THE PROSPECTS FOR UNDERGROUND GAS STORAGE IN BRAZIL

IEA Brazil Gas Workshop 2019

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Ana Claudia S. Pinto
Energy Research Office (EPE)

About EPE – Energy Research Office

15 anos

Empresa de Pesquisa Energética

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.

Foto: Engie

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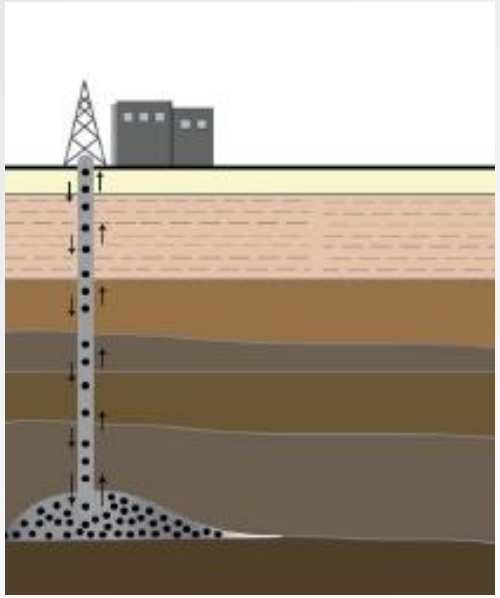
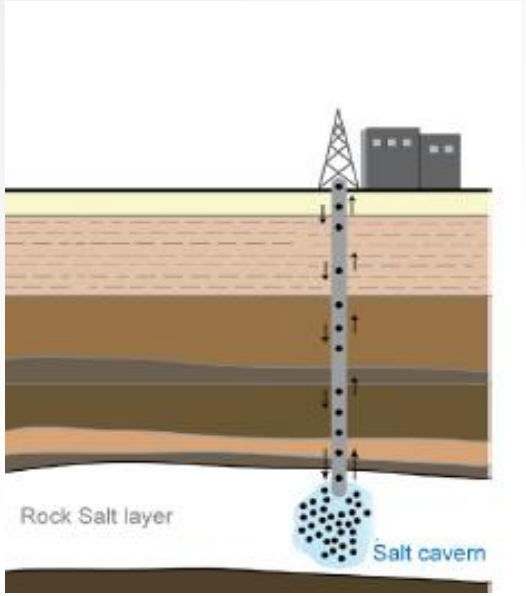
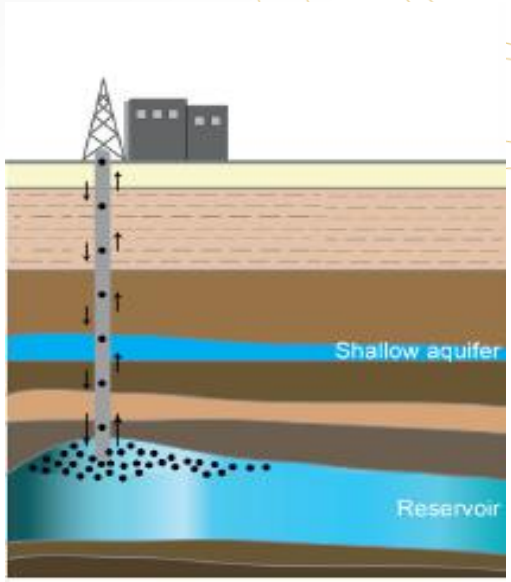
Types of UGS





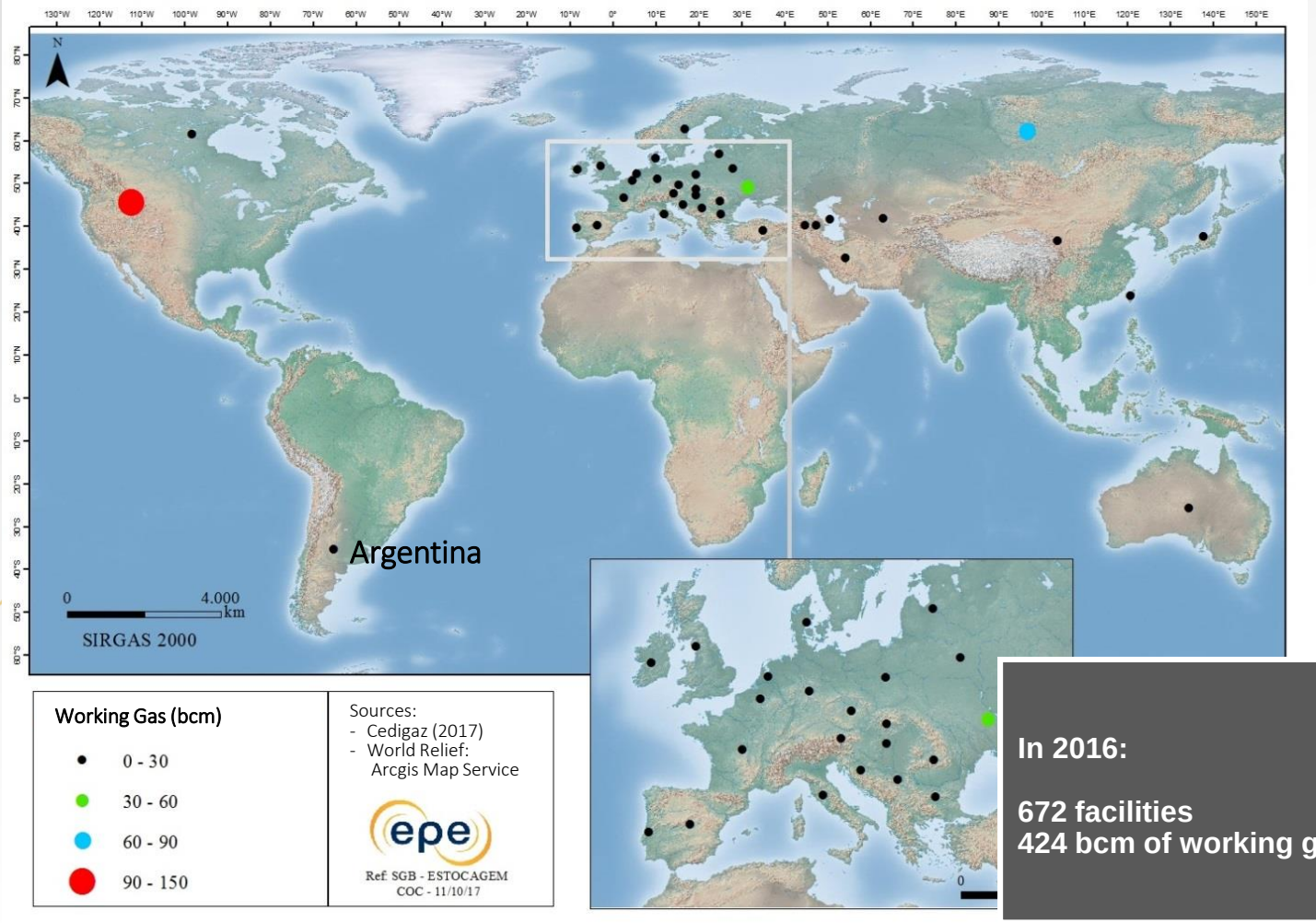


	Depleted Reservoir	Salt Cavern	Aquifer
Major Use	Seasonal Cycling	Peaking Services	Seasonal Cycling
Description	Low deliverability, low cycling, high capacity	High deliverability, high cycling, low capacity	Low deliverability, low cycling, high capacity.
Injection	120-200 days	20 days	120-200 days
Withdrawal	60-120 days	5-20 days	60-120 days

Source: Procesi (2013) and EDI (2016)

World Outlook

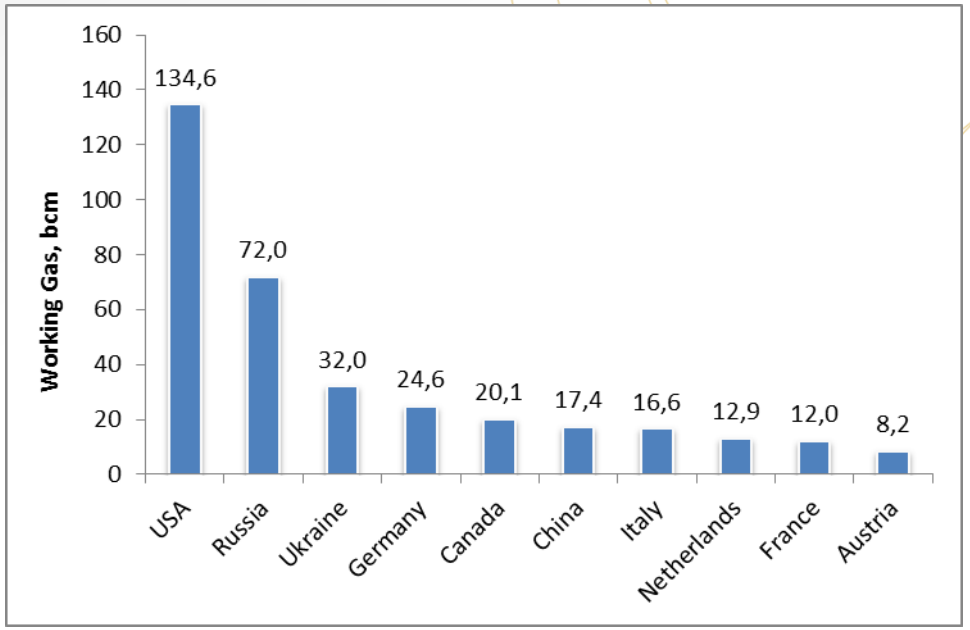
UGS facilities by working gas capacity



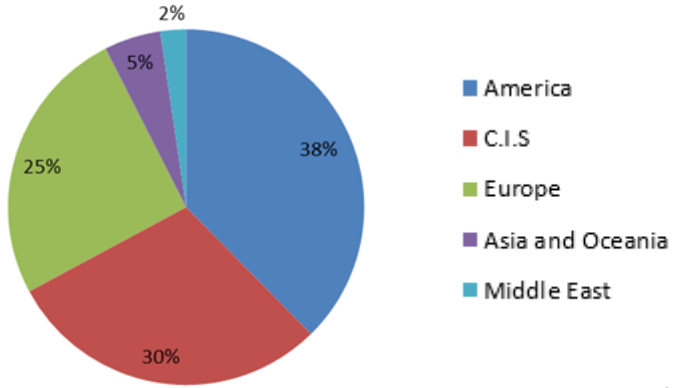
In 2016:

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

NOVO MERCADO DE GÁS

MARKET SITUATION

Before disinvestment, Petrobras coordinates and supplies the market

Gas production

81% of gas production
~ 100% of gas supply

Gathering pipelines

Gas Processing

LNG Terminals

100% LNG imports

Transmission pipelines (point-to-point model)

Imports from Bolivia (pipeline)

100% of imports from Bolivia

LDCs City gate

Share holder in 19 out of 25 LDCs

Source: ANP

100% risks taken by Petrobras

NEW GAS MARKET

Competition vision

Gas production

Several producers

Gathering pipelines

TPA
Third Party Access

Gas Processing

LNG Terminals

Storage

Transmission System (Entry-Exit model)

Imports from South Cone (pipeline)

More than one importer and origin

LDCs City gate

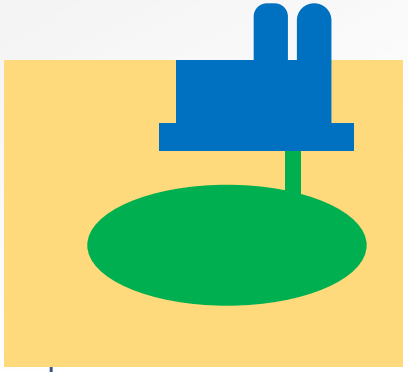
Higher diversification

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

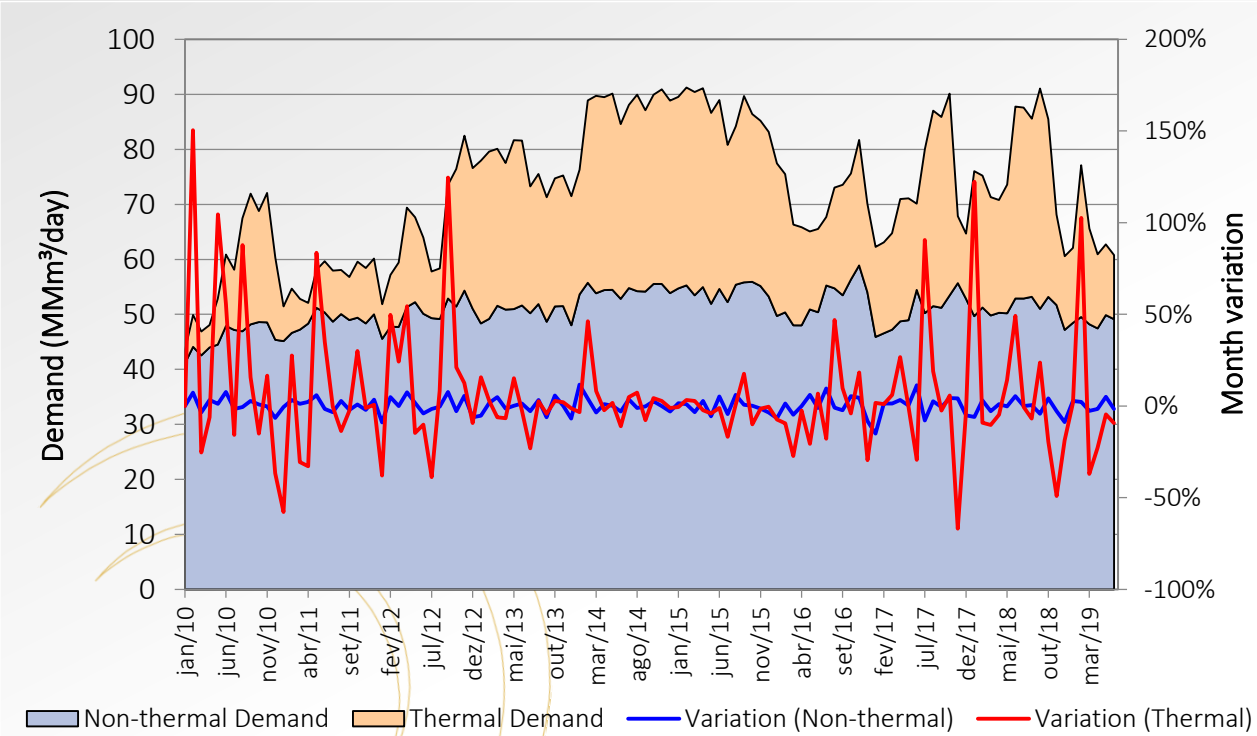


UGS could guarantee security of natural gas supply in the event of supply difficulties on the part of producer or shipper agents.

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

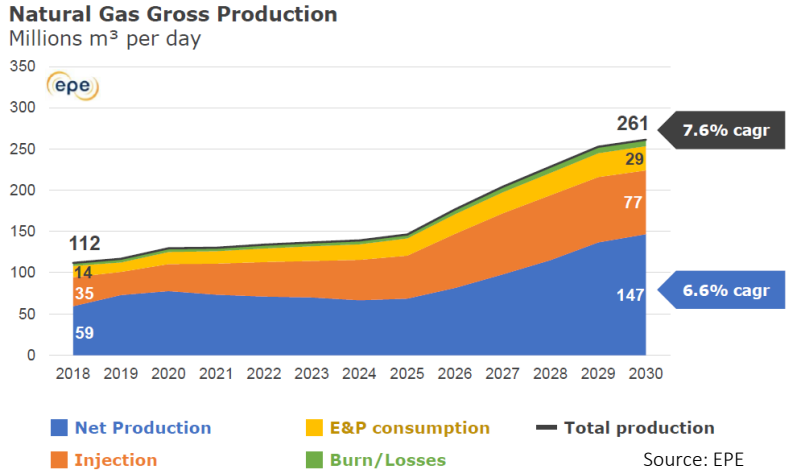
Underground Gas Storage in Brazil

To integrate gas industry to power and industrial sectors



Source: ABEGAS, MME.

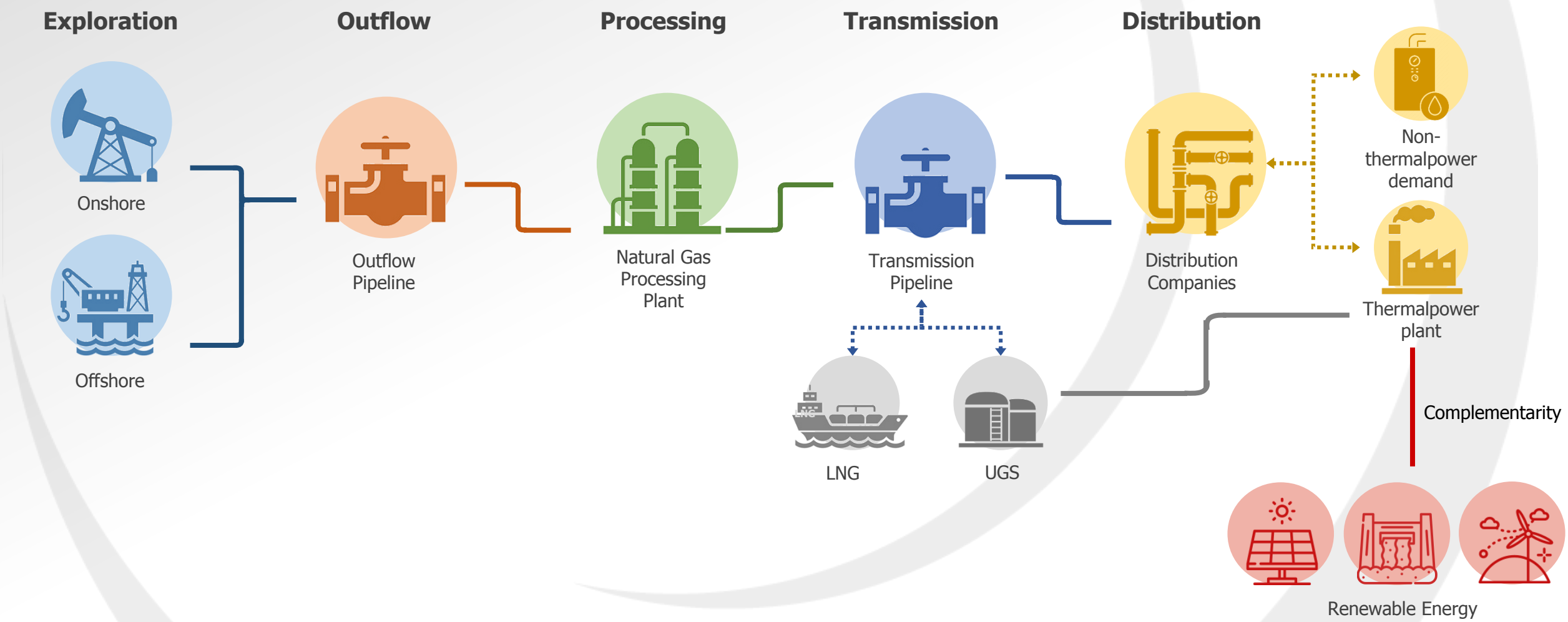
- Natural gas tends to occupy an increasingly relevant space in electric generation, mainly for peak demand hour;
- Need for flexibility in the supply of natural gas to these projects;



Source: EPE

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



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.**

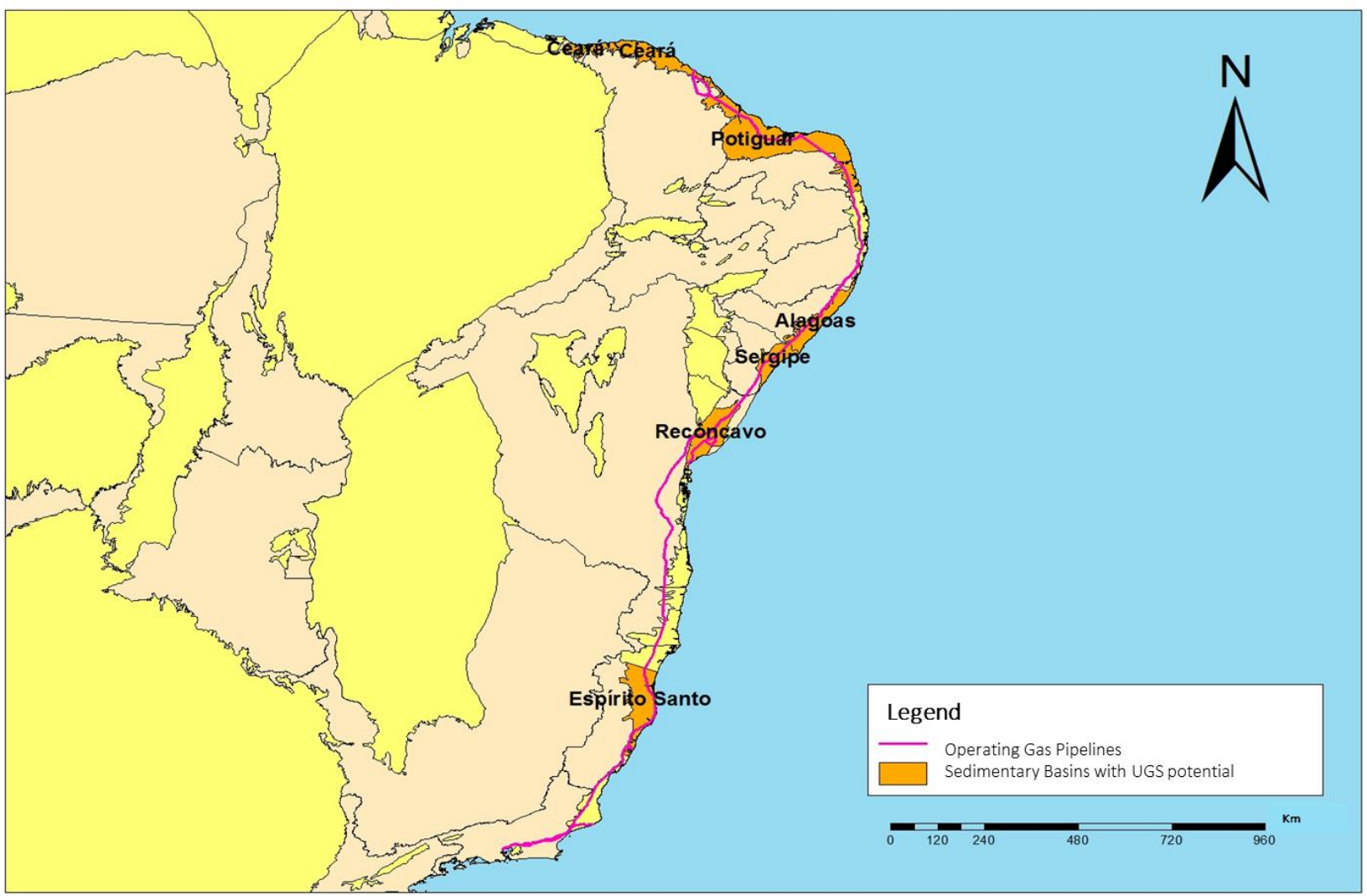
Law Project N° 6.407, de 2013
Apensado PL n° 6.102/2016

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



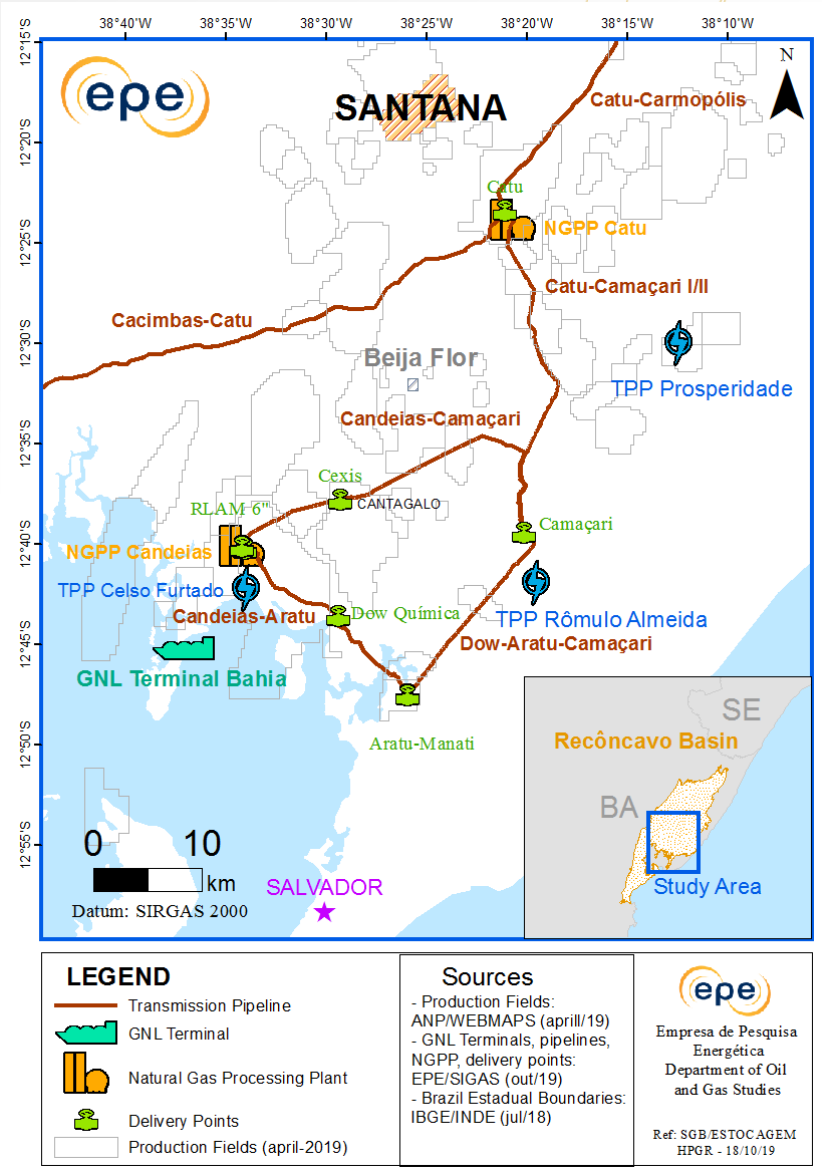
Source: adapted from ANP interest consultation, 2016.
Link: http://www.anp.gov.br/wwwanp/consultas-audiencias-publicas/concluidas/3178-consulta-de-interesse-2016-areas-para-estocagem-subterranea-de-gas-natural

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 km²
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

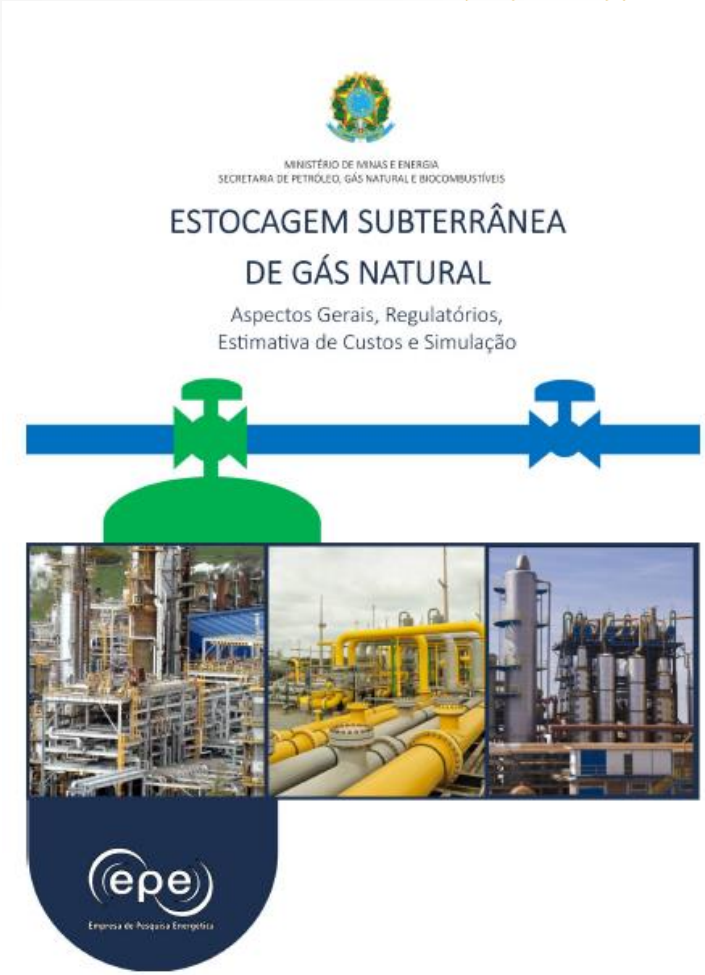
- The Brazilian gas market is undergoing significant changes :
    - 17 new shippers in GASBOL auction;
    - TCC Petrobras/CADE;
    - Energy Auction A-6;
- UGS can help achieve "New Gas Market" objectives mainly in promoting competitiveness and integrating the gas natural industry to power.
- One of 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



Ana Claudia Sant'Ana Pinto

Energy Research Analyst

Division of Oil, Gas and Biofuels Studies

Oil and Gas Department

E-mail: ana.pinto@epe.gov.br

Telephone: +55 (21) 3512-3227

MINISTÉRIO DE MINAS E ENERGIA

PÁTRIA AMADA BRASIL GOVERNO FEDERAL

epe Empresa de Pesquisa Energética

Avenida Rio Branco, 1 - 11º andar

20090-003 - Centro - Rio de Janeiro

http://www.epe.gov.br/

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