Scientific Development Leading to Innovation
A Brazilian Oil and Gas Case Study

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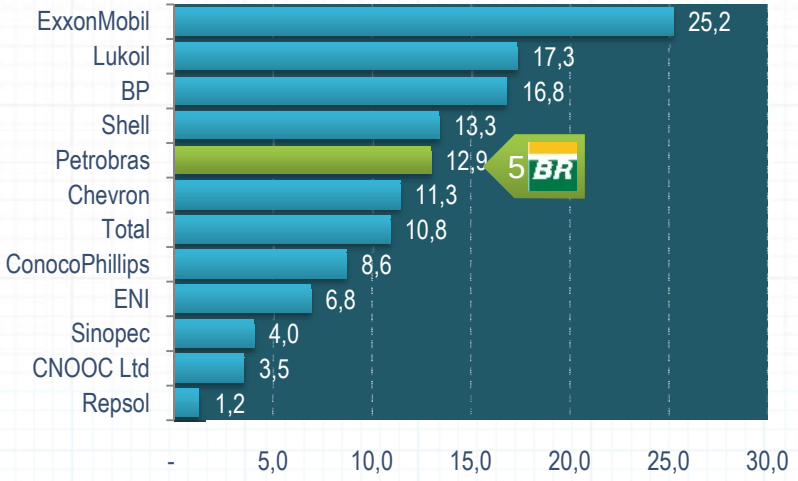
NOTICE TO NORTH AMERICAN INVESTORS

The SEC (United States Securities and Exchange Commission) only allows oil and gas companies to include, in their filed reports, proved reserves demonstrated by the Company via actual production or conclusive formation tests, which are economically and legally feasible under current economic and operating regulations. We have used certain terms in this presentation, such as oil discoveries, which the SEC's guidelines strictly prohibit us to use in our filed reports.

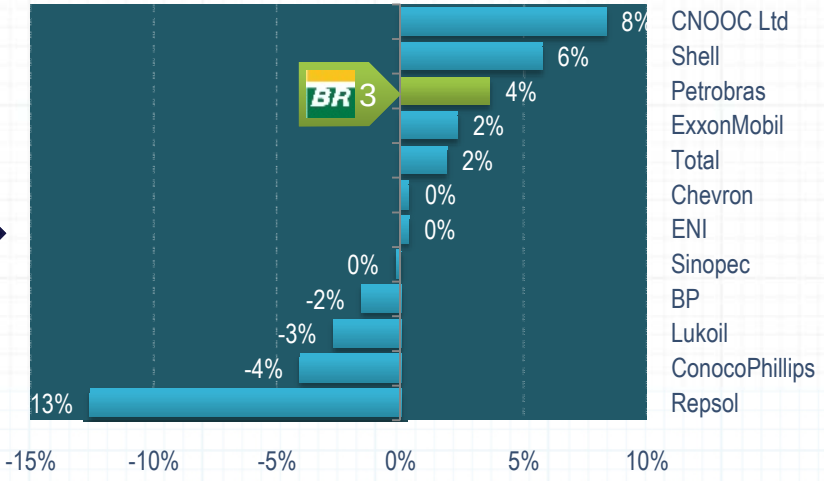
Oil and Gas Proven Reserves and Production

Petrobras reserves have grown 4% in average in the last 5 years

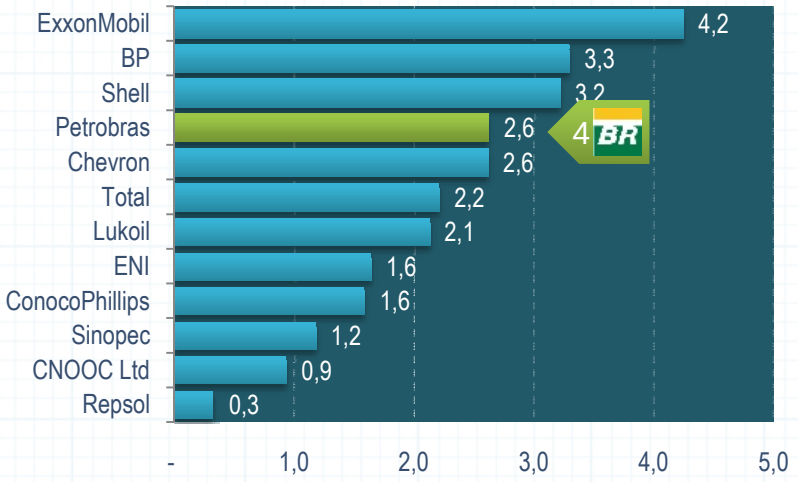
Proven Reserves (bn boe – SEC - 2012)



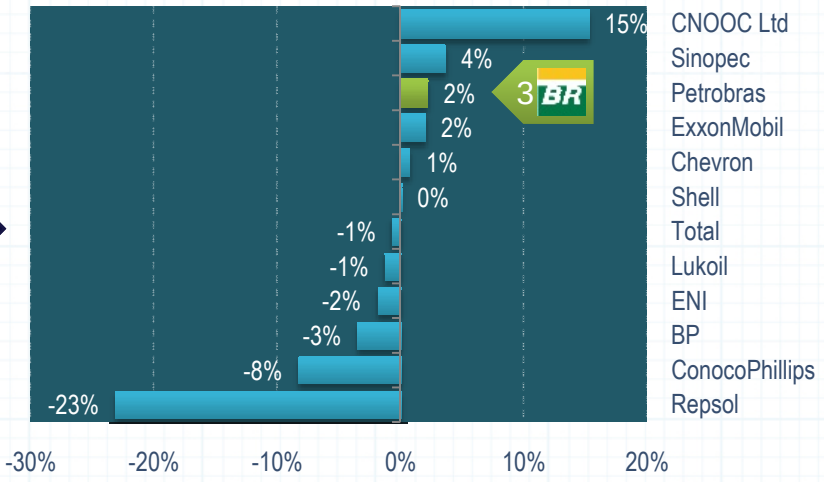
% Reserves Growth (5 years average)



Oil and Gas Production (mmboe/d)



% Production Growth (5 years average)



Source: Evaluate Energy 2012

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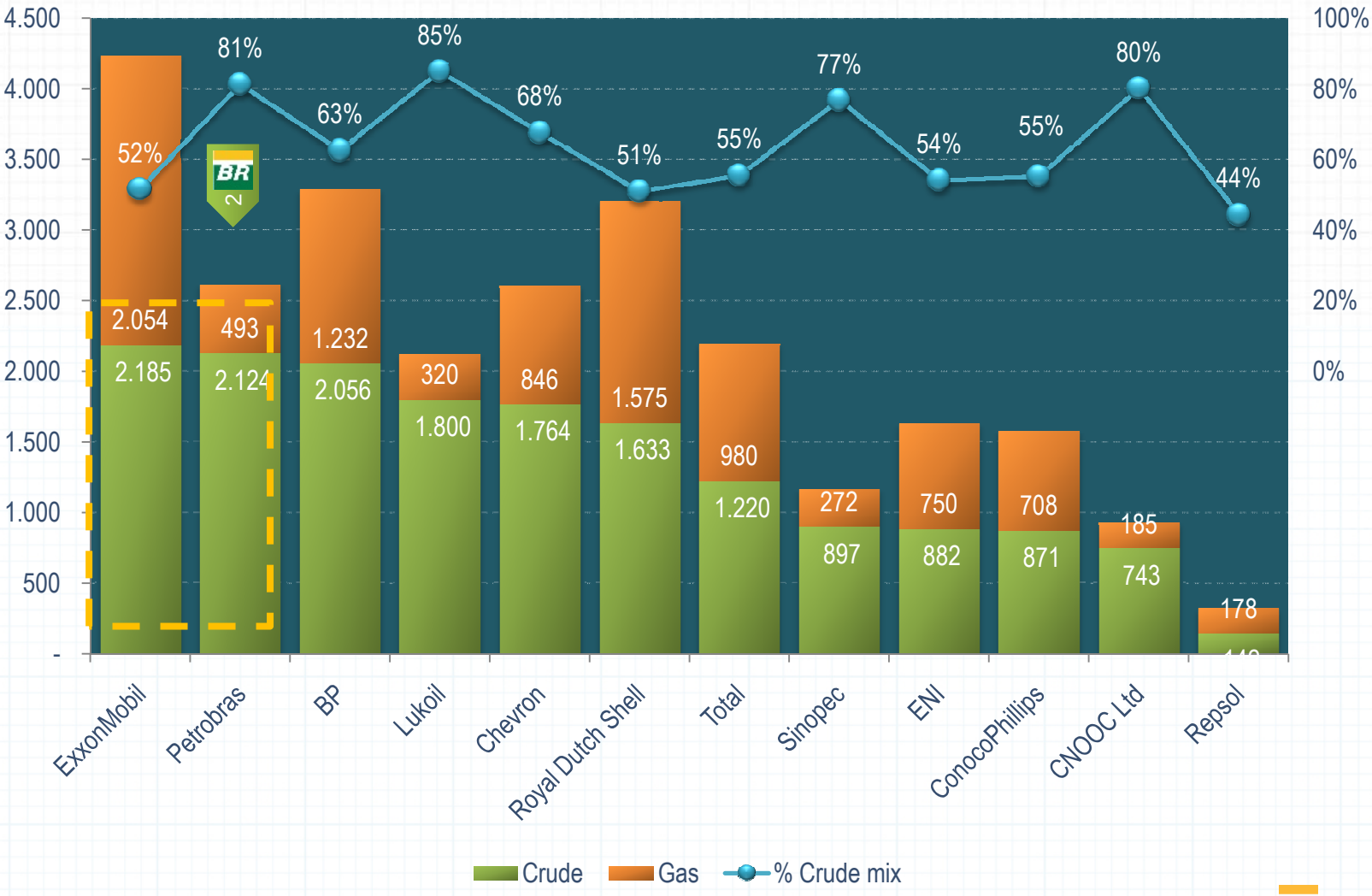
Oil and Gas Profile

Petrobras is the 2nd largest oil producer with a marginal difference to the 1st



Source: Evaluate Energy 2012

Strong R&D Focus Since the Beginning

1953

Petrobras creation

1963

R&D Unit creation

1973

CENPES facilities opening

CENPES facilities construction (1971)

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R&D Facilities Expansion (2010)

Petrobras R, D&E Center - CENPES

CENPES	Original	Expansion	Total
Total Area:	118,000 m^2	190,000 m^2	308,000 m^2

Number of Labs – 227

Motivation for Innovation

Giant discovers in deep waters (1984)

Need for Adoption of New Technologies

Giant discovers in ultra deep waters (2006)

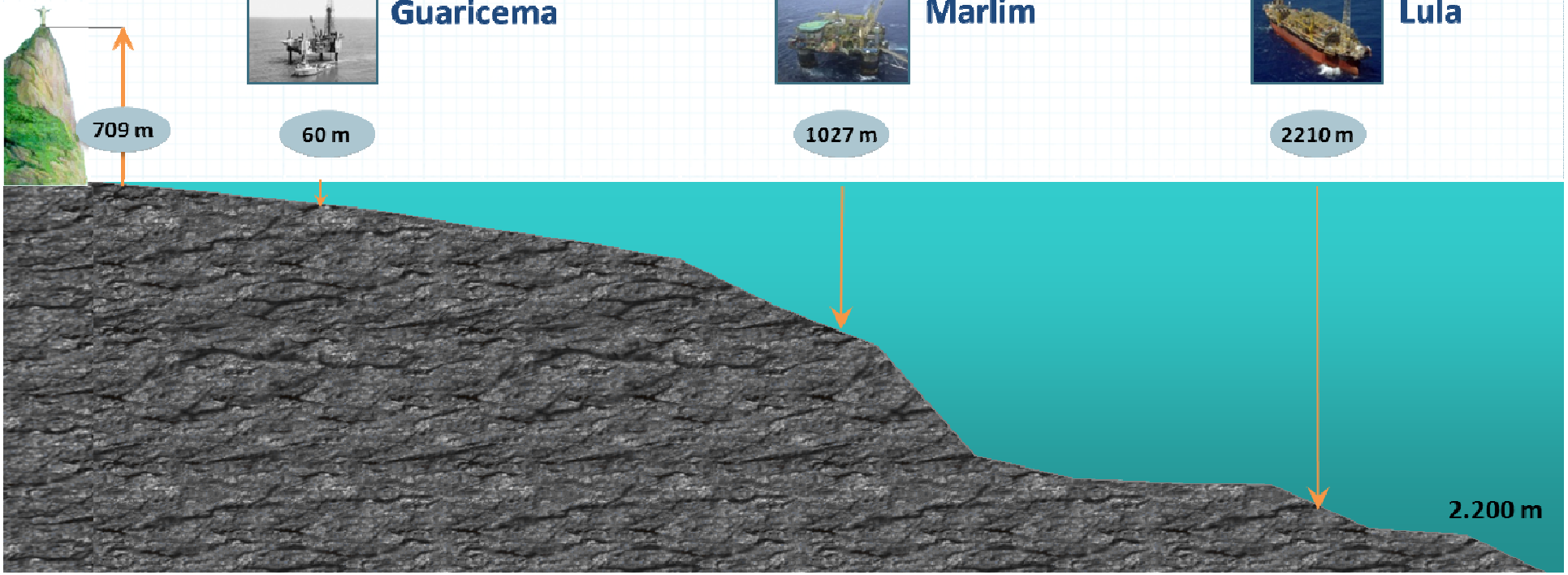
Competitiveness

Sustainability

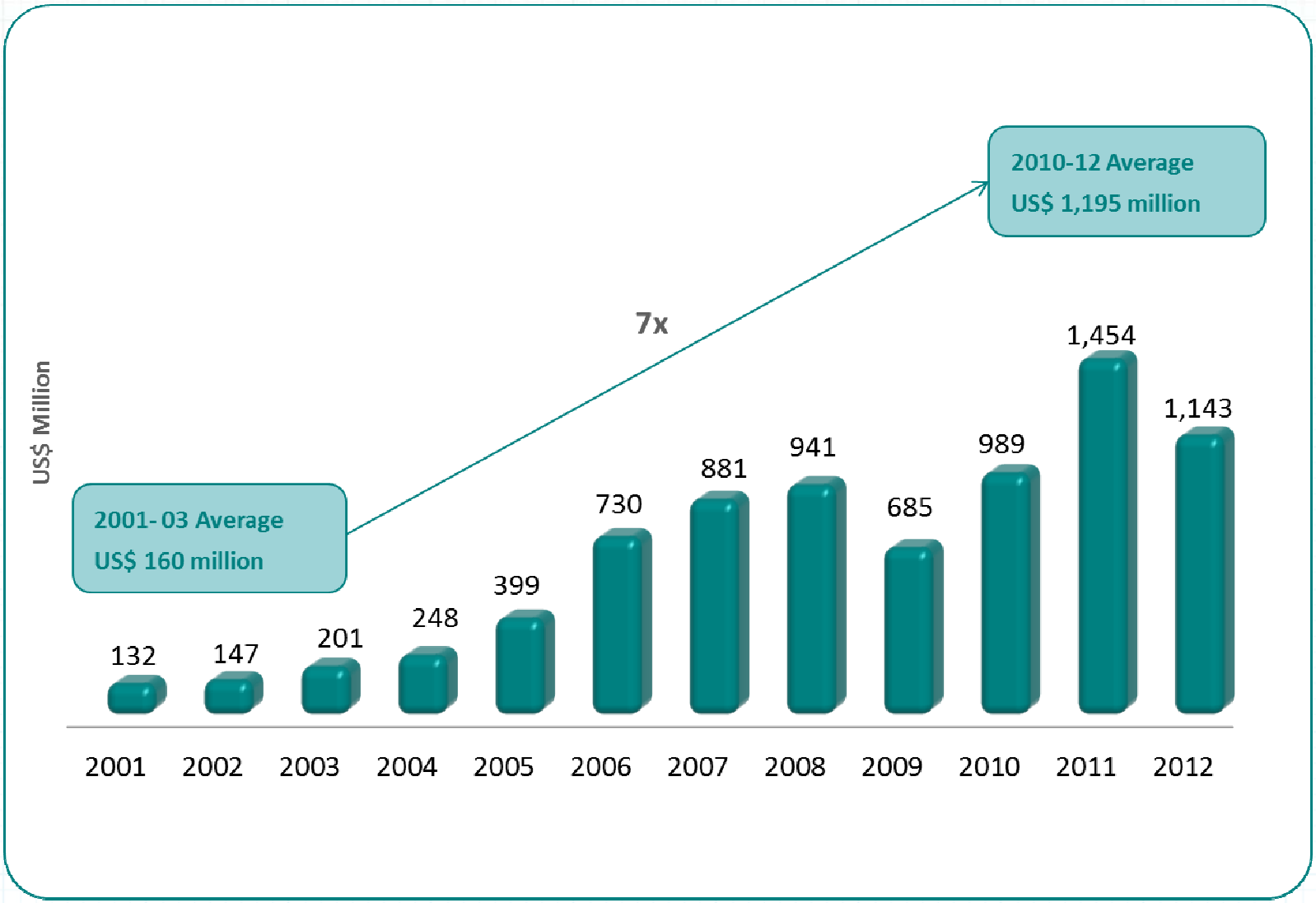
Guaricema

Marlim

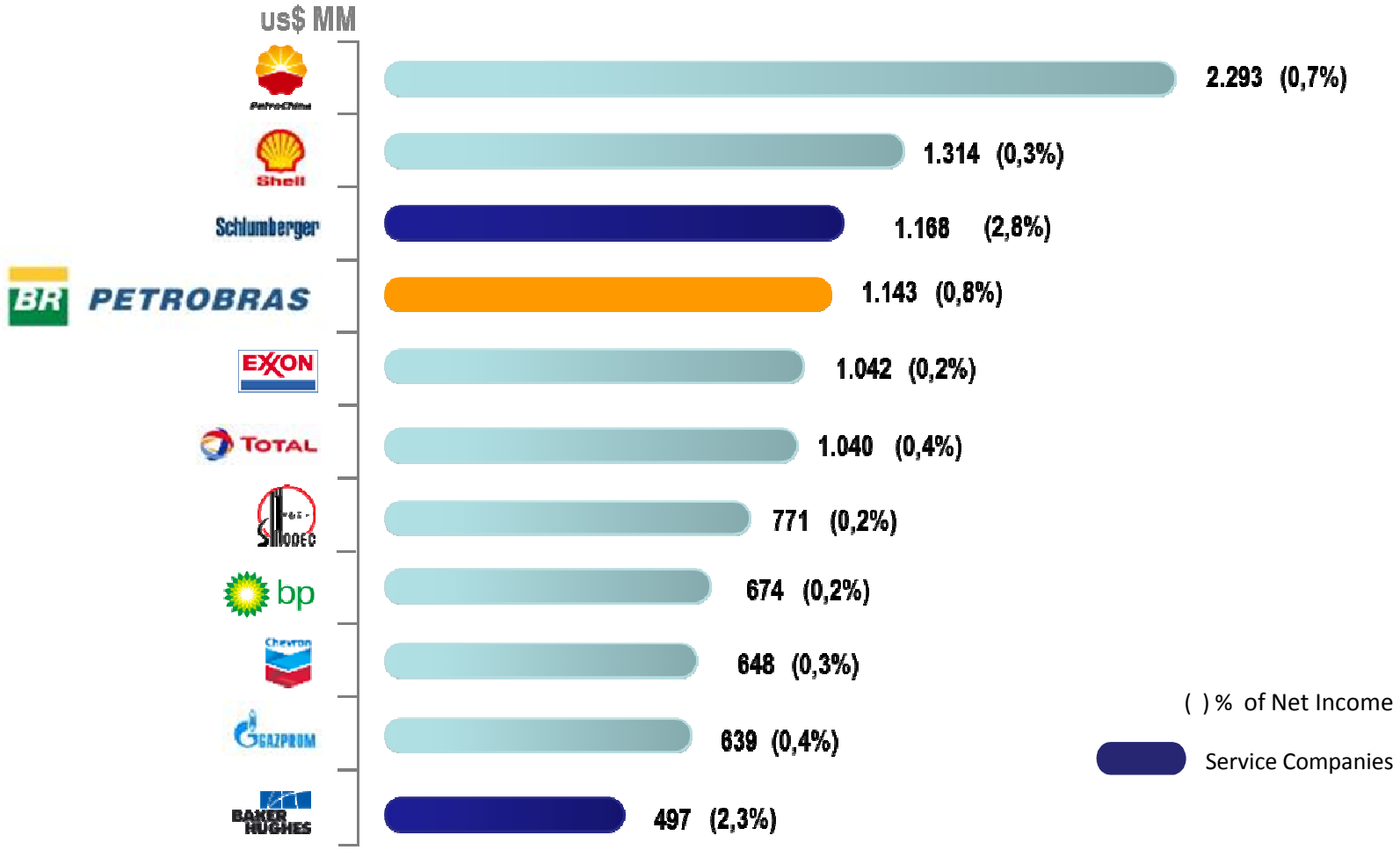
Lula



Petrobras Investments in R&D



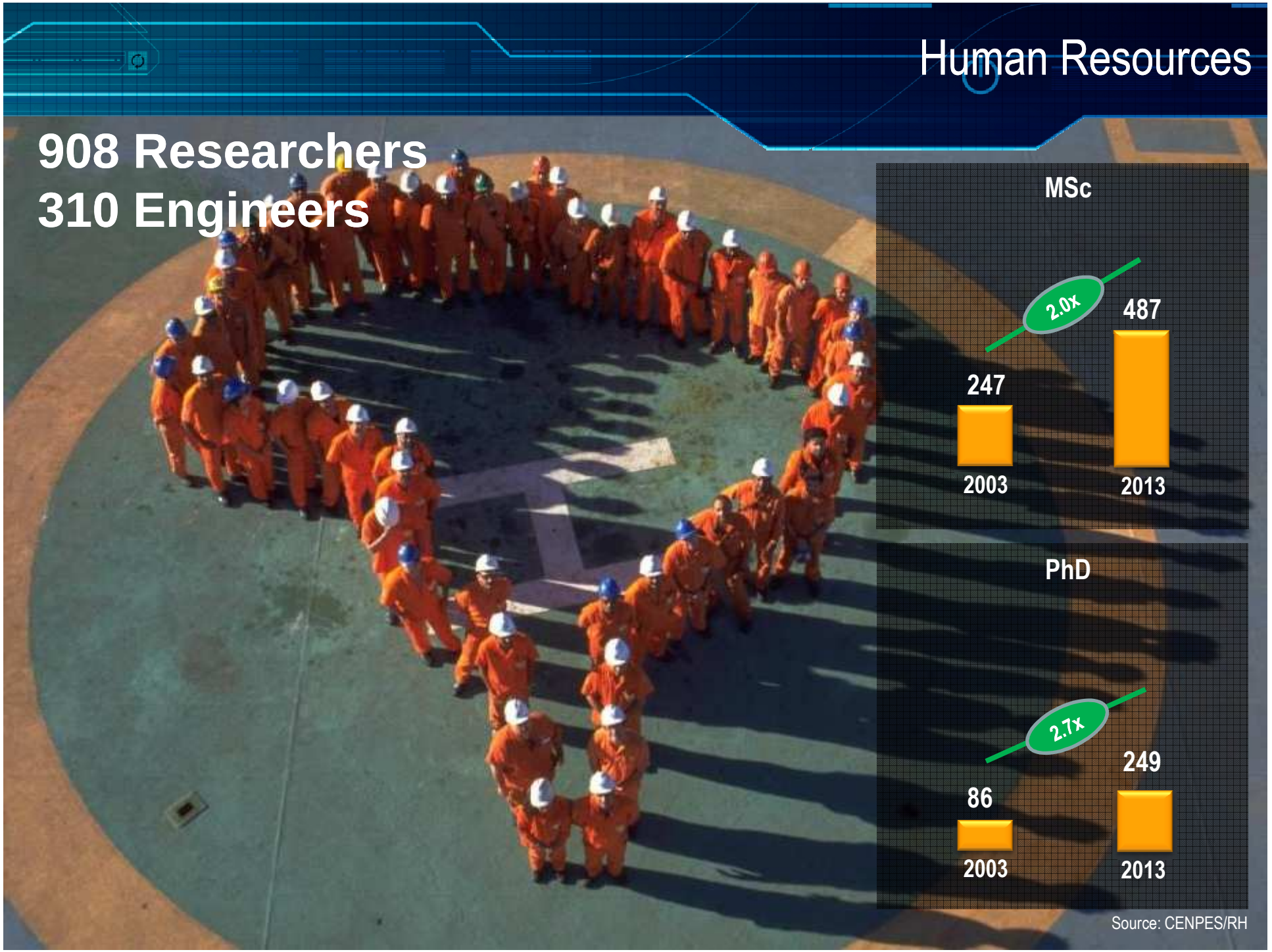
Investments in R&D by Top Energy Companies



Source: Energy Evaluate, 2013; Schlumberger 2012 Annual Report; Baker Hughes 2012 Annual Report

Human Resources

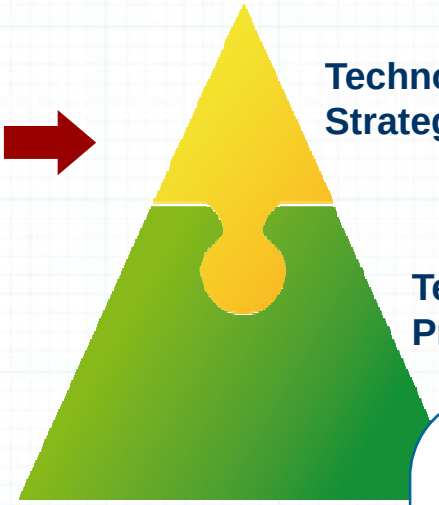
908 Researchers
310 Engineers



Source: CENPES/RH

Innovation Strategy

Business Strategy



Total alignment to company strategy

Expanding the limits


New frontiers exploration


Production Optimization


Pre-salt Production


Subsea Production Systems


Non-Conventional Reservoirs


Logistics and Commercialization of Natural Gas


Offshore Operation Logistics


Supply and exportation of oil and derivatives


Pre-salt oil refining and refining park flexibilization

Value - added and product diversification

New fuels, Lubricants and Special Products

Petrochemicals

Ammonia and Urea

Biofuels and Bio products

Thermoelectricity and Renewables

Sustainability

Water and Effluents

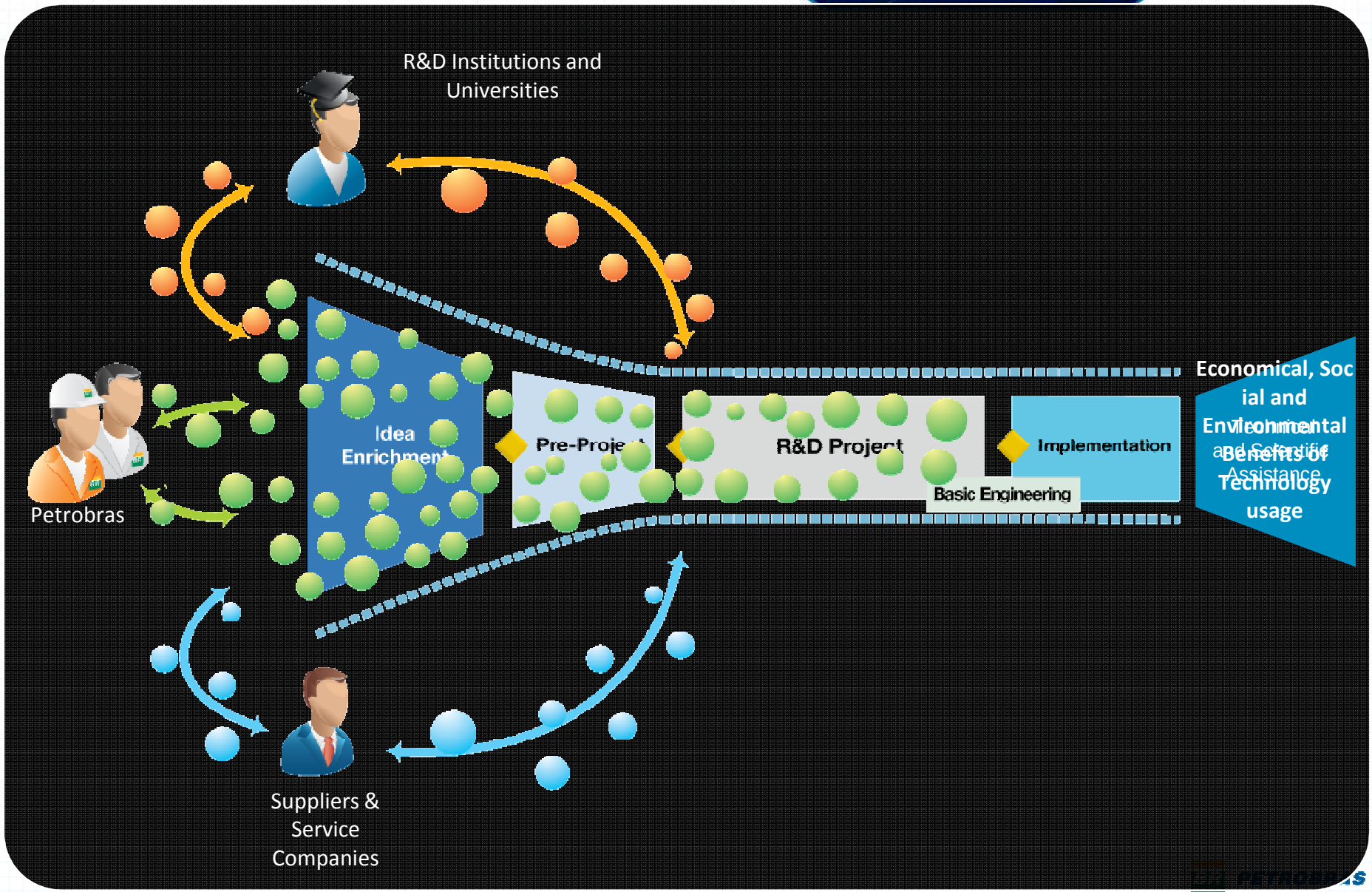
CO2 and other Emissions

Energy and Operations Efficiency

Biodiversity

Integrity, Safety and Reliability

Applying the Open Innovation Concept

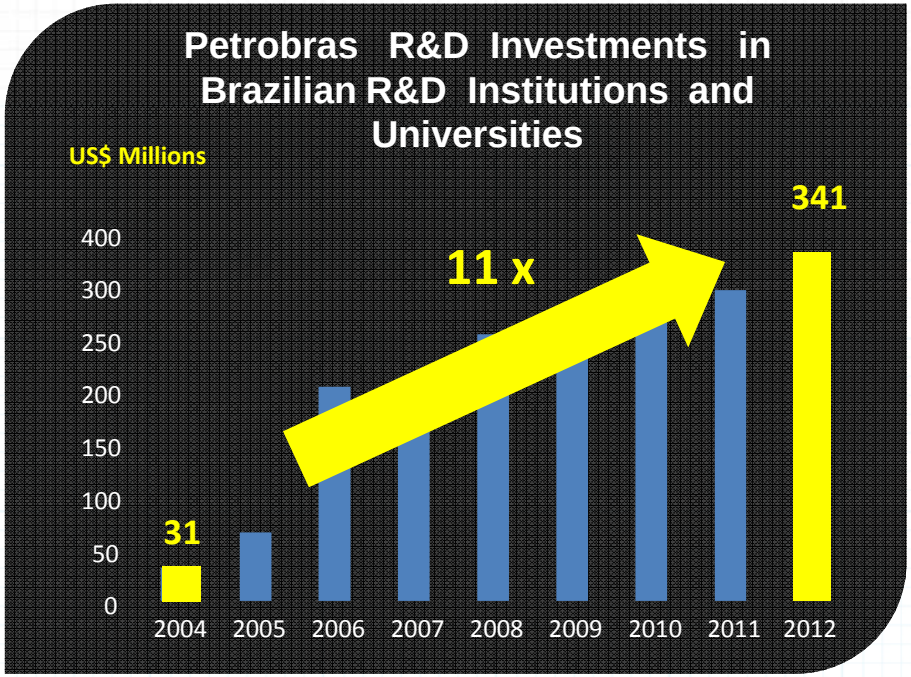


Academy Relations

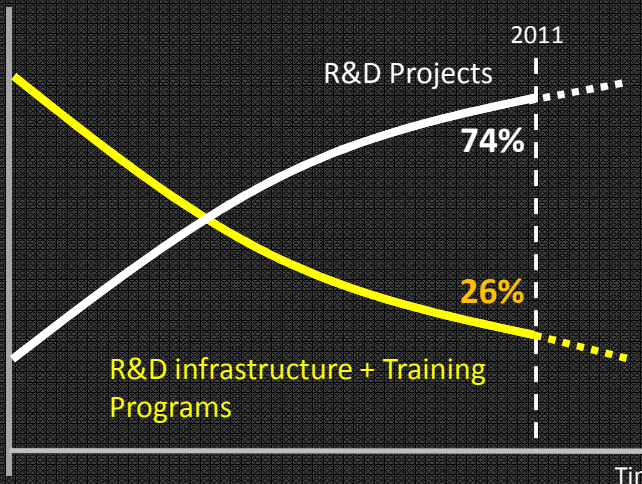
R&D Investment Stimulus in Brazil (ANP)

% Gross Revenues high prod fields → Academy R&D Mandatory Investment

Petrobras R&D Investments in Brazilian R&D Institutions and Universities



R&D Cooperation with Brazilian Universities and Research Institutions



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Brazilian Universities and Technology Institutions

- ✓ **120 Brazilian Universities**
- ✓ **US$ 2 billion invested* (2004-2012)**

Thematic Networks	
Materials and Corrosion Technology	Micropaleontology
Scientific Computing and Visualization	Pipeline Multiphase Flow Network
Bioproducts	Brown Field Revitalization
Geotectonic	Metrology
Sediments and Stratigraphy	Testing Laboratories O&G and Energy Industry
Catalysis	Supply Chain Manegement
Geochemistry	Combustion
Fuels and Vehicle Lubricants	Nanotechnology
Water Management	Well Constr., Monitoring, Control & Automation
Subsea Production Systems	Advanced Materials for the Refining Industry
Drilling Engineering	Natural Gas
Geophysics	Primary Processing
Heavy Oil	Pipeline Transportation Technologies
Reservoir Management and Simulation	Computational Fluid Dynamics
Petrochemistry	Production Optimization
Marine Environment	Oceanographic Modeling
Climate Changes	Refining Products and Process Reliability
Asphalt Tecnology	Produced water reuse
Ecosystems	Enhanced CO2 oil recovery technology
Lubricants Technology	Hydrogen: production, usage and storage
University - Industry partnership	Shipbuilding Technology
Clean Fuels Technologies	Artificial Lift research methods
Convergent Technologies	Energy Planning
Concrete and Refractories	Geologic and Geophysical Reservoir Characterization and Modeling
Basins Modeling	

March/2013

* Includes Thematic Networks and other university investments 2004 to 2012.

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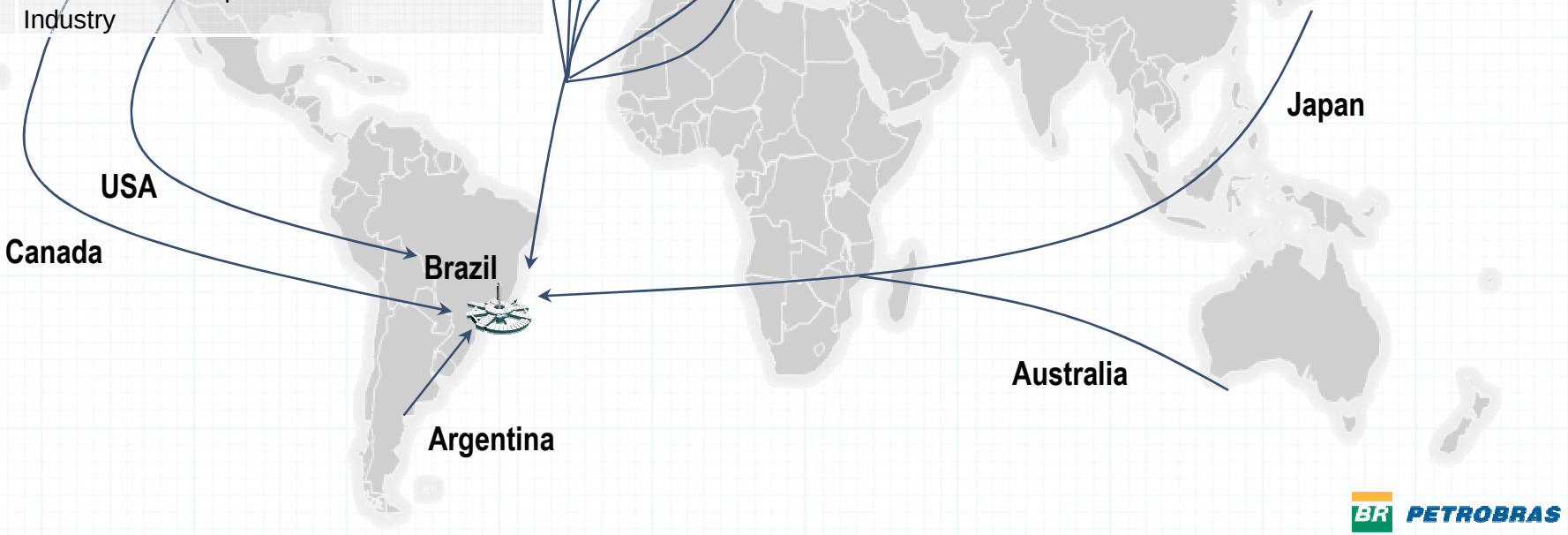
Current R&D International Agreements

Country	Theme
USA	Enhanced Oil Recovery, Drilling Engineering, Subsea Production Systems, Refining Technologies Licensing
	Reservoir Characterization and Modeling, Nanotechnology
France	Refining Technologies Licensing, Naphtha Hydrodessulfurization Technologies, Drilling Engineering
	Geosciences, Seismic Data Acquisition, Reservoir Characterization and Modeling, Materials technology
Norway	Seismic Monitoring, Hydrodynamic Modeling, Subsea Production Systems
	Oil Contaminants and Hydrates, Environmental Impacts in the Oil and Gas Industry

Norway **Netherlands**
Sweden **France**
UK **Germany**
Ireland **Portugal**
Belgium **Italy**

Country	Theme
Canada	Biomass Gaseification, Reservoir Characterization and Modeling
	Seismic Data Acquisition
United Kingdom	Materials technology, Reservoir Characterization and Modeling
	Carbonatic Reservoirs
Australia	Geology, 4D Seismic Data Acquisition
Netherlands	Production Optimization
	Polymers
Japan, Belgium, Germany, Italy, Portugal, Argentina, Sweden, Ireland	Geology and e New Materials
	Process Simulation, CO_2 Removal, Gas Hydrates



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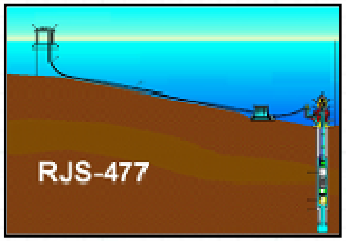
Main Academy Contributions to the Innovation Cycle

1997

Anchorage System with Polyester Line – Marlim

1998

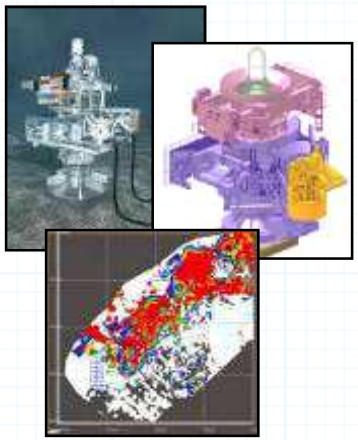


Rigid Steel Riser in Catenary for Deep Waters in Semi-Sub – Marlim

2001

2,500m water depth
Horizontal Christmas Tree – Roncador
VASPS Operation – Marimbá

ERW (Extended Reach Well)
MSL-42



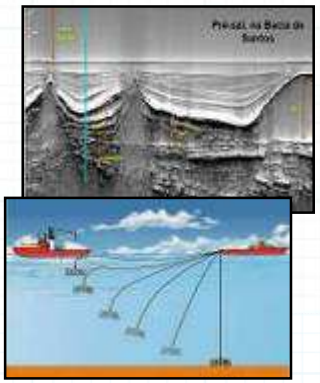
2002

2003

Multi-fracture well – Enchova

Main Academy Contributions to the Innovation Cycle

Torpedo Piles for the Anchorage System – Albacora Leste



PRONAV and Bandeira Brasil Systems

2005

2006

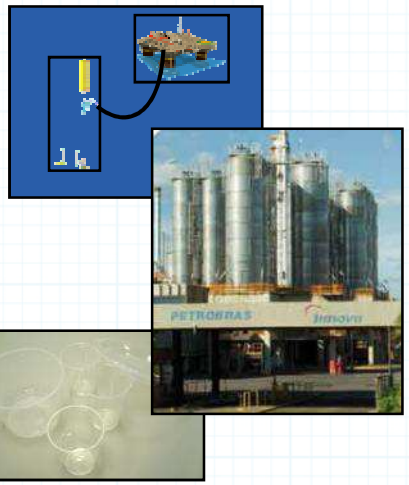
First application of feedback loop manager – BR-Perfx (UN-BA)

Manifold Installation by Pendulum Method – Roncador

Free Standing Hybrid Riser – Roncador

Transparent high impact polystyrene (Clear HIPS) at INNOVA

2007



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Main Academy Contributions to the Innovation Cycle

New equipment for emergency repair of liquid pipelines (Transpetro)

Selection of materials for Lula and Guará wells

New models for daily prediction of sea conditions (Campos, Espirito Santo, Santos Basins and Equatorial Margin)

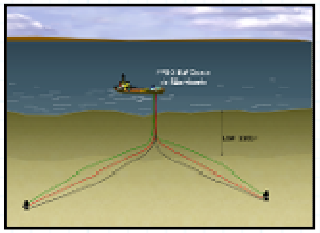
Flexible Risers in LDA of 2200m – Tupi

New models for produced water reinjection after seawater injection (Marlim)

2009

2008

First application of Alarm Management (BR-Alarm) at REFAP



2010

Modified SACI technology – Reduced atmospheric emissions (REMAN)

New methodologies for connate water characterization and scaling inhibition (Espadarte)

New corrosion model for flexible risers (Marlim and Pre-salt wells)

Main Academy Contributions to the Innovation Cycle

Ultrasonic Pig
(Transpetro)

Real-time simulation of fluid drainage in cementation process (Marlim and Papa-Terra)

VASPS
Vertical Annular Separation and Pumping System (Congro; Malhado; Corvina)

New nanobounded refractory concrete (REVAP)

High performance transfer and storage (REPLAN and REVAP)

2011

New methodology for simulation of Well/Casing/Cement ensemble (Santos Basin Pre-Salt)

Campos Basin Environmental Characterization

2012

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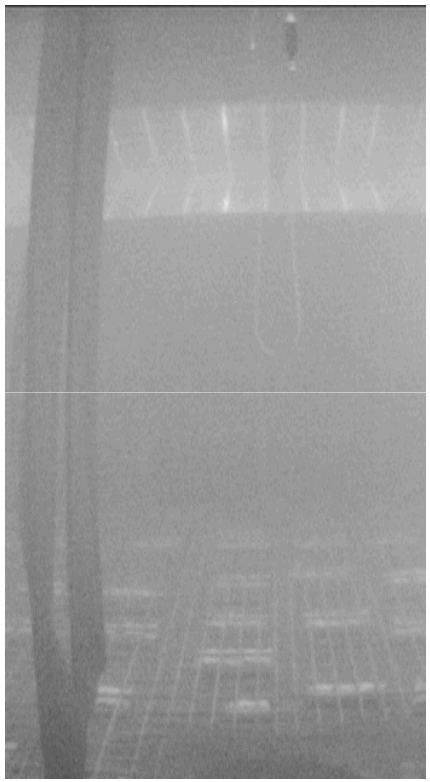
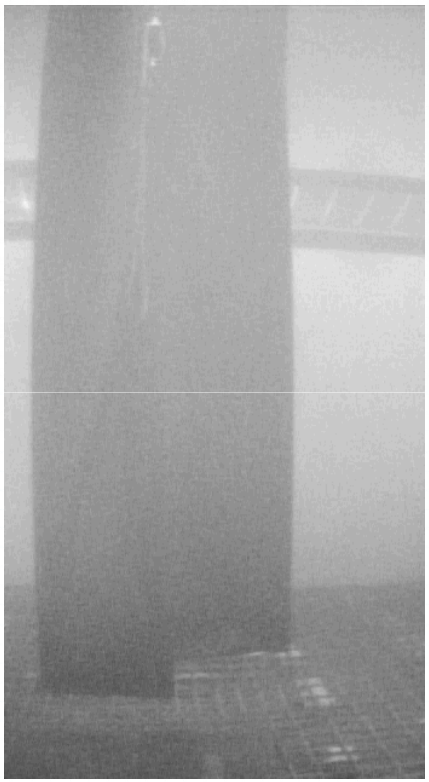
Torpedo Piles Mooring (2005)

Torpedo Pile Prototype 2

Camera 1

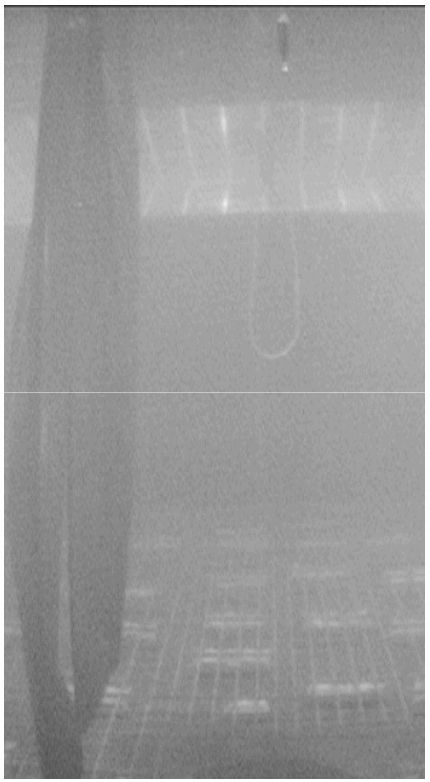


Camera 2



Torpedo Pile Prototype 3

Camera 1



Camera 2

Reduced scale pilot tests at LabOceano (UFRJ)

Concept analysis

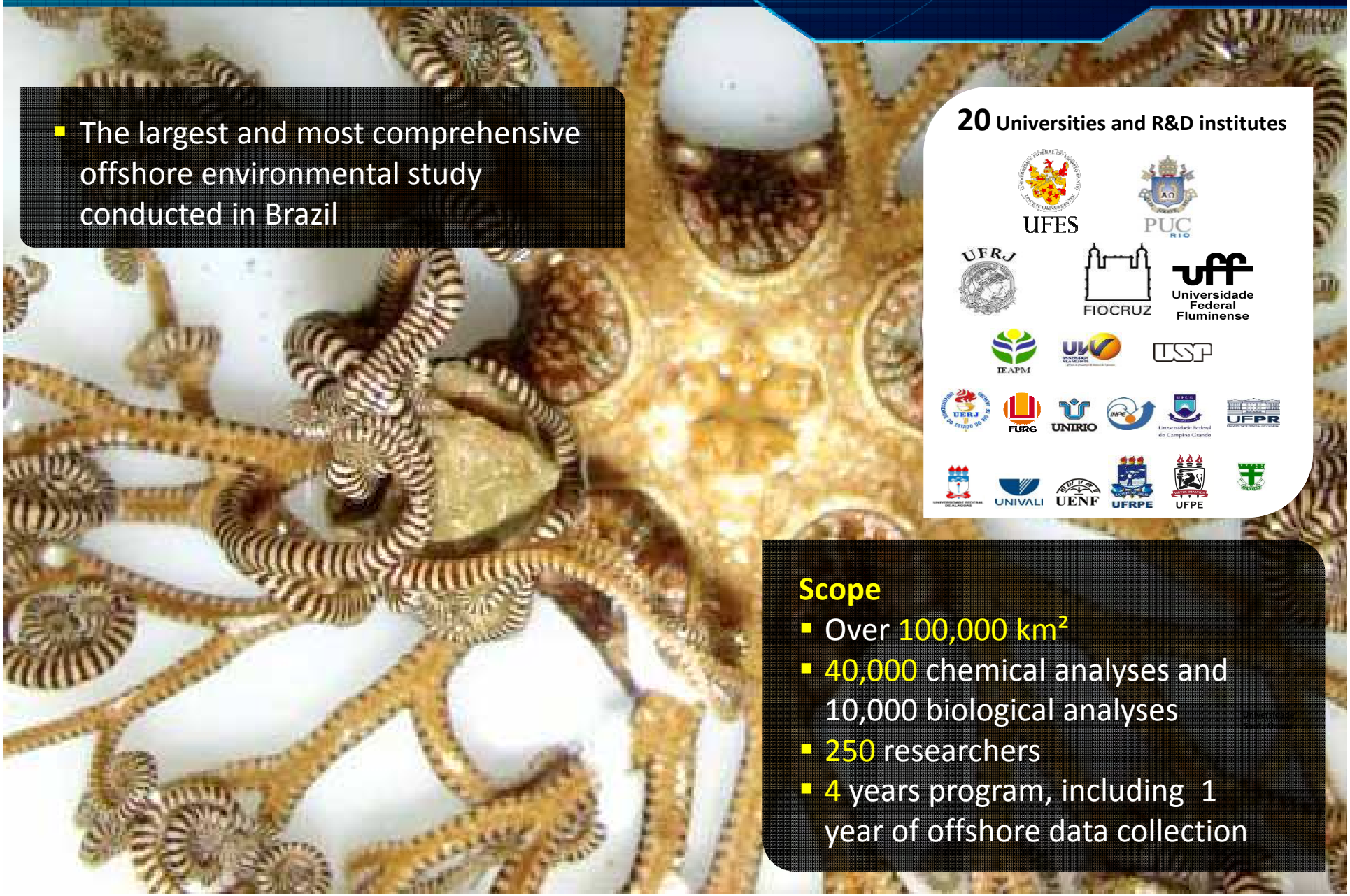
Craveability

Graphic Interface

Installation Monitoring

Hydrodynamics Analysis, Load Capacity, Launch and Crave Analysis

Campos Basin Environmental Characterization (2011)



- The largest and most comprehensive offshore environmental study conducted in Brazil

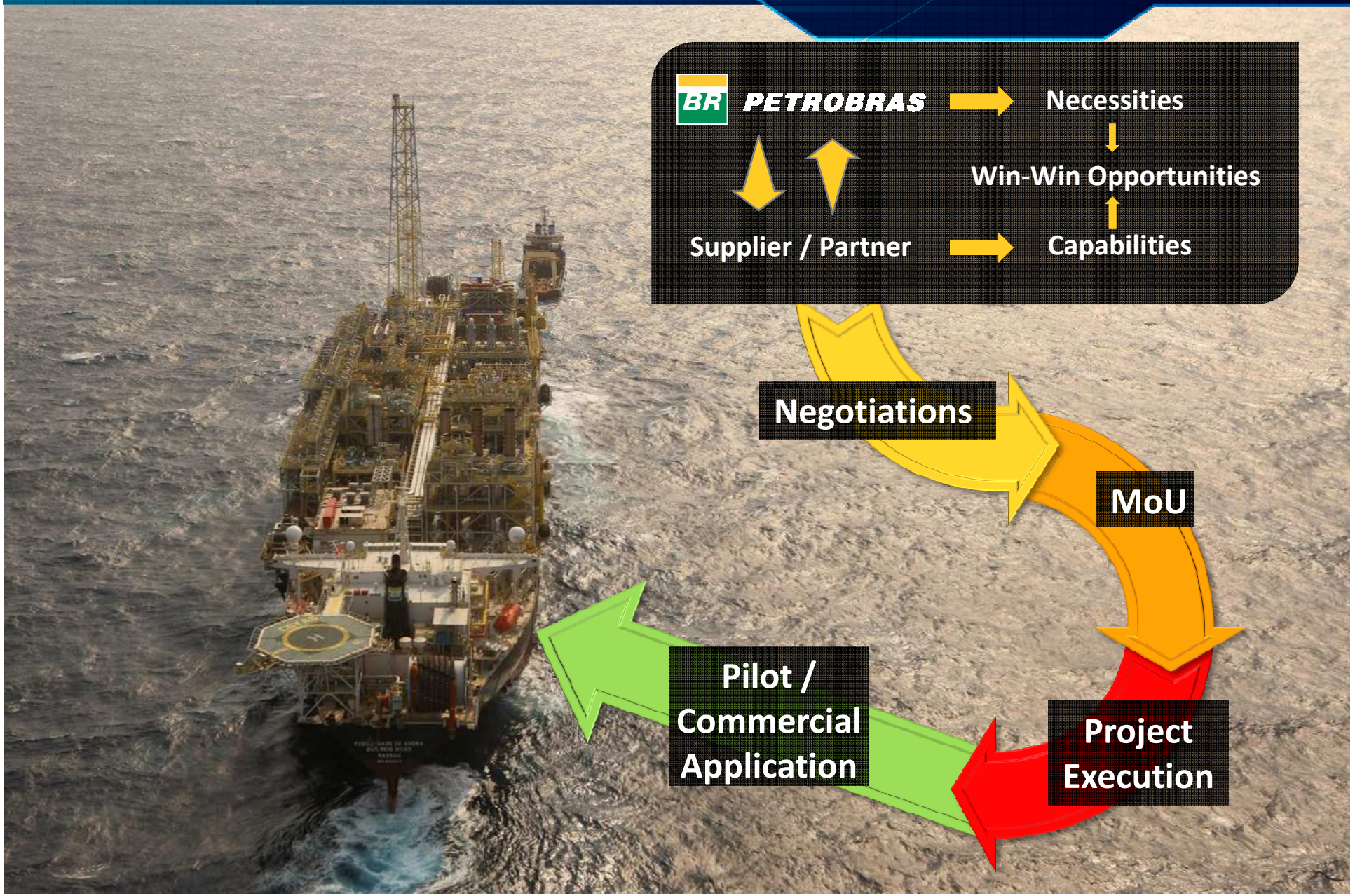
20 Universities and R&D institutes

UFES, PUC RIO, UFRJ, FIOCRUZ, Universidade Federal Fluminense, IEAPM, UVV, USP, UERJ, FURG, UNIRIO, INPE, UFCG, UFPR, UFAL, UNIVALI, UENF, UFRPE, UFPE, UFC

Scope

- Over 100,000 km²
- 40,000 chemical analyses and 10,000 biological analyses
- 250 researchers
- 4 years program, including 1 year of offshore data collection

Industry Partnerships - 25 years of experience



Industry Partnership: Some Examples

Negotiations

JARAGUÁ EQUIPAMENTOS INDUSTRIAIS
DUPONT
Clariant
ATIVA TECNOLOGIA & DESENVOLVIMENTO
EBSE Engenharia de Soluções
CMG COMPUTER MODELLING GROUP LTD.
Tenaris Confab
altus
USIMINAS
DOW
LUPATECH
AkerSolutions
FUGRO
OXITENO
ABS Consulting
NGH Japan
VILLARES METALS

MoU

GE
delp
UOP A Honeywell Company
cybernétix
V&M
intel
SG biofuels
IBM
ALFA LAVAL
pakelo research & development global
MODEC
SIEMENS

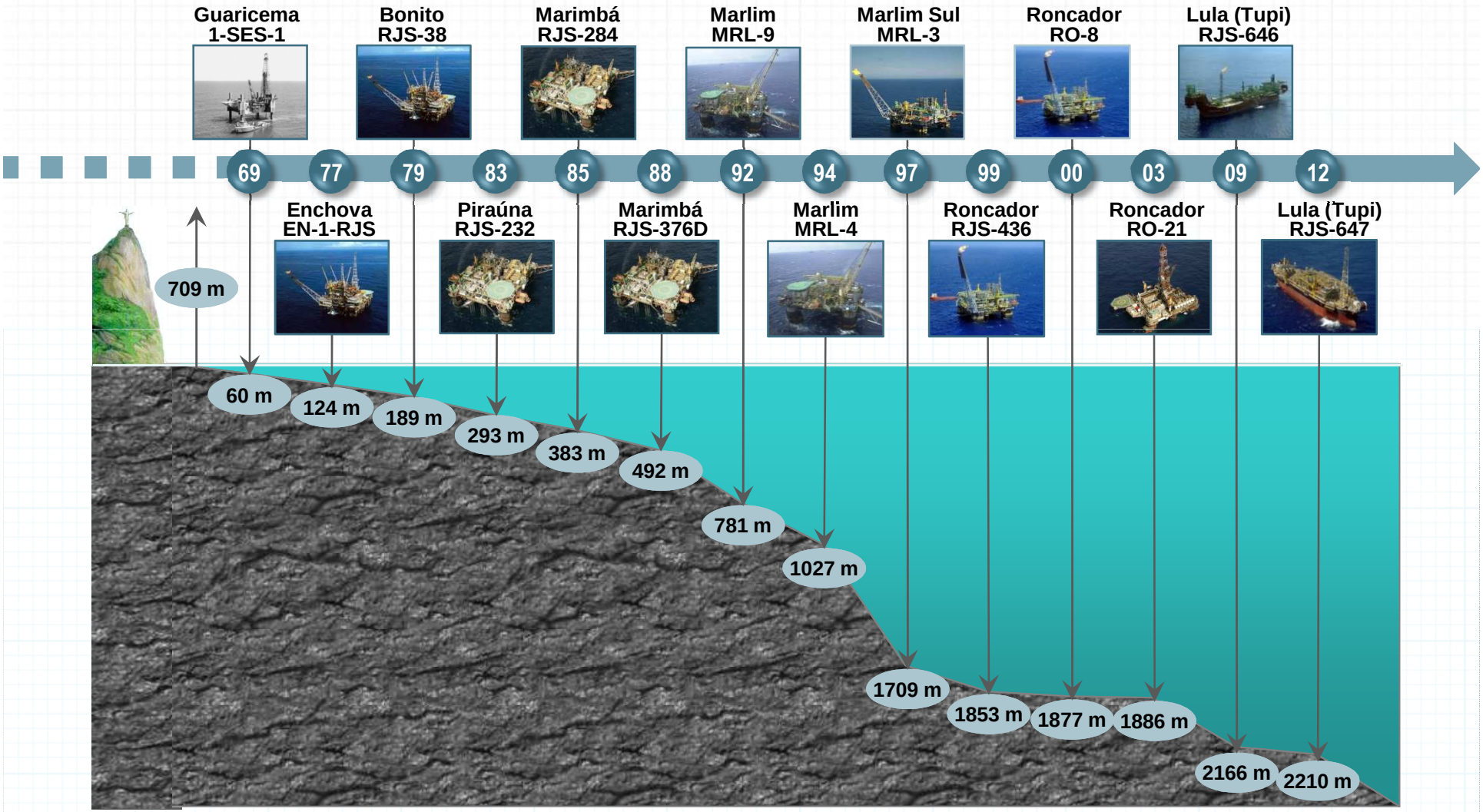
Project Execution

VALE
novozymes Rethink Tomorrow
BIOECON
ALBEMARLE
btg biomass technology group
NALCO
FORO ENERGY
Weatherford

Pilot /Commercial Application

FMC Technologies
Schlumberger
3M
Technip
BAKER HUGHES
HALLIBURTON
Braskem
CGGVERITAS
SINTEF
CAMERON
FÁBRICA CARIOCA DE CATALISADORES
FRAMO ENGINEERING AS

Water Depth Track Records



Source: Petrobras; Offshore Magazine - WoodGroup Mustang

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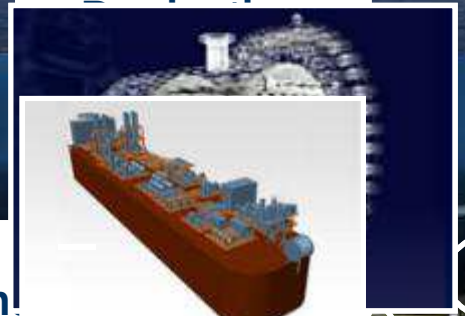
Rio de Janeiro Science Park

Future Vision

New Generation of Process Equipment



Un

Subsea Processir

Drilling

Nanoparticles

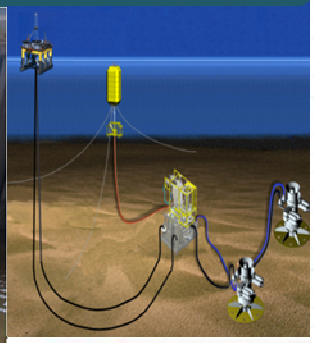
Laser Drilling


Why not?

Main Ongoing Technology Projects (2013)

Raw Water Injection (RWI)

Application: Albacora (P-25)
Water Depth: 1,890 ft (575 m)



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Subsea Water-OilSeparation (SSAO)

Application: Marlim Field (P-37)
Water depth: 3,280 ft (1,000 m)

FMC Technologies

Subsea Multiphase Pump

Application: Barracuda (P-43)
Water Depth: 3,410 ft (1,040 m)

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Teamwork

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PETROBRAS 60anos
Letícia Sugita
Petrobras Engineer since 2009
LETICIA
BR