The important role of a more flexible, competitive and back up natural gas in the energy transition in Latin America

By

Alvaro Ríos Roca, Gas Energy Latin America (Bolivia)
The important role of a more flexible, competitive and back up natural gas in the energy transition in Latin America

Alvaro Ríos Roca

April 24, 2018
GAS ENERGY LATIN AMERICA (GELA) is an energy consulting company (natural gas, oil, power and petrochemical) operating throughout Latin America and the Caribbean since 2008.

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

Senior Partners
In each country.

Specialized Senior Consultants:
All energy sectors.
Contents

• Energy and natural gas in Latin America

• Renewable energy penetration in Latin America

• Developments in Latin America with a cleaner, friendlier, more flexible and competitive natural gas
  ✓ North America (EEUU, Canada and Mexico)
  ✓ Central America the Caribbean (Panama, Dominican Republic and El Salvador)
  ✓ North Cone (Colombia, T&T and Venezuela)
  ✓ South Cone (Brazil, Argentina, Bolivia, Chile and Peru)

• Some conclusions and remarks
Globally, in 2016 markets adapt to the energy transition: demand grows slightly, the energy mix changes towards cleaner sources.
• Venezuela most important reserves, but not the conditions for development and are associated to oil production
• Reserves in Mexico, Trinidad and Tobago, Bolivia and Colombia continue to decline
• Argentina and Brasil are to add reserves and production in Vaca muerta and Presalt.
Venezuela's production is recovering BY investment of private companies (Cardon IV)
Natural gas production in Mexico, Trinidad and Tobago, Bolivia and Colombia are decreasing due to lack of new findings and developments
Argentina's production is recovering as a result of the Vaca Muerta and Brazil form Presalt associated gas
• Mexico continues demanding for power and replace pollutants and more expensive fuel oil.
• Argentina continues increasing demand as well as Venezuela for reinjection to produce oil.
• Brasil power thermoelectric sector competes with hydro generation and is cyclical but continues growing
• Colombia, Peru and Chile have stable growing demands.
• TT has declining demand due to lack of production in petchem facilities

Source: BP Statistical Review of World Energy 2017
Contents

• Energy and natural gas in Latin America

• Renewable energy penetration in Latin America

• Developments in Latin America with a cleaner, friendlier, more flexible and competitive natural gas
  ✓ North America (EEUU, Canada and Mexico)
  ✓ Central America the Caribbean (Panama, Dominican Republic and El Salvador)
  ✓ North Cone (Colombia, T&T and Venezuela)
  ✓ South Cone (Brazil, Argentina, Bolivia, Chile and Peru)

• Some conclusions and remarks
Brazil, Mexico and Chile are the countries with the highest demand for renewable energy and Argentina is making strong efforts.

* Based on gross generation from renewable sources including wind, geothermal, solar, biomass and waste, and not accounting for cross-border electricity supply.
LA investment in renewable energy - 2017

- Most important investment in renewable are solar and wind technologies
- Mexico, Brazil and Chile are leading investments
- Some hydro projects are being pursued but strong environmental opposition
- Natural gas ideal energy source for backing up all new inermitent RE

Source: Frankfurt School, «Tendencias globales en inversión de energías renovables», 2016
### LA hydro power projects

- Natural gas ideal as base and backup for hydro generation in dry seasons
- Region continues to promote development of hydro projects

#### Large hydroelectric projects

<table>
<thead>
<tr>
<th>Project</th>
<th>MW</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sao Manuel</td>
<td>2.400</td>
<td>2018</td>
</tr>
<tr>
<td>Belo Monte</td>
<td>11.200</td>
<td>2019/2020</td>
</tr>
<tr>
<td>Rositas</td>
<td>500</td>
<td>2024</td>
</tr>
<tr>
<td>Angosto del Bala</td>
<td>1.600</td>
<td>2025</td>
</tr>
<tr>
<td>Cachuela Esperanza</td>
<td>990</td>
<td>N/A</td>
</tr>
<tr>
<td>Jorge Copernic</td>
<td>1.310</td>
<td>2022</td>
</tr>
<tr>
<td>Angosto del Bala</td>
<td>1.600</td>
<td>2025</td>
</tr>
<tr>
<td>Chihuído I</td>
<td>637</td>
<td>2020</td>
</tr>
</tbody>
</table>

Source: BNAmericas March 2018
LA renewable energy outlook

Increased competition from renewable energies, increasingly competitive throughout the region.

Source: Latin American Energy Review, 2017
The projections show the share of renewable energy in Mexico’s energy mix.
Chile - Renewables energy

Renewable energy projections TWhr

Average prices for bid processes

Source: New Energy Finance, New Energy Outlook 2017 (BNEF)
Brazil - Renewable energy

An outlook of the matrix in the 10 years horizon

Source: EPE November 2017
Contents

- Energy and natural gas in Latin America
- Renewable energy penetration in Latin America
- Developments in Latin America with a cleaner, friendlier, more flexible and competitive natural gas
  - North America (EEUU, Canada and Mexico)
  - Central America the Caribbean (Panama, Dominican Republic and El Salvador)
  - North Cone (Colombia, T&T and Venezuela)
  - South Cone (Brazil, Argentina, Bolivia, Chile and Peru)
- Some conclusions and remarks
Natural gas exchanges in Latin America

Integration of markets more commercial than political

1) North America (EEUU, Canada and Mexico)

2) Central America and the Caribbean (Panama, Dominican Republic and El Salvador)

3) Northern Cone (Colombia, T&T and Venezuela)

4) South Cone (Brazil, Argentina, Bolivia, Uruguay, Chile and Peru)
1) North America (EEUU, Canada and Mexico)

More flexible and competitive gas

- Mexico, the US and Canada already make up an integrated competitive natural gas market by pipeline.

- Mexico will continue importing pipeline gas from US to replace dirtier combustible and possibly LNG in the future as back up flexible source for renewable energy

- Competitive price structure and huh market prices

Source: EIA, Energy Information Administration, Feb 2018
2) Central America and the Caribbean

LNG regional distribution network

- Virtual commercial integration to displace oil products (LPG, diesel, fuel, gasoline)
- LNG and small LNG competing in price with other fuels
- Back up source for future renewable energy coming in the region

Source: AES, 2017
3) Northern Cone (Colombia, T&T and Venezuela)

- Venezuela still trying to sell pipeline gas in Colombia but contract remains in stand by (uncertainty issues)
- Colombia declining production needs flexible gas for hydro power back up and is studying one more LNG terminal
- Venezuela gas to substitute declining production to move gas to 4 LNG plants is under study
4) Southern Cone (Brazil, Argentina, Bolivia, Uruguay, Chile and Peru)

- Brazil baking large hydro
- Chile backing solar/wind
- Argentina backing winter peaks and renewable

Gas on gas competition

- Perú LNG 4.45 MMTPY
- Mejillones 5.5 MMCMD
- Quinteros (15 MMCMD)
- Bahía 14 MMCMD
- Guanabara 20 MMCMD
- ARG-2008 Bahía Blanca 17 MMCMD
- ARG-2011 Escobar 10.5 MMCMD
- Pecém 7 MMCMD

Small LNG replacing (LPG, diesel, gasoline, fuel oil)

Contents

• Energy and natural gas in Latin America

• Renewable energy penetration in Latin America

• Developments in Latin America with a cleaner, friendlier, more flexible and competitive natural gas
  ✓ North America (EEUU, Canada and Mexico)
  ✓ Central America the Caribbean (Panama, Dominican Republic and El Salvador)
  ✓ North Cone (Colombia, T&T and Venezuela)
  ✓ South Cone (Brazil, Argentina, Bolivia, Chile and Peru)

• Some conclusions and remarks
Conclusions and remarks

• Most countries in LA have potential and reserves of conventional and unconventional natural gas

• Natural gas is moving to a more commercial integration competing with prices and pollution issues against dirtier energy sources.

• Several countries in LA have strong hydro power capacity and there are further plans to continue developments

• New renewable energy (solar and wind) are to continue penetrating in the energy mix in all LA

• Natural gas as LNG is providing that

• Natural gas keeps displacing oil products in all segments (power, industrial, vehicles, commercial, residential)

• Small LNG continues to penetrate strongly into the region in smaller markets

• LNG and pipeline natural gas are ideal for competitively backing up water, solar and wind
MUCHAS GRACIAS!

www.gasenergyla.com

alvaro.rios@gasenergyla.com