

Unconventional Gas Development in Argentina

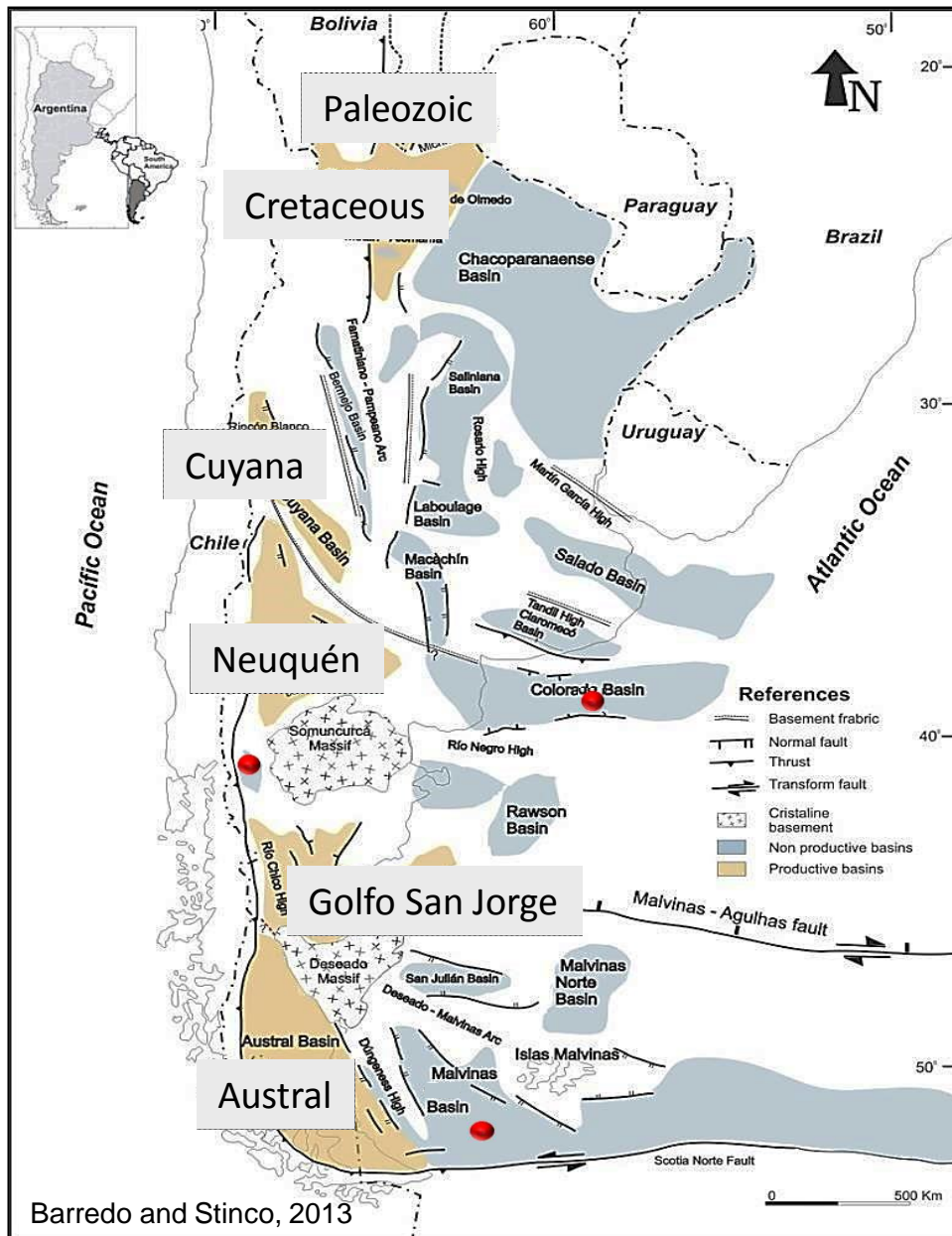
Session 5 : Unconventional Gas Development

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Argentina Basins & Resources



Productive

545,000 km² (18%)

*Paleozoic – Cretaceous – Cuyana - Neuquén
Golfo San Jorge - Austral*

Non Productive

2,500,000 km² (82%)

Ñirihuau - Colorado Marina - Malvinas

Total

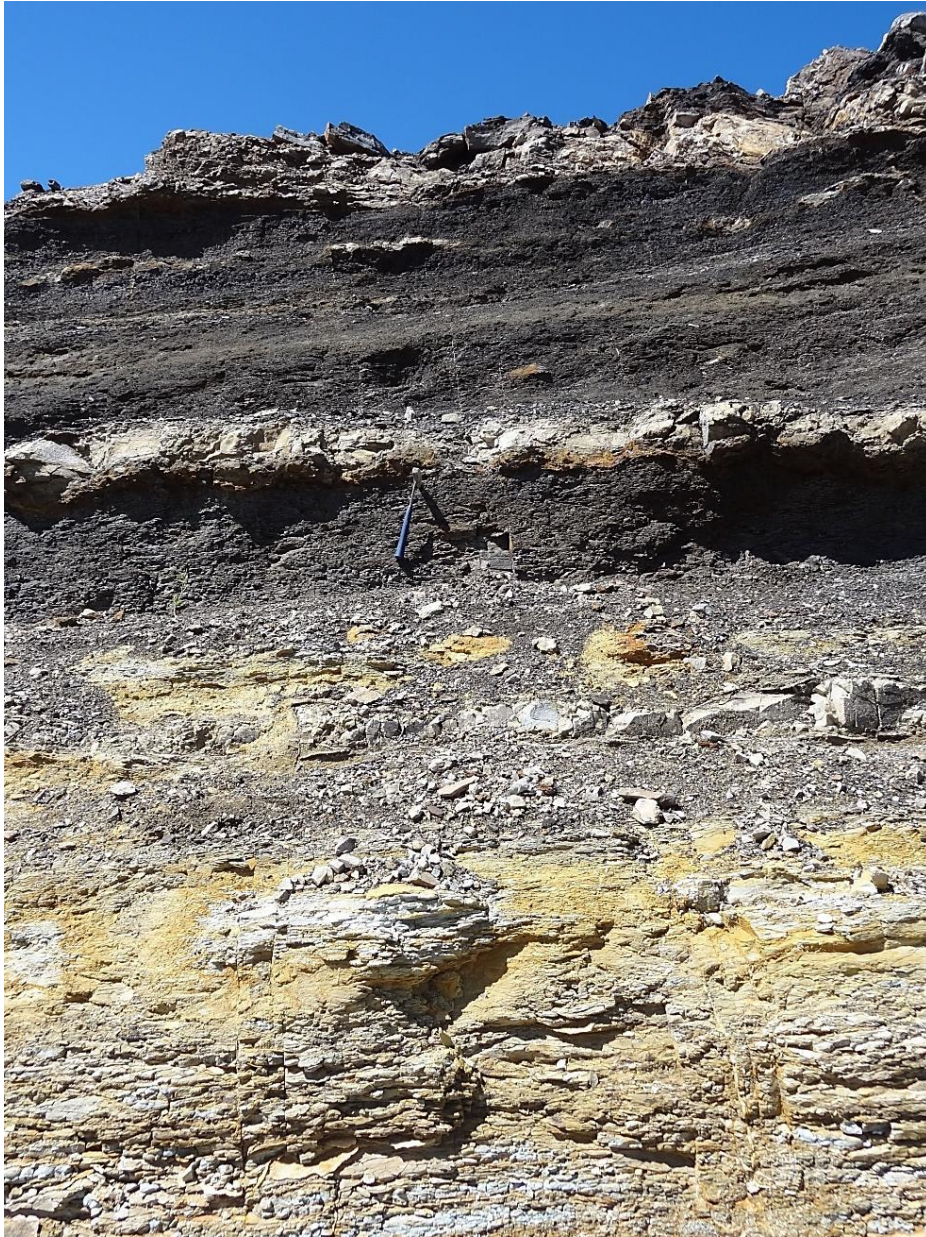
3,045,000 km²

Basin	Formation	Resources (TCF)
Paleozoic	Los Monos	40
Cretaceous	Yacoraite	5
Cuyana	Cacheuta	15
Neuquén	Precuyano	5
Neuquén	Los Molles	190
Neuquén	Vaca Muerta	220
Neuquén	Agrio	40
Golfo San Jorge	Neocomiano	20
Golfo San Jorge	D-129	100
Austral	Serie Tobífera	5
Austral	Palermo Aike	160
Total		800

Current Status

- “ Resources of 800 TCF and 27 BBO have generated great expectation in Argentina. Annual country consumption is close to 1.5 TCF and 0.204 BBO.
- “ Vaca Muerta Formation is currently producing more than 40,000 boe (45% gas) compared to 4,700 boe in 2013.
- “ Operating companies show a level of activity for conventional and unconventional projects that are around 10 to 20 % less than last year.
- “ However, most unconventional studies are still on. Focused not only in Vaca Muerta Formation but also in Pozo D-129, Los Molles and Agrio Formations.
- “ Environmental Impact Studies together with hydrological ones are being performed in the different basins for establishing the proper project planning, engineering design and feasibility analysis (including technical, economical, environmental and social aspects).

Current Status



Vaca Muerta Formation outcrops in Pampa Tril area, Neuquén Province. (Stinco, 2015)



Current Status

- “ Average initial production for vertical oil wells is around 180 bopd and 400,000 cfpd of gas with and estimated ultimate recovery after 30 years of 260,000 barrels of oil equivalent.
- “ For horizontal oil wells average initial production is close to 320 bopd and 800,000 cfpd of gas with and estimated ultimate recovery after 30 years of 517,000 barrels of oil equivalent.
- “ Vertical and horizontal gas wells drilled in Vaca Muerta Formation have an initial production of 2,900,000 cubic feet per day and 4,700,000 cubic feet per day respectively. Estimated ultimate recovery after 30 years for a vertical gas well is 2.2 bcf and 3.8 bcf for the horizontal gas well.
- “ Vertical development wells costs 7.5 to 8.5 MMUSD, while exploration wells 15.0 MMUSD. Horizontal wells double vertical ones.
- “ Unconventional gas production represents less than 1% of annual consumption.

Strategies and Challenges

- “ Different scenarios consider to cover more than 50% of the country gas demand in not more than 15 years. In order to achieve it, between 600 to 1,400 unconventional gas wells per year are required.
- “ A wide variety of challenges are present: in depth geological knowledge, optimal completion, drilling of economic wells, optimization of the field operations, fracking design and response, water accessibility and disposal, equipment availability, expansion of local equipment design and production
- “ Oil production reached its peak in 1998 while gas in 2001. Since then, in both cases production shows declination with a clear tendency of not being able to recover production unless new projects are successful, such as: new discoveries from exploration, implementation of improved/enhanced oil recovery plans and unconventional reservoirs development.