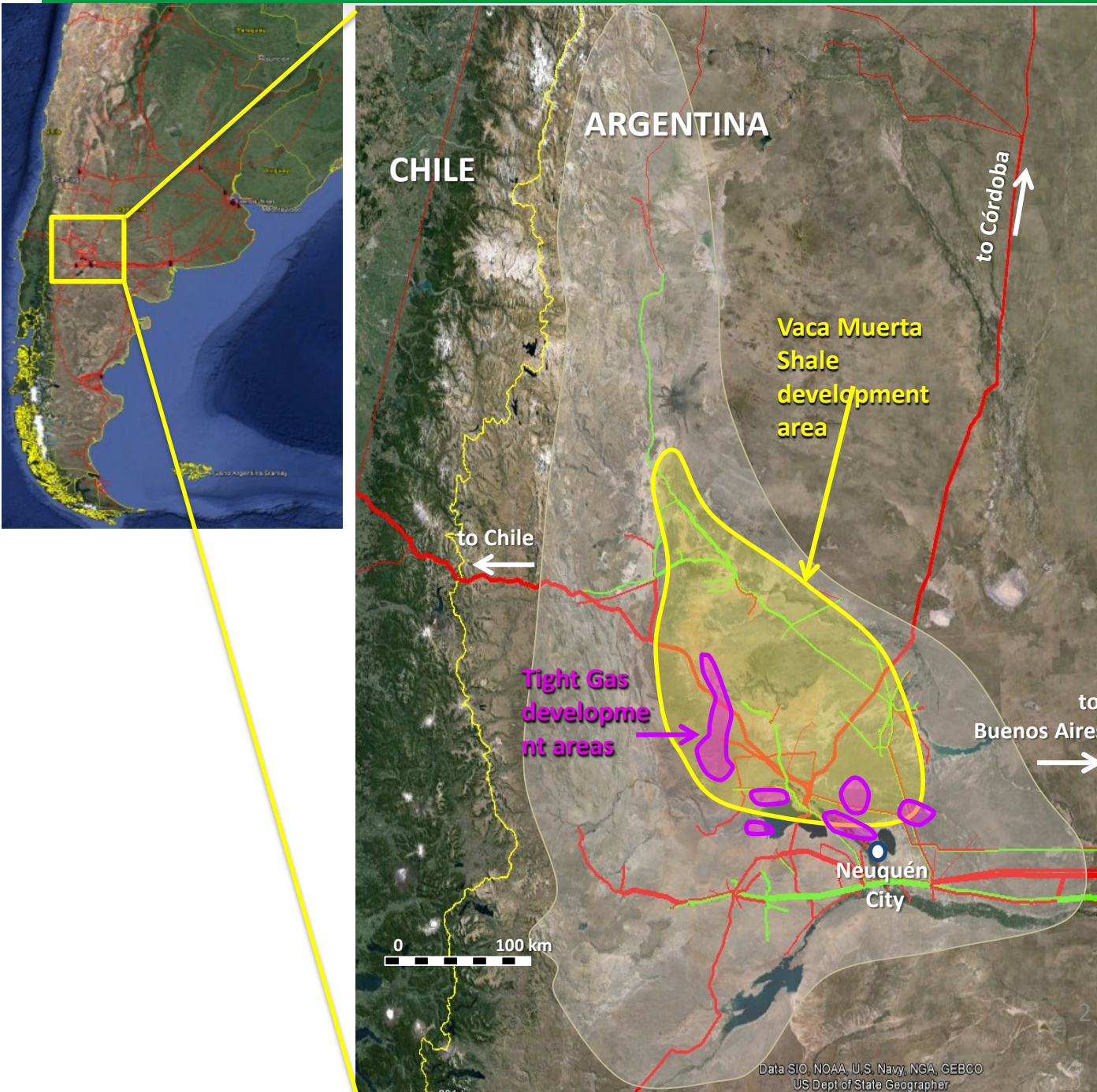


PAN AMERICAN ENERGY

Neuquen Basin, Vaca Muerta Fm. & Results



Neuquen Basin World Class Unconventional

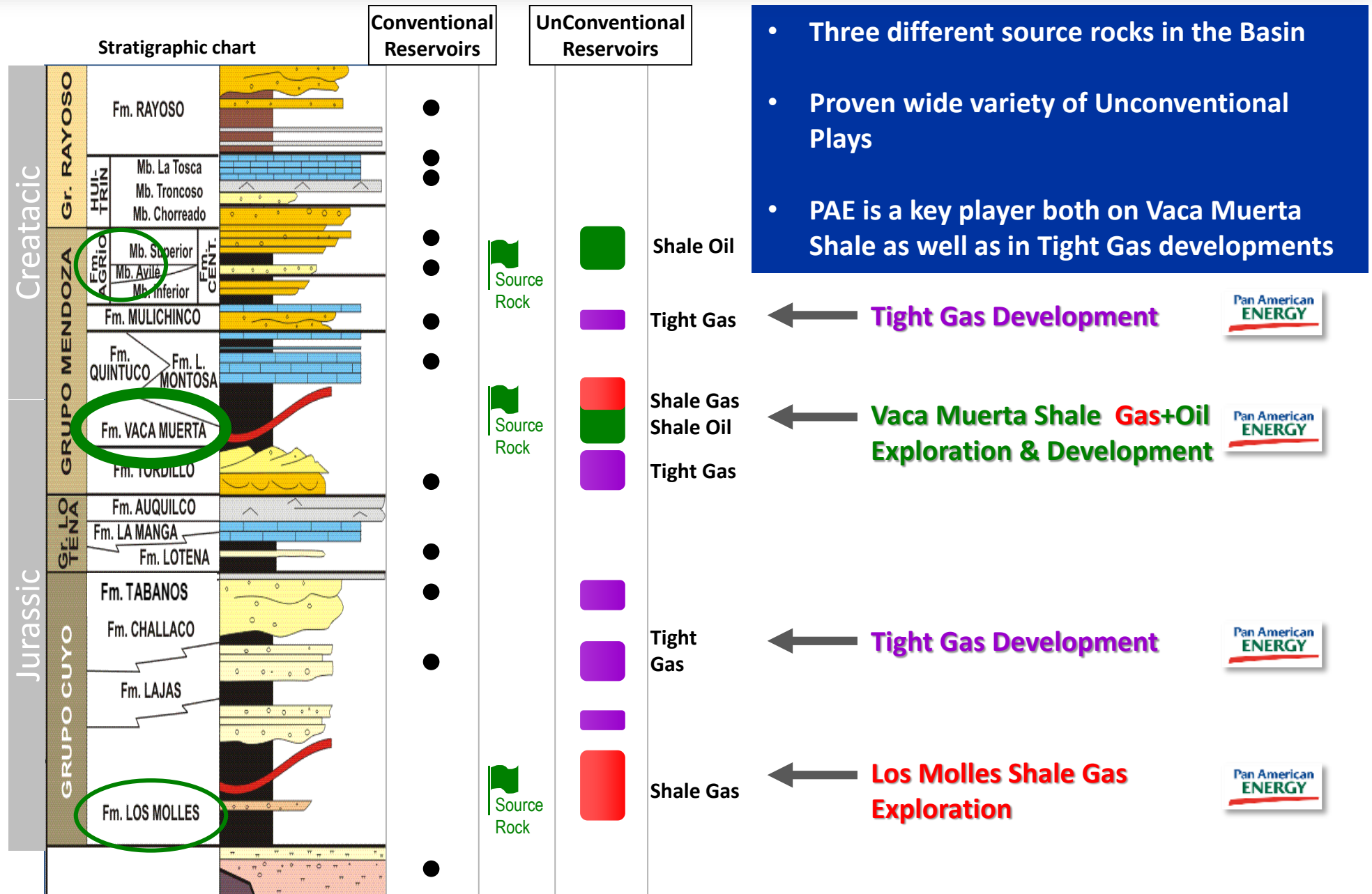


- Area: > 120000 km² (30 MM Ac)
- Oil Discovered October 1918
- Wells: > 29,000
- Cumulative Oil: > 4,7 BBO
- Cumulative Gas: > 30 TCF
- Daily Oil Prod: 237,2 Kbopd (38 Km³/d)
- Daily Gas Prod: 3,4 Bcfd (96,4 MMm³/d)

Outstanding Unconventional Resource

- Shale and Tight plays underlie mature conventional reservoirs.
- Facilities in place leverage initial stages of projects development.
- Close to the Neuquén's city
- Well connected to the country
- Very low population density
- Land is flat, without vegetation
- Water sources available
- Environmental issues are manageable

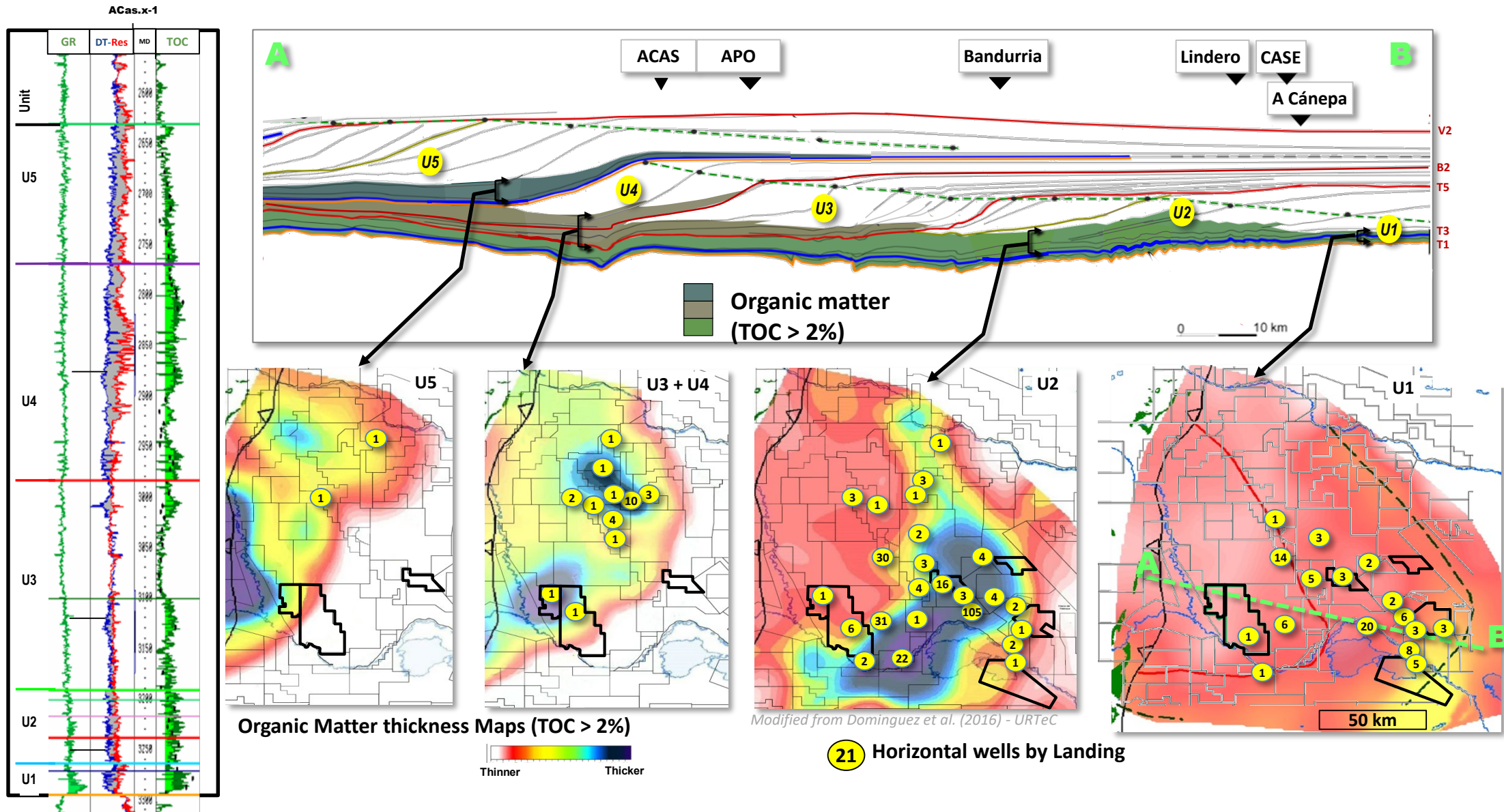
Neuquen Basin – Stratigraphic Column



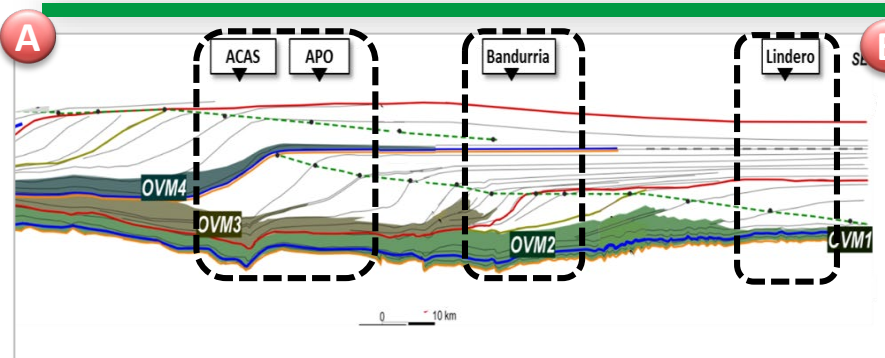
- Three different source rocks in the Basin
- Proven wide variety of Unconventional Plays
- PAE is a key player both on Vaca Muerta Shale as well as in Tight Gas developments

VACA MUERTA SHALE PLAY

Several landing zones have been de-risked to date in different areas of the basin



PAE in Neuquen Basin



APOACAS
190,000 acres
Dry Gas Pilot
 6 Wells 2019/20
29,8 Tcf

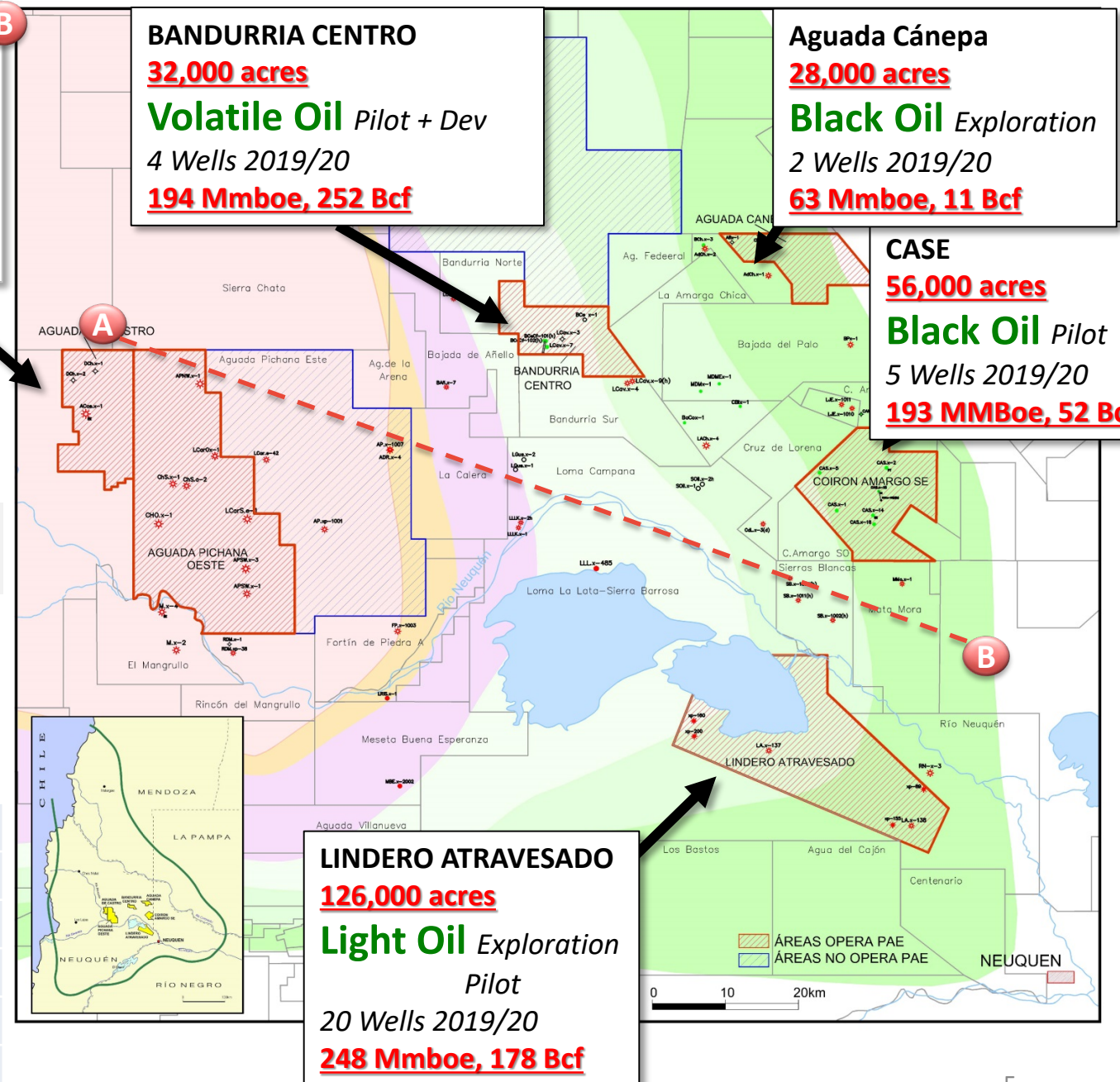
Operated Assets: 432000 Acres;
Net PAE 252250 Acres

3rd Party Operated Assets: 414919 Acres;
Net PAE 68325 Acres

Net PAE: 320575 Acres

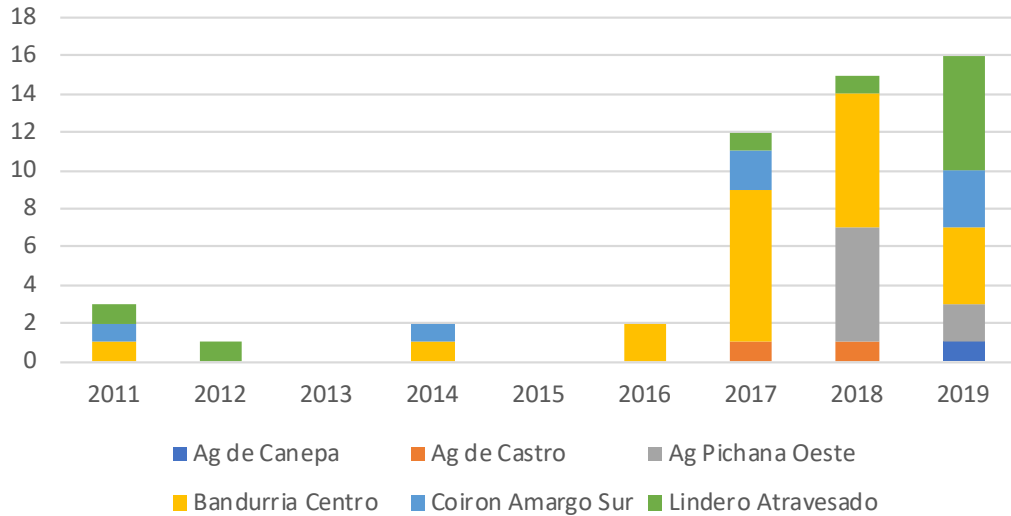
Operated Assets

	Targets	Tested	# Wells
Bandurria Centro	3	3	400
Lindero Aravesado	2	1	250
CASE	2	1	250
Ag Canepa	1		50
APO-ACAS	8	5	800
Total			1750



Wells & Operated Gross Production

Wells



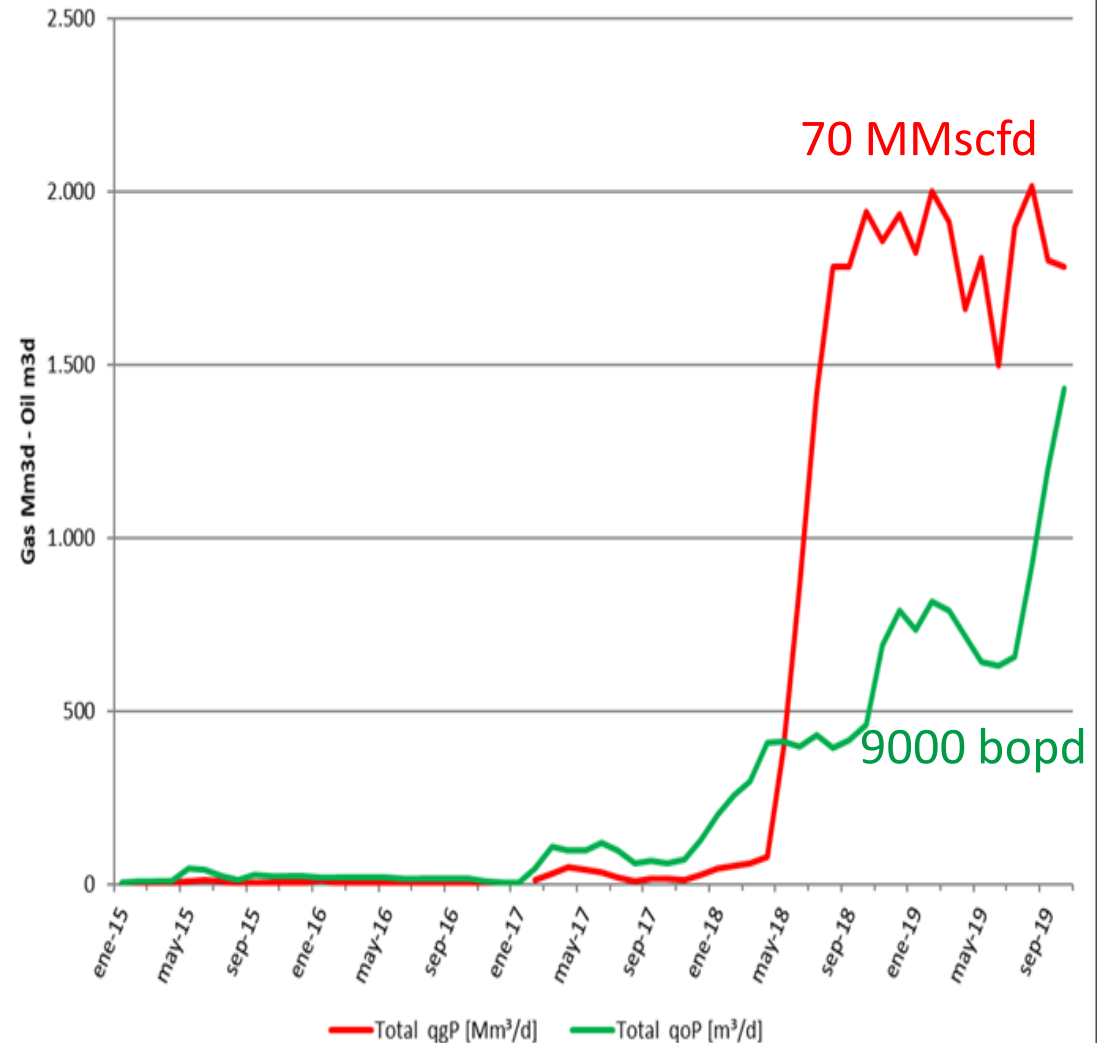
Pozos Perforados VM

Area	2011	2012	2014	2016	2017	2018	2019	Total
Ag de Canepa							1	1
Ag de Castro					1	1	0	2
Ag Pichana Oeste						6	2	8
Bandurria Centro	1		1	2	8	7	4	23
Coiron Amargo Sur	1		1		2		3	7
Lindero Atravesado	1	1			1	1	6	10
Total	3	1	2	2	12	15	16	51

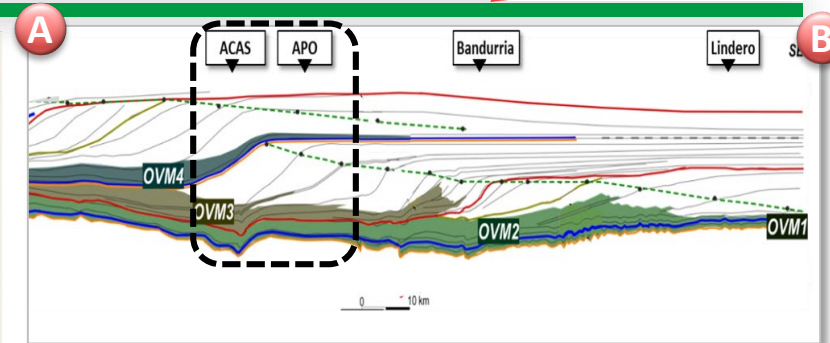
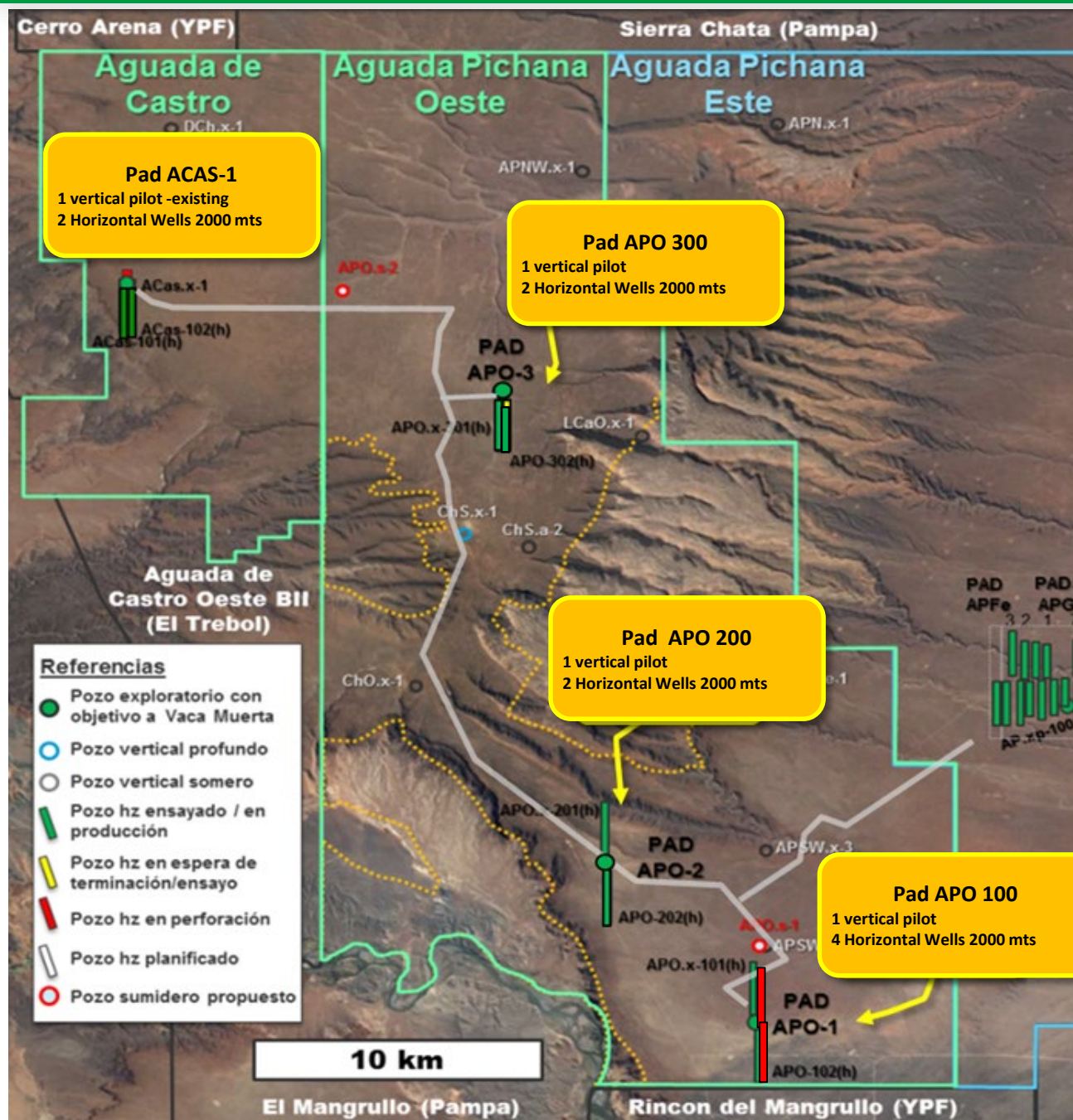
6 Vertical Wells

45 Horizontal Wells

PAE Gross Production from Vaca Muerta



APO-ACAS Pilot Project



Wells on Production: 7 (Lat 2000 m)

Shut in well: 1 (Lat 2000 m)
APO-302(h) due to high water production

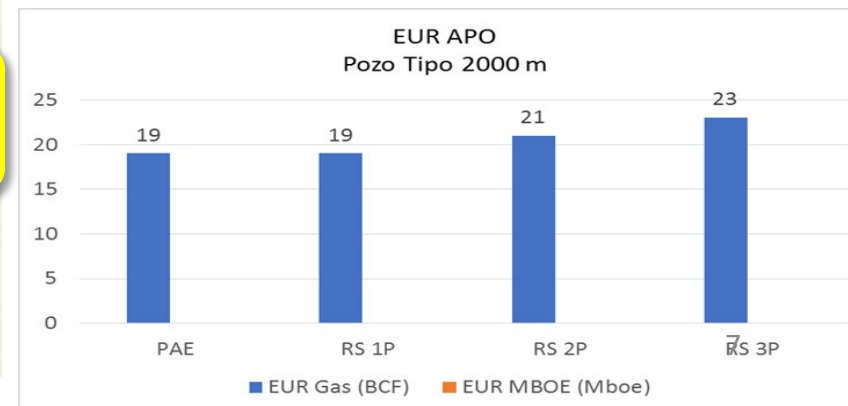
Waiting On Completion Wells: 2 (Lat 2000 m)

- APO-103(h)
- APO-104(h)

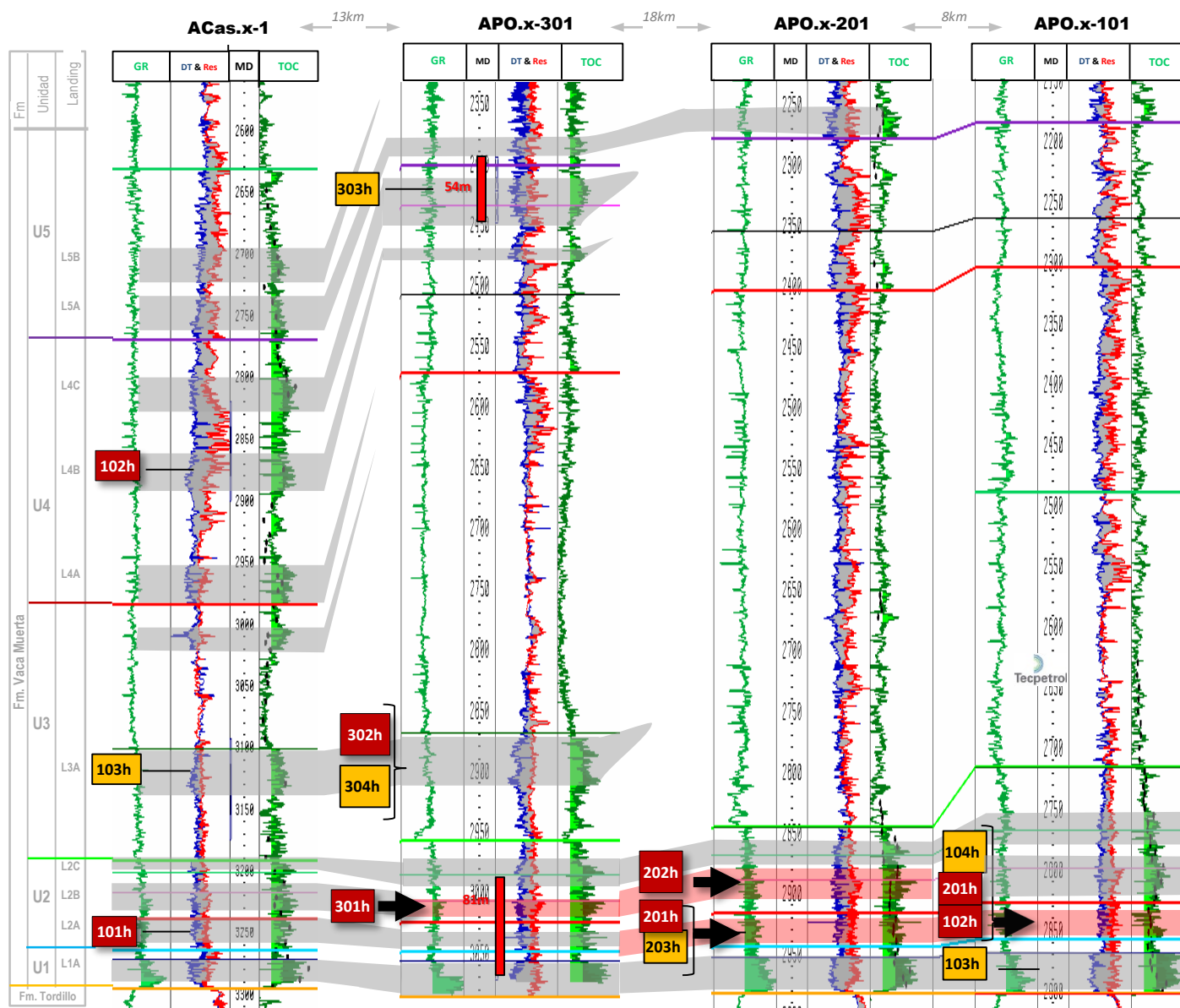
Wells to be Drilled & Completed: 4 (Lat 2000 @ 3000 m before July 2020)

New Gas pipeline APO to APE: 24Km. Diam 24". On Construction. Nov 2019

Dehydration Plants: 4 Individual 1,5 MMm3/d. On Construction



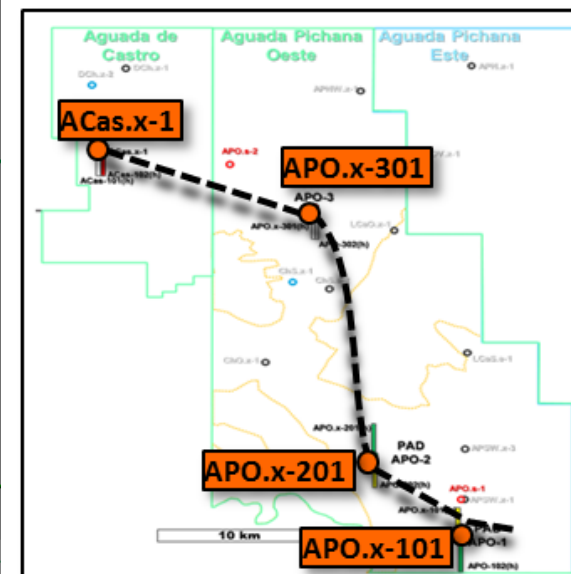
3 VM Targets, >800 Horizontal wells, with various degrees of risk and uncertainty

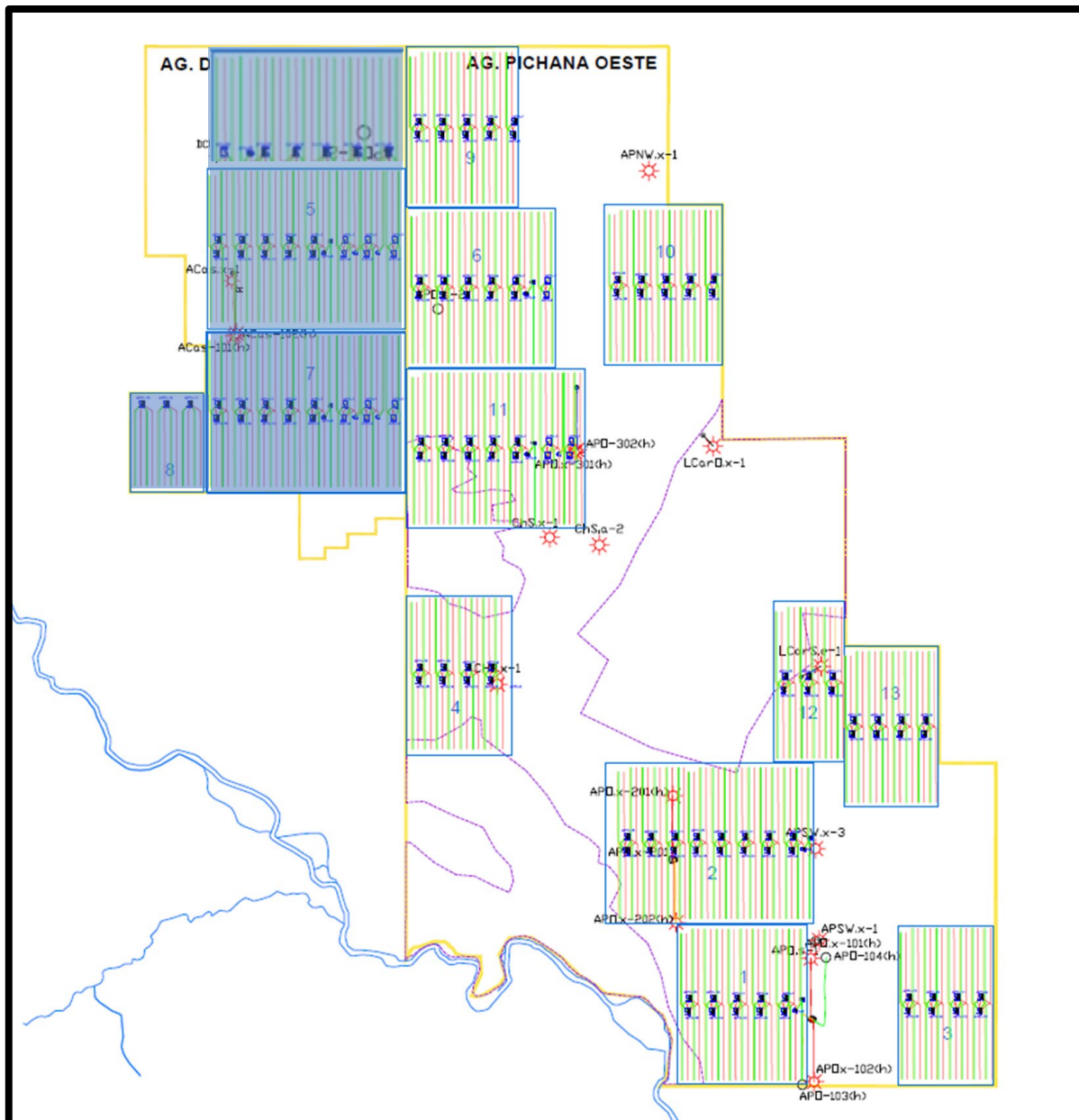


101h 2018 Wells

103 h 2019 Wells

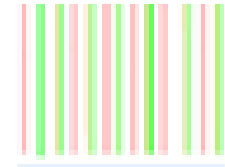
Tested Landings





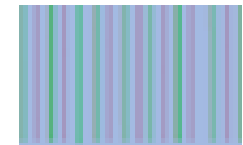
Most likely case

Landing Points: 3
Wells: 840 wells
Drain: 7.8 MMft
Reserves: 22,5 Tcf



Potential Resources

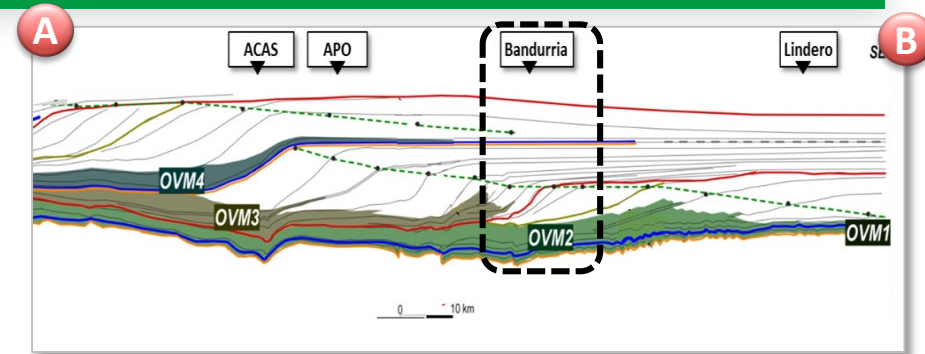
Landing Points: 2
Wells: 270 wells
Drain: 2.5 MMft
Resources: 7,3 Tcf



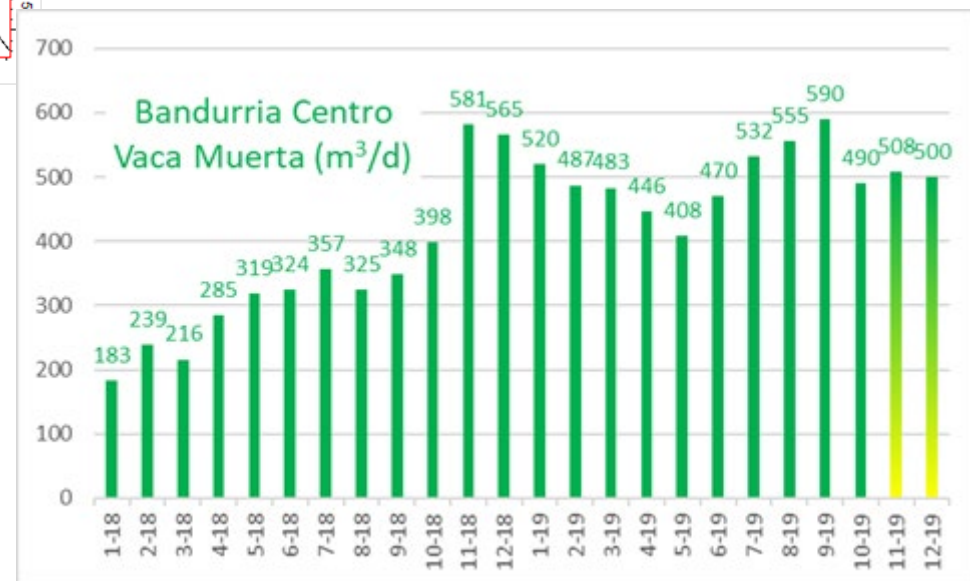
Total case

Landing Points: 5+
Wells: 1110 wells
Drain: 10.3 MMft
Resources: 29,8 Tcf

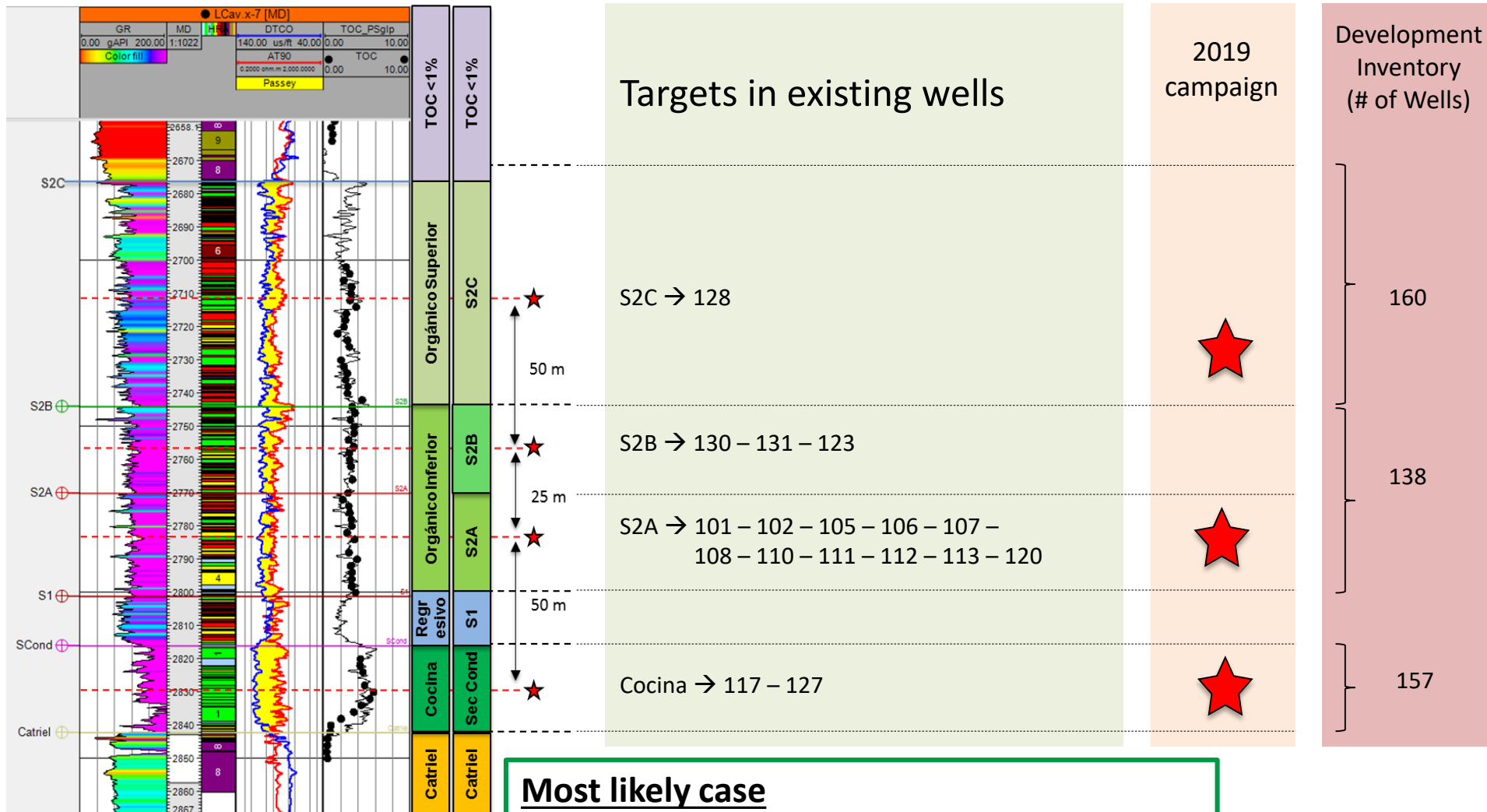
Pan American
ENERGY



-
- | Well Type | EUR Oil (Mbo) | EUR MBOE (Mboe) |
|--------------|---------------|-----------------|
| PAE | 704 | 803 |
| RS 1P | 700 | 817 |
| RS 2P | 850 | 992 |
| RS 3P | 1,150 | 1,342 |
| PT <-> RTA | | |
| BCE-101h | 403 | 520 |
| BCE-102h | 253 | 326 |
| BCE-105h | 444 | 573 |
| BCE-106h | 277 | 357 |
| BCEcf-107h | 324 | 324 |
| BCEcf-108h | 455 | 587 |
| BCEDi-120h | 587 | 672 |
| BCEBh-117h | 718 | 857 |
| BCEcg-111h | 506 | 604 |
| BCEdg-123(h) | 590 | 676 |



3 VM targets, > 400 Horizontal wells, with various degrees of risk and uncertainty



Most likely case

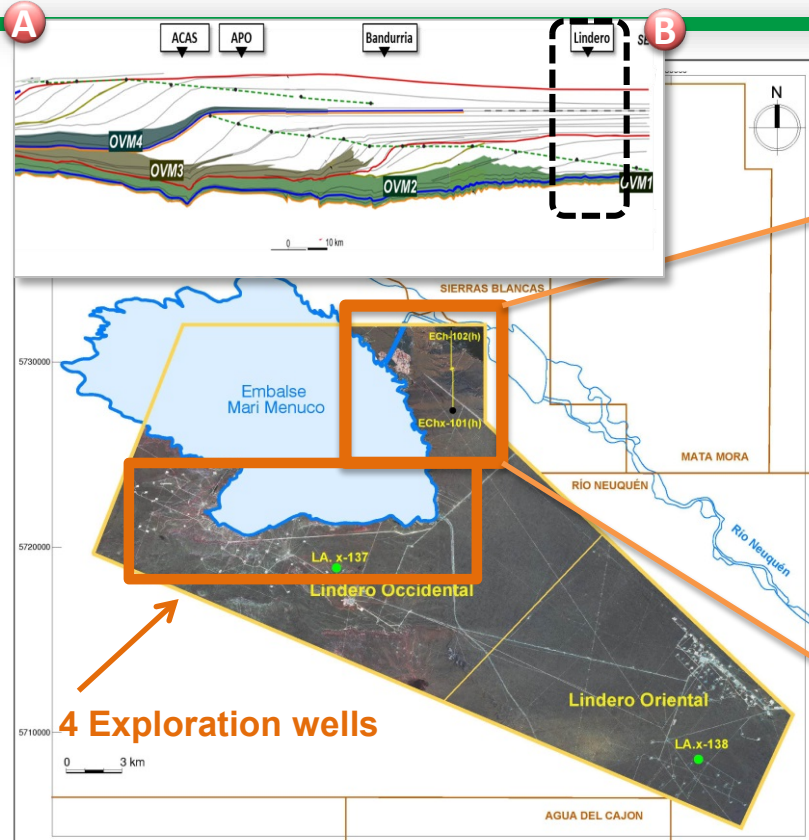
Landing Points: 2

Wells: 290 wells

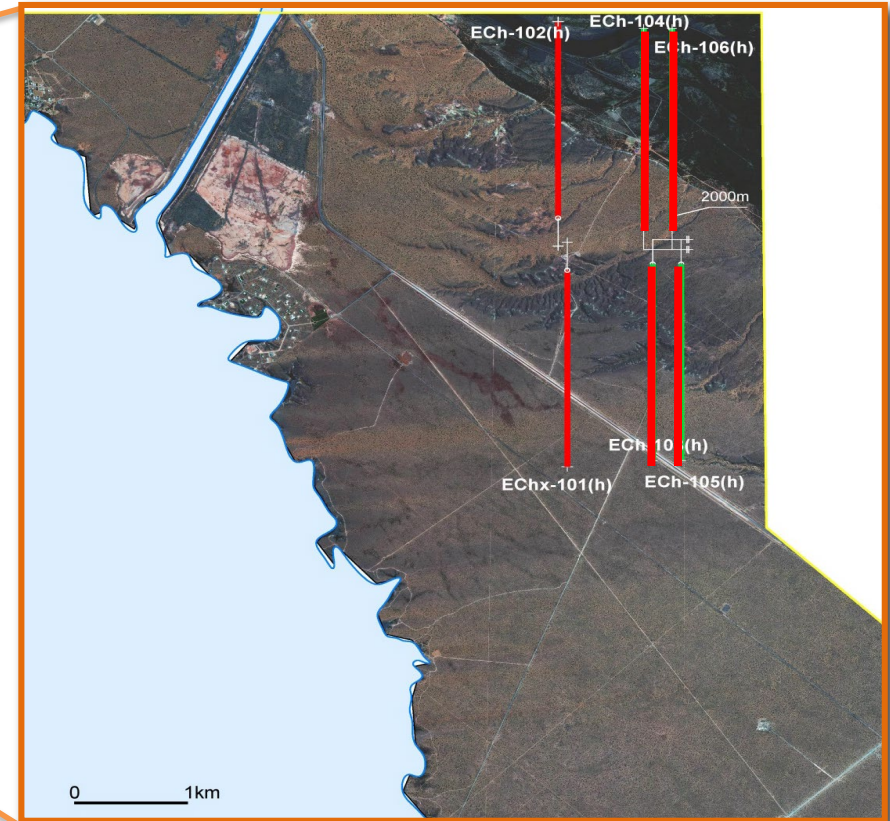
Drain: 2,4 MMft

Reserves: 194 MMBoe (252 Bcf Gas)

Lindero Atravesado



El Chañar de-risking Project



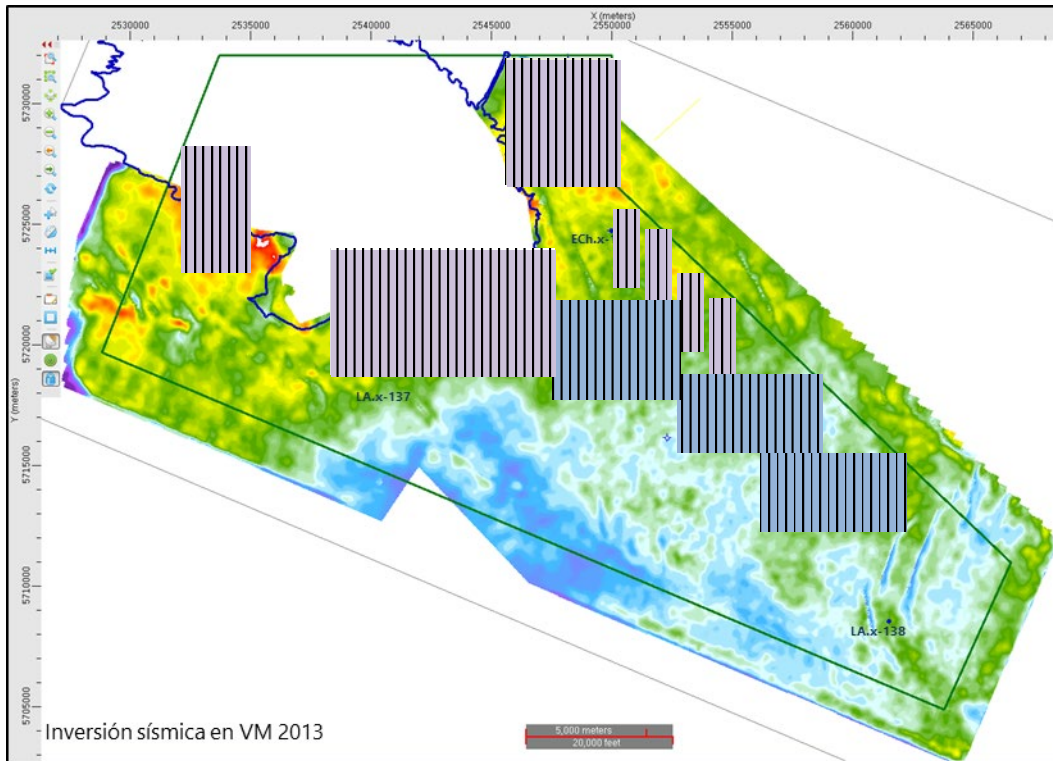
Exploration and de-risking
Qoi:1000 bopd
EUR: 1,1 MMBOE

- 6 shale oil wells on production.
- 2 shale oil wells on Completion.



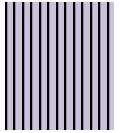
Lindero Atravesado

Most likely cases



Most likely case

Landing Points: 1 Proved
Wells: 105 wells
Drain: 0.8 MMft
Reserves: 105 MMBoe. (77 Bcf Gas)

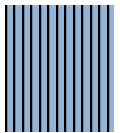


Landing Points: 1 Ongoing Test

Wells: 105 wells
Drain: 0.8 MMft
Reserves: 88 MMBoe. (65 Bcf Gas)

Potential Resources

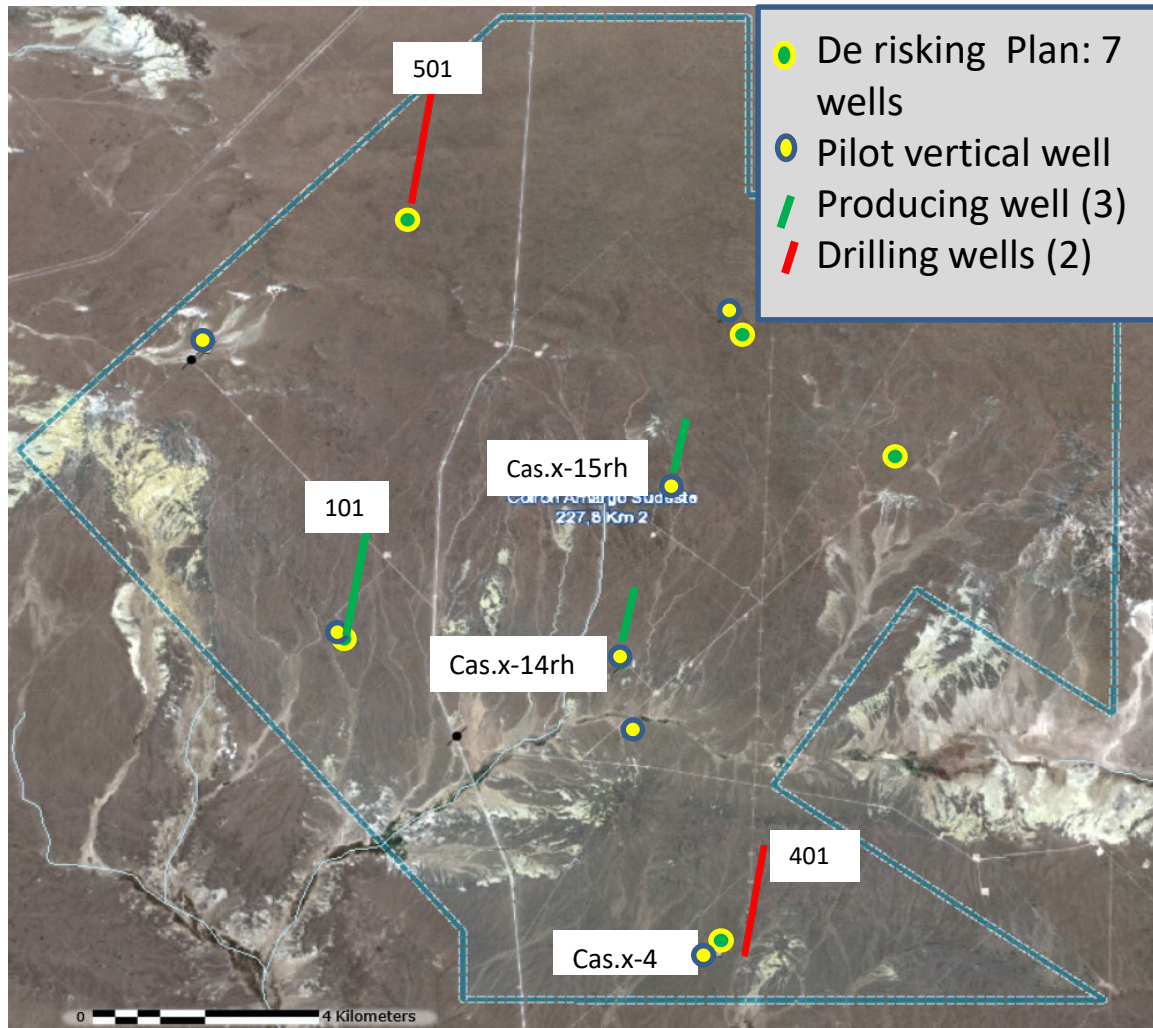
Landing Points: 1
Wells: 90 wells
Drain: 0.6 MMft
Resources: 55 MMBoe. (36 Bcf Gas)



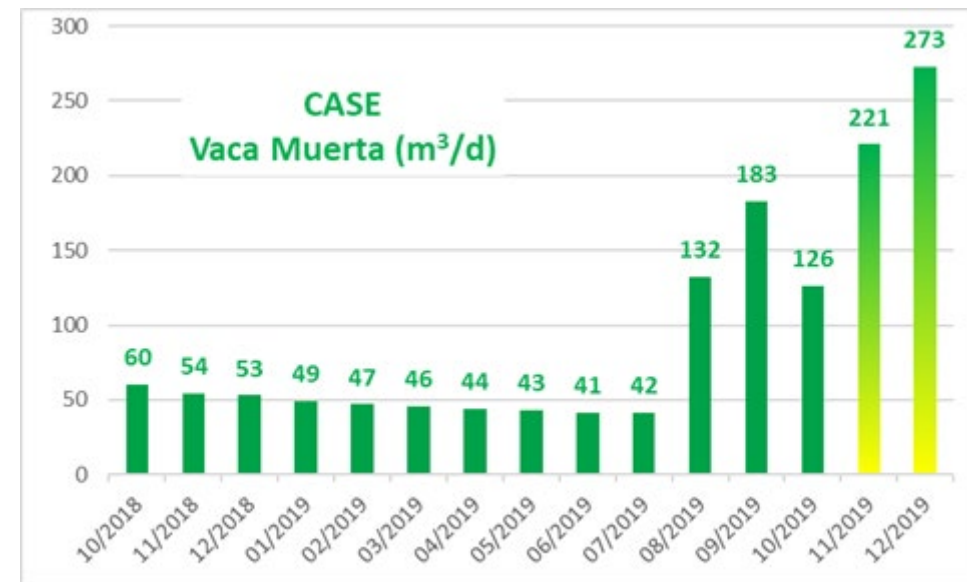
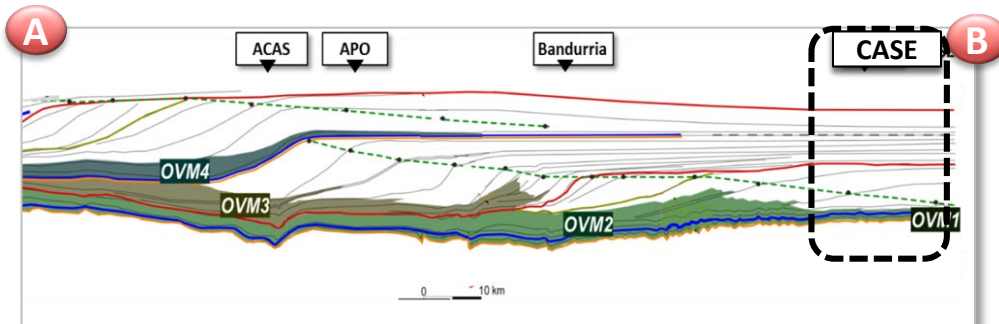
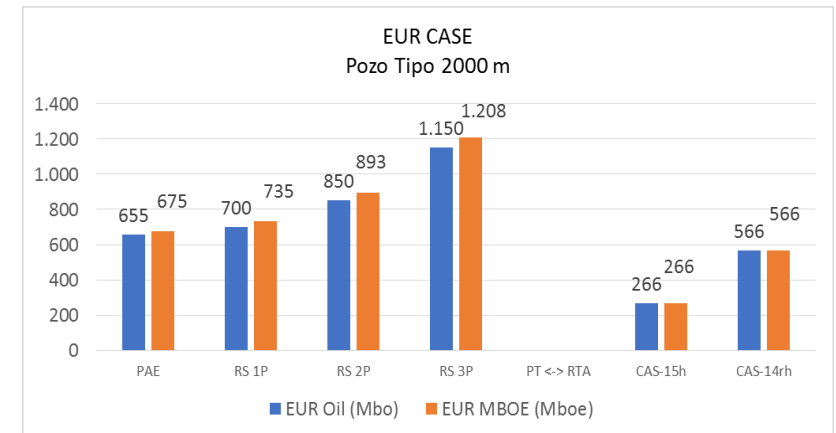
Total case

Landing Points: 2+
Wells: 300 wells
Drain: 10.3 MMft
R + R: 55 248 MBoe. (178 Bcf Gas)

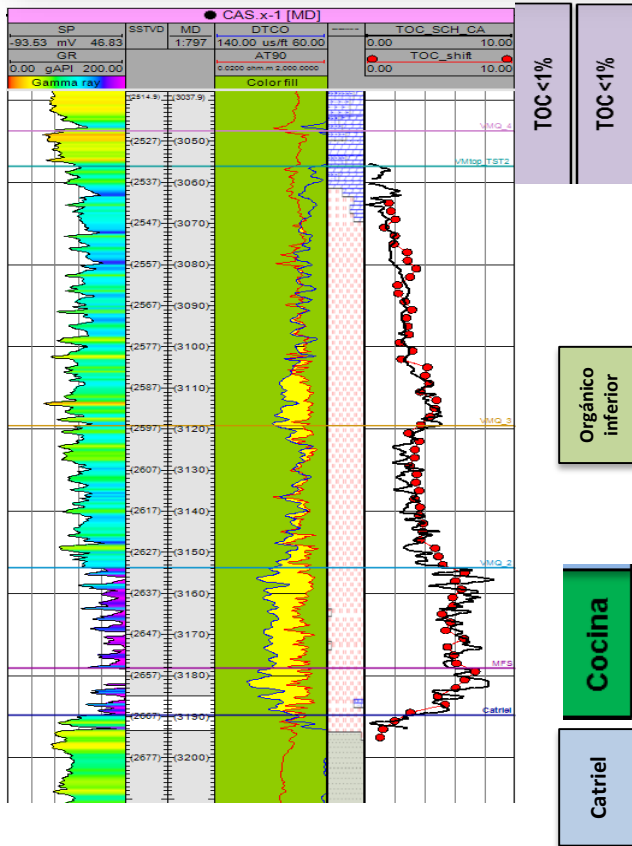
Coiron Amargo SE. (CASE)



Exploration Phase (2018): 2 wells
De-risking Phase: 5 wells 2019/20



Coiron Amargo SE



Targets in existing wells

Organic → **Not tested**

Kitchen → CAS.x-14rh – CAS.x-15rh,
CAS 101h.

2019
Proposals

Development
Inventory
(# of Wells)

70

230

Most likely case

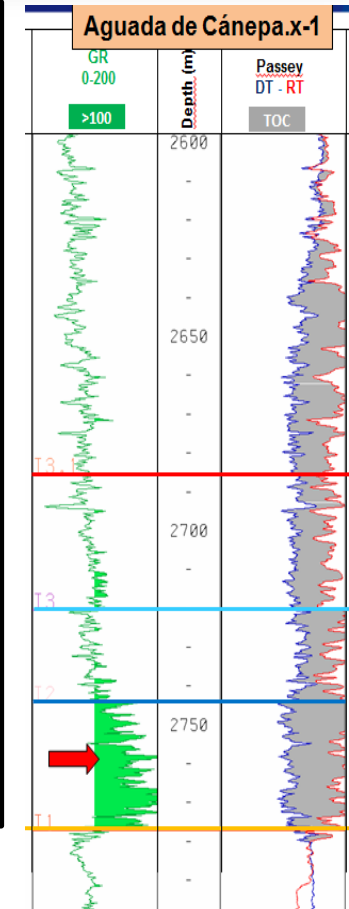
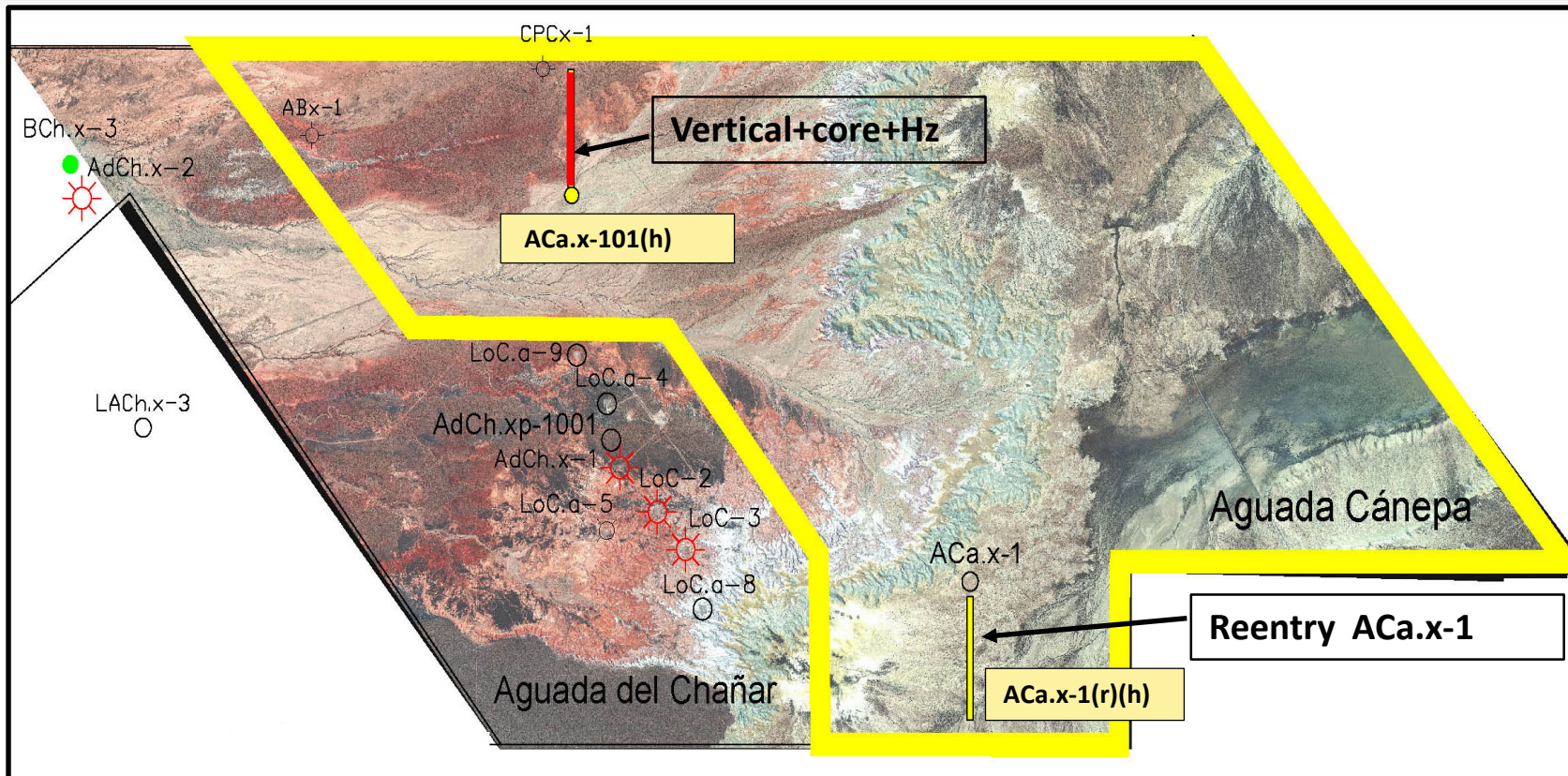
Landing Points: 1

Wells: 190 wells

Drain: 1,6 MMft

Reserves: 193 MMboe (52 Bcf Gas)

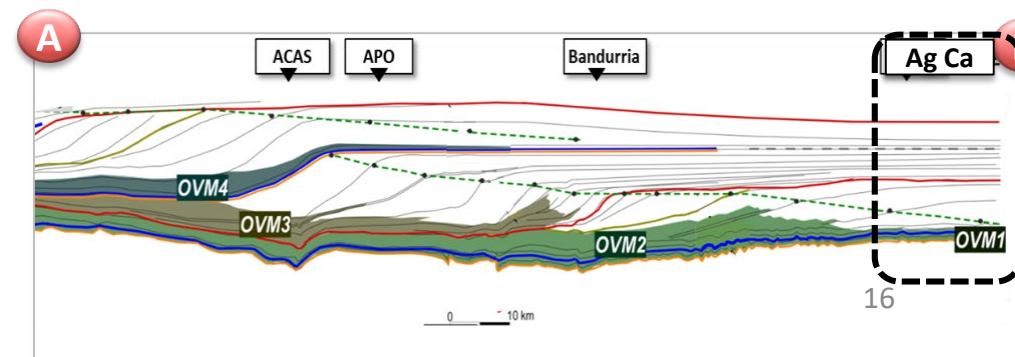
Aguada de Cánepa



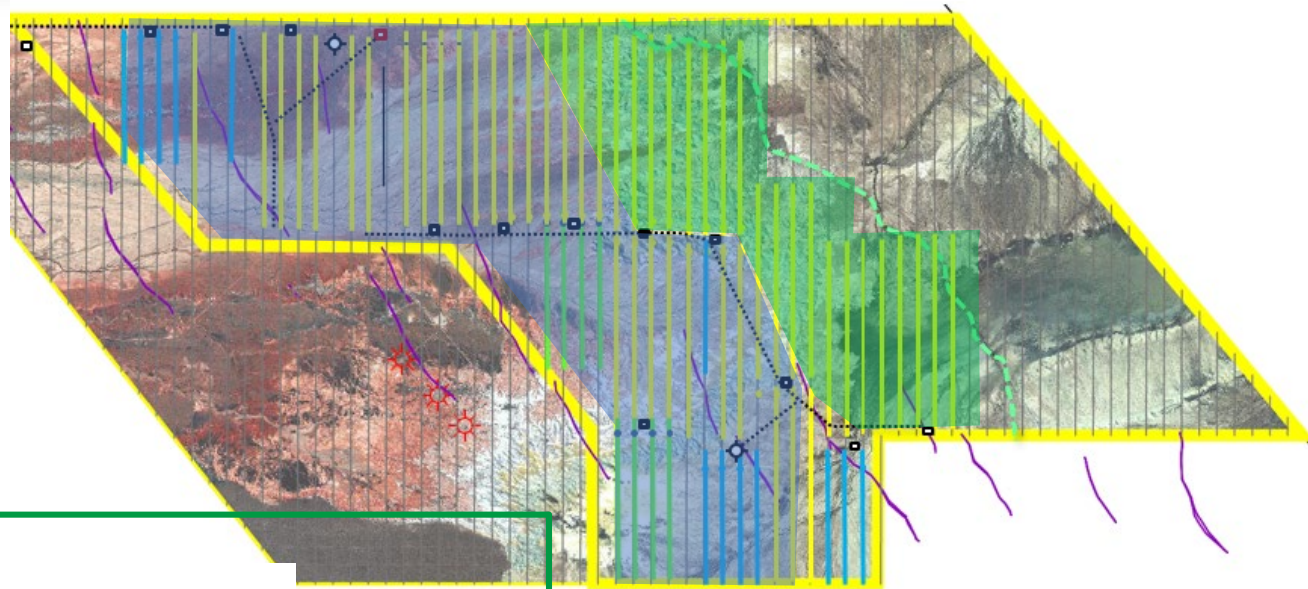
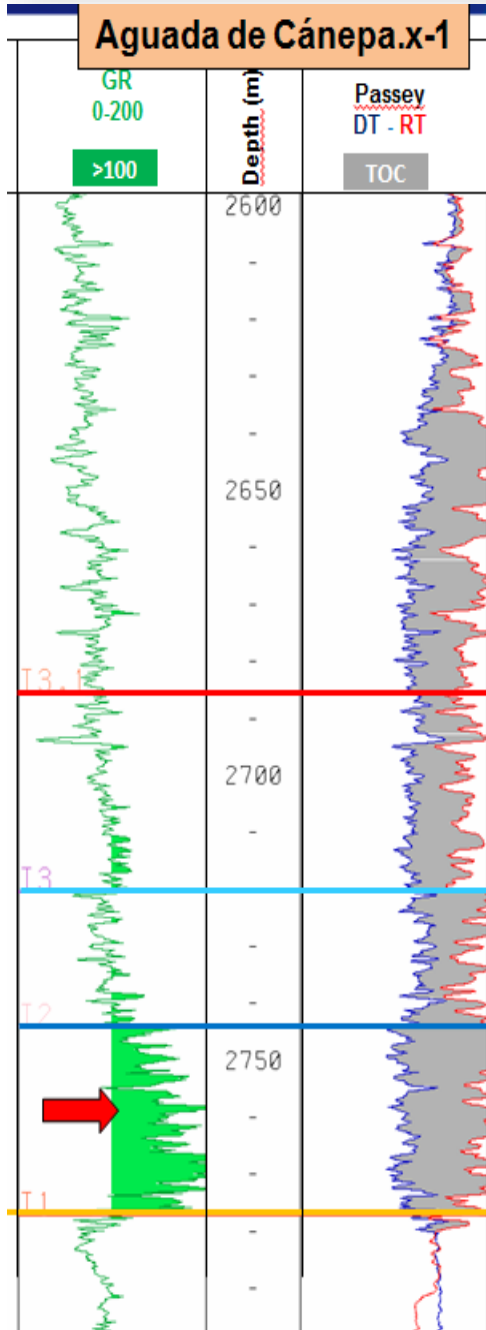
Exploration 1st Phase: Tight gas G. Cuyo
ACax-1 Vertical well drilled in 2017

Exploration 2nd Phase: Vaca Muerta Shale
1 Vertical pilot well + core + 2000 mts horizontal well. Production : 1000 bod
1 Horizontal well (2000m), reentry of ACax-1.
On going

1 VM target, > 100 Horizontal Wells



Aguada de Cánepa



Most likely case

Landing Points: 1 Proved
Wells: 40 wells
Drain: 0.35 MMft
Reserves: 36 MMBoe. (6 Bcf Gas)

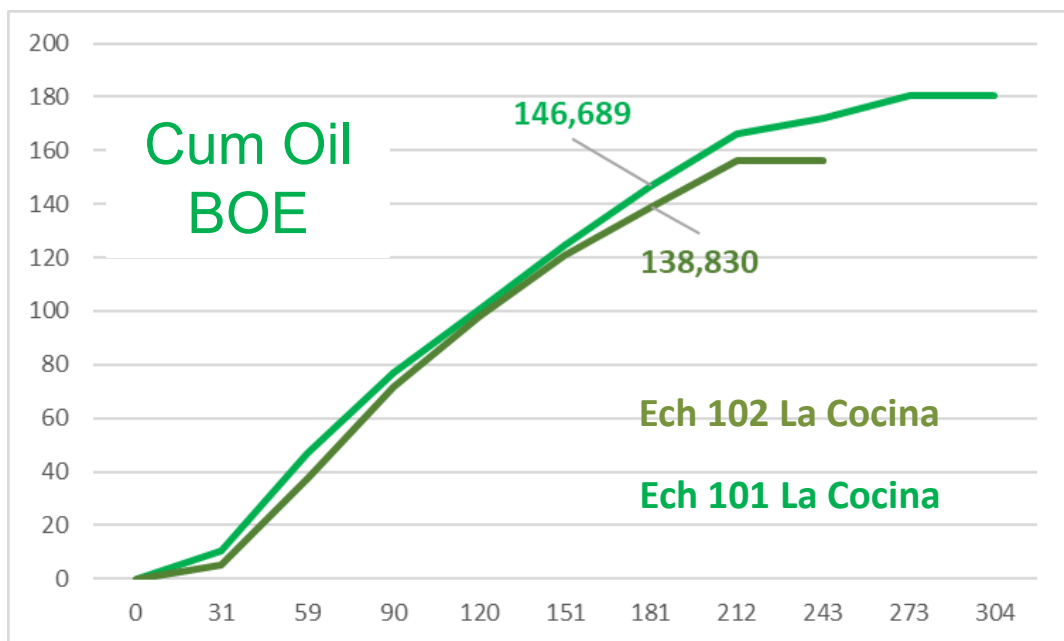
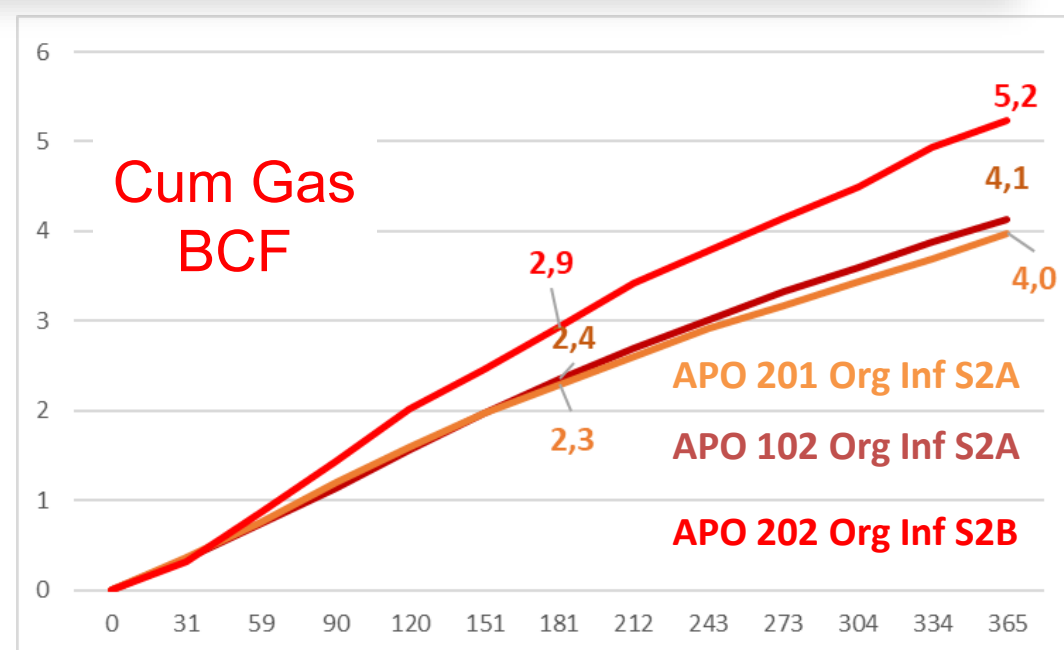
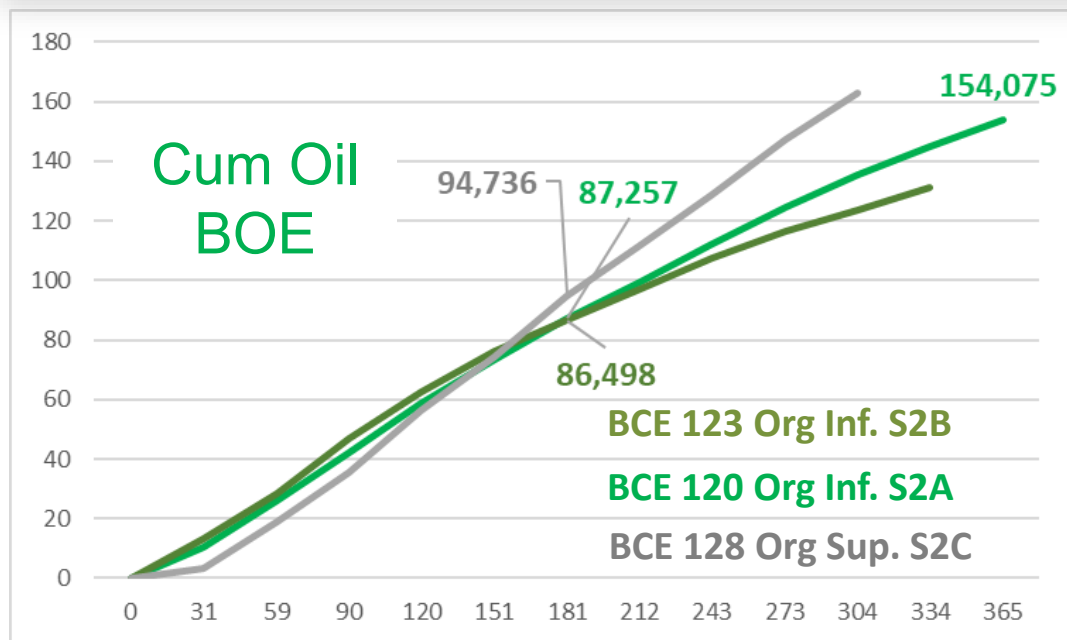
Potential Resources

Landing Points: 1
Wells: 31 wells
Drain: 0.25 MMft
Resources: 27 MMBoe. (5 Bcf Gas)

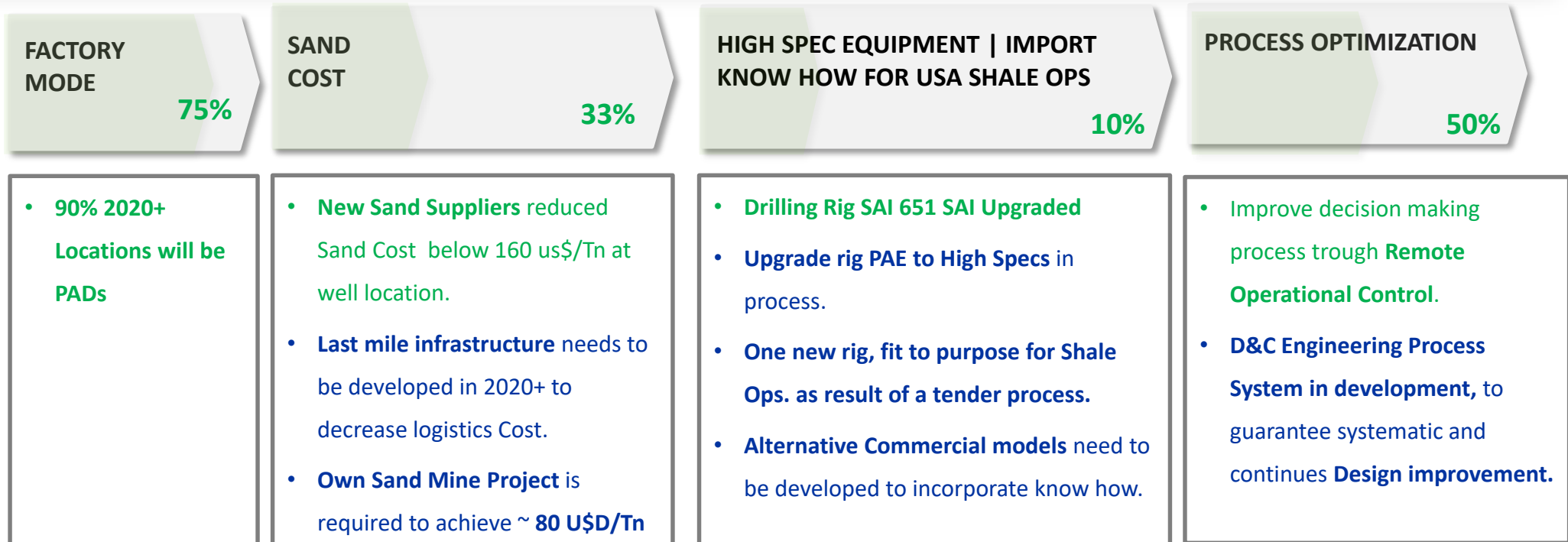
Total case

Landing Points: 1
Wells: 71 wells
Drain: 10.3 MMft
R + R: 63 MMBoe. (11 Bcf Gas)

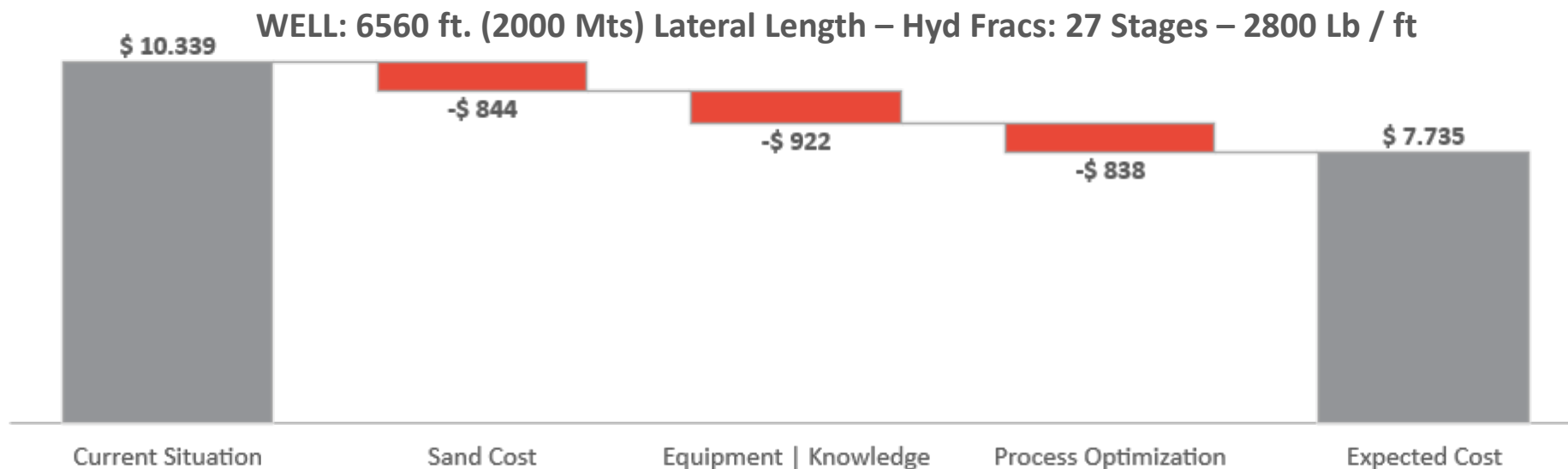
Vaca Muerta, Production Results



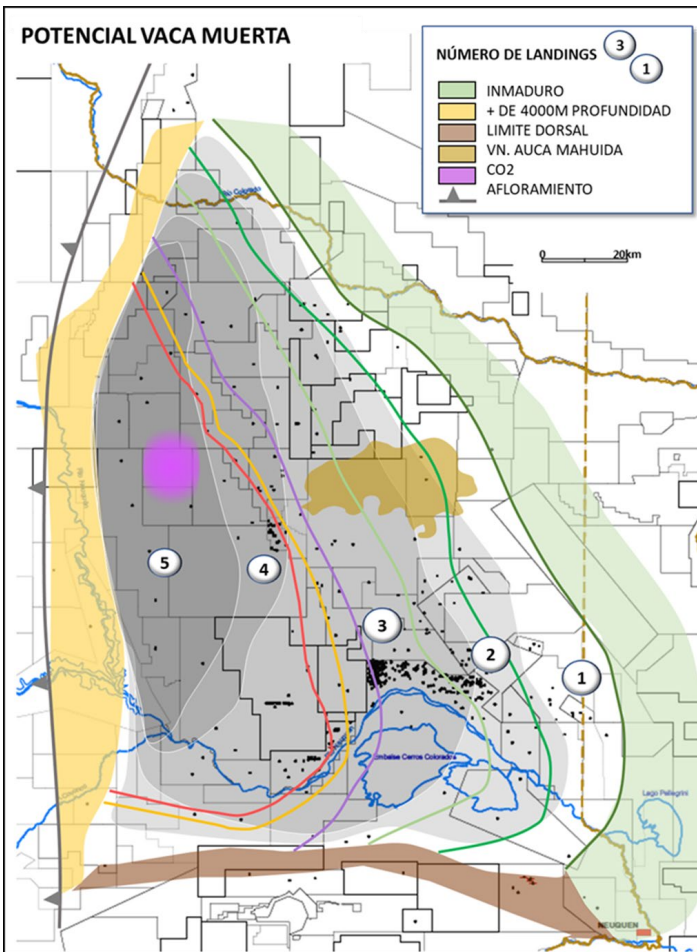
D&C Cost Reduction Initiatives



Green Comments: Done
Blue Comments: In process



Vaca Muerta - Resources



Type Wells per Window

Indicador	Dry Gas	Wet Gas	Gas Retrógado	Black Oil	Medium Oil	Light Oil
Bbl/ft		4,6	15,3	96	120	80
GOR (m3/m3)		20000	3500	60	140	450
MMcf/ft	2,4	0,52	0,30	0,03	0,09	0,20
EUR Boe/ft		94	67	102	136	115

Acres/Landing Zones

LPs	Miles Acres/zona	Dry Gas	Wet Gas	Retrogade	Light Oil	Medium Oil	Black Oil
1	3869	1258	203	335	699	666	708
2	3336	1258	203	314	678	646	236
3	2774	1258	203	314	678	320	0
4	1273	886	60	140	179	8	0
5	717	637	25	44	11	0	0
Miles Acres	11968	5298	693	1147	2246	1640	944

Wells & lateral Foot to drill

	Total Cuenca	Dry Gas	Wet Gas	Retrogade	Light Oil	Medium Oil	Black Oil
Miles de Pozos	60	26,5	5,7	3,5	11,2	8,2	4,7
MM Ft a perforar	397	176	38	23	75	54	31

Resources Estimated

	Total Cuenca	Dry Gas	Wet Gas	Retrogade	Light Oil	Medium Oil	Black Oil
Tcf	455	418	11	12	2	5	6
TBbl	16,9		0,6	0,1	7,2	6,5	2,5

Challenges. Unconventional Development

The Industry has improved in terms of efficiency, but the competitiveness level needs to grow.

To allow the full hydrocarbons developments of the unconventional resources all the players must work together.

The gap in efficiency and costs that separates us from more competitive international producers is still broad.

Efficiency improvement.

More and new services companies

Align the interest of operators and Contractors

Bring new and proved technology like hi specs & high tech rigs, hydraulic frac equipment , directional drilling tools, etc.

Contracts focused on efficiency with variable rates subject to productivity.

Small and medium-sized companies (“Pymes”), suppliers, etc, should understand that this type of developments have a marginal gain and that benefits come with the sustainability of the business (long term).

Reach a higher level of technical & geological knowledge .

High knowledge of geology and reservoir behavior was acquired, but there is still much to learn to be successful in these type of developments.

Mid Stream Co.

Needed for debottlenecking

Unions.

Kipping the social peace and and improvement of efficiency , the activity level should growth creating new jobs.

Provincial & Federal Governments.

Align the regulations with the requirements of sustainability that needs VM for the development and provide a competitive environment

A low-angle, upward-looking photograph of a construction site. In the foreground, two large, dark, ribbed pipes frame the left and right sides of the image. In the center, a tall, white and yellow crane or drilling rig extends diagonally towards the top of the frame. The background is a clear, bright blue sky with a few thin power lines visible. The word "Gracias" is centered in the upper half of the image in a white, sans-serif font.

Gracias