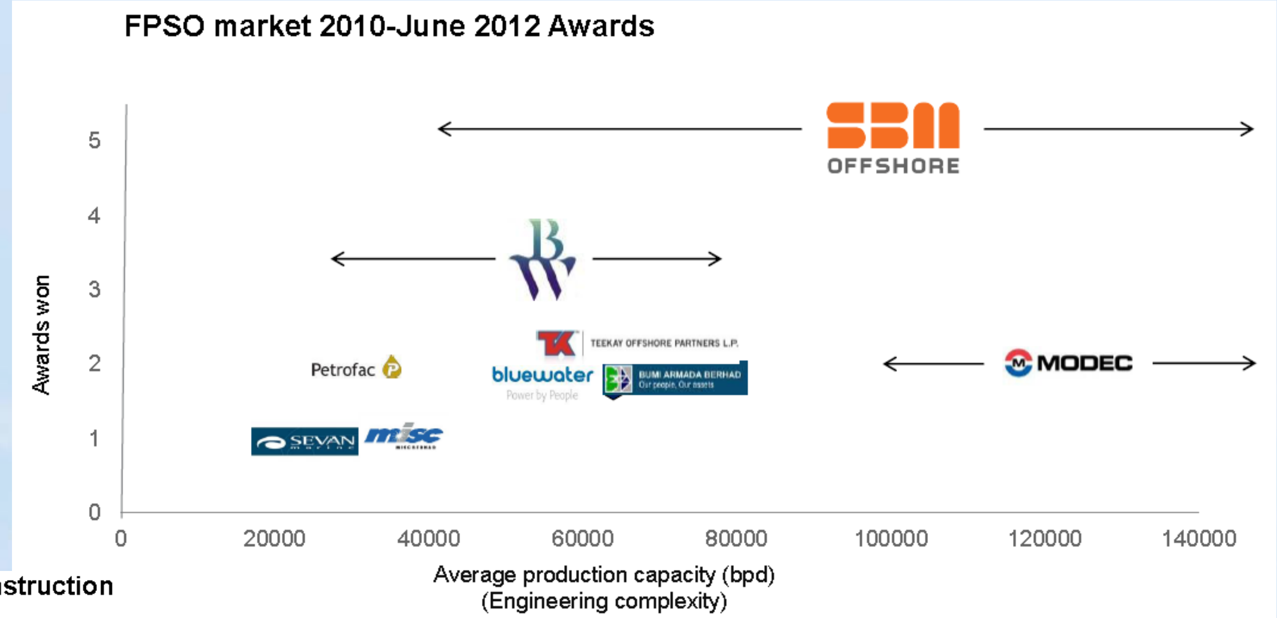


Source: 2013 FPSOs of the World wall chart by Offshore Magazine.





Leased FPSO Space (another view)



Note: Courtesy of SBM Offshore

Roughly 5+ million bbl/day flows through Leased FPSOs

FPSO /FSO Market Share

	Bumi Armada	BWO*	MODEC	SBM
Confirmed Orders to Date	6	32	36	41
Engineering Services Only	0	1	0	0
FPSO EPCI	0	3	8	5
FSO EPCI	0	6	5	2
Total Engineering or EPCI Projects	0	10	13	7
Decommissioned	0	0	2	3
Sold	0	4	3	5
Under Construction	1	1	4	6
Currently on Charter	5	14	14	13
Total Current Confirmed Charters	6	14	18	18
Total Units Chartered to Date	6	18	23	26
Re-Deployments	0	4	1	8
Total Charter Contracts	6	22	24	34
FPSO /FSO Conversions	6	27	30	30
FPSO /FSO New-Build	0	0	5	3
FPSO O&M (not Chartered)	0	2	4	1

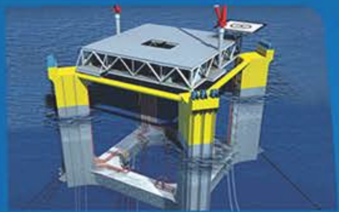
	Total	Installed	Lease	L & I
FPSO	209	157	97	73
FSO	100	90	52	47
Gas	34	18	22	8
Other	12	8	1	1
Semi	50	43	4	3
Spar	23	19	1	0
TLP	28	23	0	0
Total	456	358	177	132

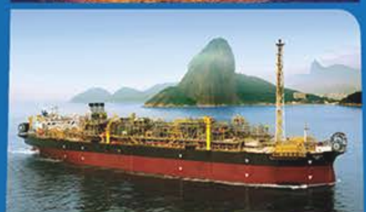
Source: Contractor Materials and IMA Report (July 2013)

Existing Installed Units (FPSO & FSO Only)

Charters for top 3 companies: ~74 (60+%)

Projects for top 3 companies: ~98 (40+%)



Random Thoughts

Who is in the FPSO Space

Functional Spec vs Prescriptive Spec

Hmmm … so where is the Risk

I see .. So what happened

What is coming up

Parting Thoughts

Functional vs. Prescriptive - Bid Submissions

FPSO proposal development

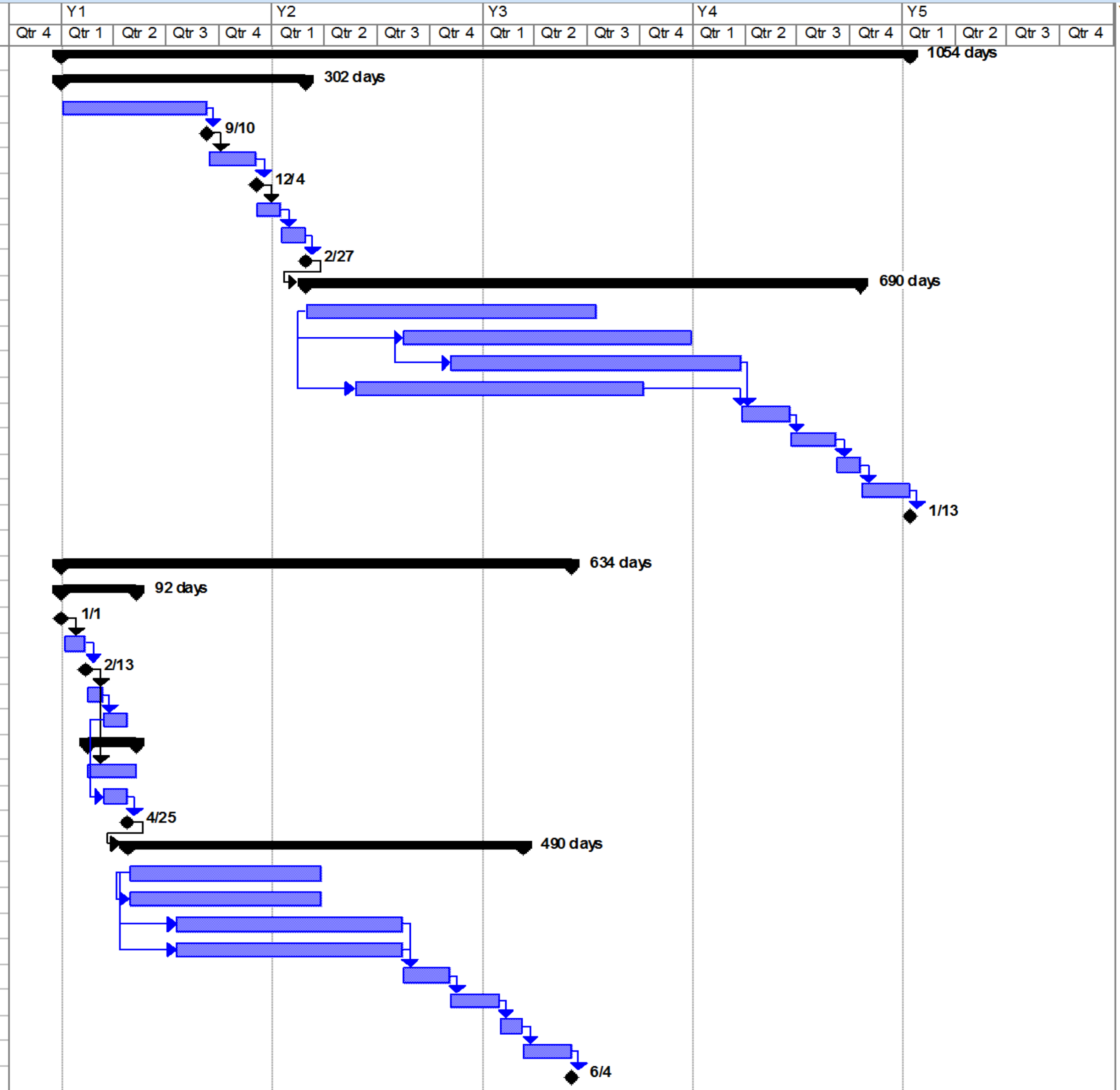
- FPSO Sizes
  - Oil: 80 – 160 kbopd
  - Gas: 100 – 300 mmscfd
  - Water: 100 – 300 kbwpd
- Cost
  - Costs adjusted to 2013 $
  - Exclusive of GAOH and Profit
- Schedule

	Min	Average	Max
Functional	160,632	2,088,147	6,800,000
Prescriptive	9,300,000	11,147,928	15,000,000
Proposal Schedule (months)			
Functional	1.5	3	6
Prescriptive	9	12	24

Note: Average of 20 FPSO proposals

Functional vs. Prescriptive EPCI Schedule (Estimate)

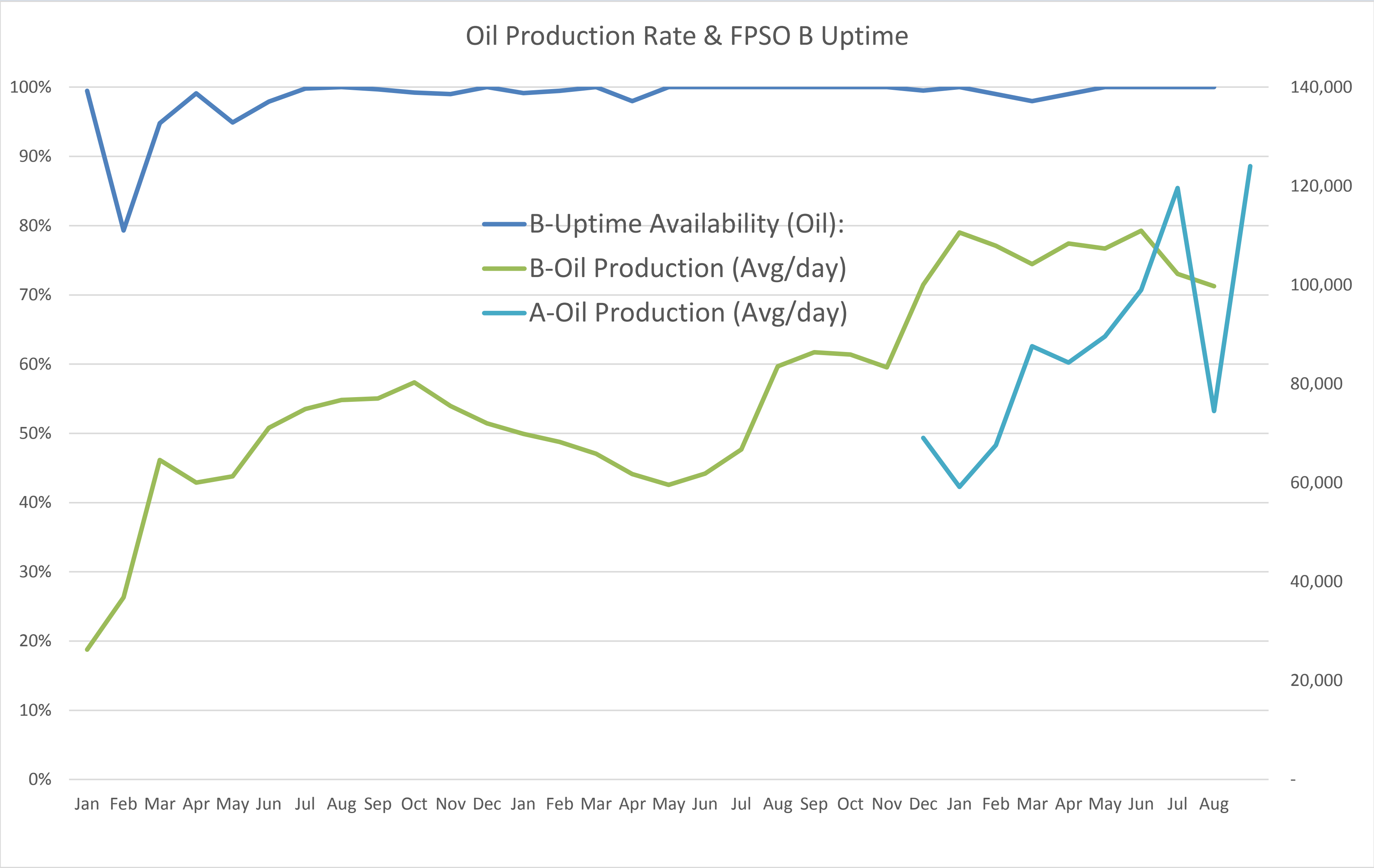
ID	Task Name
1	**Prescriptive Specification**
2	**FEL**
3	Company preforms FEED
4	Issue ITT
5	Contractor Proposal Development
6	Submit Proposals
7	Company Reviews Proposals
8	Company Negotiates Contract
9	EPCI Award
10	**EPC**
11	Detailed Engineering
12	Procurement
13	Facilities Fabrication
14	Vessel Conversion
15	Facilities Integration
16	Pre-Commissioning
17	Sea Trials & Sail-to-Site
18	Hook-Up & Commissioning
19	First Oil
20	
21	**Functional Specification**
22	**FEL**
23	Company Issues ITT
24	Contractor Proposal Development
25	Contractor Submit Proposals
26	Company Reviews Proposals
27	Company Negotiates Contract
28	**FEED**
29	Hull
30	Topsides Facilities
31	EPCI Award
32	**EPC**
33	Detailed Engineering
34	Procurement
35	Facilities Fabrication
36	Vessel Conversion
37	Facilities Integration
38	Pre-Commissioning
39	Sea Trials & Sail-to-Site
40	Hook-Up & Commissioning
41	First Oil



Functional vs Perspective Performance (Actuals)

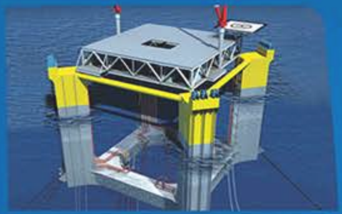
		A	B
Major Parameters		Prescriptive	Functional
	Client	A	B
	Water Depth (meters)	2,000	1,100
	Size /Type	DH VL + Ext Turret	SH VL + Ext Turret
	Purchase or Lease	Purchase	Lease->Purchase
Process Conditions			
	Oil /Liq. Rate (kbopd)	150 /210	120 /160
	Water Injection (kbwpd)	300	232
	Gas Handling (mmscfd)	245 (2 x 65%)	160 (2 x 100%)
	CO2 (%)	N/A	N/A
	H2S Handling (ppm)	1.7 (NACE)	0 (Non-NACE)
	Topsides Arrival (bar)	20	34
	Gas Lift Take Off (bar)	197	374
	Gas Reinjection (bar)	354	374
	Gas Export (bar)	354	204
	Water Injection (bar)	197	340
Key Dates			
	Discovery to First-Oil	100 months	42 months
	ITT to First Oil	78 months	32 months
	LOI to First-Oil	54 months	30 months

FPSO A & B



Oil Production Rate & FPSO B Uptime
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
B-Uptime Availability (Oil):
B-Oil Production (Avg/day)
A-Oil Production (Avg/day)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug

So what is the value of a Prescriptive Spec Tender?






Random Thoughts

Who is in the FPSO Space

Functional Spec vs Prescriptive Spec

Hmmm … so where is the Risk

I see .. So what happened

What is coming up

Parting Thoughts

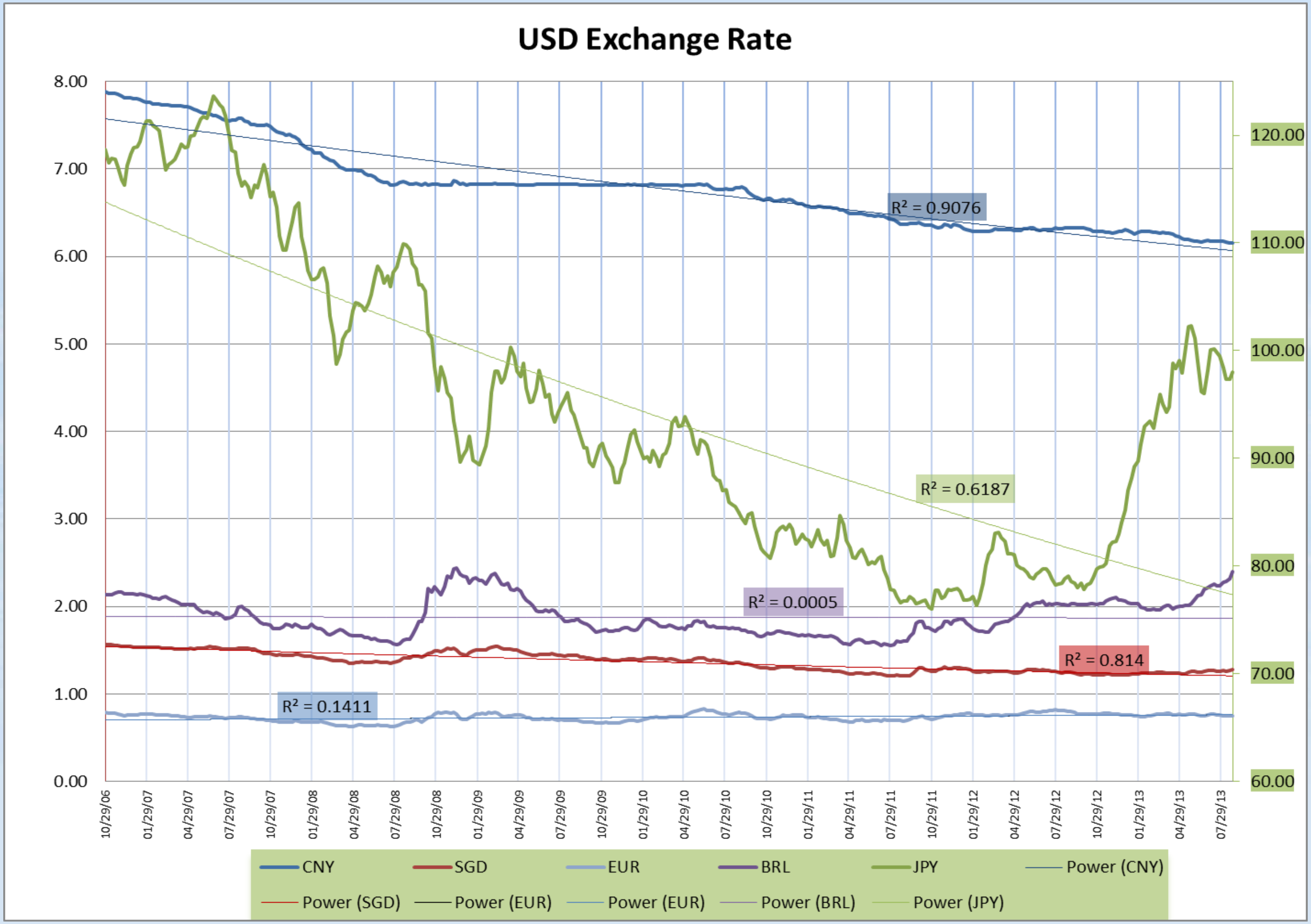
Raw Material

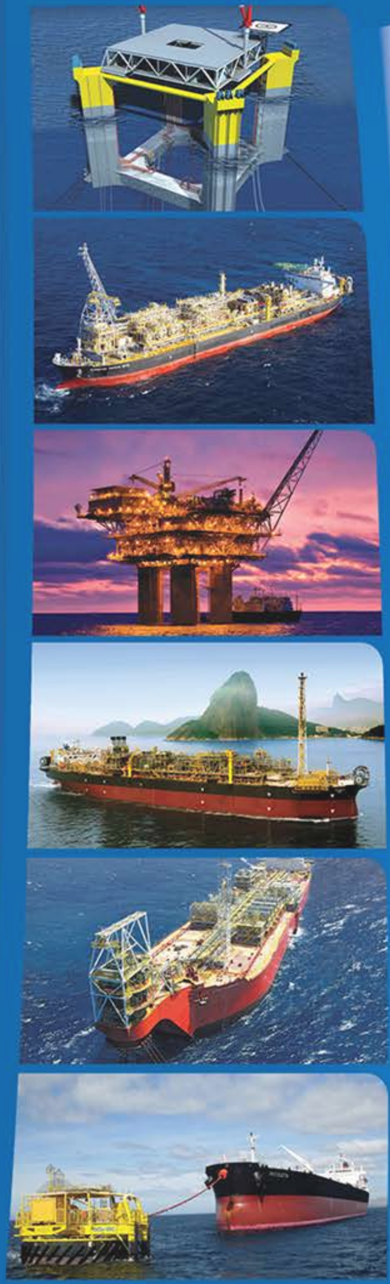
H-Beam 5.5×8×200×100 (Tokyo), adjusted by JPY/USD yearly average rates

SUS304, 18-8, 2.0mm (Tokyo), adjusted by JPY/USD yearly average rates

Copper (Tokyo), adjusted by JPY/USD yearly average rates

Currency Fluctuation against Bid Basis

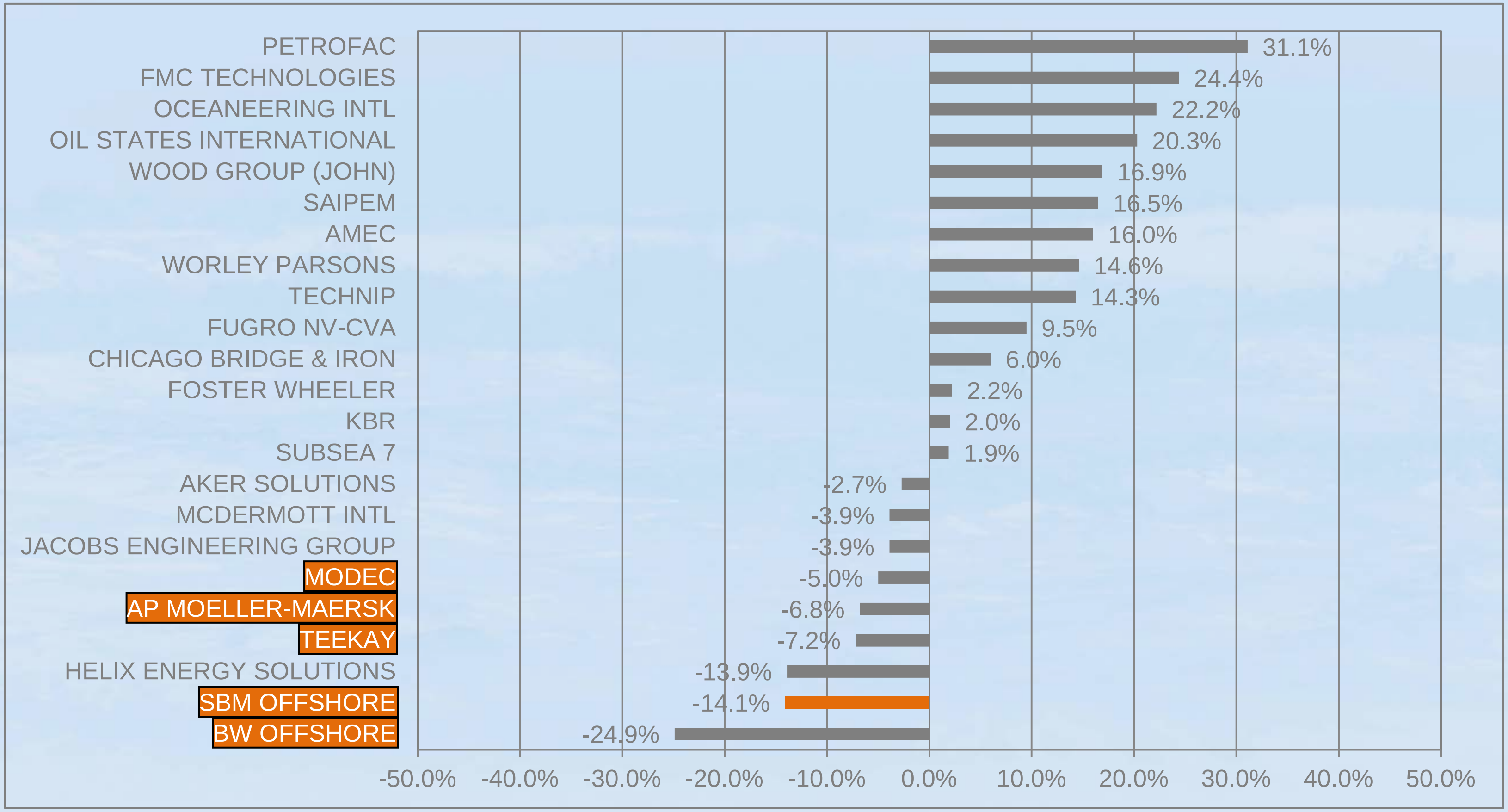




Random Thoughts

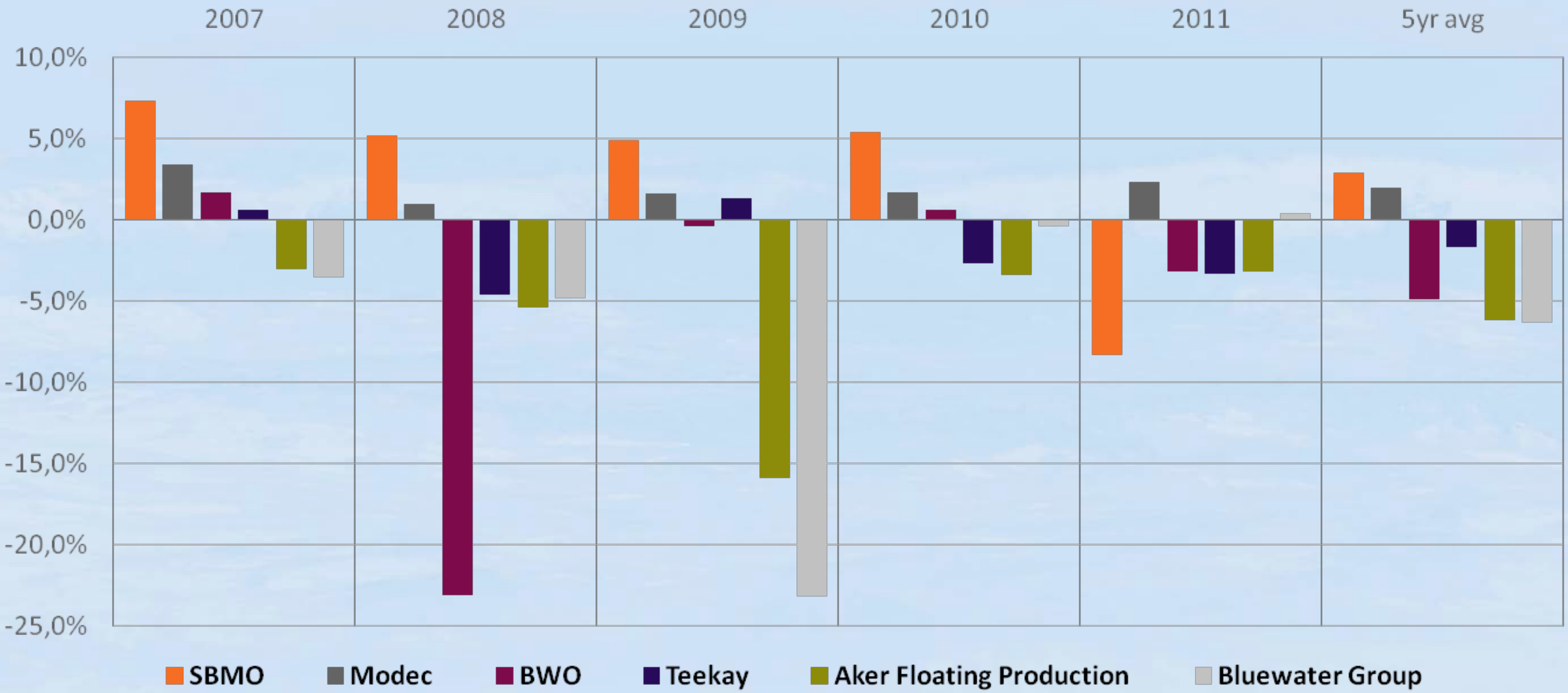
- Who is in the FPSO Space
- Functional Spec vs Prescriptive Spec
- Hmmm … so where is the Risk
- I see .. So what happened
- What is coming up
- Parting Thoughts

TSR Peer Group Ranking 2008 – 1H2012
Compound Annual Growth Rate (%CAGR)

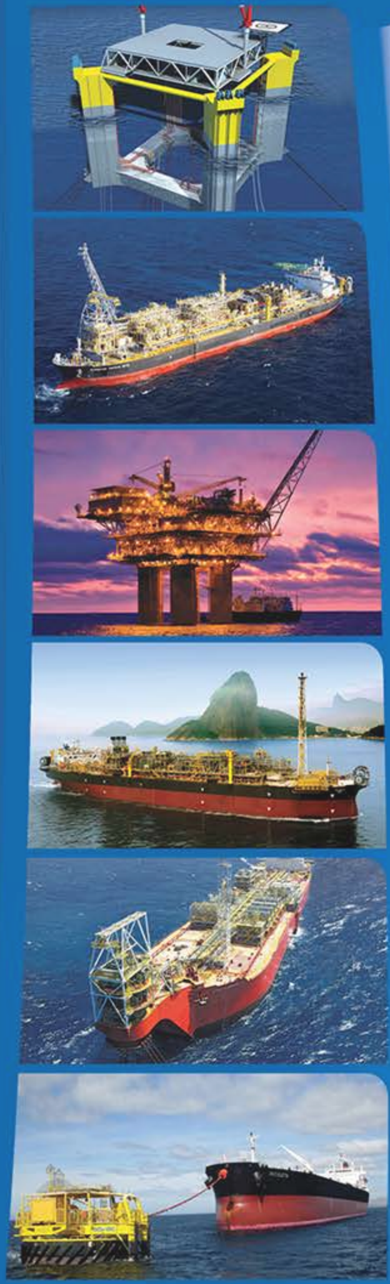


Note: Courtesy of SBM Offshore

Return on Total Assets



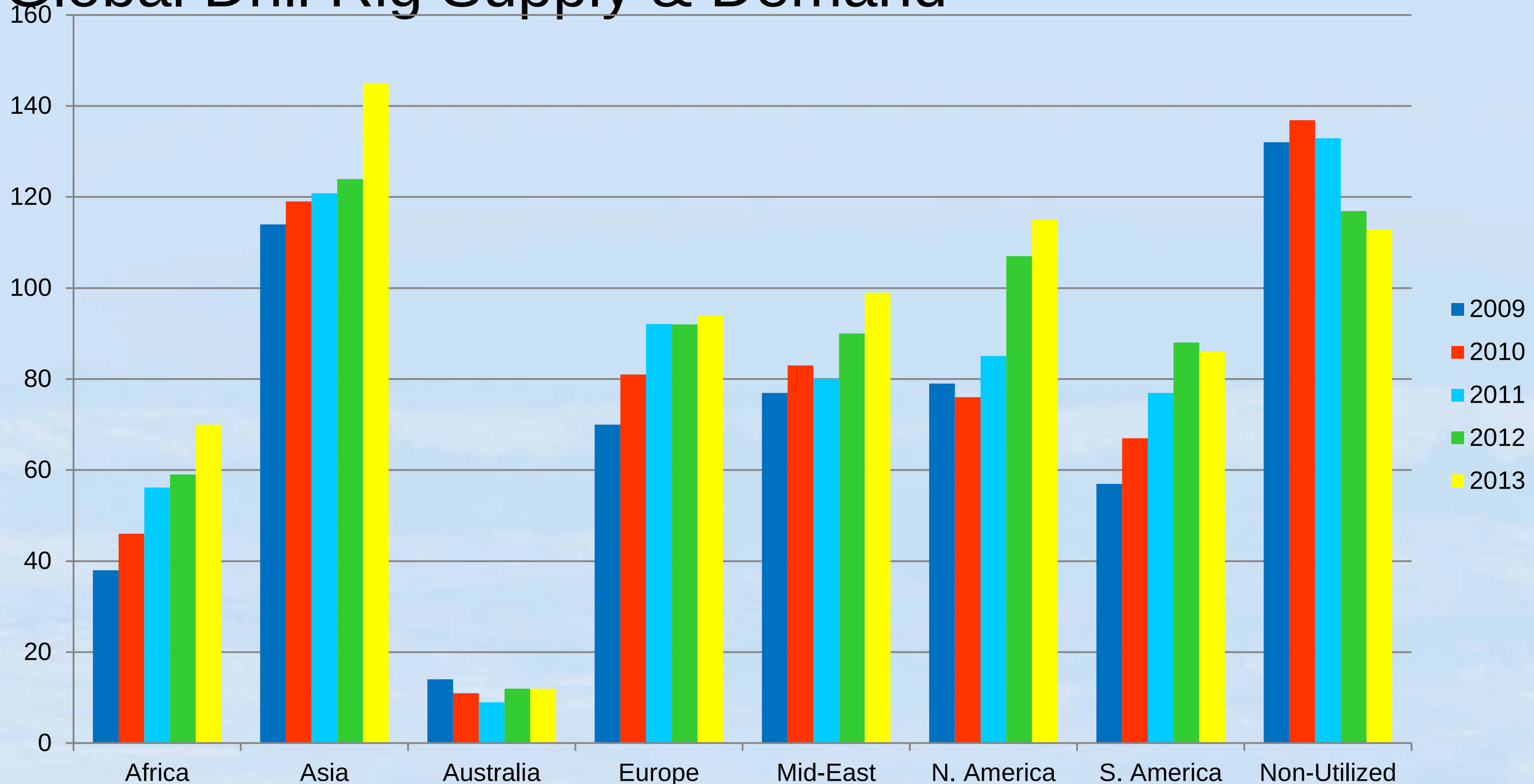
Note: Courtesy of SBM Offshore



Random Thoughts

- Who is in the FPSO Space
- Some Recent Performance
- Where is the Risk
- What is happening to the FPSO group
- What is coming up
- What should you do

Global Drill Rig Supply & Demand

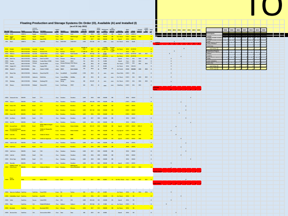


	Rigs in Region					Utilization				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Africa	54	53	65	69	79	70%	87%	86%	86%	89%
Asia	133	151	154	155	177	86%	79%	78%	80%	82%
Australia	14	11	12	12	12	100%	100%	75%	100%	100%
Europe	97	100	106	108	109	72%	81%	87%	85%	86%
Mid-East	106	112	108	111	123	73%	74%	74%	81%	80%
N. America	112	116	114	139	141	71%	66%	75%	77%	82%
S. America	65	77	94	95	93	88%	87%	82%	93%	93%
Total	581	620	653	689	734					

Global demand for Floaters (Five-year look-ahead)

Number of Projects (Production Start)

	2014	2015	2016	2017	2018	2019	2020
Firm Projects							
BRAZIL	3	1	3	2	1	0	0
AFRICA	2	1	0	1	0	0	0
GOM	0	0	0	1	0	0	0
ASIA/ OCEANIA	10	1	1	1	0	0	0
North Sea	2	2	1	2	0	0	0
Sub TOTAL 1	17	5	5	7	1	0	0
Prospective Projects							
BRAZIL	1	1	5	2	1	0	0
AFRICA	1	1	7	5	4	1	1
GOM	2	2	1	1	0	0	0
ASIA/ OCEANIA	1	5	10	8	4	3	3
North Sea	1	1	2	2	1	0	0
Sub TOTAL 2	5	10	25	17	11	4	4
TOTAL 1+2	22	15	30	24	12	4	4



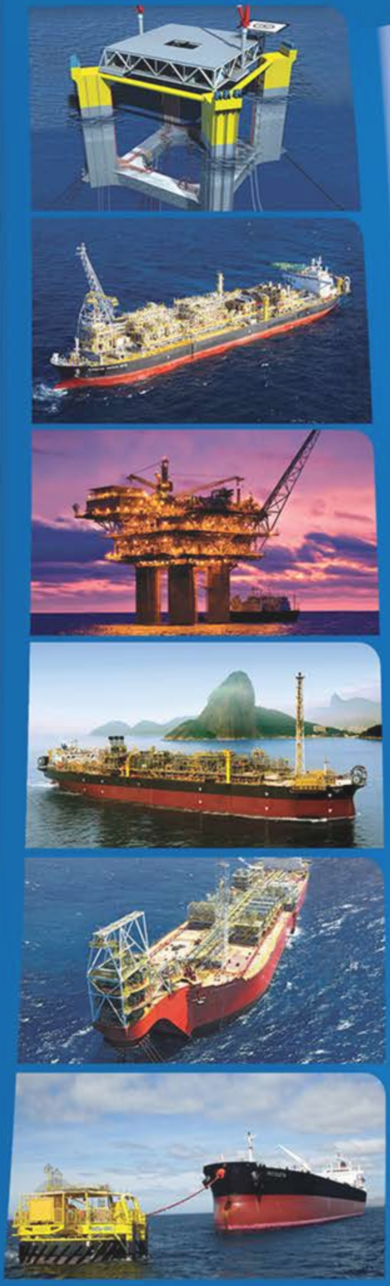
Back-Log

MODEC

- Recently Completed
  - PB Pilot 2 & OSX-3
- 2011-2012 Award (ongoing)
  - PB FPSO 5 & 6
- 2013 Awards
  - Tullow TEN
  - PB FPSO 9

SBM

- Recently Completed
  - PB FPSO 3 & OSX-2
- 2011-2012 Awards
  - PB FPSO 4
- 2013 Awards
  - ENI 15-06 (West-Hub)
  - PB FPSO 7 & 8
  - Shell Stones



Random Thoughts

- Who is in the FPSO Space
- Functional Spec vs Prescriptive Spec
- Hmmm … so where is the Risk
- I see .. So what happened
- What is coming up
- Parting Thoughts

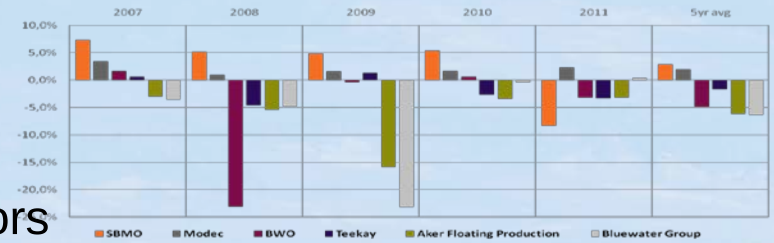
Buy or Lease

- Basis:
  - After the financial crash of 2008, lenders are more conservative
  - Relationship with Lenders is critical
  - Cash is King and is limited in the markets
- Problem:
  - Should I Lease a FPSO or Buy One
- Solution
  1. I have lots of free cash, Buy
  2. I don’t have free cash, Lease
  3. I am undecided, Lease with Option to Purchase

Risk Allocation

- Basis:
  - FPSO Contractors are under-performing in the market
- Problem:
  - Industrial events and project-over-runs have made the experienced community more aware of the risks and more risk averse
- Solution:

1. Continue with business as usual
   1. Lump-Sum and bleed the contractors

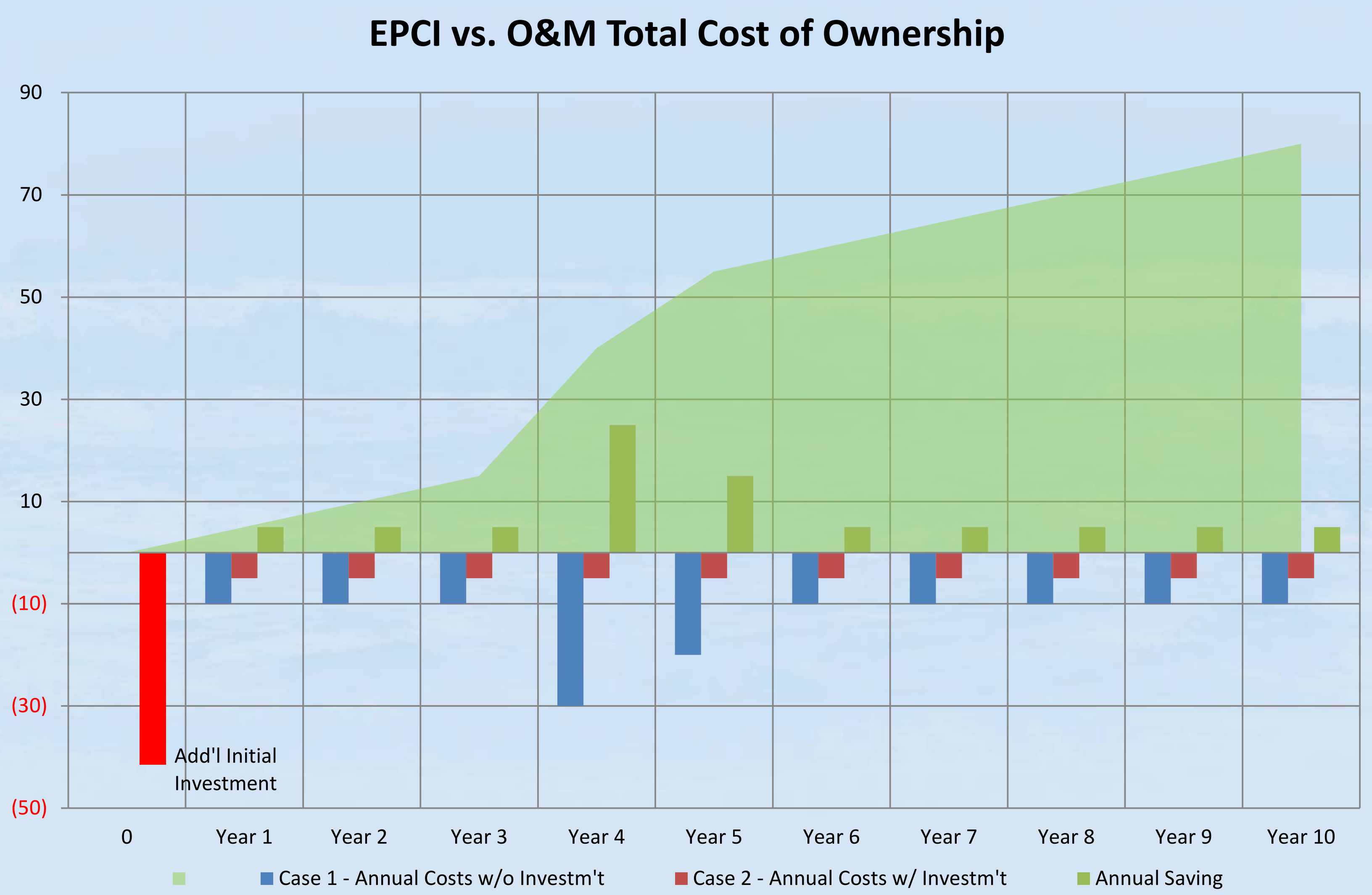


2. Use open-book approach during FEED /Design Competition
   1. Collaboratively evaluate the risks /rewards and apportion the commercial, contractual, technical and HSE risks

Operator Specs vs Contractor Specs

- Basis:
  - Large/Medium IOCs have their own Specifications
  - Experienced Operators have their own Specifications
- Problem:
  - Which Specs should I go with
- Solution
  1. Cost and Schedule are not as important, My Company Specs are written in Stone … Go with Operator Specs
  2. I need it fast, I need it now … Go with Contractor Specs
  3. Price and schedule are important but so are my “holy cows” … Contractor specs with a bolt-on for the “must haves”
     1. Con: Likely longer FEED and no schedule improvement
     2. Pro: Possibly lower Capex

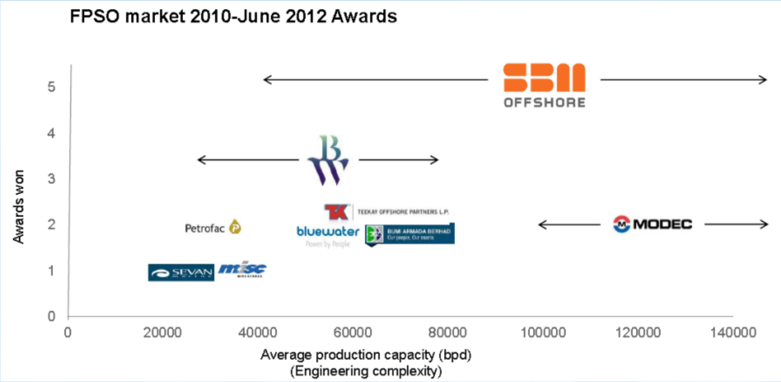
If I go with Contractor Spec, what should I focus on



Resource Demand is High, Supply Low

- Basis:
  - Demand for FPSOs is increasing … or is it?
    - What will Shale Oil Supply do to Deep-Water Demand?
  - Contractors are getting busy
- Problem:
  - Resources Are limited - Over-working limited resources could result in greater errors … and may result in an HSEQ event
- Solution:
  1. Poach from others
  2. Hire from outside Industry (and Train)
  3. Contractors /Clients create Integrated Project Team

Who do I Use



- Basis:
  - Lots of Contractors Out there
- Problem:
  - Who do I go with
- Solution - Select bidders based on Project Cost & Complexity, then
  1. Closed Design Competition and go with Lowest Normalized Price
     1. Cons: Exclusions and Provisos
     2. Pros: Typical Industry Practice
  2. Open-book FEED
     1. Pick a supplier(s) with a compatible Culture
     2. Risked cost estimate and ROE /IRR

Schedule is King