

# Marine Demands for 2020-2030: Local Content and opportunities in a new environment

Petrobras' Technical Seminar

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Brazilian Local Content Regulation

PETROBRAS' Local Content Policy: The New Scenario

Offshore and Maritime Equipment Demand: New Opportunities

Technology Challenges and the Pre-Salt: Results Achieved, the Future and the Role of Suppliers

Conclusions

## Brazilian Local Content Regulation

PETROBRAS' Local Content Policy: The New Scenario

Offshore and Maritime Equipment Demand: New Opportunities

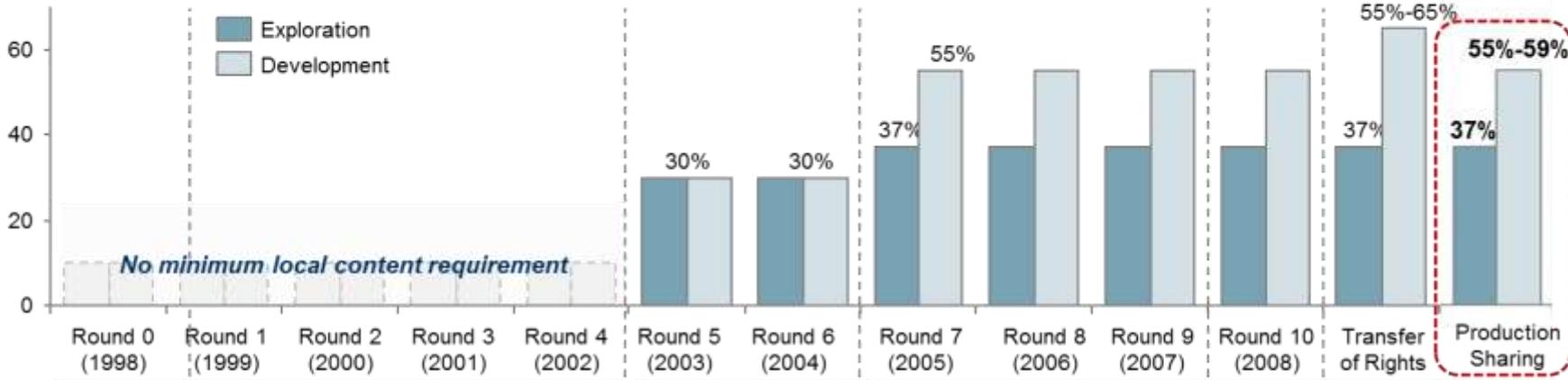
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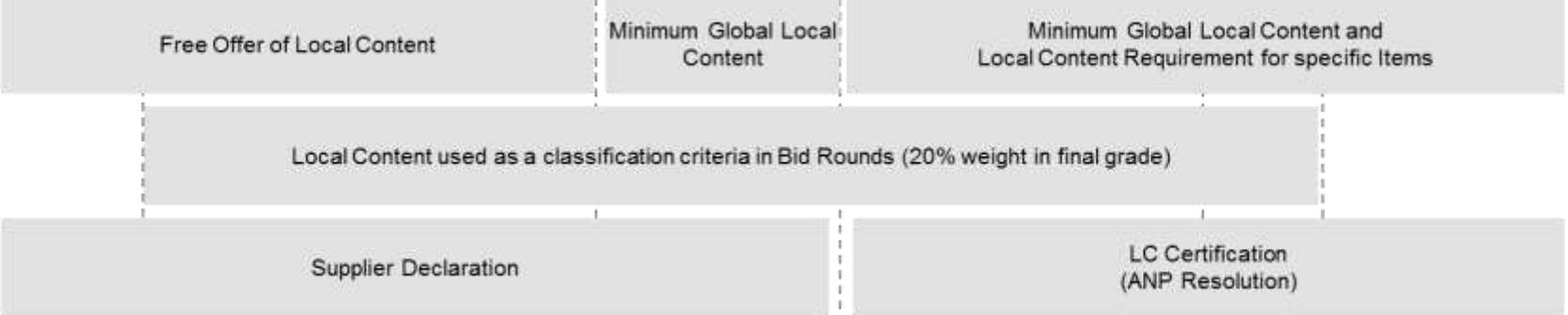
# Brazilian Local Content Regulation

## Local Content Requirement

**Global Local Content Requirement by ANP for each Bid Round**  
(For Deep Water)



- LC Requirement
- LC Valuation Criteria
- LC Measurement



ANP Resolutions 36,37, 38 e 39 ▲

Brazilian Local Content Regulation

**PETROBRAS' Local Content Policy: The New Scenario**

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## PETROBRAS' Local Content Policy

The projects and acquisitions for Petrobras must support the challenges of Company's Strategic Plan and therefore maximize local content based on competitive and sustainable basis, accelerating the development of markets where it operates, guided by ethics and generating continued innovation.

*December 22<sup>nd</sup>, 2011*

# Production Units: The New Scenario 2020 - 2030



## Contracting Model

Mainly **chartered**

## Target Companies

Only companies with **renowned experience** in similar projects

## Local Content Required

Requirements will be **based on contractual clauses** with the government, but **may be dropped depending on local conditions**

(Eg: hull construction with local price and delivery time higher than international standards)

## Local Production Encouragement

Goods and services produced with **brazilian engineering** (basic or detailed design) will have a **multiplying factor on evaluation of the final local content index (under analysis by ANP)**

# PETROBRAS' Local Content Policy

## Main Drivers for The New Scenario

### DRIVERS

#### Capital Discipline

- Ensure adherence to capital discipline, assuring the competitiveness of procurement and reducing financial and logistical risks in implementation and operation of projects.

#### Integration of Supply

- Execute procurement in a coordinated manner for the items of common use.

#### Local Content Standardization in Petrobras

- Uniform criteria for measuring and requiring local content in Petrobras acquisitions.

#### Local Suppliers

- Encourage the development of local markets in a sustainable manner.

#### National Engineering

- Prioritize supplies with local engineering development.

#### Technology Gaps

- Encourage the development of the local market to overcome technology gaps.

Brazilian Local Content Regulation

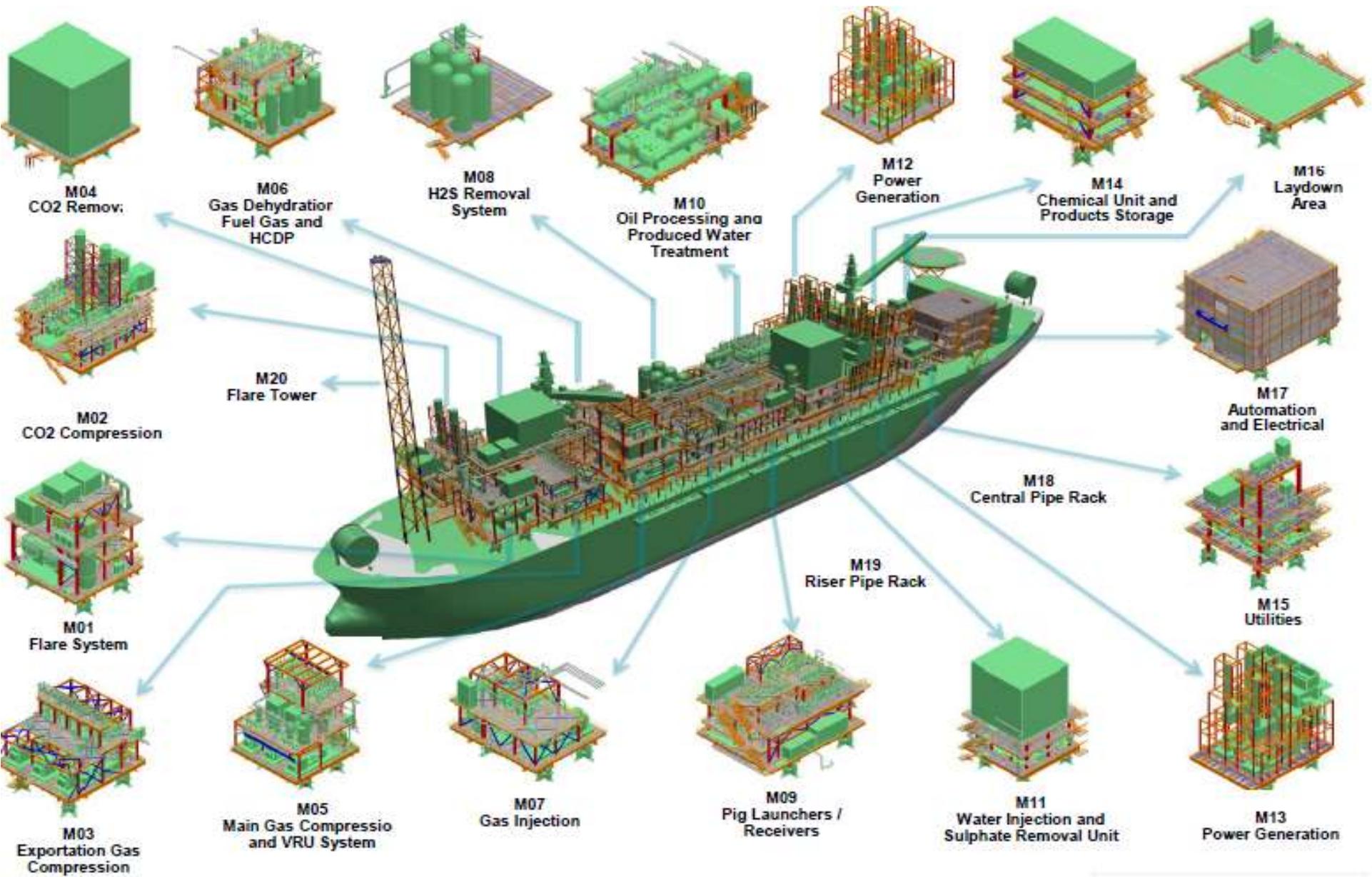
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# Production Units Pre-Salt Concept - standard FPSO



# Production Units

## Fleet increase by 2030

### Fleet increase 2020-2030

- According to Strategic Plan Revision to be released soon
- Will reflect new scenario for the oil industry in the world
- Mainly FPSO production systems
- Priorization for Pre-Salt development
- Local content requirements



### *Example of potential equipment for new suppliers*

Equipment
Chemical Injection Unit
Offshore Cranes
Vacuum Sewage System
Offloading System
Life Boats + Davit
Manual Operated Valves
Piping
Fittings



Offloading System



Offshore Crane



Chemical Injection Unit

### *Modules and Systems manufactured abroad or not with Local Content Requirement National supply needs more competition*

Package/Skid
Vapor Recovery Unit
Gas Dehydration Unit
Vacuum Deaerator Unit
Chemical Injection Unit
<b>H<sub>2</sub>S Removal Unit</b>
Nitrogen Generator Unit
<b>Sulphate Removal Unit</b>
Electrostatic Treaters Package
Produced Water Treatment
Flare Gas Recovery Compression Unit
Flare
Fresh Water Maker
Shell&Tubes Heat Exchange Package
<b>Plate Heat Exchangers Package</b>
Pressure Vessels / Separators Packages
Centrifugal Pumps Package
Sea Water Lift Pumps Package

Package/Skid
Water Injection Pumps Package
Well Service Pump Package
Reciprocating Pumps Package
Positive Displacement Pumps Package
<b>Filters Package</b>
Pig Launchers & Receivers Package
Mechanical Handling Equipment Package
Icss – Integrated Control & Safety System
Hydraulic Power Unit - Hpu
Fiscal Metering Skid
<b>Electrical And Automation Module</b>
Hvac System
<b>Exportation Gas Compression Unit</b>
<b>CO<sub>2</sub> Compression Unit</b>
Main Gas Compressor
Injection Gas Compression Unit
Main Turbogenerator Unit

# Production Units

## Main equipment demand - Loose Equipment

***Equipment with high demand manufactured abroad or not with Local Content Requirement  
National supply needs more competition***

Equipment
Compressor
Pressure Vessel (Scrubber/Separator/K.O.Drum)
Tank
Control Panel (Distribution Panel)
Pumps
Hydrocyclones / Gas Flotation
Filter
Shell&Tubes Heat Exchanger
Plate Heat Exchanger
Mechanical Handling Equipment
Oil Dehydrator / Pre-Oil Dehydrator
Oil Dehydrator Degasser / Pre-Oil Dehydrator Degasser
Pig Launchers & Receivers
Control, Shutdown, Choke, Pressure Safety, Deluge Valves
Manual Valves (Un)
Piping (Ton)
Fitting (Ton)
Cable (Electrical/Instrumentation/Telecom) (Km)
Instrumentation (Transmitter/Gauge/Indicator) (Un)

## Main equipment demand – Estimated quantities - Hull

### *Hull Critical Equipment*

Equipment
Offshore Crane Api-2C (50T)
Aluminium Helideck
Lifeboat & Davit
Rescue Boat & Davit
Foam Firefighting System
CO <sub>2</sub> Firefighting System
Inert Gas System
Sewage Treatment & Vacuum Unit
Auxiliary & Emergency Diesel Generator
Diesel Fire Water Pump
Ballast Pumps
Cooling Water Pumps
Fresh Water Generator
Portable Water Generator

Equipment
Fire Detection System
Environmental & Positioning System
Navigation Aid System
Offloading System
Mooring System
Pull-In / Pull-Out System
Submerged Cargo Pumps
Submerged Deballast Pumps
Control Valves System (Un)
Helicopter Refueling System
Diesel Purifier
Vac System
Accommodation Package
Automation & Electric Package

## Fleet increase 2020-2030

- According to the number of drillships and FPSOs to be operating between 2020-2030
- Simulations are on the way
- Offshore activities over 200 km from the coast
- Local content requirements



## *Example of potential equipment for new suppliers*

Equipment
Offshore and provision cranes
Vacuum Sewage System
Life rafts
Metal Pipes
Directional Propulsion Systems
Transverse Thrusters



Provision Crane

### *Equipment manufactured abroad or not with Local Content Requirement*

### *National supply needs more competition*

MACHINERY
Directional propulsion system (UN)
Transverse thrusters (UN)
Generator set (UN)
Emergency generator (UN)
Working Air Compressors (UN)
Oil Purifier (UN)
Oil water separator (UN)
Heat exchanger (UN)
Fans and blowers (UN)
Vacuum sewage system (system)
Air-conditioning system (system)
Fresh water heater (UN)
Laundry equipment (set)
Provisions crane (UN)
Compressors for bulk (UN)
Cargo pump (UN)
Control systems and supervising machines (system)
PIPING
Metal pipes (meters)
Valves (pieces)
Manual Operated Valves (estimated) (pieces)
Fittings for hydraulic pipes (high pressures) (UN)

STRUCTURE
Classified profiles (ton)
HULL OUTFITTING
Steel doors (UN)
Ducts of natural and forced ventilation (UN)
Windows (UN)
Fixed firefighting system (system)
Smoke and heat detectors (set)
General alarm (system)
Whistle (UN)
Magnetic Compass (UN)
INTERIOR OUTFITTING
Partition and Ceiling (m <sup>2</sup> )
Flooring (m <sup>2</sup> )
Internal Doors (UN)
Anchors (UN)
Life raft (UN)
Buoys and life jackets (UN)
Boats transceivers (UN)

### *Equipment manufactured abroad or not with Local Content Requirement*

#### *National supply needs more competition*

ELECTRICAL
Cable Seals (UN)
Main switchboard (set)
Distribution Panels (UN)
Starters (UN)
Spotlights and reflectors (UN)
Navigation lights (set)
Aldis lamp (UN)
Battery charger (UN)
Static Inverter/Frequency Converter (UN)
Window Wipers (UN)
Sound-powered telephone (UN)
Public Address System (system)

ELECTRICAL
Transformers and Rectifiers (UN)
Radar (UN)
Navigation, communication and signaling equipments (set)
Ecosounder (UN)
VHF Radio (UN)
SSB Radio (UN)
Speed Log (UN)
Automatic Pilot (UN)
Satellite navigator + Ploter (GPS System) (UN)
Automation System (system)
Dynamic Positioning System (system)

# Brief overview of the marine facilities in Brazil



- 9 active shipyards and 4 under construction
- 79,194 direct jobs (feb/2015)
- Orders:
  - 8 hull construction
  - 4 hull conversion
  - 16 FPSO modules construction and integration
  - 28 drilling rigs – *project under revision*
  - 40 tanker vessels

# P-67 and P-69 Hull Construction

ERG Shipyard - RS

P-69

P-67

# P-67 Hull Construction

ERG Shipyard - RS



ERG Shipyard  
8 Hull Construction  
Date: Mar/15

# P-74 and P-76 Hull Conversion

Inhaúma Shipyard - RJ



P-76

P-74

**Inhaúma Shipyard**  
**4 Hull Conversion**  
**Date: Mar/15**

# 2 Suezmax Tanker Vessels

## Atlântico Sul Shipyard - PE



**Atlântico Sul Shipyard**  
**5 Suezmax, 5 Aframax, 4 Suezmax DP, 3 Aframax DP**

**Date: 2014**

# Shipyards Construction

## Enseada Shipyards - BA



Enseada Shipyards  
6 Drilling Vessels – *project under revision*

Date: Nov/14



Kawasaki Heavy Industries, Ltd.

# P-66 Modules Construction

## BrasFels Shipyard - RJ



BrasFels Shipyard  
P-66, P-69, FPSO Caraguatatuba, FPSO Itaguaí Modules  
construction and Integration  
6 semisubmersibles rigs – *project under revision*

# P-66 Integration

## BrasFels Shipyard - RJ



BrasFels Shipyard  
P-66, P-69, FPSO Caraguatatuba, FPSO Itaguaí Modules  
construction and Integration  
6 semisubmersibles rigs – *project under revision*

# P-66 Integration

## BrasFels Shipyard - RJ



BrasFels Shipyard  
P-66, P-69, FPSO Caraguatatuba, FPSO Itaguaí Modules  
construction and Integration  
6 semisubmersibles rigs – *project under revision*

# P-67 Modules Construction

DM/TKK



M05 of P-67  
Fuel and Gas  
Dehydration

M15 of P-67  
Power generation

DM/TKK  
Modules construction: P-66 to P-71  
Date: Mar/15

# P-66 and P-67 Modules Construction

## DM/TKK



M05 of P-67  
Gas, Fuel and  
Gas  
Dehydration

M05 of P-66  
Fuel and Gas  
Dehydratonde  
Gás

M15 and  
M16 of P-67  
Power  
generation

M15 and M16  
of P-66  
Power  
generation

DM/TKK  
Modules construction: P-66 to P-71  
Date: Dec/14

# Maricá and Saquarema Modules Construction

Brasa Shipyard - RJ



Source: SBM



**Brasa Shipyard  
FPSO Maricá and Saquarema Modules  
construction and Integration**

**Date: Jan/15**

Brazilian Local Content Regulation

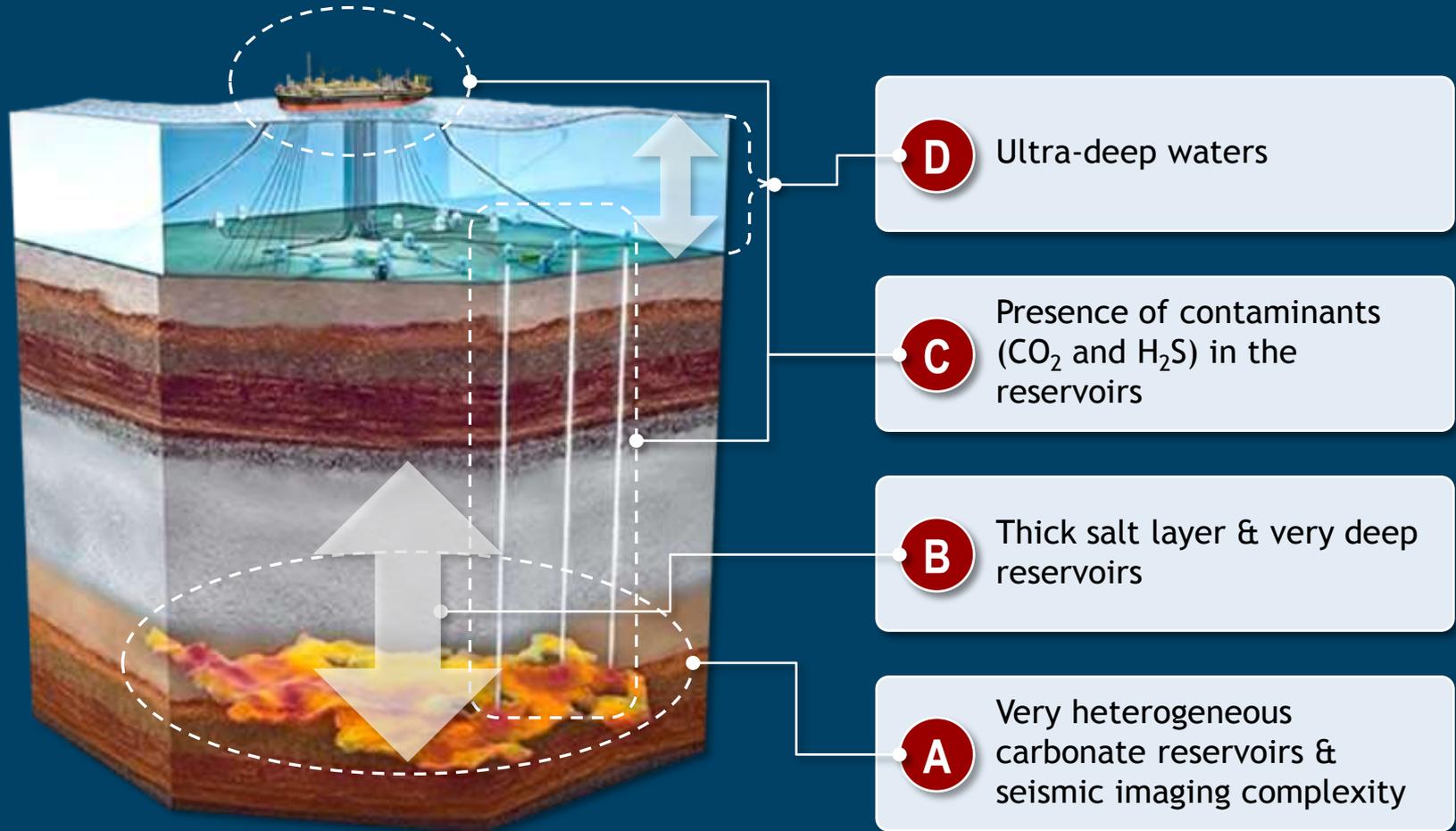
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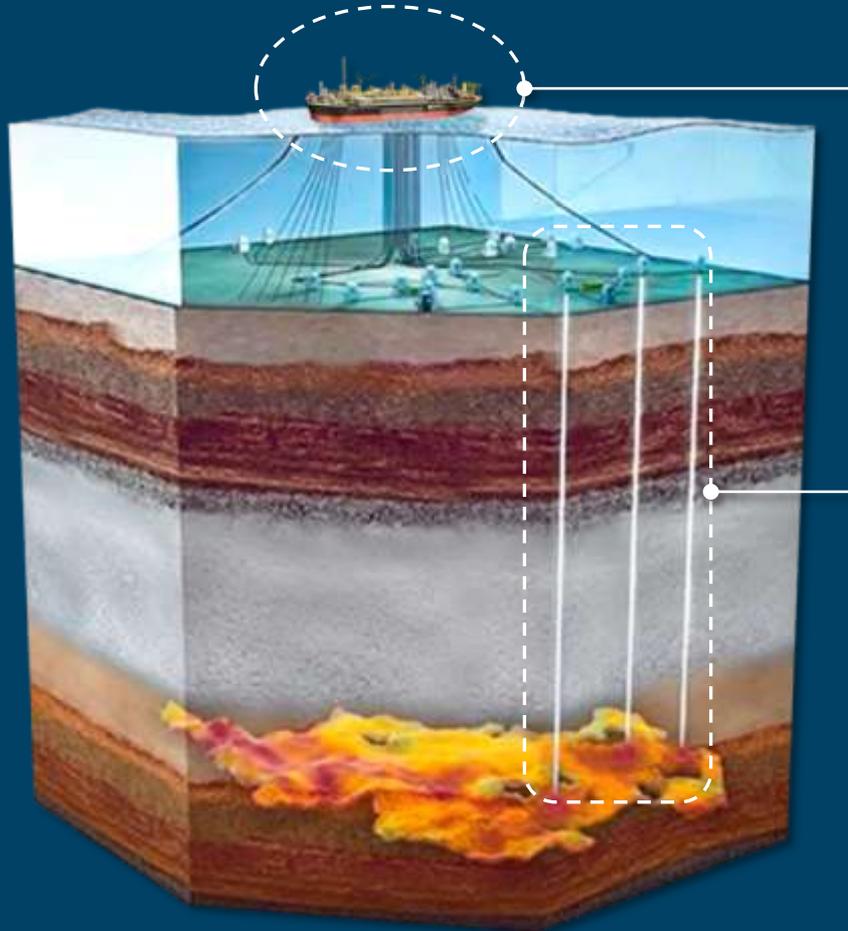
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## FIRST WAVE OF TECHNOLOGY APPLICATION



## FIRST WAVE OF TECHNOLOGY APPLICATION



**D** Ultra-deep waters

**C** Presence of contaminants (CO<sub>2</sub> and H<sub>2</sub>S) in the reservoirs

**B** Thick salt layer & very deep reservoirs

**A** Very heterogeneous carbonate reservoirs & seismic imaging complexity

## FIRST WAVE OF TECHNOLOGY APPLICATION

### MAIN TECHNOLOGIES APPLIED

6

First CO<sub>2</sub> separation from associated natural gas in ultra-deep water (2,220 m) associated with CO<sub>2</sub> re-injection into producing reservoirs



1st Unit: FPSO Cidade de Angra dos Reis  
3rd Unit: FPSO Cidade de São Paulo



2nd Unit: FPSO Cidade de Paraty

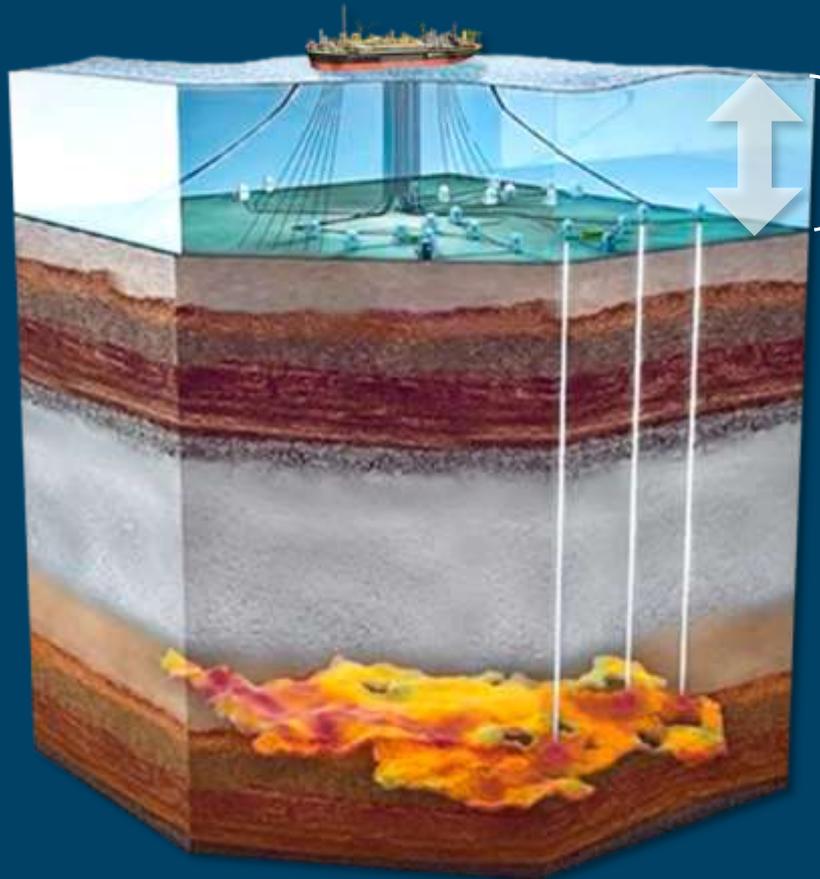


7

Deepest offshore well (2,220 m) injecting gas with CO<sub>2</sub> - CO<sub>2</sub> injected gas content can reach 85%



## FIRST WAVE OF TECHNOLOGY APPLICATION



**D** Ultra-deep waters

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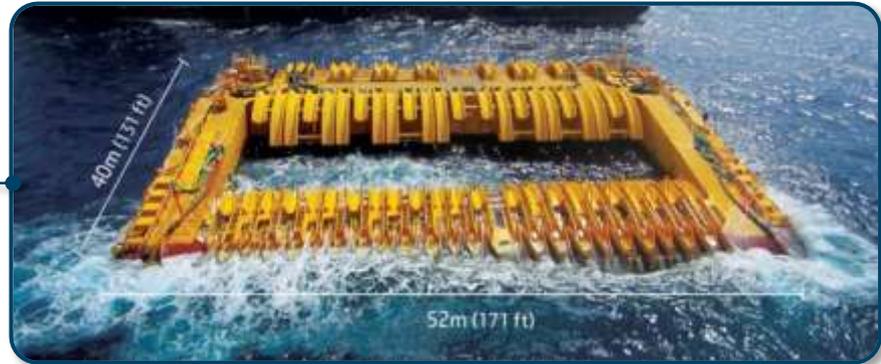
## FIRST WAVE OF TECHNOLOGY APPLICATION

### MAIN TECHNOLOGIES APPLIED

8

First Buoy Supporting Risers (BSR) (2,100 m) - 4 BRSs are already installed, with six wells in production up to July 2014

subsea 7



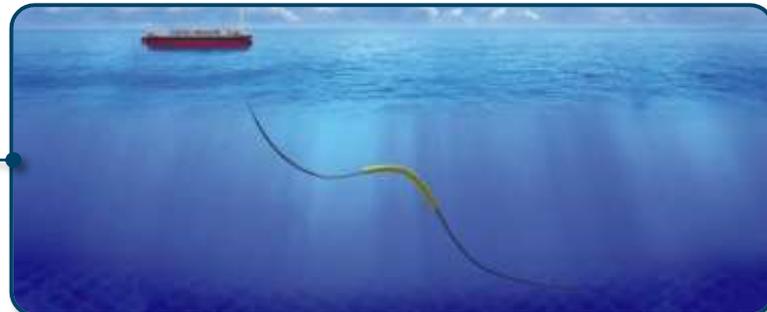
9

First Steel Catenary Risers (SCR) with Lined Pipes installed by reel lay method



10

Deepest Steel Lazy Wave Riser (SLWR) totally composed of lined pipes and metallurgically clad pipes (to be installed in 2015)



## FIRST WAVE OF TECHNOLOGY APPLICATION

### MAIN TECHNOLOGIES APPLIED

11

Deepest flexible riser installed in Lula field (2,220 m)



12

First application of flexible risers with integrated tensile armor wire-monitoring system



13

Subsea trees with standard mechanical interfaces



Technip

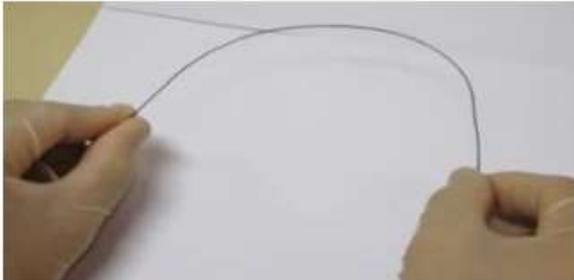


FMC Technologies

AkerSolutions

OneSubsea  
A Cameron & Sabherwal Company

## NEXT TECHNOLOGICAL WAVE: THE WAY FORWARD



**Advanced  
membrane  
materials** for CO<sub>2</sub>  
separation from  
natural gas



UFRJ

UF *m* G



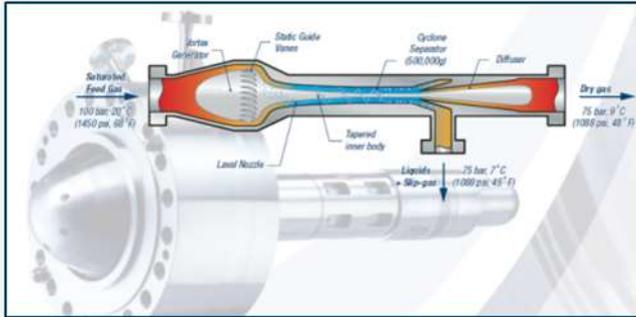
BMSHA



SSGL

**Subsea  
processing:  
Subsea  
Separation  
and Pumping**

## NEXT TECHNOLOGICAL WAVE: THE WAY FORWARD



**Supersonic separation of water, hydrocarbons and CO<sub>2</sub> from natural gas**



**Nanotechnology applied for increasing reservoir recovery and materials**



## NEXT TECHNOLOGICAL WAVE: THE WAY FORWARD

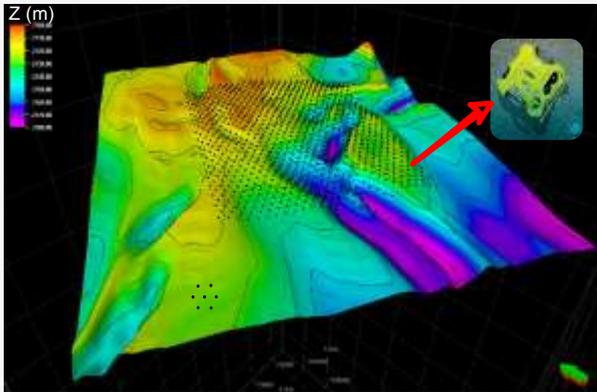


**High Pressure  
Separation (HighSep)  
for bulk CO<sub>2</sub> removal**

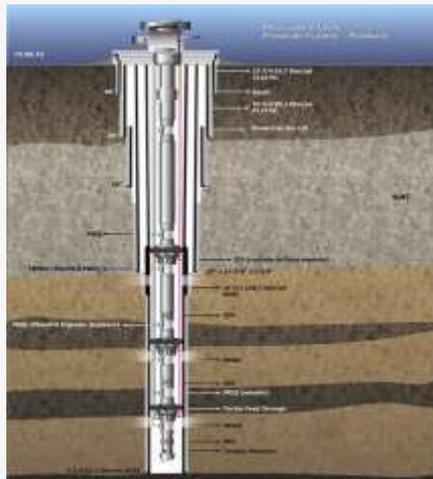


**Large Capacity FPSOs**

## NEXT TECHNOLOGICAL WAVE: THE WAY FORWARD



**Ocean bottom sensors for 4D monitoring of fluids in the reservoir**



**Intelligent completion in three intervals, with downhole chemical injection - Multiplex or Direct Hydraulic Control**

## NEXT TECHNOLOGICAL WAVE: A CONCRETE CASE - LIBRA

### Business & Technology Drivers

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- Larger Capacity FPSOs
- Optimize the oil production capacity
- Compact equipments for oil and gas processing
- System automation & monitoring to enhance reliability & availability
- Overcome shipyard limits on high capacity hulls
- Conceptual design & construction optimization
- Building methods focusing on cost, time and quality

### Some Technologies and Solutions Mapped

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- Compact compressors / High capacity compressor for offshore use
- High capacity water injection pumps
- Compact flotation units for water treatment
- Blow down system for high gas flow rates
- Blocks fabrication & erection strategy for FPSO high capacity
- Service Hubs
- Construction focus on weight reduction

# Technological Park in Rio de Janeiro



BR PETROBRAS  
CENPES

TECHNOLOGICAL CENTERS INSTALLED

Schlumberger HALLIBURTON TenarisConfab  
FMC Technologies SIEMENS  
vallourec EMC<sup>2</sup> BAKER HUGHES GE

TO BE INSTALLED

B  
BG GROUP

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# Conclusions

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- After 16 years, Local Content Policy is mature and a new age is foreseen for the future: new suppliers can benefit from the years ahead;
- The first challenges to put the Pre Salt fields into operation are overcome but the next wave is just tomorrow. Manufacturers, Service Providers and Universities are key partners;
- The average Local Content today for E&P Projects range between 55% and 65%. **There are plenty of opportunities for foreign companies wishing to establish in Brazil;**
- The association between Brazilian and foreign manufacturers is a good approach as to provide the solutions for technology bottlenecks. But other alternatives are welcome. Think, evaluate and make the right decision !

# Thank you

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