Our vision

Provide Argentinians with abundant, clean and low cost energy, and transform our country in a World Class Energy Supplier through the massive and responsible development of unconventional resources and through the fast incorporation of renewables, reaching competitive costs for the development of the small and medium-sized enterprises (SMEs), the industries and the transport.
Our six objectives

1. Double natural gas production in 5 years, to achieve 260 MMm$^3$ (9.2 Bcf) per day and to export 100 MMm$^3$ (3.5 Bcf) daily.

2. Double oil production in 5 years, reaching 1 million barrels per day and to export 500 thousand daily.

3. Create 500 thousand new jobs associated with the development of Vaca Muerta.


5. Develop the full potential of renewable energy, reaching by 2025 a 20% share of Argentina’s electricity consumption.

6. Due to this great energy offer reach world class competitive prices to strongly develop SMEs, industries and transport sector.
Where we are heading in energy markets

**Natural Gas**: a unique, transparent and competitive market
- MEGSA: electronic platform for spot transactions and contracts.
- Complete and real time information.
- Business opportunities: liquefaction and storage.

**Power markets**: an efficient and competitive system
- More natural gas availability for power generation at lower prices.
- Low generation costs due to fuel optimization.
- 5,000+ MW of renewable energy.
- Operation efficiency: PPP for power transmission.

**Transport**: more supply options
- Gasoline and Diesel oil.
- vs. LNG, GNC.
- vs. biodiesel, bioethanol.
- vs. electric vehicles.
Argentine energy matrix

Internal energy supply* - 2017

- Natural Gas: 57%
- Oil and derivatives: 30%
- Mineral Coal: 1%
- Nuclear: 2%
- Biomass and biofuel: 4%
- Hydraulic: 2%

Total 83 MMtoe

Power generation matrix - 2017

- Thermal: 65%
- Nuclear: 4%
- Others Renewable: 2%
- Hydraulic >50 MW: 29%

Total 136 TWh

* TIOS: Total Primary Energy Supply + balance of trade
Private investment in the energy sector - 2018 est.

- **Power distribution (data for AMBA)**: 519 MMUSD
- **Renewable generation**: 2,798 MMUSD
- **Thermal power generation**: 576 MMUSD
- **Upstream O&G**: 9,521 MMUSD
- **Transport and distribution of Oil and Gas**: 495 MMUSD
- **Total private investment**: 13,910 MMUSD
Power transmission and distribution

Renewable energy

Thermal power generation

Other O&G

Transport and distribution of natural gas

Nuclear

Public investment in the energy sector - 2018 est.

Power transmission and distribution per capita - USD

- 0.1 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- 2.5 - 3.0
- 3.0 - 3.5

Renewable generation per capita - USD

- 0.0 - 2.0
- 2.0 - 4.0
- 4.0 - 6.0
- 6.0 - 8.0
- 8.0 - 10.0
- 10.0 - 12.0
- 12.0 - 14.0

Thermal power generation per capita - USD

- 0.4 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.8

Total public per capita - USD

- 0.1 - 2.0
- 2.0 - 4.0
- 4.0 - 6.0
- 6.0 - 8.0
- 8.0 - 10.0
- 10.0 - 12.0
- 12.0 - 13.5

Other O&G

Transport and distribution of natural gas

Nuclear

201 MMUSD

265 MMUSD

24 MMUSD

1,152 MMUSD

Public investment in the energy sector - 2018 est.
Sweet spots of Vaca Muerta - Sustainability of the Plateau

**Oil**

Window: 22,000 km²

- 5,4+ MM Acres
- EUR / Well: 631 kbbl/well
- Landing points/area: 2.5/km² (2.5/247 acres)
- MMbbl/Area: 1.6 MMbbl/km² (6.5 kbbl/acre)
- Unconventional Production Plateau 2030: 1,143 kbbl/day
- Reservoir to exploit in 25 years: 10,434 MMbbl
- Exploited Area: 6,614 km² / 1.6 MM acres (30%)

**Gas**

Window: 13,000 km²

- 3,2+ MM acres
- EUR / Well: 12.9 BCF/well
- Landing points/area: 2.5/km² (2.5/247 acres)
- BCF/area: 32.25 BCF/km² (0.13 BCF/acre)
- Unconventional Production Plateau 2030: 14.1 BCF/day
- Reservoir to exploit in 25 years: 128.6 TCF
- Exploited Area: 3,990 km² / 987,643 acres (31%)
Current players in Vaca Muerta (Wood Mackenzie)

- More than 30 big, independent and local companies are active in Vaca Muerta

Acreage in Vaca Muerta per company

Source: Wood Mackenzie
Activity is increasingly driven by new players (IHS – Markit)
## 31 key projects

<table>
<thead>
<tr>
<th>Area</th>
<th>Operator</th>
<th>Black Oil</th>
<th>Light Oil</th>
<th>Wet Gas</th>
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<td>Phoenix</td>
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</table>

Sources: WoodMackenzie, Ministerio de Energía y Recursos Naturales de Neuquén y Ministerio de Energía de la Nación
What would Vaca Muerta look like at full development?

Current Vaca Muerta shale wells: 884 wells

Vaca Muerta shale wells @ Loma Campana’s density:
Approx. 35,000 wells

Vaca Muerta shale wells @ 2.5 landing points/km²:
Approx. 85,000 wells
Conventional and Unconventional Reserves and Resources

Oil Reserves and Resources (Bbbl)
- P1 conv, 2.1
- P2 conv, 0.7
- P3 conv, 0.5
- R conv, 1.0

Unconventional Resources, 27.0

Natural Gas Reserves and Resources (Tcf)
- P1 Conv, 11.9
- P2 Conv, 5.2
- P3 Conv, 4.8
- R Conv, 8.3

Unconventional Resources, 802.0

Source: EIA (USA) and Secretariat of Energy (Argentina)
Vaca Muerta in numbers

One of the best resources in the world

Unconventional Gas Resources

- China
- Argentina
- Algerian
- United States

Unconventional Oil Resources

- Russia
- United States
- China
- Argentina

Source: EIA 2013.

Generated volume
5,000 Bboe

- 2,460 Bboe (98%)
  Trapped in unconventional reservoirs
  How much is technically recoverable? According to DOE: 7% - 169 Bboe

- 40 Bboe (2%)
  Trapped in conventional reservoirs
  Already produced: 8.5
  Recoverable: 9.7
### Vaca Muerta vs. US plays

<table>
<thead>
<tr>
<th>Play</th>
<th>TOC [%]</th>
<th>Thickness [m]</th>
<th>Reservoir pressure [psi]</th>
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<tr>
<td>Vaca Muerta</td>
<td>3—10</td>
<td>30—450</td>
<td>4,500—9,500</td>
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<td>Barnett</td>
<td>4—5</td>
<td>60—90</td>
<td>3,000—4,000</td>
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<td>Haynesville</td>
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<td>60—90</td>
<td>7,000—12,000</td>
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<td>Marcellus</td>
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<td>10—60</td>
<td>2,000—5,500</td>
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<tr>
<td>Eagle Ford</td>
<td>3—5</td>
<td>30—100</td>
<td>4,500—8,500</td>
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<tr>
<td>Wolfcamp (Permian)</td>
<td>3</td>
<td>200—300</td>
<td>4,600</td>
</tr>
</tbody>
</table>

**Acreage**
- **Vaca Muerta**: ~8.65 MM acres, 35,000 km²
- **Eagle Ford**: ~9.4 MM acres, 38,000 km²

**Max Thickness**
- **Vaca Muerta**: ~1,480 feet
- **Eagle Ford**: ~330 feet

Sources: Energy Information Administration (EEUU), 2013 e YPF, 2014
There is plenty of room in Vaca Muerta for new players.
Argentina’s concession terms are competitive against its peer group, even when including the Vaca Muerta cost of entry (Wood Mackenzie).

Notes: *Permian including original entry cost at US$15,000/acre | * Vaca Muerta entry costs based on recent YPF and GyP transactions

Source: Wood Mackenzie
YPF farm-ins have averaged US$8,000/acre, less than half L48 costs of US$20,000-30,000 per acre (Wood Mackenzie)

GyP Neuquen license round entry costs (signature bonus and work commitments) have equated to US$3000/acre.

Neuquen basin ownership

Cost per acre, YPF farm-ins

Source: Wood Mackenzie M&A tool
Shale oil production - Horizontal wells

**Unconventionals represent 12% of oil production**

**Total oil production increased 5.0% between June 17 and June 18**

**Total unconventional**

**Jun 18**
- 48 kbbl/d

**+54%**
- Shale oil horiz jun17-jun18

**Unconventionals represent 12% of oil production**
Shale gas production - Horizontal wells

Unconventional represents 36% of natural gas production.

Total natural gas production increased 8.2% between June 17 and June 18.

Unconventional represents 36% of natural gas production.

Total unconventional production increased 8.2% between June 17 and June 18.

Shale gas production horiz jun17-jun18 increased +162%.

Jun 18 20 MMm³/d
Argentina is one of the four countries in the world which are commercially developing unconventional resources.
Cost decline as performance increases (source YPF)

Shale oil costs - Loma Campana [USD/boe]
- Development cost
- Lifting cost

Shale gas costs - El Orejano [USD/MMBTU]
- Development cost
- Lifting cost

Loma Campana Horizontal well costs [kUSD/lat.ft.]
- Horizontal well cost

Loma Campana horizontal well performance
- Avg. Lateral length [km]
- Avg. Frac stages

Source: YPF and Ministerio de Energía
WTI and Brent vs Medanito

Medanito Export Parity was estimated using Brent -4 USD/bbl (transport) -10% (export tax).
US´ Oil Prices vs Medanito’s export parity price (09/13/2018)

Source: oilprice.com and Secretaría de Gobierno de Energía
## Accumulated production by type of wells (Wood Mackenzie)

<table>
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<tr>
<th></th>
<th>IP30 (boe/d)</th>
<th>EUR (mmboe)</th>
<th>Cum 180 (kboe)</th>
<th>Cum 365 (kboe)</th>
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<tr>
<td></td>
<td>2017</td>
<td>2018</td>
<td>% change</td>
<td>2017</td>
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<tr>
<td>Black Oil</td>
<td>901</td>
<td>531</td>
<td>-41%</td>
<td>0.82</td>
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<tr>
<td>Light Oil</td>
<td>901</td>
<td>945</td>
<td>5%</td>
<td>0.82</td>
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<tr>
<td>Wet Gas</td>
<td>911</td>
<td>1,076</td>
<td>18%</td>
<td>0.83</td>
</tr>
<tr>
<td>Dry Gas</td>
<td>2,440</td>
<td>1,993</td>
<td>-18%</td>
<td>2.37</td>
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</tbody>
</table>

### Charts

- **Black Oil**: 89.9% Oil, 77.4% Oil
- **Light Oil**: 54.7% Oil
- **Wet Gas/Condensate**: 34.0% Oil
- **Dry Gas**: 0% Oil

*Source: Wood Mackenzie*
Economic values of horizontal wells (Wood Mackenzie)

**Black Oil window type well**

NPV15 post-tax, millions

IRR post-tax

---

**Light Oil window type well**

NPV15 post-tax, millions

IRR post-tax

---

**Wet Gas/Condensate window type well**

NPV15 post-tax, millions

IRR post-tax

---

**Dry Gas window type well**

NPV15 post-tax, millions

IRR post-tax

Source: Wood Mackenzie
Liquid break-even prices in Vaca Muerta vs. USA plays

Sources: Wood Mackenzie | **Current estimate own elaboration
Gas break-even prices in Vaca Muerta vs USA plays

Sources: Wood Mackenzie | **Current estimate own elaboration
Oil Production

- **NGLs**
- **Unconventional**
- **P1ND + P2 + P3**
- **P1 Developed**

Double oil production in 5 years

- **1 Bbbl**
- **0.6 Bbbl**
- **3.3 Bbbl**
- **1.5 Bbbl**

Midstream requirements

Current pipeline capacity

- 2008: 648 kbbl/day
- 2010: 560 kbbl/day
- 2012: 650 kbbl/day
- 2014: 750 kbbl/day
- 2016: 870 kbbl/day
- 2018: 1,012 kbbl/day
- 2020: 1,320 kbbl/day
- 2022: 1,500 kbbl/day

Thousand m³/day

- 2008: 200 Thousand m³/day
- 2010: 200 Thousand m³/day
- 2012: 200 Thousand m³/day
- 2014: 200 Thousand m³/day
- 2016: 200 Thousand m³/day
- 2018: 200 Thousand m³/day
- 2020: 200 Thousand m³/day
- 2022: 200 Thousand m³/day
- 2024: 200 Thousand m³/day
- 2026: 200 Thousand m³/day
- 2028: 200 Thousand m³/day
- 2030: 200 Thousand m³/day
Natural Gas Production

Exports (MMm³/d):
Chile: 10 (2019); 30 (2022).
Brasil: 3 (2019); 9 (2022); 30 (2025).
Mundo (GNL): 40 (2023); 80 (2024); 120 (2025).

5,9 Tcf

3,6 Tcf

32 Tcf

5,6 Tcf

Neuquén-Rosario Pipeline 35 Mm³/d

midstream requirements

P1 Developed
Key ongoing projects - Oil

- **Plateau kbbl/dia**

<table>
<thead>
<tr>
<th>Project</th>
<th>Year</th>
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<tbody>
<tr>
<td>Los Atuel (50% YPF)</td>
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<tr>
<td>C. Del Chañar (100% EASA)</td>
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<tr>
<td>Los Malocas (50% YPF)</td>
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<tr>
<td>C. Amarguillo Este (35% PAE - 35% Mediana - 10% GyP)</td>
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<tr>
<td>M. Buena Esperanza (50% YPF - 50% Petronas)</td>
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<td>Ag. Villanueva (100% Petronas)</td>
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<tr>
<td>Narambuenas (50% YPF-50% Shell)</td>
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</table>

**NGLs**, 68

- **San Roque (25% Wintershall - 34% YPF - 16% PAE - 25% Total)**
- **La escalonada (45% Total - 23% Shell - 23 % O&G Developments - 10% GyP Neuquén)**
- **Bandurria Centro (100% PAE)**
- **La Ribera I (100% YPF)**
- **La Ribera II (100% YPF)**
- **Bandurria Norte (90% Wintershall- 10% PyG Neuquén)**
- **Aguada Federal (90% Wintershall- 10% PyG Neuquén)**
- **Bajo del Toro (50% YPF - 50% Statoil)**
- **Bajo del Chiqui - La Invernada (90% Exxon Móbil - 10% GyP Neuquén); 50**
- **Bajada de Palo (100% Vista Oil&Gas); 70**
- **Cruz de Lorena - S. Blancas (50% Shell - 40% O&G Developments - 10% GyP Neuquén); 100**
- **La Amarga Chica (50% YPF-50% Petronas); 65**
- **Bandurria Sur (100% YPF); 65**
- **Loma La lata (100% YPF); 33**
- **Loma Campana (50% YPF-50% Chevron); 90**

- **Conventional; 289**
Key ongoing projects - Natural gas

**Associated Gas:** 55

- Salinas del Huitrin (100% YPF)
- Los Toldos I Sur (100% Exxon Mobil)
- La Escalonada (45% Total - 22.5% Shell - 22.5% P&G Developments - 10% GyP Neuquén)
- Estación Fernández Oro (100% YPF)
- Bajo del Chiqui - La Invernada (90% Exxon Mobil - 10% GyP Neuquén)
- La Ribera I (100% YPF)
- Pampa de las Yeguas I (50% Exxon Mobil - 50% YPF)
- Rincón la Canza (45% Total - 22.5% Shell - 22.5% P&G Developments - 10% GyP Neuquén)
- Cerro Arena (50% YPF - 50%)

- Aguada de la Arena (100% YPF); 15
- La Calera (50% Pluspetrol - 50% YPF); 8
- Las Tacanas (50% YPF - 50% Pluspetrol); 9
- Cerro las Minas (50% YPF - 50% Total); 13
- Ag. Pichana Oeste (45% PAE - 30% YPF - 25% Total)
- Ag. de Castro (50% YPF - 50% Total); 14
- Ag. Pichana Este (40% Total - 22.5% Wintershall - 22.5% YPF - 15% PAE); 29
- Fortín de Piedra (100% Tecpetrol); 20

**Conventional:** 45
Production Wells and associated investments

Completed wells

Investments - BUSD
Equipment requirements to develop resources

**Drilling rigs**

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<th>Number of rigs</th>
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**Completion sets**

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<td>2021</td>
<td>21</td>
</tr>
<tr>
<td>2022</td>
<td>25</td>
</tr>
<tr>
<td>2023</td>
<td>33</td>
</tr>
<tr>
<td>2024</td>
<td>39</td>
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<tr>
<td>2025</td>
<td>40</td>
</tr>
<tr>
<td>2026</td>
<td>38</td>
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<tr>
<td>2027</td>
<td>35</td>
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<tr>
<td>2028</td>
<td>34</td>
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<tr>
<td>2029</td>
<td>33</td>
</tr>
<tr>
<td>2030</td>
<td>33</td>
</tr>
</tbody>
</table>
**New employment estimation**

Direct, indirect and induced Jobs at the oil and gas in Argentina

Bottom up estimation:

- Overall Jobs 2017 (direct, indirect, induced): 454 thousand jobs
- 500 direct Jobs per rig, 600 Jobs per LNG Train and 20% refinement increase
- Indirect jobs: 3.25 per each direct job in the extraction sector of oil and gas and 9.66 per each job in midstream and downstream (IOT 1997).
- Induced Jobs: +40% (1.7 upstream / 3.9 downstream) per each direct job in Oil and Gas (source: MINEM + MINPROD).
On track to recover the energy trade surplus

**Physical Oil international exchange**

- **Imports**
- **Exports**
- **Balance**

**Physical Natural Gas international exchange**

- **Bolivia Imports**
- **LNG Imports**
- **Exports**
- **Balance**

![Graph showing physical oil and natural gas international exchange](image-url)
On track to recover the energy trade surplus

Trade Balance of Oil

- 50 USD/BBL
- 75 USD/BBL
- 100 USD/BBL

Trade Balance of Natural Gas

- LNG: 6 USD/MMBTU
- Bol: 5 USD/MMBTU
- LNG: 8 USD/MMBTU
- Bol: 7 USD/MMBTU
- LNG: 10 USD/MMBTU
O&G’s net exports can surpass current agribusiness exports

Trade Balance of O&G

BUSD

22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6

Low Med Hight

Soybean Complex
Corn
Wheat
Meat, milk, leather
Other

Natural Gas
Crude Oil

Agri 2017
O&G Potential 2023
O&G Potential 2027
O&G’s net exports can surpass current agribusiness exports

Trade Balance of O&G

- Low
- Med
- High

BUSD

- Soybean Complex
- Corn
- Wheat
- Meat, milk, leather
- Other
- Natural Gas
- Crude Oil

Agri 2017
O&G Potential 2023
O&G Potential 2027
Norpatagonico Train — PPP project to be bidded soon

Estimated investments: 1,285 M USD

- 850 km recovery
- Capacity > 6 Mt
- 48 months of construction

Standard of the Railway:
- 25 tons/ railway’s axis upgraded
- Maximum speed of 70 km/h
- Crossings’ Deviation for 100 wagons

- 200 km recovery: 582 M USD
- 250 km new railway: 391 km upgraded
- 330 M USD for 193 km
- 330 M USD for 176 km
- 200 km recovery: 582 M USD
Patagonia LNG: Energy for the world

**UPSTREAM**

25 year project to develop:

50 TCF

approximately 3,900 gas wells

(production: 5.5 BCF/day = 2 TCF year)

38 TCF (77%) export

(production: 4.2 BCF/day)

12 TCF (23%) local market

(production: 1.3 BCF/day)

1,550 km² => 12% acreage Vaca Muerta (gas window)

**MIDSTREAM**

Gas pipeline

4.2 BCF per day

**DOWNSTREAM**

LNG Patagonia 6 trains

(0.7 BCF/day each)

2023 = 1.4 BCF/day
2024 = 2.8 BCF/day
2025 = 4.2 BCF/day

Estimated ranking:

Installed liquefaction capacity in 2026

<table>
<thead>
<tr>
<th>#</th>
<th>Country</th>
<th>BCF/day</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>27.3</td>
<td>32%</td>
</tr>
<tr>
<td>2</td>
<td>Qatar</td>
<td>13.3</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>Australia</td>
<td>10.8</td>
<td>13%</td>
</tr>
<tr>
<td>4</td>
<td>Russia</td>
<td>5.4</td>
<td>6%</td>
</tr>
<tr>
<td>5</td>
<td>Argentina</td>
<td>4.2</td>
<td>5%</td>
</tr>
</tbody>
</table>

Installed liquefaction capacity in 2026
We have the capabilities
We have the knowledge
We have the technology
We took the decision
and we have the people
to develop Vaca Muerta
Gas Transport pipelines

Investments in Gas Transport

The investments of TGS and Neuquén-Rosario Pipeline correspond to private investments. GNEA, Regional-Centro II Pipeline, De la Costa Pipeline and Cordillero Pipeline are carried out by public works regime.

Note: Tariff Review values expressed in dollars using 16 ARS/USD exchange rate.

TGN y TGS: Infrastructure developed by Tariff Review corresponds to maintenance and improvement of gas pipelines and compressor plants. TGS: includes 125 km gas pipeline.
Oil Transport pipelines

Investments in Oil Pipelines

The main investments correspond to the expansion of the transport capacity of the oil pipelines operated by Oldelval (private investment).

According to the demand forecast, an additional investment of 50MMUSD is estimated in 2026 for the construction of a new section Lago Pellegrini-Medanito.

- **Allen – Puerto Rosales pipeline expansion.** 60MM USD.
  - Current capacity: 157 MMbbl/day
  - Expanded capacity: 220 MMbbl/day

- **Lago Pellegrini – Allen pipeline expansion.** 40km. 30MM USD.
  - Current capacity: 145 MMbbl/day
  - Expanded capacity: 289 MMbbl/day

- **Lago Pellegrini – Medanito pipeline expansion.** 120km. 50MM USD.

- **Allen – Puerto Rosales pipeline expansion.** Aprox. 200MM USD.
  - 2021 Capacity: 220 MMbbl/day
  - Target capacity: 415 MMbbl/day
Argentina Offshore Round 1

Austral / West Malvinas and Northern portion of the Argentina Basin

General goal of the Round:
Increase awareness of Argentine Offshore through real investments in Exploration, carried out by companies with the technical and financial capacity to fulfill the objectives of the Round.

Status:
- Nomination Process ended the 7th of June
  12 companies Nominated blocks.

Blocks to be included in Round 1 are the following:
- Malvinas Basin: 18 Deepwater blocks from (WD 100 to 700 m) from 3,600 to 6,300 Km² (Discarded 10 blocks from Nomination process).
- Austral Basin: 6 Shallow water blocks (WD < 100 m) from 2,000 to 2,700 Km²
- Argentina Basin: 7 Deepwater blocks (WD 200 to 1,300 m) from 6,000 to 9,000 Km² & 7 UltraDeepwater blocks (WD 1,200 m to 4,000 m) from 3,000 to 9,000 km².
Bidding Terms

Bids: On committed Working Units for the 1st Exploration Period. Each block will have (i) Minimum Working Units (equivalent to a 4 x 4 or 3 x 3 km of 2D in 100% of the Block) and (ii) Basic Working Units (equivalent to 20% to 40% of 3D of the surface of the block).

Formula to be used:

\[ \text{Bid (usd)} = \text{WU} \times 5000 \text{ (usd/WU)} + \text{Bonus}^* \text{ (usd)} \]

\( \text{WU} \): Working Units offered for 1st Exploration Period. Must be higher than or equal to Minimum Working Units

*Bonus is accepted only if \( \text{WU} > \text{Basic WU} \); to be paid 50% upfront + 50% end of 3rd year exchangeable for WU done in the first 3 years in addition to Offered WUs

Working units in excess of the amount committed in one period may be carried forward to the following period in line with Art. 20 of the Law.

Committed Working Units not fulfilled in one given period shall be paid in cash or Energy Secretariat will execute the guarantee.

Contract Terms

Long Duration Exploration Permit: Three periods of 4 + 4 + 5 years for all blocks except – Shallow waters: 4 + 3 + 4. Relinquishment of 50% at the end of 2nd Period. Obligation to drill one well in 2nd Period and on Extension Period

- Enough time for Production Concession: 30 years + 10 of extension (successive extensions possible)
- Ability to keep Non Commercial Discoveries: Possibility to keep discoveries for 5 + 5 years after Exploration Permit if discovery appraised and non commercial
- Reduced Royalties linked to success: Starting in 5 % to 12% based according to:

\[ R \text{ factor} = (\Sigma \text{Sales}-\Sigma \text{Royalties})/(\Sigma \text{E&A}+\Sigma \text{Investments}+\Sigma \text{OPEX}) \]
Round to be launched October 2018. Offers to be submitted by the end of February 2019.

Roadshows to be held in Buenos Aires, Houston and Europe (London or Paris) planned for October.

Those interested in receiving information about the Round (e.g. new Data in the Database, dates of workshops, new legal instruments, any other news about the Round) please send an email to rgarciaberro@minem.gob.ar
Projects in progress

- 500 kV Interconnection in Bahía Blanca - Mar del Plata and connection in 132 kV to Villa Gesell, North Section
- 500 kV Interconnection in Bahía Blanca - Mar del Plata and connection in 132 kV to Villa Gesell, South Section
- 500 kV Interconnection ET La Rioja Sur 500/132 kV and Supplementary Project II
- Electrical Interconnection ET Rincón Santa María - ET Resistencia - Line II

PPP Investments - 2019 onwards

- 500 kV Interconnection ET Río Diamante - ET Coronel Charlone and Supplementary Project in 132kV
- 500 kV Transmission Line ET New San Juan - ET Rodeo - Iglesias
- 500 kV Interconnection ET Atucha II - ET Nueva Belgrano - ET Oscar Smith
- 500 kV Interconnection ET Coronel Charlone - ET Plomer - ET Ezeiza
- 500 kV Interconnection ET Plomer - ET Vivoratá, ET Plomer - ET Atucha II, ET Plomer - ET Manuel Belgrano
- 500 kV Interconnection ET New San Juan - ET Rodeo - ET La Rioja
- 500 kV Interconnection ET Choel Choel - ET Puerto Madryn (2nd line)
- Transmission Substation 500/132 kV - 450 MVA Comodoro Rivadavia

300 MMUSD

Now being bided

2,300 MMUSD
Results of the RenovAr program

Diversity of technologies and federal distribution

- **WIND**
  - 34 projects
  - 2,466 MW
  - 9,778 GWh/year

- **SOLAR PV**
  - 41 projects
  - 1,732 MW
  - 4,290 GWh/year

- **BIOGAS AND BIOMASD**
  - 58 projects
  - 236 MW
  - 1,665 GWh/year

- **MINI HYDRO**
  - 14 projects
  - 32 MW
  - 103 GWh/year

- **Awarded projects**
  - 147

- **Power**
  - 4,466.5 MW

- **Energy**
  - 15,835 GWh
Results of the RenovAr program

Decreasing prices in each competitive bidding.

Weighted average price: 54.72 USD/MWh
Thank you.
Appendix
Anadarko’s Delaware Wolfcamp Northeast Extension position used as base asset to benchmark across regions (Wood Mackenzie)

- Anadarko holds approximately 240,000 net acres in the Delaware Wolfcamp NE Extension.
- Remaining PV post-tax of this acreage is US$ 4286 million.
- 2017 and 2018 M&A deals in the same sub-play closed between US$ 25,000 and 40,000 per acre.
- Assuming US$25,000/acre for a potential new entry in 2019, the cost of acquiring this position would be US$ 6,000 million.
- A US$15,000/acre price, reflective of earlier entries, equals to a US$ 3,600 million acquisition cost (used in the benchmarking exercise).

2017/2018 M&A transaction prices in Wolfcamp A NE Extension
Fiscal regime and product pricing assumptions (Wood Mackenzie)

Argentina fiscal terms and oil pricing assumptions

Royalty: 12%
Sales Tax: 2%
Income Tax
2018 35%
2019 30%
2020 25%

Oil price
Brent - 10% export retention (assumes ARS4/USD exported)

Anadarko Delaware Wolfcamp Northeast Extension asset assumptions

Lease Information

<table>
<thead>
<tr>
<th>Basin</th>
<th>Gross Acres ('000 acres)</th>
<th>Net Acres ('000 acres)</th>
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</thead>
<tbody>
<tr>
<td>Delaware</td>
<td>590</td>
<td>240</td>
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</table>

Type Well Assumptions

<table>
<thead>
<tr>
<th>EUR</th>
<th>Initial Production Gas (mmcfd)</th>
<th>Initial Production Oil (b/d)</th>
<th>Initial Production NGLs (b/d)</th>
<th>Royalty Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>1.54</td>
<td>770</td>
<td>173</td>
<td>18.00</td>
</tr>
</tbody>
</table>

Remaining Recoverable Reserves (at 01/01/2018)

<table>
<thead>
<tr>
<th>Proved Developed</th>
<th></th>
<th>Proved + Probable (2P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquids (mmbbl)</td>
<td>Gas (bcf)</td>
<td>Total (mmboe)</td>
</tr>
<tr>
<td>36.50</td>
<td>75.56</td>
<td>49.80</td>
</tr>
</tbody>
</table>

Net Development Drilling in the play

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>25</td>
<td>33</td>
<td>16</td>
<td>80</td>
<td>77</td>
<td>46</td>
<td>46</td>
<td>62</td>
<td>46</td>
<td>31</td>
</tr>
</tbody>
</table>

Applicable Tax Rates by State

<table>
<thead>
<tr>
<th>State</th>
<th>Oil Severance (%)</th>
<th>Oil Ad Valorem (%)</th>
<th>Oil Income (%)</th>
<th>Gas Severance (%)</th>
<th>Gas Ad Valorem (%)</th>
<th>Gas Income (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Mexico</td>
<td>8.24%</td>
<td>2.50%</td>
<td>7.60%</td>
<td>9.09%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Texas</td>
<td>4.60%</td>
<td>4.00%</td>
<td>n/a</td>
<td>7.50%</td>
<td>7.60%</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Oil Transport System Expansion (OldeVal)

Current situation

- The exponential growth of non-conventional Oil production in Argentina motivates the study of the transportation system to identify possible bottlenecks and guarantee an adequate infrastructure planning.
- Demand forecast for the period 2019-2023 shows the need to carry out expansion works on the oil transport system.

Oil Transport System Expansion (OldeVal)

Works needed to supply demand forecast (2019-26)

Next Steps

OldeVal Proposition

- New Contract Carrier regulation to enable firm offer transport contracts.
- Time extension of Oldeval concession to match investment amortization period.

Expected Results

- Financial viability of oil pipeline expansions.
- More flexibility for producers to match transport contracts with upstream projects.
**Main assumptions about profiles**

<table>
<thead>
<tr>
<th></th>
<th>Natural Gas</th>
<th>Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conventional assumptions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUR (y15)</td>
<td>1.5 BCF</td>
<td>180 kbbl</td>
</tr>
<tr>
<td>Declination</td>
<td>-15%</td>
<td>-9%</td>
</tr>
<tr>
<td>Risked P1ND/P2/P3</td>
<td>100% / 50% / 10%</td>
<td>100% / 50% / 10%</td>
</tr>
<tr>
<td>Incorporation of reserves in the first year</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Incremental incorporation reserves</td>
<td>+0.3% per year</td>
<td>+0.3% per year</td>
</tr>
<tr>
<td>Production in the first year of the reserves incorporated</td>
<td>16.4%</td>
<td>11.9%</td>
</tr>
<tr>
<td>Capex</td>
<td>2.5 MM USD</td>
<td>2.5 MM USD</td>
</tr>
<tr>
<td>Total reserves incorporated</td>
<td>6 TCF</td>
<td>25 MM BBL</td>
</tr>
<tr>
<td><strong>Unconventional assumptions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUR (y30)</td>
<td>12.9 BCF</td>
<td>631 kbbl</td>
</tr>
<tr>
<td>EUR total (y30)</td>
<td>2388 kboe</td>
<td>820 kboe</td>
</tr>
<tr>
<td>Condensed</td>
<td>1 m³ oil per 28,000 m³ gas</td>
<td>-</td>
</tr>
<tr>
<td>GOR</td>
<td>-</td>
<td>300 m³ gas per m³ oil</td>
</tr>
<tr>
<td>Capex</td>
<td>12.2 MM USD + 15% facilities</td>
<td>10.2 MM USD+ 15% facilities</td>
</tr>
<tr>
<td>Opex</td>
<td>5.9 USD/BOE (1 USD/MMBTU)</td>
<td>7 USD/BOE</td>
</tr>
<tr>
<td>Fractures</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Total reserves incorporated</td>
<td>55 TCF</td>
<td>5.5 Bbbl</td>
</tr>
<tr>
<td>EIA 2013</td>
<td>7%</td>
<td>21%</td>
</tr>
<tr>
<td>Breakeven</td>
<td>4 USD/MMBTU</td>
<td>46.7 USD/BBL</td>
</tr>
</tbody>
</table>

**Overall unconventional oil production profile.**

**Overall unconventional gas production profile.**
Main assumptions about Natural Gas production

Conventional production:

- P1D (72%): declination -15%
- P1ND (100%) + P2 (100%) + P3 (50%):
  - Total incorporated reserves: 172 Billion m³ (6 TCF).
  - Incorporation of reserves in the first year: +5%
  - Incremental incorporation reserves: +0.3%
  - The production in the first year is 16.4% of the incorporated reserves, then decline equal to developed reserves (-15%).
  - Accumulated production per well: 42 Million m³ (1.5 BCF)
  - Cost per well: 2 MM USD

Overall unconventional production profile

- EUR₃₀ = 366 Million m³ gas (12.9 BCF).
- Total EUR = 2,388 kboe
- Capex = 12.2 MM USD + 15% of facilities.
- Opex = 5.9 USD/boe (1 USD/MMBTU)
- IP 30: 0.33 MM m³/d gas
- Condensed: 1 m³ de oil per 28,000 m³ of gas
- Horizontal well with 33 fracture stages, 250 tons of sand per fracture
- 40 perforation`s days

Break-even: 4 USD/MMBTU
Main assumptions about Oil production

Conventional Production:
- P1D (72%): declines @ 9%
- P1ND (100%) + P2 (50%) + P3 (10%):
  Total incorporated reserves: 157 Million m³ (25 MM bbl).
  - Incorporation of reserves in the first year: +5%
  - Annual incremental incorporation reserves: +0.3%
  - The production in the first year is 12% of the incorporated reserves, then decline equal to developed reserves (-9%).
  - Accumulated production per well: 28.6 mil m³ (180 kbbl)
  - Cost per well: 2 MM USD.

Overall unconventional production profile
- EUR_{y30} = 100.3 mil m³ oil (631 kbbl).
- EUR Total = 820 kboe.
- Capex = 10.2 MM USD + 15% de facilities.
- Opex = 7 USD/boe
- IP 30: 92 m³/d oil (579 bbl/dday)
- GOR = 300 m³ gas/m³ oil
- Horizontal well with 33 fracture stages, 250 tons of sand per fracture
- 40 perforation´s days

Break-even: 46.7 USD/BBL
• Energy represents 52.5% of total emissions in 2014 (368 MMtCO2e - National emissions inventory).

• In the Paris Agreement, Argentina has an aggregate commitment to limit its emissions to 483 MMtCO2e unconditionally, and 369MMtCO2e in the conditional target to the application of certain policies

• Our estimations would lead the energy sector to 56% in the case of fulfilling the unconditional commitment and 73% of the conditional commitment.

Notes: Estimation methodology using the IPCC 2006 methodology with the emission factors of the BUR of the Argentine Republic to the UNFCCC.
Assumptions for vehicle fleet

Trucks assumptions:
- 20% replacement in LNG trucks by 2030
- Annual gasoil consumption per truck: 10.2 m$^3$
- Annual LNG consumption per truck: 8 tn
- Fleet growth in trucks fleet: 2% (a.a.)
- Effective cutting biodiesel 2030: 16%

AMBA buses assumptions:
- 80% of buses from AMBA to CNG in 2030
- Annual gasoil consumption per bus: 33 m$^3$
- Annual CNG consumption per bus: 34 thousand m$^3$
- Fleet growth in buses fleet: 2% (a.a.)
- Initial fleet 2017 (MINTRAN): 20 thousand.
- Effective biodiesel cutting: 20%

Cars assumptions:
- 20% replacement to CNG in the fleet in 2030.
- Annual gasoline consumption per car: 1.53 m$^3$
- Annual GNC consumption per car: 1.38 thousand m$^3$
- Fleet growth in vehicle fleet: 3.8% (a.a.)
- Initial fleet 2017 (ADEFA): 9.4 million
- Effective cut bioethanol: 22%

In 2030, the demand for additional CNG amounts to 20 MMm$^3$/day, given the reconversion of private vehicles, SUVs, trucks, and buses to CNG / LNG.

Due to the substitution of liquid fossil fuels, it is possible to save 0.85 million tCO$_2$e of GHG in 2025 and 0.57 million in the year 2030.

Notes: 1) Includes private cars, taxis or similar and SUVs..

---

![Graph showing share of biofuel vs kg CO2 per million kcal](image-url)
Natural gas liquefaction plant analysis

- Gradual incorporation: 40 MMm$^3$/d in 2023, 80 MMm$^3$/d in 2024 and 120 MMm$^3$/d in 2025.
- The cost of liquefaction ranges between USD 2.5 / MMBTU and USD 3.6 / MMBTU, depending on the price of gas in PIST (for each USD that increases local gas, the cost of liquefaction increases 0.1 USD).

Gas price at the wellhead that makes the project viable

**Plant assumptions:**
- Capacity per train: 5 MMtpa (20 MMm$^3$/d)
- Number of trains: 6
- Total capacity: 30 MMtpa (120 MMm$^3$/d)
- CAPEX: 600 USD/tpa installed
- Total investment: 18 mil MMUSD
- Discount rate: 9% in USD
- Amortization period and useful life: 25 years
- Natural gas own consumption: 9%
- OPEX: 0.65 USD / MMBTU

**Transportation assumptions:**
- Local Transportation – new gas pipeline: 0.75 USD/MMBTU
- GNL shipping:
  - USA – Argentina: 1.0 USD/MMBTU
  - USA – Asia: 1.8 USD/MMBTU
  - Argentina – Asia: 1.6 USD/MMBTU
New Electric Power Generation

Nominal power incorporated per year [MW]

Investment dates are based on project commissions.

5 BUSD
Estimated value 2017 – 2018

46 BUSD
Estimated value 2019 – 2030

Investment 2017 – 2018 (MMUSD)
Investments (RTI) in Gas Distribution

Investment includes in system expansion and maintenance

RTI values expressed in dollars using 16 ARS/USD exchange rate

Secretaría de Gobierno de Energía
Secretaría de Planeamiento Energético

Gas Distribution

GAS CUYANA S.A.
GAS DEL CENTRO S.A.
GAS NATURAL BAN S.A.
GASNOR S.A.
GAS DEL NORTE
GASNEA S.A.
CAMUZZI GAS PAMEPANA S.A.
CAMUZZI GAS DEL SUR S.A.
METROGAS S.A.
Investments in Power Transport

Amounts in ARS at May 2018 using 23 ARS/USD exchange rate.

- **TRANSNEA**
  - 1867 km
  - 1350 MVA
  - 22 Substations

- **TRANSNOA**
  - 4992 km
  - 3413 MVA
  - 80 Substations

- **DISTROCUYO**
  - 1259 km
  - 1595 MVA
  - 11 Substations

- **TRANSCOMAHUE**
  - EPEN
  - 765 km; 340 MVA; 11 Substation

- **TRANSBA**
  - 6228 km
  - 3865 MVA
  - 85 Substations

- **TRANSSTA**
  - 2312 km
  - 1702 MVA
  - 21 Substations

- **TRANSER**
  - 7645 km
  - 15300 MVA
  - 37 Substations
Electric Power Distribution

Investments in Electrical Distribution
(Buenos Aires Metropolitan Area)

Amounts in ARS at May 2018 using 23 ARS/USD exchange rate

Only EDENOR and EDESUR expansion and maintenance are considered
EDENOR Investment Plan: Expected results
Requirements in High, Medium and Low Voltage networks

**TRANSMISSION SUBSTATIONS**

- N° SSEE > 100% capacity
- N° SSEE between 70% and 100% capacity

**SUBSTATION FEEDERS**

- N° feeders with demand restriction
- N° feeders with warning alarms

**DISTRIBUTION SUBSTATIONS**

- CCTT since 160 kVA with FC > 1,10

**EDENOR MAXIMUM DEMAND FORECAST**

- MW
**Entrance of main generation projects**

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Description</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>Repotenciación de Embalse</td>
<td>35 MW</td>
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<tr>
<td>2019</td>
<td>Res. 287</td>
<td>864 MW</td>
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<tr>
<td>2020</td>
<td>Res. 287</td>
<td>996 MW</td>
</tr>
<tr>
<td></td>
<td>Río Turbio</td>
<td>240 MW</td>
</tr>
<tr>
<td></td>
<td>CC Brigadier López</td>
<td>140 MW</td>
</tr>
<tr>
<td></td>
<td>CC Ensenada de Barragán</td>
<td>280 MW</td>
</tr>
<tr>
<td>2021</td>
<td>70 MW</td>
<td>El Tambolar</td>
</tr>
<tr>
<td></td>
<td>270 MW</td>
<td>Aña Cuá</td>
</tr>
<tr>
<td></td>
<td>27 MW</td>
<td>Carem 25</td>
</tr>
<tr>
<td>2022</td>
<td>465 MW</td>
<td>Incremento de potencia Yacyretá</td>
</tr>
<tr>
<td>2023</td>
<td>950 MW</td>
<td>Cóndor Cliff</td>
</tr>
<tr>
<td>2024</td>
<td>360 MW</td>
<td>La Barrancosa</td>
</tr>
<tr>
<td>2025</td>
<td>637 MW</td>
<td>Chihuido I</td>
</tr>
<tr>
<td>2026</td>
<td>216 MW</td>
<td>Portezuelo del Viento</td>
</tr>
<tr>
<td>2027</td>
<td>1.150 MW</td>
<td>V Central Nuclear</td>
</tr>
</tbody>
</table>

**Incorporation of renewable energy:**

Power needed to comply with the law 27,191 to 2025 (20%) and then increase in the share of renewable energy, to reach 25% in 2030.

Note: It is considered as additional power (35 MW) which arises from the project of repowering and extension of useful life of the Nuclear Power Station of Embalse.
World Energy Matrix - Primary Energy Offer (MMTOE)

- Coal
- Renewables
- Hydroelectricity
- Nuclear energy
- Natural gas
- Oil
Global energy context - Production, demand and reserves

**Production – MMBBL/d**

- **Oil**
  - Asia Pacific, Africa, Middle East, Europe

- **Gas**
  - Asia Pacific, Africa, Middle East, Europe

**Demand – MMBBL/d**

- **Oil**
  - Asia Pacific, Africa, Middle East, Europe

- **Gas**
  - Asia Pacific, Africa, Middle East, Europe

**Reserves – %**

- **Oil**
  - Middle East, S. & Cent. America, North America, CIS, Africa, Asia Pacific, Europe

- **Gas**
  - Middle East, S. & Cent. America, North America, CIS, Africa, Asia Pacific, Europe