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THE PROSPECTS FOR UNDERGROUND GAS STORAGE IN BRAZIL

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Ministério de Minas e Energia

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About EPE – Energy Research Office

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www.epe.gov.br



Federal Office linked to the Ministry of Mines and Energy



We develop studies and data/statistics to support formulation, implementation and evaluation of energy policies

**Member of the Board of the
National Council for Energy Policy (CNPE)**

Introduction

- **UGS Goals**

- Flexibility at peak demand times;
- Security of natural gas supply;
- Maintenance of operational flexibility and balance of the pipeline network;
- Tool to mitigate price volatility.

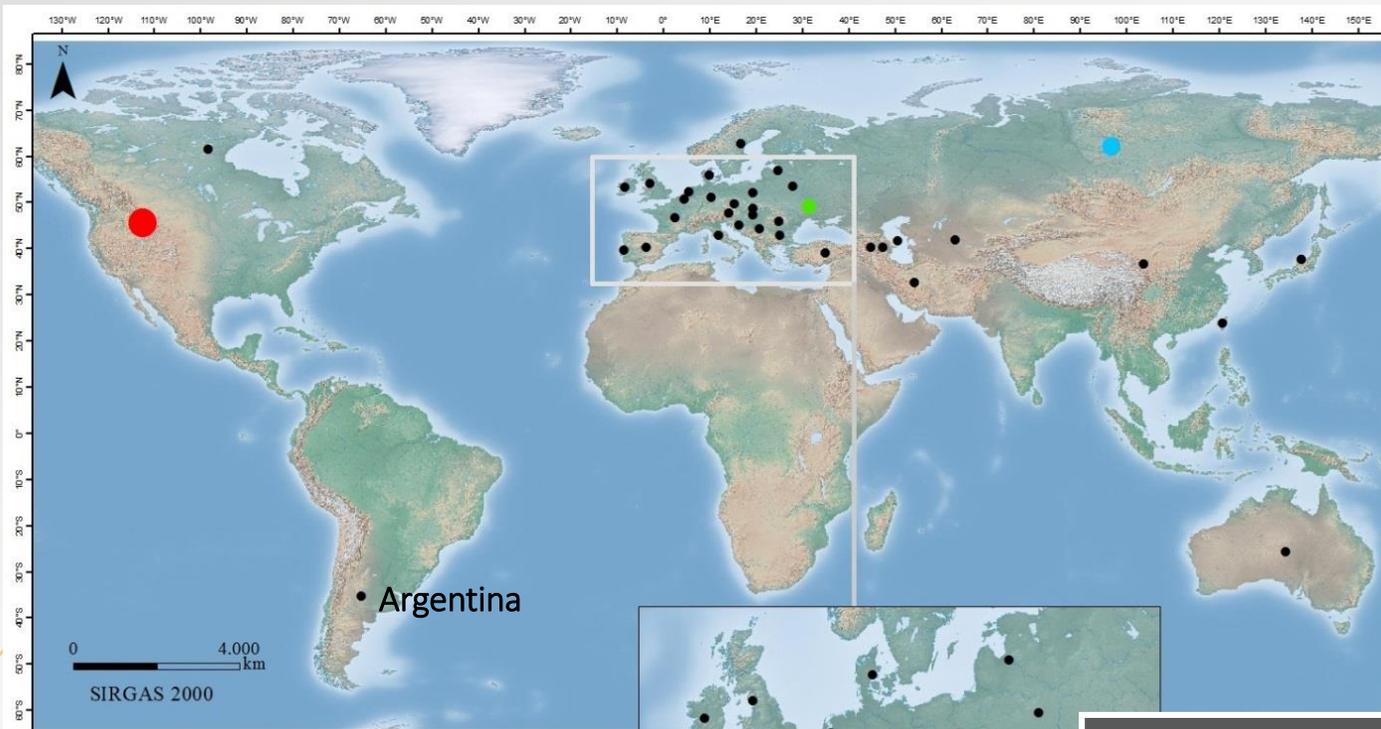
- **UGS in Brazil**

- UGS activity is very incipient in Brazil;
- Greater diversity of agents and greater risk sharing of pipeline network operation may leverage the need to use UGS;
- Security of supply and balancing of the pipeline network.



World Outlook

UGS facilities by working gas capacity



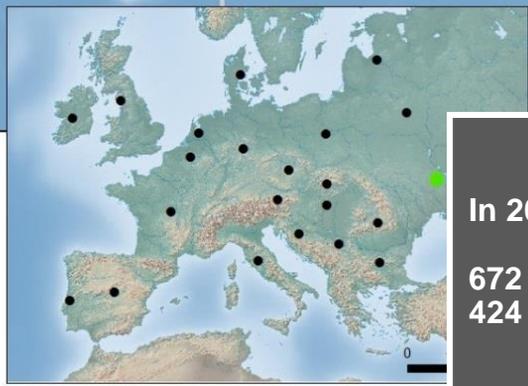
Working Gas (bcm)

- 0 - 30
- 30 - 60
- 60 - 90
- 90 - 150

Sources:
 - Cedigaz (2017)
 - World Relief:
 Arcgis Map Service

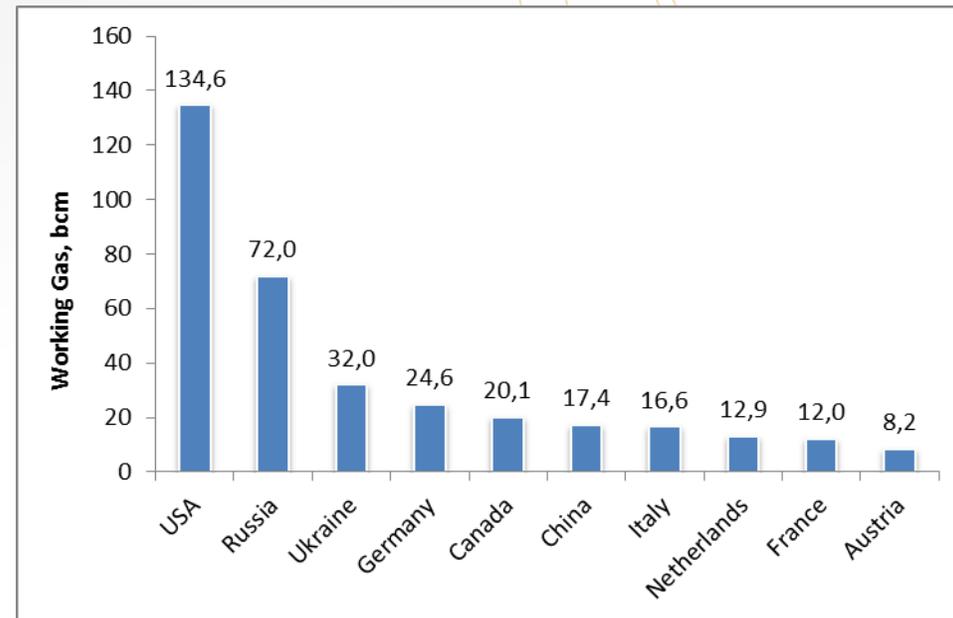


Ref. SGB - ESTOCAGEM
 COC - 11/10/17

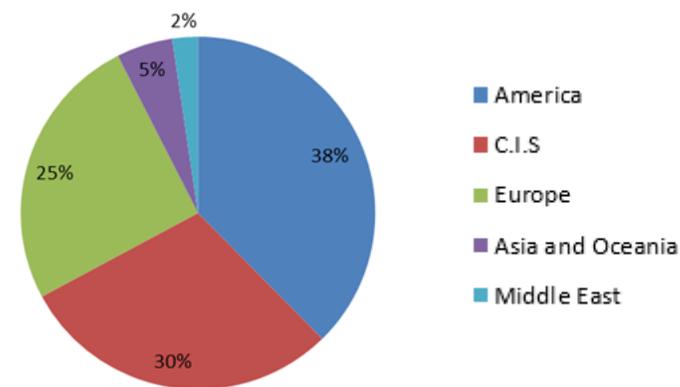


In 2016:
 672 facilities
 424 bcm of working gas

The ten countries with the largest working gas capacity in the world



Working Gas Volume by Region (%)



Source: CEDIGAZ (2017).

Novo Mercado de Gás / “New Gas Market”

New Gas Market Pillars:

- To promote competition;
- To integrate gas industry to power and industrial sectors;
- To harmonize federal and states regulations;
- To reduce tax barriers;

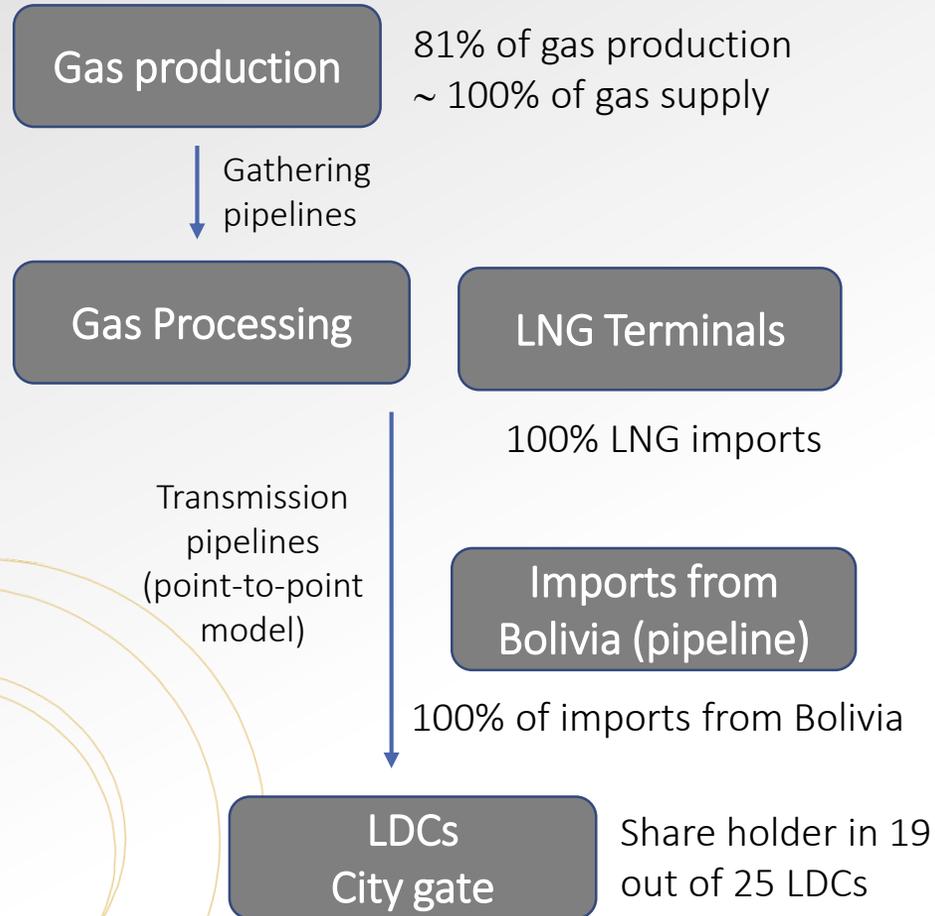
Expected Results:

- Open, dynamic and competitive natural gas market
- New market access and developments
- Monetization of the natural gas (including pre-salt)
- Attract investments and promote industrial activity



MARKET SITUATION

Before disinvestment, Petrobras coordinates and supplies the market

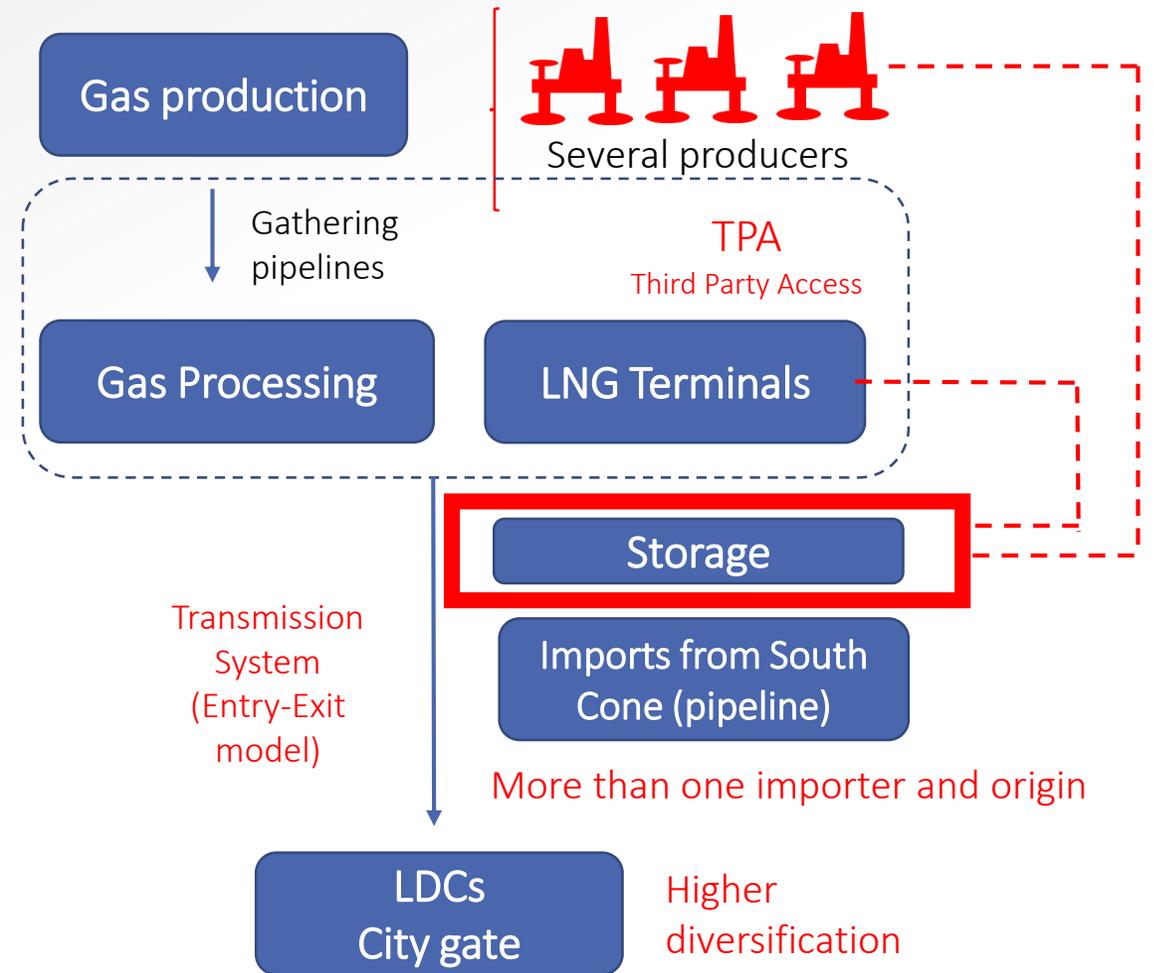


Source: ANP

100% risks taken by Petrobras

NEW GAS MARKET

Competition vision



Risks shared by market stakeholders

Underground Gas Storage in Brazil

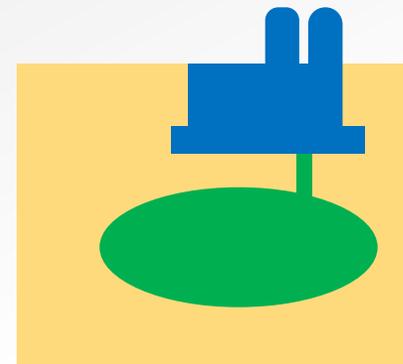


To promote competition

Several producers of natural gas

Several actors in transmission pipeline

Risk shared by market stakeholders



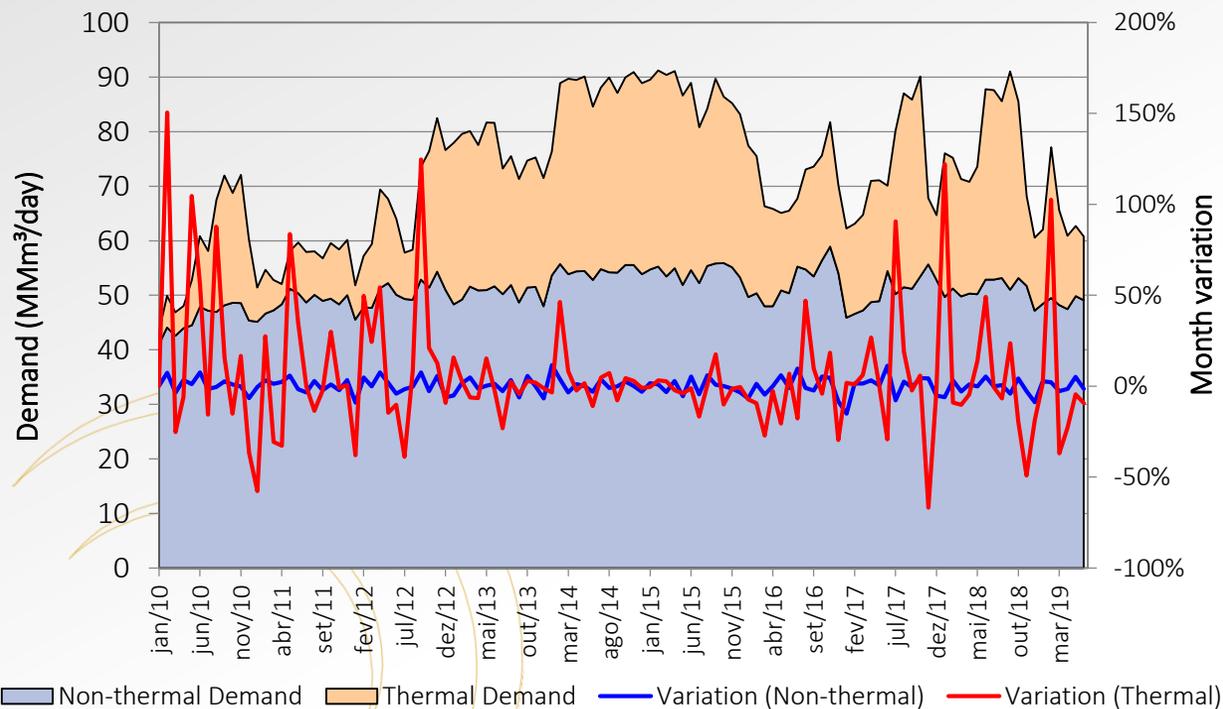
UGS could guarantee security of natural gas supply in the event of supply difficulties on the part of producer or shipper agents.

UGS facilities could provide peak-shaving services at peak production times for the various producers that operate in an open and competitive gas market.

Underground Gas Storage in Brazil



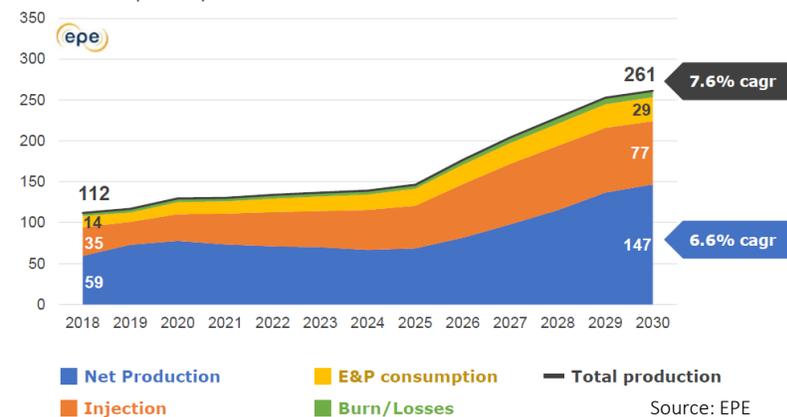
To integrate gas industry to power and industrial sectors



Source: ABEGAS, MME.

- Natural gas tends to occupy an increasingly relevant space in electric generation, mainly for peak demand hour;
- Need for flexibility in the supply of natural gas to these periods

Natural Gas Gross Production
Millions m³ per day



With a larger supply of natural gas from Pre-Salt and Post-Salt areas, UGS could be used as a strategy for balancing flows and providing flexibility in supply.



Underground Gas Storage in Brazil

Exploration



Onshore



Offshore

Outflow



Outflow Pipeline

Processing



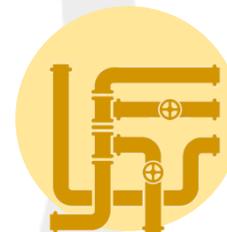
Natural Gas Processing Plant

Transmission



Transmission Pipeline

Distribution



Distribution Companies



Non-thermal power demand



Thermal power plant



LNG



UGS



Renewable Energy

Complementarity

Implementation challenges of a UGS in Brazil

- The concession regime is still used for the installation of a new UGS. The authorization regime would be the most appropriate to encourage the development of the activity in Brazil.

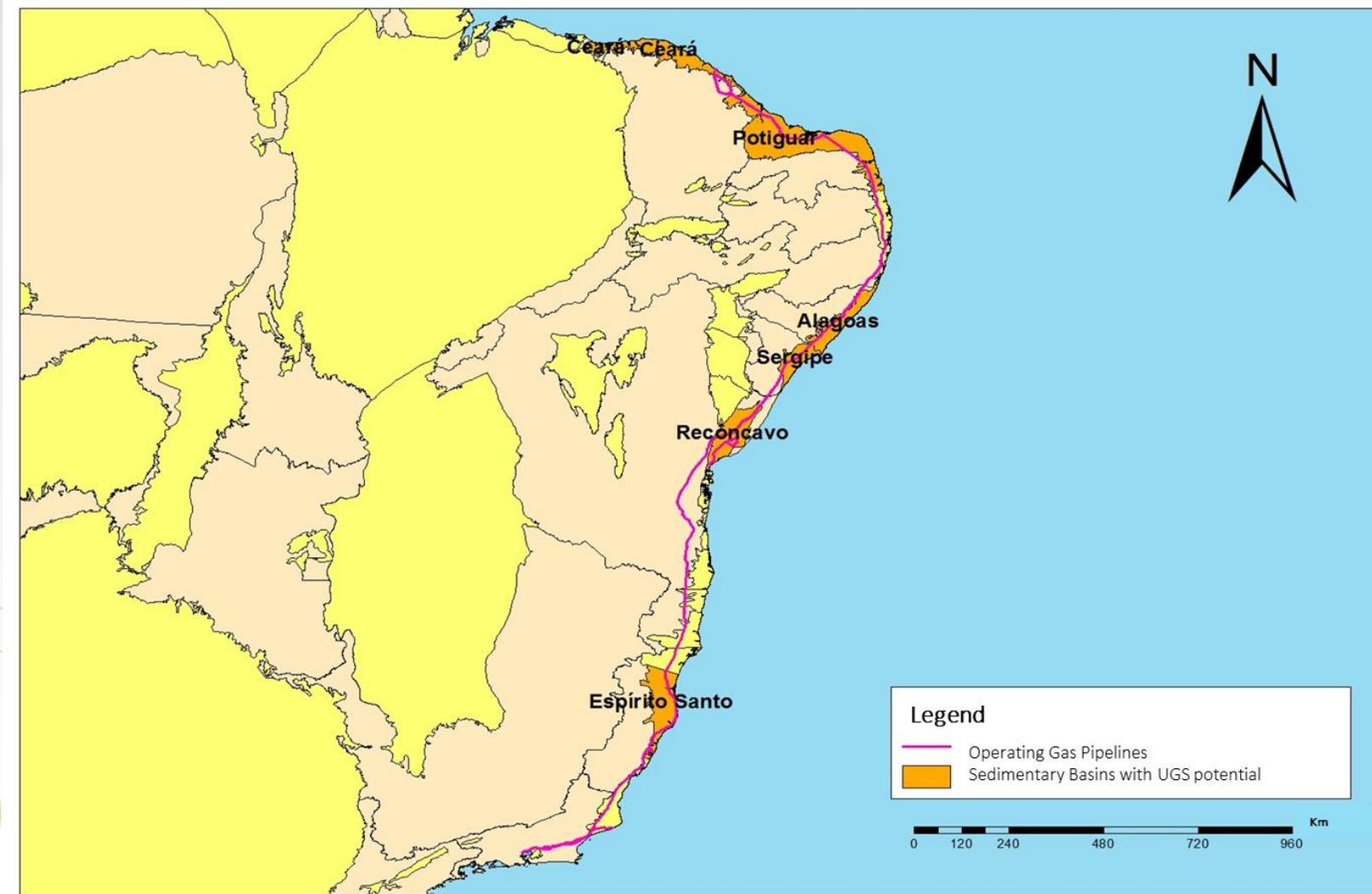
Law Project N° 6.407, de 2013
Apensado PL n° 6.102/2016

Today
Concession regime (**Law 11.909/2009**)  The Law Project proposal
Authorization regime

Principal Changes

- ANP will make available to interested parties the geological data on areas with potential for storage.
- Third party access in accordance with regulated terms defined by ANP.
- Natural gas stored in geological formations is not the property of the Union.

Potential Opportunities in Underground Gas Storage - BRAZIL



Source: adapted from ANP interest consultation, 2016.

Link: <http://www.anp.gov.br/wwwanp/consultas-audiencias-publicas/concluidas/3178-consulta-de-interesse-2016-areas-para-estocagem-subterranea-de-gas-natural>

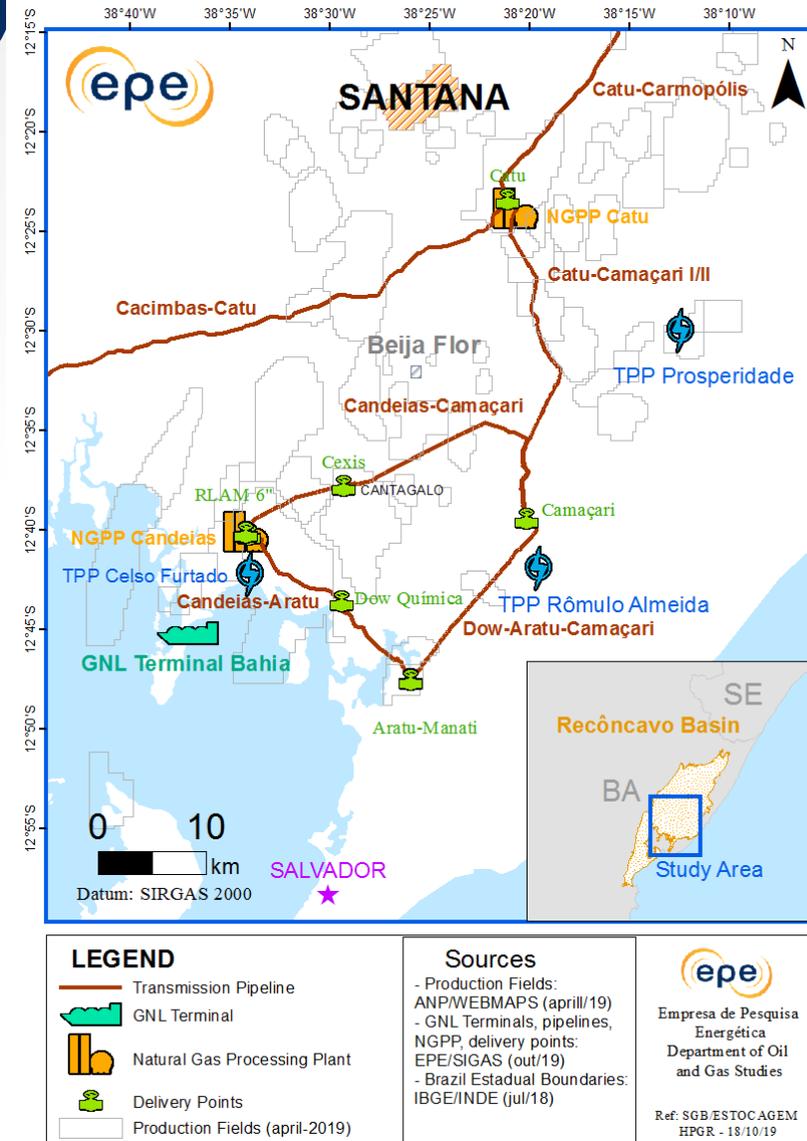
Brazilian Case – Santana Field (Bahia)

Plano de Desenvolvimento Aprovado
Reunião de Diretoria nº 823 de 28/10/2015
Resolução nº863/2015

Santana	
Nº do Contrato:	48000.003692/97-80
Operador do Contrato:	Santana Exploração e Produção Ltda.
Estado:	Bahia
Bacia:	Recôncavo
Localização:	Terra
Lâmina d' água:	-
Fluido Principal:	Óleo
Área:	26,93 km ²
Situação:	Em produção
Descoberta:	12/1962
Declaração de Comercialidade:	Não há – Rodada Zero
Início de Produção:	01/1963
Previsão de Término da Produção:	2025 (término do contrato)

➔ Concessionary company: Santana Exploration and Production of Oil and Gas Ltda (STOGAS Group);

➔ The Development Plan (PD) presented by the company included storage activity, which was evaluated and authorized by the ANP through this document at the end of 2015.



Final Remarks

- The Brazilian gas market is undergoing significant changes :
 - 17 new shippers in GASBOL auction;
 - TCC Petrobras/CADE;
 - Energy Auction A-6;
- UGS can help achieve “New Gas Market” objectives mainly in promoting competitiveness and integrating the gas natural industry to power.
- One of the major challenges for the development of UGS facilities in Brazil is that the current regime is still concession.

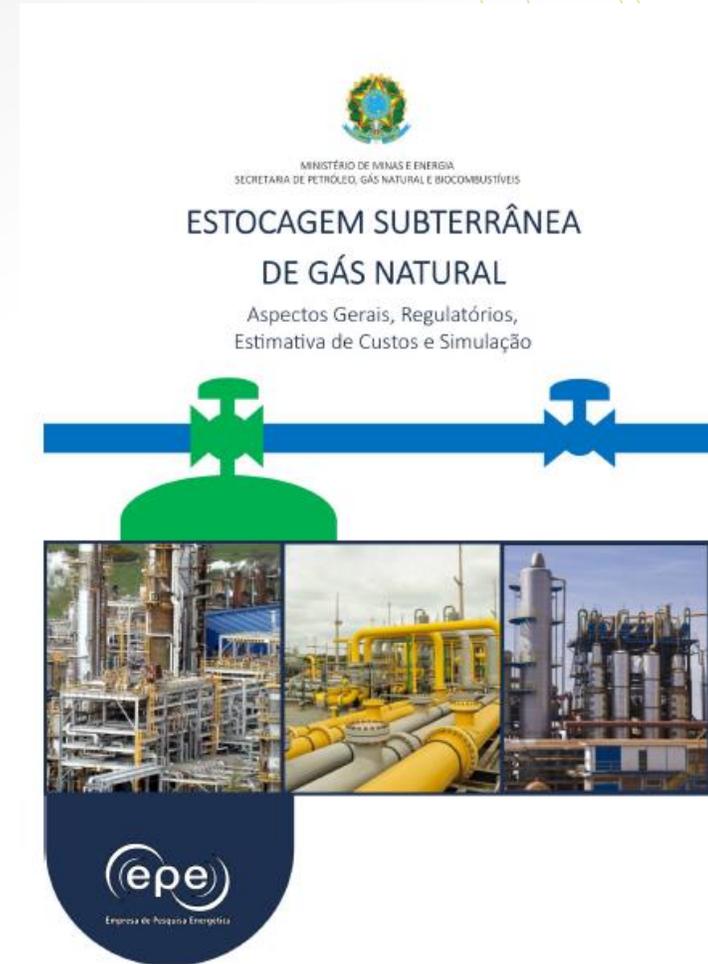
Technical Report About UGS

 An introduction to the subject, besides an hydraulic thermal fluid simulation study and economic feasibility case study for an hypothetical UGS case (depleted field) in Brazil.

 Technical report available on the EPE website.



www.epe.gov.br



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