Southern Cone Natural Gas Dynamics

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Content

- Brief institutional presentation of GELA
- The reality and dynamics of the natural gas markets in the Southern Cone
- Final comments
GAS ENERGY LATIN AMERICA (GELA) is an energy consulting company (natural gas, oil, LPG, power, renewables and petrochemical) operating throughout Latin America and the Caribbean since 2008.

**Technical Offices:**
Bolivia, Peru and Venezuela: Servicing Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Uruguay and other countries in Latin America and the Caribbean.

**Senior Partners**
In each country.

**Specialized Senior Consultants:**
All energy sectors.
GELA's types of Clients

**CLIENT TYPES**

- **E&P Companies**
- **Energy**
- **Transport and Distributors**
- **Institutions & Associations**
- **Industry & Services**
- **Financial Institutions**
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Integrated market (Brazil, Uruguay, Argentina, Bolivia and Chile)

Gas on gas competition

LEGEND
- Subandean (Bolivia)
- Pre salt (Brazil)
- Vaca Muerta (Argentina)
- LNG Regasification
- LNG Liquefaction

Source: Elaboration by GELA, 2019
Evolution of LNG price indicators

1) Long-term LNG contracts of USA. FOB Price, the formula is 1.15% HH + 1.1 USD / MMBTU

Source: Global Gas and LNG Outlook, July 2019
LNG prices dynamics according to seasonality

Winter higher demand and higher prices of LNG and vice versa

Source: IRI, 2019
Brazil - Natural gas demand evolution

NOTE: Only data available until August 2019

Demand falls: slower growth in the economy

Demand falls (2017-2019): 17%

Source: Mines and Energy Ministry; ABEGAS, August 2019
Brazil - Natural gas supply evolution

NOTA: Reinjection (Gross National Supply) for liquid recovery and transport consumption on imports

Gross National Supply. Gross and net supply difference

Source: Mines and Energy Ministry; ABEGAS, August 2019
Brazil - LNG new projects

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Location</th>
<th>Capacity (MMmcd)</th>
<th>Operation date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sergipe (In construction)</td>
<td>Sergipe</td>
<td>14</td>
<td>2020</td>
</tr>
<tr>
<td>2</td>
<td>Açú (In construction)</td>
<td>Norte Rio de Janeiro</td>
<td>21</td>
<td>2021</td>
</tr>
<tr>
<td>3</td>
<td>Comgás (under study)</td>
<td>Sao Paulo</td>
<td>14</td>
<td>2020</td>
</tr>
<tr>
<td>4</td>
<td>Sao Francisco del Sur (under study)</td>
<td>Santa Catarina</td>
<td>15</td>
<td>2021</td>
</tr>
</tbody>
</table>

Pre salt supply - Actual and new projected tiers

Conditioning and Collection Facilities (Offshore)

Route 1: 10 MMcmd (Built)
Route 2: 16 MMcmd (Built)
Route 3: 18 MMcmd (Construction 2021)

Routes under study (Investment. 1500 MM$US)

Route 4: 10 a 15 MMcmd ~275 Km
Route 5: 10 a 15 MMcmd ~275 Km
Route 6: 10 a 15 MMcmd ~120 Km

Argentina - Natural gas demand evolution

NOTE: Only data available until July 2019

Source: Energy Secretary; Enargas, 2019
Argentina - Natural gas supply

* Gross National Supply

** Gross and net supply difference

NOTA: Only data available until July 2019

Source: Energy Secretary; Enargas, 2019
Argentina - Unconventional production

As of July, unconventional reservoirs represent 44% of the total gas supply.

Source: GELA based in the analysis of the Energy Secretary, 2019.
Argentina - Vaca Muerta - Companies and investment announcements

Vaca Muerta’s Surface by company

Source: MINEM; Neuquén Natural resources; Wood Mackenzie, 2019

POSTPONED AGREEMENTS WITH NEW GOVERNMENT
Infrastructure projects - Collection pipelines

1. "Central or Litoral " new pipeline
   (Section 1: Tratayen - Salliqueló)
   Bid postponed twice
   Not until 2023/24

2. "Central or Litoral " new pipeline
   (Section 2: Salliqueló - San Nicolas)
   Not until 2024/25

3. Central west - North pipeline interconection and North pipeline reversion
   Not until 2025

Source: Ministry of Energy, GELA’s Analysis, 2019
Argentina - Gas supply auction for distributors with competitive prices of Vaca Muerta

Today we already have competitive prices with Vaca Muerta’s production

*Prices before PIST* (in spanish)
*Entrance Point to the Transportation System

Source: Megsa; GELA, 2019
Bolivia: Natural gas supply - demand balance

Source: YPFB, Minem Argentina, Brazil & GELA, Sep 2019.
Hydrocarbon potential in Bolivia

- Portfolio with potential short-term resources: 31 TCF

Potential = Reserves

Total Gas: 151 TCF
Total Líquidos: 17.3 BBbl

- Prospects in execution
- Prospects
- Leads
- Plays potential resources (Yet to find)
Exploratory activity September 2019

- **YARARA-X1**
  - **YRA-X1**
  - YPFB CORP
  - 14/09/2019
  - Perforando 2315m.
  - 0.2 TCF (YTF) PS 20%

- **BOICOBÓ-X1**
  - BCS-X1
  - REPSOL E&P BOLIVIA
  - 05/10/2019
  - Perforando (43m)
  - 1 TCF (YTF) PS 15%

- **SIPOTINDI-X1**
  - SIP-X1ST
  - YPFB CORP.
  - 22/08/2018
  - Perforando 4330 m
  - 1 TCF (YTF) PS 15%

- **AGUARAGUE CENTRO-X1D**
  - AGC-X1D
  - YPFB CHACO
  - 08/08/2019
  - Perforando 2296
  - 1 TCF (YTF) PS 20%

- **CARANDA X1005**
  - Petrobras
  - 15/01/2018
  - Planificando WO
  - 0.4 TCF (YTF) PS 80%

Source: GELA, YPFB, MHE, Sep 2019.
# Exploratory Activity 2020 - 2022

## Private operators

<table>
<thead>
<tr>
<th>Operator</th>
<th>Contract area</th>
<th>Drilling Year</th>
<th>Well</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REPSOL E&amp;P BOLIVIA S.A.</strong></td>
<td>Caipipendi (ZT)</td>
<td>II TRIM/2020</td>
<td>BOUY-X3* ✓ (0,67 TCF)</td>
</tr>
<tr>
<td></td>
<td>Iñiguazu (ZT)</td>
<td>I TRIM/2020</td>
<td>MARGARITA-X1001* ✓ (0,67 TCF)</td>
</tr>
<tr>
<td><strong>PETROBRAS BOLIVIA S.A.</strong></td>
<td>San Telmo Norte (ZT)</td>
<td>IV TRIM/2019</td>
<td>DOMO OSO-X1* ✓ (0,21 TCF)</td>
</tr>
<tr>
<td><strong>SHELL BOLIVIA S.S</strong></td>
<td>Huacareta (ZNT)</td>
<td>II TRIM/2020</td>
<td>YAPUCAITI X1* ✓ (0,95 TCF)</td>
</tr>
<tr>
<td><strong>TOTAL BOLIVIE S.A.</strong></td>
<td>Azero (ZNT)</td>
<td>I TRIM/2021</td>
<td>ILLIMCHUPA-X1* ✓ (2,6 TCF)</td>
</tr>
<tr>
<td><strong>YPF S.A.</strong></td>
<td>Charagua(ZT)</td>
<td>II TRIM/2020</td>
<td>CHARAGUA-X1* ✓ (2 TCF)</td>
</tr>
</tbody>
</table>

## YPFB and Subsidiaries

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<tr>
<th>Operator</th>
<th>Contract area</th>
<th>Drilling Year</th>
<th>Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>YPFB ANDINA S.A.</td>
<td>CAROHUAICH0 8B</td>
<td>2020</td>
<td>EDA-X1 ?? 0,5 TCF. PS 18%</td>
</tr>
<tr>
<td>YPFB ANDINA S.A.</td>
<td>CAROHUAICH0 8D</td>
<td>2021</td>
<td>SRR-X3 ✓ 1 TCF. PS 20%</td>
</tr>
<tr>
<td>YPFB CHACOS.A.</td>
<td>ÁREAS VARIAS</td>
<td>2020</td>
<td>LMS-X13D ✓ 0,5 TCF. PS 20%</td>
</tr>
<tr>
<td>YPFB CHACOS.A.</td>
<td>CAROHUAICH0 8C</td>
<td>2020</td>
<td>LHS-X2 ?? 0,5 TCF. PS 15%</td>
</tr>
<tr>
<td>YPFB CHACOS.A.</td>
<td>CAROHUAICH0 8A</td>
<td>2020</td>
<td>OPB-X1 ?? 0,5 TCF. PS 10%</td>
</tr>
<tr>
<td>YPFB CHACOS.A.</td>
<td>ITACARY</td>
<td>2020</td>
<td>ITY-X1 ?? 1,3 TCF. PS 15%</td>
</tr>
<tr>
<td>YPFB CHACOS.A.</td>
<td>CHIMORE Y OTROS</td>
<td>2020</td>
<td>SMG-X2ST 0,5 TCF. PS 20%</td>
</tr>
<tr>
<td>YPFB CHACOS.A.</td>
<td>ASTILLERO</td>
<td>2020</td>
<td>AST-X1 ✓ 2 TCF. PS 27%</td>
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<tr>
<td>YPFB</td>
<td>IÑAU</td>
<td>2021</td>
<td>IÑAU-X3 ?? 1 TCF. PS 15%</td>
</tr>
<tr>
<td>YPFB</td>
<td>SAUCE MAYU</td>
<td>2022</td>
<td>SAUCE MAYU-X1 ?? 0,5TCF. PS 15%</td>
</tr>
<tr>
<td>YPFB</td>
<td>INGRE</td>
<td>2021</td>
<td>INGRE-X3 ?? 1,5TCF. PS 15%</td>
</tr>
</tbody>
</table>

Natural gas price markers - Gas on gas competition

**Price calculated quarterly:** Formulas includes fuels

\[
PG = P_t^* \left[ 0.50 \frac{FO_1}{FO_0} + 0.25 \frac{FO_2}{FO_0} + 0.22 \frac{FO_3}{FO_0} \right]
\]

**Damping Factor:**

\[
P_t = 0.5PG + 0.5P_{t-1}
\]

**New price calculated quarterly:** Formulas includes fuels and diesel

\[
PG = \frac{P + \left[ 0.20 \frac{FO_1}{FO_1_d} + 0.40 \frac{FO_2}{FO_2_d} + 0.20 \frac{FO_3}{FO_3_d} + 0.20 \frac{ULSD_1}{ULSD_d} \right]}{\text{(USD/MMBTU)}}
\]

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**Before:** gas prices were calculated with these formulas

**Now:** these formulas will no longer be valid, now price marker are related to Henry Hub
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Final comments

- LNG is arriving to the Southern Cone and will continue arriving and is quite competitive.

- Bolivia natural gas production is declining but there is current exploration in known region with infrastructure.

- Vaca Muerta (Argentina) and Presalt (Brazil) have initiated natural gas production with competitive costs.

- There is existing pipeline and LNG infrastructure that could be used.

- Pricing more commercial than political and gas on gas competition.

- Prices with Henry Hub marker and not oil linked.
Thanks for your attention!

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