# High potential exploration assets Roland Muggli Head of Exploration



A focused E&P strategy

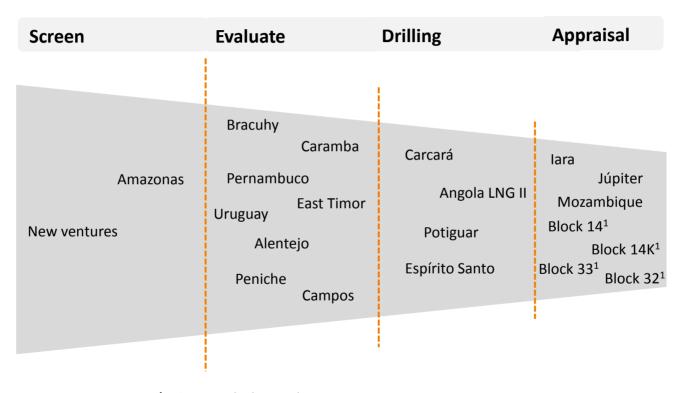
Resources and targets

**High potential exploration assets** 

Delivering world class development projects



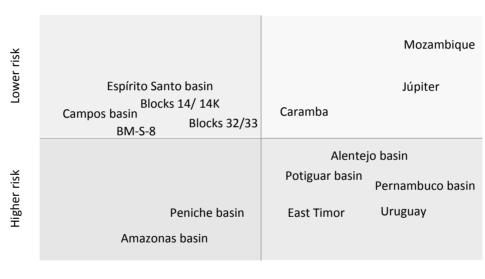
## Over 100 prospects and leads currently in exploration funnel





## Still a lot of upside potential from current exploration portfolio

#### **Exploration portfolio – potential/risk profile**



Lower resource potential

Higher resource potential

112 prospects and leads identified within Galp Energia portfolio



## Mozambique embraces a world class province

#### Royuma basin discoveries

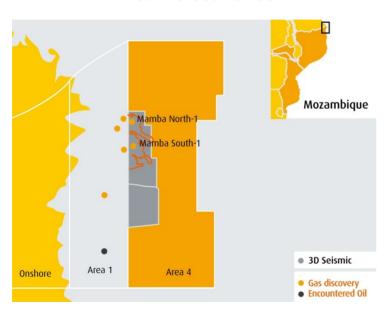


- Mamba South-1 and North-1 wells discovered gas in place resources of up to 30 Tcf
- Excellent reservoir characteristics in terms of porosity and permeability
- Mamba North-1 test flowed 1 mln m<sup>3</sup>/d (35 mmscf/d) constrained by test equipment
- Test also produced condensate in minor quantities



### Intense exploration and appraisal campaign in place

#### **Area 4 discoveries**

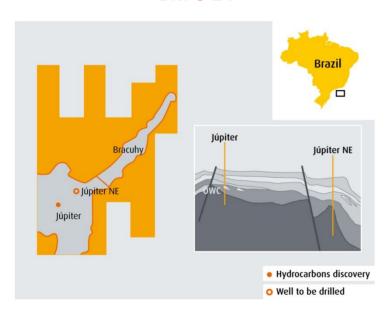


- Back-to-back drilling of 5 exploration/appraisal wells in 2012 with testing operations
- Plan to also test a separate Eocene/Paleocene prospect not connected to Mamba structure
- Block holds additional prospectivity warranting continued exploration during 2013



## Key Júpiter NE appraisal well in 2012

**BM-S-24** 

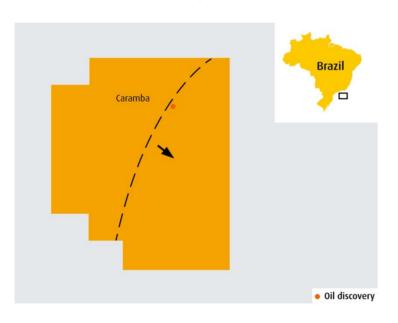


- Júpiter discovery well found a reservoir of significant oil, condensate and gas with CO<sub>2</sub> content
- Júpiter NE appraisal well expected to be drilled in 2H2012 testing a thicker pre-salt reservoir section
- Primary aim is to assess CO<sub>2</sub> distribution and thickness of oil rim
- Potential for large upside if field-wide OWC deeper than estimated in Júpiter well, not included in exploration resources



## **Testing Caramba resource upside in 2013**

**BM-S-21** 

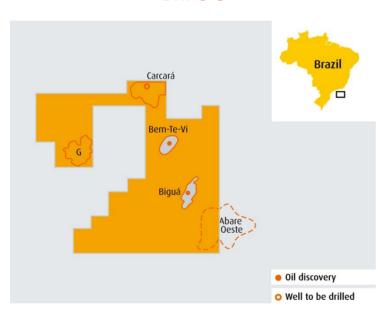


- Caramba well in 2007 found a reservoir of light oil
- Caramba pre-salt discovery with significant updip potential
- Plan to drill Caramba Sul appraisal well in 2013
- Expected DoC by April 2015



# 3<sup>rd</sup> exploration well outcome is key to support a development plan

BM-S-8

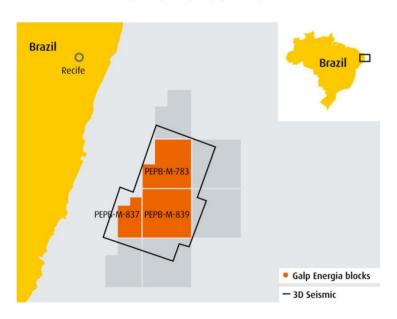


- Evaluation plan for 2,432 km<sup>2</sup>
- Two exploration wells to date encountered high API pre-salt oil in Bem-Te-Vi and Biguá accumulations
- 3<sup>rd</sup> exploration well, Carcará currently being drilled
- Results will be an important contributor towards DoC in December 2012



## New frontier area with high potential

#### Pernambuco basin

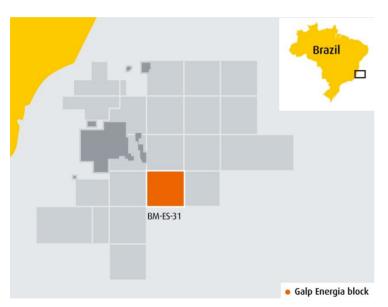


- Underexplored basin
- 3D seismic acquired over entire concession covering prospects in structural/stratigraphic trapping configuration
- Multiple objectives of over Tertiary/Cretaceous intervals (clastics/carbonate)
- Maturation of identified prospects towards drilling stage
- 1st exploration well expected for 2013



## Espírito Santo is a highly prolific oil and gas province

#### **Espírito Santo basin**



- Extensive portfolio of prospects mapped
- Targets: Upper Cretaceous and Tertiary turbiditic sandstones structurally trapped against salt diapirs
- 2<sup>nd</sup> exploration well, targeting postsalt prospect to be drilled by 2012
- Further drilling candidates identified



## New frontier province with significant resource potential

#### **Potiguar basin**



- Two contracts including stakes in five blocks, covering an acreage of 3,736 km<sup>2</sup>
- Prolific shallow waters area located. near Brazilian equatorial margin
- 9 prospects identified in water depths of 1,500m in a predominantly stratigraphic setting (Cretaceous clastics)
- 1<sup>st</sup> exploration well, Ararauna, to be drilled in 2012



### **Exploration phase extended in East Timor**

#### **East Timor**

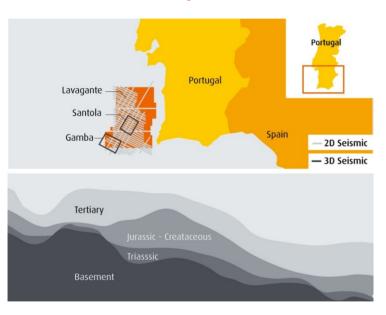


- Timor island accretionary wedge and foreland basin (Northern Bonaparte)
- First frontier exploration well Cova-1 in 2011 was considered to be noncommercial
- Well data allowed to re-evaluate entire concession including deeper plays (Permian, Triassic)
- Extension of current exploration phase until November 2012 allows to mature identified prospects towards drill or drop decision



## Alentejo basin exploration drilling to start as early as 2013

#### Alentejo basin

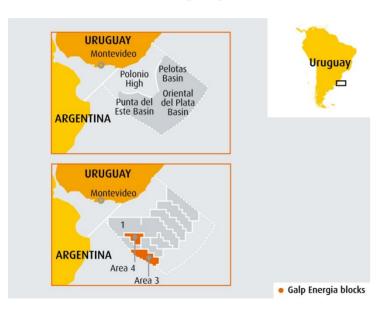


- Mesozoic rift basin with large structures identified
- 1,800 km<sup>2</sup> of 3D seismic with excellent quality acquired in 2011
- Several prospects identified with significant resource potential
- Drilling decision for the 1st exploration well to be taken in 2012



## **Exploration activities still in early stages**

#### **Uruguay**

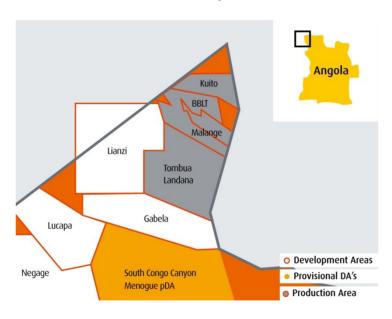


- 6,290 km of 2D seismic over Blocks 3 and 4 in Punta del Este basin
- 2D seismic evaluation ongoing with focus on Tertiary stratigraphic and Paleozoic syn-rift plays
- Several leads identified with significant upside potential
- Basin modelling to assess charge uncertainty
- Next milestone: decision on 3D seismic acquisition



## Optimising upside potential nearby existing infrastructure

#### Blocks 14/14k

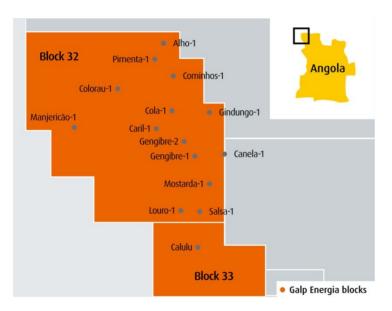


- Investment strategy is to provide new volumes for the existing facilities
- Pinda targets present the largest defined exploration volumes in existing DA's
- Fault bounded structures (rafts) at Pinda Fm level
- Drill one Pinda exploration well in 2012
- Potential upside may be found in Miocene, Oligocene and pre-salt levels (block wide play assessment ongoing)



## **Evaluation program on track in blocks 32 and 33**

#### **Blocks 32/33**



#### Block 32

- Five year exploration program to develop 2<sup>nd</sup> hub in block 32
- Two exploration/appraisal wells in 2H12 (Gengibre-3 / Caril -2)
- Oligocene/Miocene channels in mixed trapping configuration

#### Block 33

 One exploration well Sumate-1 to be drilled in March 2012 in block 33



# More than 20 exploration and appraisal wells to drill in 2012

		2012				
Country	Area	1Q	2Q	3Q	4Q	Total
Brazil	Lula	$A^1$	$A^1$	$A^1$		3
	Cernambi		$A^1$			1
	lara	Α				1
	BM-S-8	E				1
	BM-S-24			Α		1
	Potiguar offshore			E		1
	BM-ES-31		E			1
Angola	Block 14				E <sup>1</sup>	1
	Block 32			E <sup>1</sup>	$A^1$	2
	Block 33	E				1
	LNG II	Α		Α	Α	3
Mozambique	Rovuma	E A	А	E	E/A E/A	6
						22

# **Acronyms**

#	Number	GWh	Giga Watt hour	
\$	United States dollar	HSE	Health, Safety and Environment	
%	Percentage	IPO	Initial Public Offering	
2D	Two dimensional seismic	Kboepd	Thousand barrels of oil equivalent per day	
3D	Three dimensional seismic	Kbpd	Thousand barrels per day	
API gravity	American Petroleum Institute gravity	Km²	Square kilometre	
BBLT	Benguela, Belize, Lobito, and Tomboco		Liquified Natural Gas	
Bbl	Barrel		Lost time injury frequency rate	
Bcm	Billion cubic metres	Mln	Million	
Bln	Billion	MW	MegaWatt	
Boe	Barrel of oil equivalent	Mmscf/d	Million standard cubic feet per day	
c.	Circa	NG	Natural Gas	
CAGR	Compound Annual Growth Rate	owc	Oil-water contact	
Capex	Capital expenditure	POS	Probability of success	
CO <sub>2</sub>	Carbon Dioxide	p.p.	Percentage point	
DA	Development area	R&M	Refining & Marketing	
DEH	Direct electrical heating	RCA	Replacement Cost adjusted	
DoC	Declaration of commerciality	SAM	Sustainable Asset Management	
E/A	Exploration well /Appraisal well	SEE	Social, Environmental and Economic impact	
E&P	Exploration & Production	SXEP	STOXX Europe 600 Oil & Gas	
EBITDA	Earnings before interest, taxes, depreciation and amortization	Tcf	Trillion cubic feet	
EOR	Enhanced oil recovery	Ton	Tonne	
EWT	Extended Well Test	WAG	Water Alternating Gas	
FLNG	Floating liquefied natural gas	WI	Working interest	
FPSO	Floating Production Storage Offloading	YE	Year End	



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