

Exploration watch

Argentina - upside potential across range of plays

Argentina has experienced major changes in its oil and gas industry over the last five years. The country holds world-class shale potential in the Vaca Muerta and is the second-largest shale region undergoing development in the world after the US. Discovered in 2010, the Vaca Muerta has attracted major companies to invest in the region including Chevron, Dow, ExxonMobil, Shell and Total. Production has historically been dominated by the state majority-owned company Yacimientos Petrolíferos Fiscales (YPF), but this is shifting as it partners with the majors to develop the Vaca Muerta and as the country moves to more market-friendly policies under President Mauricio Macri, elected in 2015. Unconventional development is not the preserve of the majors, however, and independent Phoenix Global Resources' 2018 programme is designed to accelerate unconventional growth in the Vaca Muerta. Meanwhile, the shift of focus of the majors to unconventionals has created an opportunity for independents operating in the conventional space, where production has been declining. Both President Energy and Echo Energy are focused on growing conventional production in Argentina and have active programmes in 2018.

Active 2018 programmes

All our featured companies underwent major changes in Argentina in 2017 and have moved quickly to implement operational programmes in 2018. Echo entered the country in early 2018, while President picked up its Puesto Flores/Estancia Vieja assets from Chevron in late 2017. Phoenix is the new identity of the combination of Andes Energia and Trefoil holdings, completed in August 2017.

Phoenix's existing production is predominantly conventional, but its programme is focused on unconventional resources. The company is drilling nine vertical wells and the first horizontal well in Puesto Rojas, and will drill two horizontal wells this year in Mata Mora, located close to the YPF/Chevron Loma Campana field. The 3C plus high prospective resources across both areas are over 1.5bnboe.

President is focusing on its Puesto Flores/Estancia Vieja assets in the Neuquén basin, at the site of the Vaca Muerta, where it holds net 2P reserves of 8mmboe. In Puesto Flores, the company is working over nine wells and will start a three-well drilling programme in September 2018. In Estancia Vieja, the company is working to reactivate the field and long-term gas well testing is underway to determine optimal field development options.

Echo has completed a programme of three workovers and four exploration wells in the Austral Basin. Testing of the exploration wells is ongoing with results from the CSO-2001(d) test expected to support a decision for gas development in Fracción D. Results from EMS-1001 will be closely watched as Echo looks to confirm the interpretation of a hydrocarbon column of up to 500m, where success could lead to significant upside in the Tobifera across the assets. A 1,200km² 3D survey will be carried out from late 2018 across the Tapi Aike licence, where 41 leads have been identified on 2D and assessed to hold gross mid-case GIIP of 7.7tcf.

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For further details, please contact:

Oil & gas team

Elaine Reynolds +44 (0)20 3077 5713

Ian McLelland +44 (0)20 3077 5756

Sanjeev Bahl +44(0)20 3077 5742

Carlos Gomes +44(0)20 3077 5722

oilandgas@edisongroup.com

COMPANIES IN THIS REPORT

Echo Energy
Phoenix Global Resources
President Energy

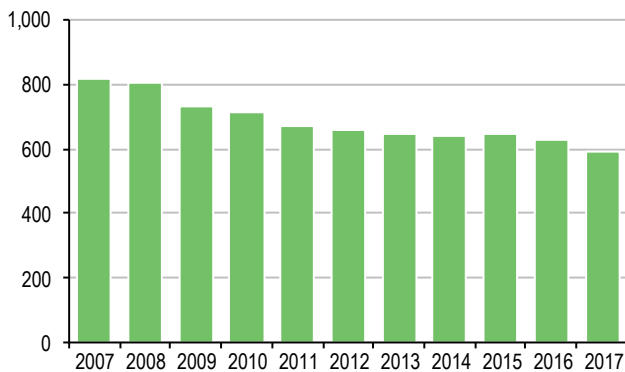
EXPLORATION WATCH

A periodic look ahead from our in-house petroleum engineer, Elaine Reynolds, focusing on interesting exploration activities with potential impact on the E&P space.

Conventional production in decline as unconventional come onstream

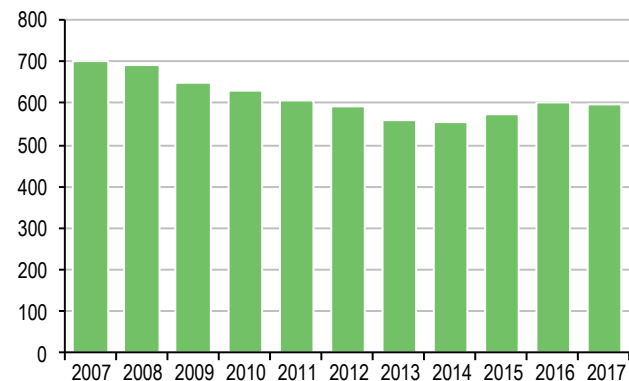
Argentina has a long history of oil and gas production stretching back to the start of the 20th century, with the first hydrocarbon discovery made in 1907. The country has seen renewed industry interest in recent years as companies look to develop the unconventional potential of the Vaca Muerta, and this is starting to bear fruit as pilot projects are converted to full-scale developments. The election of President Mauricio Macri in 2015 on a ticket of pro-market reforms has encouraged private investment, coinciding with this increase in industry activity. By 2017 the country produced just under 600kbpd of oil and almost 18kboepd of gas, of which 75,000boepd was produced from the Vaca Muerta. However, this is not sufficient to meet Argentina's domestic demand and at present around 3.5% of oil consumption and 23% of gas consumption is imported, with gas imported by pipeline from Bolivia and internationally in the form of liquefied natural gas (LNG). Oil production has declined in recent years as production from mature conventional assets has declined; however, gas production has been increasing since 2014 as production from unconventional assets starts to come onstream. The state majority-owned production company YPF is by far the largest E&P sector player in the country (providing around 46% of oil production and 39% of gas production), although there are more than 50 other oil and gas companies, ranging from super majors to small and medium-sized local players.

Exhibit 1: Argentina crude oil production, kbpd



Source: BP Statistical Review 2017

Exhibit 2: Argentina gas production, kboepd



Source: BP Statistical Review 2017

As a mature oil province, Argentina has a well-developed service market and infrastructure network. The country has extensive infrastructure in place including over 3,171km of oil and 17,884km of gas pipelines and eight major refineries. The country also has a developed service industry with key international players with a large presence including Schlumberger, Baker Hughes and Halliburton.

World-class shale potential

Argentina has world-class shale gas and shale oil potential, and in 2013 was ranked by the US Energy Information Administration (EIA) as holding the fourth largest shale oil and second largest shale gas resources in the world. It is the second largest shale region undergoing development in the world after the US.

Exhibit 3: World shale oil and shale gas resource estimates

	Recoverable shale gas resources (tcf)		Recoverable shale oil resources (bnbbbl)
China	1,115	Russia	75
Argentina	802	US	58
Algeria	707	China	32
USA	665	Argentina	27
Canada	573	Libya	26

Source: EIA

The bulk of these unconventional resources sit in the Vaca Muerta in the Neuquén basin and, as a result, this region has seen a ramp up in activity over the last five years. Major players Chevron, Dow, Shell, Total, Pan American Energy, ExxonMobil, Equinor and Schlumberger have all entered into JVs with YPF in the Vaca Muerta since 2013 and production has subsequently increased here from 4,100boepd in 2013 to 75,000boepd in 2017. This increase has predominantly been from the flagship Loma Campana oil field, which is being developed by YPF and Chevron, and from the YPF/Dow El Orejano gas development. Two further projects, the Total-operated Fortin de Piedra and Aguada Pichana Este fields, came onstream in 2017, but the region remains underdeveloped. Meanwhile Wood Mackenzie estimates that production from the Vaca Muerta could peak between 700,000boepd and 1.25mmboepd by 2031.

Despite the dominance of the majors in the Vaca Muerta, opportunities remain in both the unconventional and conventional space for independent companies. In this report, we highlight three London-listed independent E&P companies that are active in the country, and which operate in different basins and/or play types. Phoenix Global Resources and President Energy both focus on assets in the Neuquén Basin, but Phoenix is prioritising its unconventional acreage in the Vaca Muerta, while President is looking to grow production from its conventional oil and gas fields in the basin. Echo Energy is concentrating on conventional gas assets in the Austral basin in the far south of the country.

Macroeconomic environment: Business-friendly Macri administration

The oil and gas industry in Argentina has historically experienced a series of political and economic cycles, from periods of investor-friendly policies to phases of government controls and market and price restrictions, with the most recent low point for the oil industry in 2012 when the Fernandez administration expropriated 51% of YPF from Spanish company Repsol. However, the election of President Mauricio Macri in 2015 has heralded a return to a business-friendly growth agenda and his administration has introduced labour, tax and capital markets reforms to attract investment domestically and from abroad. Despite this, Macri had to seek assistance from the International Monetary Fund (IMF) this year as the peso collapsed amid a selloff in emerging markets. The IMF agreed to step in during June 2018 with a \$50bn loan agreement. Domestic crude oil prices have also been capped by the government in a bid to limit fuel price gains and inflation; however, new Energy Minister Javier Iguacel has indicated that this is expected to be a temporary measure. The country remains the beneficiary of international goodwill and will host the next G20 summit in November 2018. From May 2019 it will also join the MSCI emerging markets index.

Argentina is also a highly decentralised federation in which each hydrocarbon-producing province has its own energy minister and sets separate royalty and tax rates. The country is highly unionised and has had a culture of striking, so companies need to work to maintain good relations. The workforce generally has good skill levels and holds significant industry experience.

Geology: Conventional and unconventional resource plays

Argentina features 18 sedimentary basins. Of these, only the Noroeste, Cuyana, Neuquén, San Jorge and Austral basins are in production, with exploration also concentrated here.

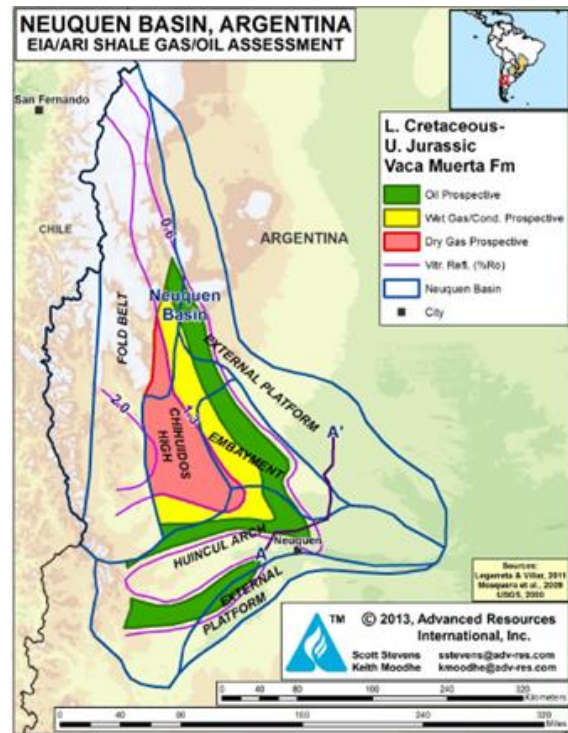
The Neuquén Basin in western Argentina stretches across four provinces (Neuquén, La Pampa, Mendoza and Rio Negro) and offers a variety of attractive hydrocarbon plays in both the Jurassic and Cretaceous sequences. Conventional reserves have been found mainly in relatively small structures along the stable platform area, where good reservoir quality sandstones and carbonates are present. The basin has a broadly triangular shape and two main regions are commonly recognised: the Neuquén Andes to the west and the Neuquén Embayment to the east and south-east. The majority of the basin's hydrocarbon fields are located in the Neuquén Embayment where the strata are relatively undeformed. The bulk of discovered unconventional reserves are also located in the Neuquén Basin, with the Vaca Muerta and Los Molles formations estimated to hold more than half of Argentina's technically recoverable shale reserves.

Exhibit 4: Producing basins in Argentina



Source: Phoenix Global Resources

Exhibit 5: Neuquen Basin



Source: EIA/ARI

The Vaca Muerta formation is estimated to have geological characteristics that compare favourably with unconventional resource plays in the US.

Exhibit 6: Vaca Muerta comparison with US unconventional plays

	Desired	Vaca Muerta	Eagle Ford	Barnett	Haynesville	Marcellus	Wolfcamp
TOC (%)	>2	3-10	3-5	4-5	0.5-4	2-12	3
Thickness (m)	>30	30-450	30-100	60-90	60-90	10-60	200-300
Reservoir pressure (psi)	High	4,500-9,500	4,500-8,500	3,000-4,000	7,000-12,000	2,000-5,500	4,600

Source: YPF

The Loma Campana development has been the centre of technological experimentation and improvement in the Vaca Muerta to date. Following an initial pilot phase of 120 wells, YPF/Chevron achieved scale with vertical wells throughout 2014 and 2015, migrating to horizontal wells from 2016. Throughout 2016, the horizontal section remained around 1500m long with an average of 17 frac stages, but by the second half of 2017, the lateral length had increased to 2500m with around

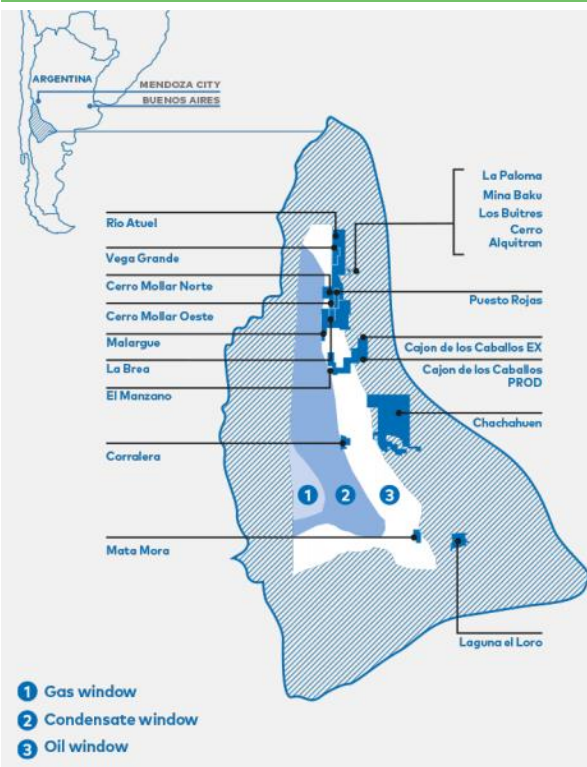
30 frac stages. The first of these wells reached an average oil production of 1070bopd in October 2017. The JV has since drilled a 3200m-long lateral well, with production rates yet to be disclosed.

Phoenix Global Resources: Focus on unconventional

Phoenix Global Resources was created from the combination of Andes Energia and Trefoil in 2017 and is backed by private company Mercuria, which holds 81.45% of the shares. In addition to being listed in London, the company is also listed in Buenos Aires. Phoenix holds 2P reserves of 57.2mmboe across the Neuquén, Austral and Cuyana basins, as independently assessed by Gaffney Cline at the end of 2017. In addition, the company holds 3C resources of 207mmboe and high case prospective resources of 1,588mmboe. The company produced 11,070boepd in 2017, with the majority coming from conventional assets in Neuquén and providing low-risk, high netback production. Phoenix has been active in recent bid rounds in both Neuquén and Mendoza provinces in 2018 and acquired four blocks in Neuquén (S La Tropicilla I, Santo Domingo I, Aguada de Castro I & II) and two blocks in Mendoza (Loma Cortaderal and Cerro Doña Juana).

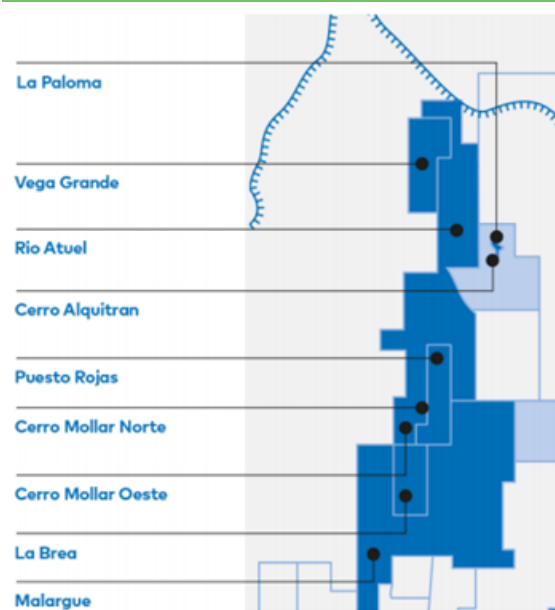
Unconventional production is in the order of a couple of hundred barrels per day, but Phoenix is looking to focus on developing its unconventional assets to unlock value. To support this, the company opened a technical excellence centre in Houston in April 2018 to provide access to the latest knowledge, technology and experience from the US shale industry. Phoenix holds 560,000 net acres in the Vaca Muerta, representing 7.5% of the entire Vaca Muerta acreage. It is carrying out a drilling programme in 2018, designed to accelerate the appraisal and development of the unconventional assets in the Neuquén basin in Puesto Rojas, Mata Mora and Corralera.

Exhibit 7: Map of Phoenix assets



Source: Phoenix Global Resources

Exhibit 8: Puesto Rojas area



Source: Phoenix Global Resources

Puesto Rojas: Testing the northern extent of the Vaca Muerta

Phoenix holds 100% working interest (WI) in the Puesto Rojas licence, which covers 424,000 net acres including La Paloma, Vega Grande, Rio Atuel (66.7% WI), Peusto Rojas, Cerro Mollar Norte, Cerro Mollar Oeste, La Brea, Mallargue (20% WI). The Puesto Rojas area sits in the north of the

Vaca Muerta and north of most of the established unconventional production from the region. An independent assessment by WD Von Gonten assigns total 3C and high prospective resources of 1bnboe to the area. Evidence that the Vaca Muerta formation characteristics extend to the north came from the late 2016/early 2017 CP-1010 conventional vertical well, drilled in Puesto Rojas by previous operator Petrolera del Sur, which produced light oil from the Vaca Muerta at an initial rate of 350bopd following fracking.

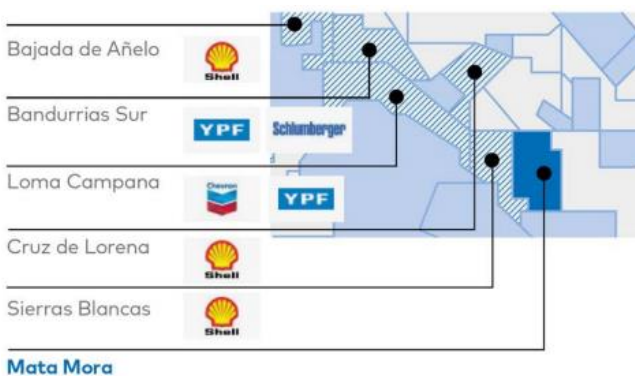
The company drilled nine vertical wells on the concession in 2017, of which five were unconventional. Four were completed and fraced across all six Vaca Muerta production horizons and individually tested to evaluate the performance of the completion technique. Testing of the VM3 horizon was the most successful, and Phoenix believes commercial horizontal wells can be drilled in this horizon. The thicker VM6 horizon, which is the primary producing horizon in CP-1010, experienced emulsion issues and the company is working on this in the lab to investigate how to avoid this in future.

Drilling activity has continued into 2018 with a programme of nine unconventional wells targeting the Vaca Muerta and the shallower tight Agrio formation. Success in the Agrio could open up a new unconventional play on the acreage. These wells, together with the acquisition of 60,000 acres of 3D seismic across the south of Puesto Rojas (and across the La Brea and Rio Atuel concessions), are designed to demonstrate the potential for large-scale development. The well data will help identify the horizons most likely to deliver the most commercial rates and this will feed into the design of the first horizontal well in Puesto Rojas, which is planned in Q418.

Mata Mora and Corralera: Close to Chevron and Shell licences

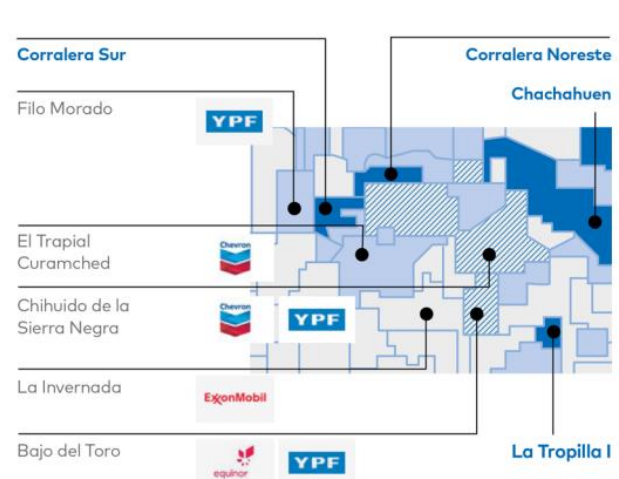
The Mata Mora and Corralera concessions may cover smaller areas than the Puesto Rojas licence (50,000 and 51,000 acres, respectively), but the licences are located close to areas being developed by the majors. In particular, Mata Mora sits in the south of the Vaca Muerta, strategically close to successful licences, including Loma Campana and Shell's Sierras Blancas. Phoenix became the operator and increased its WI in these licences from 27% to 90% in April 2018.

Exhibit 9: Mata Mora



Source: Phoenix Global Resources

Exhibit 10: Corralera



Source: Phoenix Global Resources

Phoenix will drill its first two horizontal wells in Mata Mora in Q318 at a planned total cost of \$35m. The wells will have lateral sections of around 2,000m and are expected to be completed by the end of the year. The frac design will be refined based on data gathered during drilling and, in the case of success, the company will drill a further 12 wells in 2019 and 24 in 2020. Netherlands Sewell & Associates Inc (NSAI) has assigned net 3C plus high prospective resources of 540mboe to Mata Mora.

Corralera is in an area of conventional production and to the west of Phoenix's conventional Chachahuen concession. In June 2018, Chevron announced it will spend \$200m on eight unconventional horizontal wells in El Trapial Curamched, to the south of Phoenix's Corralera Sur. Phoenix is planning to drill two horizontal wells on the Corralera Sur and Noreste blocks in Corralera in 2019/2020.

President Energy: Growing conventional production in Neuquén

President Energy entered Argentina in 2010 when it acquired a 50% WI in the Puesto Guardian field (increasing to 100% in 2014) in the Noroeste Basin in north-west Argentina. The company increased its presence in the country with the acquisition of the conventional Puesto Flores/Estancia Vieja assets from Chevron in late 2017, and these two fields are the focus of activity for President. Puesto Flores and Estancia Vieja are located in the Neuquén Basin and the company is looking to grow its presence here as larger companies sell off their conventional assets to focus on shale development. Current gross production from Argentinian assets is 2,600boepd and the assets hold 2P reserves of almost 27mmboe and prospective resources of over 7.tcf and 194mmbbls. Beyond Argentina the company produces 325boepd from producing assets in Louisiana and holds two exploration licences in Paraguay. The company is looking at listing in Buenos Aires in addition to its London listing.

Exhibit 11: President assets location map



Source: President Energy

Puesto Flores and Estancia Vieja: Target to double production

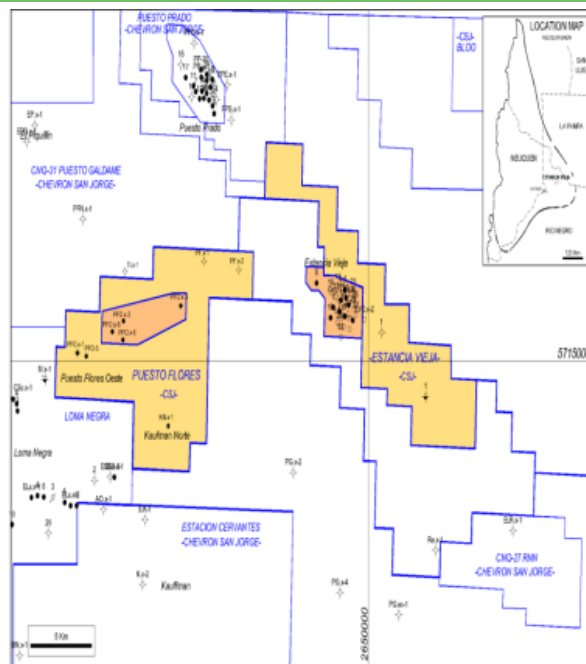
The Puesto Flores/Estancia Vieja concession covers 175km² in the Rio Negro province in the Neuquén Basin. President is operator and holds a 90% WI in the concession, where it is partnered by Empresa de Desarrollo Hidrocarbúrfero Provincial S.A. EDHIPSA, the Rio Negro Provincial energy company. Production is 2100bopd in Puesto Flores, while Estancia Vieja remains shut in currently while the company considers options to monetise. A workover programme carried out from late 2017 demonstrated there are untapped oil bearing intervals in Puesto Flores together with viable gas production from Estancia Vieja (which the company estimates could be up to some

600boepd). The fields have been independently assessed by JR Consultores to hold net 2P reserves of 8mboe as of 31 December 2017, an increase of 66% from the previous figure on the basis of remapping and successful production from horizons not previously produced. As a result, the more valuable Neuquén Basin reserves now account for 30% of President’s Argentinian reserves, up from 15% previously. The company is focusing expenditure on these fields with a fully funded accelerated programme, as the return here is greatest compared to the rest of its portfolio and the company is aiming to double production within three years.

Commencing in November 2017, the company worked over four shut in wells in Puesto Flores and brought them back into production. Three of the workovers demonstrated the presence of oil in previously untested zones, most notably in PFO-50, which tested at 400 bopd from 11m of new net reservoir and doubling the previous production rate from the well. Following on from this success, President is currently carrying out a workover programme of nine wells. Eight of these are on production wells with seven completed to date. The remaining workover, already completed, was to convert a production well to a water injector so that the company can dispose of its own produced water and thereby reduce costs.

In September the company is planning a three-well drilling programme at a cost of around \$3m per well. The programme is expected to include two development wells and one step out appraisal well. The company believes that not all the production from the field can be explained to be coming from four-way closures and so the appraisal well will test the presence of combined stratigraphic and structural traps that might extend beyond the previously defined field boundaries within the concession. Additional production and exploration wells are planned for 2019.

Exhibit 12: Puesto Flores and Estancia Vieja



Source: President Energy

Estancia Vieja: Reactivation as a gas field

The Estancia Vieja field was previously a prolific producer of both oil and gas, at one stage producing over 18,000boepd between 1992 and 1993, but was producing only 63boepd prior to being shut-in in 2011 by the previous operator. President is planning to reactivate the field as a gas field and is carrying out well tests to assess the potential of the field.

In Q118, President tested three wells that demonstrated viable gas production from the field, with gas flow rates from two of the wells of between 1.35mmscfd and 1.85mmscfd.

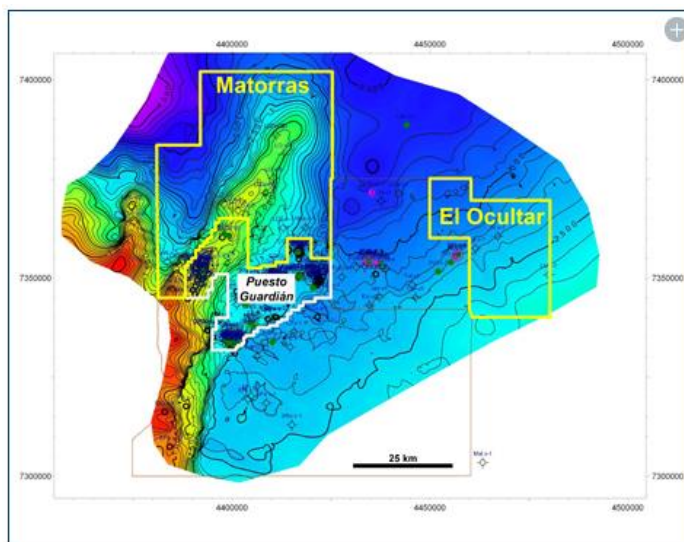
At the end of June 2018, the company commenced long-term gas well testing in Estancia Vieja with a view to assessing the size of the reservoir, the optimal production rate, and to determine the optimal field development. Testing of the first well, EV 8, has demonstrated a stable production rate of c 200boepd, and testing has now moved to EV 19, which the company expects to be capable of producing at c 250boepd. Since there will not enough available LNG capacity to handle the projected increased gas production from the field, the gas will initially be used to power the Estancia Vieja field, providing a saving of approximately US\$30k per month. The current plan is to extend this facility to use the gas to power the whole of the Puesto Flores field and save over US\$120k per month.

Puesto Guardian: Farm out process for exploration potential ongoing

Puesto Guardian is located in the Noroeste Basin in the far north of Argentina, in the Salta Province. President holds 100% WI in the licence, which holds 2P resources of 18.6mboe. Puesto Guardian produces 500bopd from five separate oil fields, which generate free cash flow and cover the cost of the company's head office in Argentina. Realised prices are lower and costs are higher in Puesto Guardian than in Puesto Flores /Estancia Vieja, leading the company to focus on the latter fields for the present. A number of workovers were carried out in 2017 but had mixed results due to integrity issues, so it has become apparent the company will need to drill new wells here to grow production. Drilling is planned on the licence in 2019.

President also holds 100% of the Matorras and Ocular licences in the area surrounding Puesto Guardian. The company launched a farm out process for these two licences and the deeper exploration prospects in Puesto Guardian in early 2018 and has reported that interest to date is encouraging.

Exhibit 13: Map with Matorras and El Ocular licences



Source: President Energy

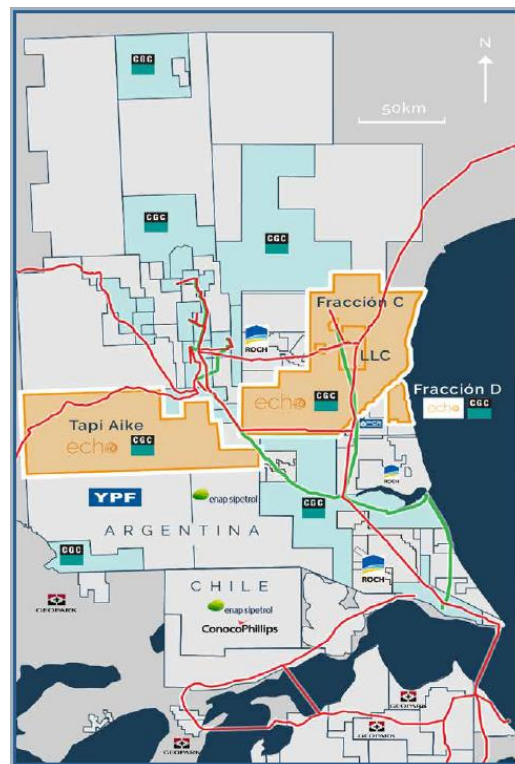
Echo Energy: Gas focused and exploration led

Echo Energy is a Latin American-focused E&P company concentrating on onshore gas assets. The company entered Argentina in November 2017 with a farm-in deal for a 50% WI in four licences covering over 11,153km² in the Austral Basin in the far south of the country. Echo is technical sub

surface operator of the licences, where it is partnered by Compañía General de Combustibles (CGC), a division of larger private Argentinian company Corporación América Internacional. Echo is the first company that CGC has chosen to partner with in Argentina. The company also has an option over exploration assets in Bolivia.

The licences cover a mix of production, near-field appraisal and low-risk exploration in the Fracción C, Fracción D and Laguna de los Capones (LLC) licences (collectively referred to as CDL), with higher-risk, high-impact exploration upside in the Tapi Aike licence. Existing production from Fracción C is 11mmscfd and the CDL area is estimated to hold 2P+2C resources of 39.2bcfe net to Echo. Tapi Aike has been independently assessed by Gaffney Cline (GCA) in 2017 to hold gross prospective resources of 7.7tcf in the mid-case (22.5tcf high case). Echo was primarily attracted by the significant exploration opportunities offered by Tapi Aike, with initial cash flow provided from CDL. A drilling and workover campaign carried out between April and July 2018 across CDL was designed to target low risk gas that can be tied back to existing infrastructure, but it has also indicated there may be additional potential than originally anticipated in the volcanoclastic Tobifera. Testing began on the first exploration well, ELM-1004, in July 2018 with results yet to be announced.

Exhibit 14: Echo assets location map



Source: Echo Energy

Potential for upside in Tobifera

The Austral basin is the youngest of the five producing basins in Argentina and is situated in a highly active tectonic zone. The basin constitutes a thick succession of sedimentary rocks and volcanoclastics deposited on a folded and eroded basement cropping out along the northern foothills of the Fueguian Andes. The main productive levels are layers of the Lower Cretaceous Springhill formation and the Jurassic Tobifera. Production has historically been dominated by the Springhill, with the Tobifera not as developed to date, but now emerging as a new play in the basin. The volcanoclastic nature of the Tobifera makes it more difficult to interpret using standard logging tools and interpretation techniques, which has come to the fore for Echo with the interpretation of a

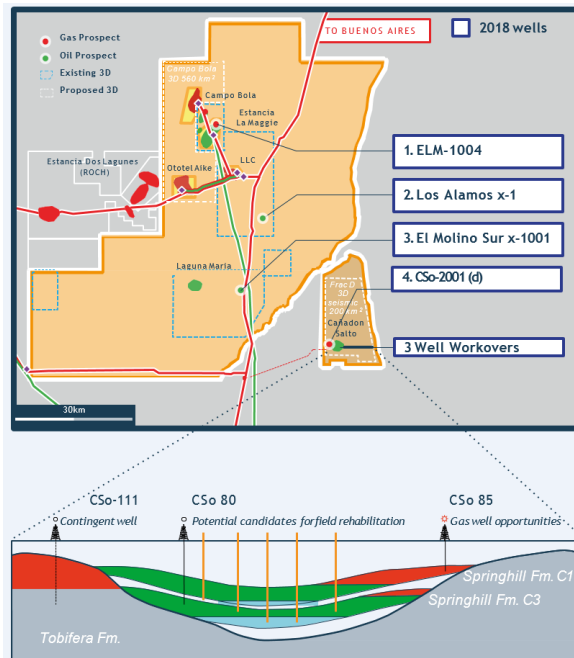
Tobifera interval in the 2018 EMS-1001 well that could be up to 500m thick. The company has had the suite of logs from the well analysed by several experts, but its understanding of the Tobifera is still developing, and the interpretation of the results will only be confirmed through testing of the well. If the test confirms the log interpretation of the Tobifera, this could open up extensive further potential through a re-evaluation of the reservoir across the licences.

Fracción C, D and LLC: Successful 2018 activity ongoing

In April 2018, Echo began a programme of three workovers in Fracción D and four exploration wells across Fracción C, Fracción D and LLC. The programme was designed to prove up several oil and gas plays and to determine commercial viability across the licences. The third well in the programme, EMS-1001, has encountered a potentially significant interval in the Tobifera.

The Fracción D workovers were designed to abandon previously oil producing intervals in the Cañadon Salto oil field and recomplete across the shallower Springhill gas zones. Cañadon Salto had produced 9mmbbls between 1985 and 2012, but gas had also been encountered in the gas cap on the east flank of the field. The first workover, on CSo-85 in the east of the licence, resulted in a maximum flow rate of 2.5mmscfd from the Springhill C1, and a connected volume of c 4bcf was estimated based on a three-week flow and three-week build up test programme. In light of this success and to secure the 7-10bscf needed for commerciality, the final well in the exploration programme was changed to target a large structure in the west of the field in the Tobifera. The western edge of the field is 25km from the existing pipeline and the company estimates it will cost \$2-3m to tie into the pipeline initially. The CSo-80 workover targeted gas in the Springhill C1 but produced oil, indicating the redistribution of fluid phases in the central part of the field, and the well has been suspended until it can be tied into the existing Fracción D facilities. The company has identified five or six further workover candidates that could provide additional oil revenue.

Exhibit 15: Fracción C, Fracción D and LLC



Source: Echo Energy

Drilling of the four exploration wells began in May 2018 with Estancia La Maggie (ELM-1004), around 4km to the north-east of existing gas collection facilities. The well was spudded on 8 May and targeted gross Pmean recoverable resources of 23bcf on the crest of a structure in the Tobifera. The well encountered 40m of high gas shows and an initial estimation of 14.5m net pay based on wireline and mud log data.

The second exploration well, Los Alamos x-1 (ELA-1), was spudded in the south-eastern section of the LLC licence. Targeting a structural four-way closure at the Springhill and Tobifera, the well was drilled down dip and on the flank of the structure in order to optimise on the Springhill and Tobifera reservoirs. The well encountered high-quality reservoir; however, it is water bearing at this location so the company will consider a potential future sidetrack updip. In the deeper Tobifera, the well found some oil staining and high gas shows across a 40m interval. The reservoir is interpreted as a series of thinly bedded oil intervals over a net pay of around 8m and these may be tested as part of the current programme.

This was followed by the EMS-1001 (El Molino Sur) well in the south of Fracción C targeting gross P50 recoverable resources of 11.4mmbbl in the primary Springhill target. While gas shows were encountered in the Springhill, it was the secondary Tobifera target that provided a potentially more significant result. Elevated gas levels with the full range of gas shows over 120m indicate intervals of potential net pay, while further additional intervals may flow with stimulation. From pressure data, Echo and CGC believe the fluid is likely to be a light oil. For comparison, the Laguna Maria well, located around 18km from EMS-1001, tested a 4m interval in the Tobifera at 300bopd in 2016. The Tobifera was not evaluated as part of the GCA CPR.

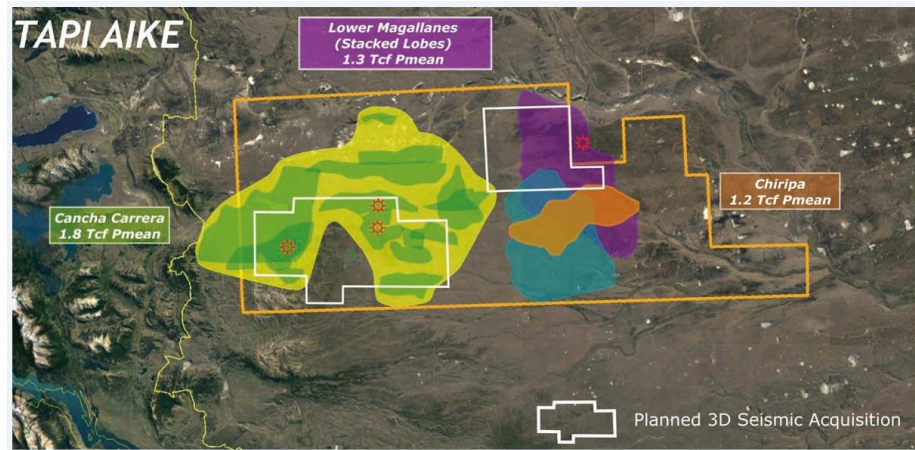
The final well of the drilling campaign, CSo-2001(d), was drilled to prove up additional gas to support a decision for gas development in Fracción D following on from the successful workover of CSo-85. The well targeted the Tobifera in a large structure in the west of the field and encountered 60m of gas shows with an initial interpretation of 30m net pay. The prospect was assigned gross best case contingent resources of 19bcf and 18.8bcf prospective resources in the 2017 GCA CPR. Prior to drilling, the cost to drill the exploration wells was estimated at \$2m each; however, the actual cost has been closer to \$1.5m per well.

A test rig was mobilised in the week starting 16 July and initial testing operations on ELM-1004 have been completed. Dry gas was produced to surface from an 8m interval at the top of the section; however, it proved challenging to completely isolate all of the interpreted gas-bearing zones from a deeper water-bearing zone. The test rig has now moved to test CSo-2001(d) and Echo, together with CGC, is evaluating options to return to ELM-1004 and carry out a hydraulic stimulation to boost well productivity. The remaining test programme is yet to be confirmed, but the most anticipated test, on EMS-1001, is currently planned to be tested last, as the company needs time to properly design the test programme, ie which zones to test, in which order and how to best stimulate. Echo expects it will be unlikely to access the full potential during the initial test. The company has also indicated that it will carry out cased hole logging in the well prior to testing. The total test programme is anticipated to take two months.

Tapi Aike: High-impact exploration expected in 2019

Tapi Aike is one of the largest onshore blocks in Argentina, covering 5,187km², and was obtained by CGC in the last bid round in August 2017. It sits in the foothills of the Andes, close to the Chilean border and benefits from 3,400km of 2D seismic and three existing gas discoveries, providing high-impact exploration potential. Echo/CGC have identified 41 leads in the concession and these have been assessed by GCA to hold gross mid-case GIIP (gas initially in place) of 7.7tcf (22.5tcf high case). A 1200km² 3D survey is scheduled for November 2018, with a view to being drill ready in 2019.

Exhibit 16: Tapi Aike



Source: Echo Energy

Although located to the west of Fracción C, the target formations in Tapi Aike are completely different. In the east of the licence, three different fan bodies have been identified in the Tertiary Rio Turbio and Magallanes lobes and an Upper Cretaceous basin floor fan. One of these, in the Lower Magallanes, extends off the acreage and into the CGC operated Estancia Chiripa block, where CGC believes it drilled the edge of the fan system in a well that flowed gas on test. Echo expects to be able to target two of these fans with one well at a gross dry hole cost of around \$3m (with Echo to pay 65% under the terms of the farm-in). Each fan is expected to target c 1.5tcf.

To the west of the licence, in Cancha Carrera, the leads are Cretaceous sandstones cut by growth faults. Wells drilled here in the 1970s have demonstrated the potential for gas in the area. The TA.x-1 well was drilled in 1974 by YPF and was abandoned due to technical issues, but not before detecting high-pressure gas. A second well 30m away did not reach TD as it had to be abandoned following a pressure blowout. The CC.es-1 well, drilled by YPF in 1973, logged gas in two separate 60m intervals in the Cerro Torro formation, but these did not flow when tested. Wells in the west of the concession are likely to be more expensive due to the potential for higher pressures and as they will have a TD of around 3,500m or deeper (compared to 2,500m in the east of the licence).

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