ENERGY SECTOR REORIENTATION
REPUBLIC OF ECUADOR

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ECUADOR
The Business Gateway to South America

Capital: Quito
Business Languages: Spanish (official)
Area: 257,217 sq Km
Time zone: GMT -5 hours
Currency: US Dollar
Population: 16.7 million
Literacy rate: 91,6%
Life expectancy: 76 years
Median age: 26 years
Unemployment Index Jun/17: 4,5%
GDP /16: USD 97,8Bn
Annual Inflation-Jul/17: 0,1%
¿Why should you Invest In Ecuador?

» **Dollar based economy** (no exchange rate risk, economic stability and low inflation).

» **Political, Legal and Tax Stability** (BIT and investment contract).

» **Developed infrastructure** (new roads, ports, airports, clean energy generation, telecommunications, education, health, among others).

» **Logistics Advantage** (Short distances of each regions of Ecuador).

» **Human Talent Development**, highly skilled.

» **Country rich in natural resources** (mining, hydrocarbons, water, agriculture, aquaculture, among others).

» **Country with higher standard of living**, with low security risks.

» **Tax Incentives**.
Government Policies in the Energy and Non-renewable Natural Resources Sector

- **Attract and promote new investments** that contribute to boost the national economy.
- **Work with the private sector to take advantage of synergies.**
- **Apply contractual models** such as Production Sharing Contracts and Concessions.
- **Promote transparent negotiations**, safeguarding the interest of the Ecuadorian State.
- **Currently working on bilateral investment treaties** for enhanced investment protection.
HYDROCARBONS SECTOR
According to an OPEC study, the demand of oil will continue growing until the year 2040.

Ecuador will increase its oil production to 540,000 BPD until the end of 2018.

The measure is part of the resolution adopted by the Organization of Petroleum Exporting Countries (OPEC) during its CLXXIV Conference, which was held on June 22 in Vienna-Austria and seeks to increase the total production of OPEC Members by 1,000,000 BPD.

Goal: reach a production level of 700,000 BPD until the end of 2021.
Ecuador's Hydrocarbons Potential

Millions of barrels

- Cumulative production: 5.864
- Reserves: Proven (P1) 1.703, Total (3P) 2.695
- Resources: Contingent (3C) 1.464, Prospective with risk (3U) 659
- Hydrocarbons volume 3P + 3C + 3U*: 4.819

8 billion barrels of recoverable reserves, according to British Petroleum report (2016)
Oil National Production (August 2018)

Thousand Barrels per Day

530
TOTAL NATIONAL PRODUCTION

413
PETROAMAZONAS PRODUCTION

117
PRIVATE SECTOR’S PRODUCTION

72
PRODUCTION OF BLOCK 43 - ITT
Exports

Additional revenue due to actual price vs. 2018 budget price (May 2017 - Jun 2018)

USD 1,379,225,829

Real invoiced value vs. State budgeted value

$/B

Months

REAL VALUE INVOICED

BUDGETED VALUE OF THE STATE

PRICE OF CRUDE ECUADOR
Minimize the footprint in the Yasuní national park (Planned use of 130 ha of a total of around 1,000,000 ha).

Use of Offshore technology.

Policy "0" (zero) discharge to environment.

Conservation of ecological corridors, canopy bridges and construction of underground passages to generate continuity to the jungle.

Monitoring and rescue of fauna and flora.

Environmental topography conservation of Biologically Sensitive Areas (ABS).
<table>
<thead>
<tr>
<th><strong>Intracampomos Round I</strong></th>
<th><strong>Suroriente Round</strong></th>
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<tbody>
<tr>
<td><strong>Areas, coordinates and vertices</strong> of the eight Intracampomos areas have been validated.</td>
<td><strong>Validation of regional geological-oil information.</strong></td>
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<td>Estimated investment of <strong>USD 900 MM during the execution of contracts.</strong></td>
<td><strong>Integration of information</strong> from the Marañón-Peru Basin.</td>
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<td><strong>Tender date: September 2018.</strong></td>
<td><strong>Continuity of reservoirs</strong> between Ecuador and Peru (Situche) is expected.</td>
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<td>The subsequent launch of the Intracampomos II Round is planned for end of Q3 - 2018.</td>
<td><strong>Tender Q4 - 2018.</strong></td>
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## Projects

<table>
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<tr>
<th>Project</th>
<th>Description</th>
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| Monteverde                    | - Optimization of clean products import for demand of south region of Ecuador.  
                                  | - Regional Hub for clean products distribution in the pacific coast.           
                                  | - Import facilities for import of LNG.                                       |
| Manabí Refinery               | - New refinery for Ecuadorian crude (14° API).                               
                                  | - High conversion refinery.                                                  
                                  | - BOT type of contract.                                                      
                                  | - 300,000 BPD capacity                                                       |
| Sulfur Plant                  | - Processing of H2S of the Esmeraldas refinery.                             
                                  | - Production of Elemental Sulfur or Sulfuric Acid (H2SO4).                    |
| Fuels Improvement in Esmeraldas Refinery | - Investment for increase the conversion rate of the Esmeraldas refinery.  
                                  | - Use of fuel oil and residue output from the refinery for production of diesel and naphta. |
| Energy Efficiency Projects    | - BOT for power generation with associated gas in oil fields                
                                  | - Replacement of old engines with electric engines in SOTE (Ecuadorean main oil pipeline). |
                                  | - Power transmission lines to the oil fields.                                |
Clean electric generation matrix

Net energy 2006
- 41.0%
- 48.0%
- 10.0%
- 1.0%

Net energy 2017
- 83.5%
- 0.2%
- 14.8%
- 1.5%

Hydroelectric | Termic | Non conventional energy | Interconnection
### Power Demand and Available Generation (MW)

<table>
<thead>
<tr>
<th>Month</th>
<th>Power Demand (MW)</th>
<th>Available Generation (MW)</th>
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</thead>
<tbody>
<tr>
<td>JAN</td>
<td>3815.3</td>
<td>5292.0</td>
</tr>
<tr>
<td>FEB</td>
<td>3748.5</td>
<td>5174.2</td>
</tr>
<tr>
<td>MAR</td>
<td>3905.5</td>
<td>5348.5</td>
</tr>
<tr>
<td>APR</td>
<td>3933.4</td>
<td>5330.6</td>
</tr>
<tr>
<td>MAY</td>
<td>3816.8</td>
<td>5263.3</td>
</tr>
<tr>
<td>JUN</td>
<td>3673.1</td>
<td>5417.7</td>
</tr>
</tbody>
</table>

*Source: CENACE, June 2018*
New generation projects

- Manduriacu: 65 MW of power
- Coca Codo Sinclair: 1,500 MW of power
- Toachi Pilatón (85%): 254.4 MW of power
- Quijos (46.72%): 50 MW of power
- Sopladora: 487 MW of power
- Mazar Dudas (87.32%): 21 MW of power
- Delsitanisagua (90.80%): 180 MW of power
- Villonaco: 16.5 MW of power

- Operating Hydropower Plants
- Hydropower Plants in Construction
- Thermal Plants in Construction
- Operating Eolic Park
Generation expansion (PME 2016 - 2025)

- Alozán 6.23 MW
- San José del Tambo 8 MW
- Inga I 2 MW
- Coca Codo Sinclair 1500 MW
- Sopladora 487 MW
- Topo 29.2 MW
- Minas San Francisco 275 MW
- Delantilisagua 180 MW
- San José de Minas 5.95 MW
- Río Verde Chico 10 MW
- Normandía 49.6
- Pusuno 39.5 MW
- Sabanilla 30 MW
- Quijos 50 MW
- Machala Gas 110 MW
- Small hydroelectric block 140 MW
- Santa Cruz 138 MW
- Paute - Cardenillo 595.6 MW
- Geotérmico 150 MW
- Santiago I: 1200 MW
- Santiago II: 1200 MW

Effective potential and maximum potential demand (MW)

- Power reserve (20%)
- Effective power (MW) of the S.N.I.
- Maximum demand of power of the S.N.I.
- Basic industries entry
New planned investments in generation

- **Unconventional Renewable Energy Block:**
  - 200 MW - USD 440 million

- **Small Hydroelectric Plants Block:**
  - 140 MW - USD 280 million

- **Geothermal Block:**
  - 150 MW - USD 600 million

- **Monteverde Combined Cycle:**
  - 280 MW – USD 292 million

4,700 MW of capacity to be installed (2018 – 2025)

USD 6,400 millones in new investments
Ecuador has a strong transmission system. The connection to the oil electric system will allow:

- **300 MW**
  - Thermal generation displaced

- **USD 350 millones**
  - Annual fuel savings
Regional integration framework

- Operations Regulation
- Commercial Regulation
- Regional Operator

Stage 1
- Short Term Market Institutionality
- Coordinated office (EC-CO-PE)

Stage 2
- Financial contracts between agents

Stage 3
- Physical contracts
- Regional planning

Types of lines
- 500 kV
- 220 kV
- Existing
- Planned
- Candidate

Incorporation of new lines:
- 500 kV Alférez – Jamondino – Inga line (2017-2020)
- 2º line, 500 kV La Niña-Daule (2020)
- 220 kV Laguna Colorada – Chuquicamata line
- Increases in current 230kV interconnection capacity

Ecuador
Colombia
Perú
Bolivia

2017
2017
2017
2019

HVDC Montalvo Line – Crucero (2020)

Back to Back + 220 kV Los Héroes – Arica line (2017)
Real and effective commitment to the sustainable development and conservation of the Galapagos Islands. Eliminate the use of fossil fuels from the islands.

**BALTRA**
- Wind power: **2,25 MW**
- Photovoltaic: **65 kWp**
- Storage: **1 MW – 4,27 MWh**
- Interconnection cable: 50 km, 34,5 kV
- Santa Cruz Photovoltaic: **1,5 MWp**

**HYBRID ISABELA**
- Dual motors (bio-fuel): **1,62 MW**
- Photovoltaic: **0,92 MWp**
- Storage: **620 kW - 305 kWh**

**FLOREANA**
- Dual motors (bio-fuel): **138 kW**
- Photovoltaic: **21 kWp**

**SAN CRISTOBAL**
- Wind power: **2,4 MV**
- To be implemented with cooperation from Korea: 1 MWp photovoltaic + 1,4 MWh of storage
Private sector participation framework in the electric sector

Master Plan of Electrification
Planning the expansion considering technical and economic criteria

Projects or generation blocks (hydro, thermal, Non-Conventional Renewable Energy)

Authorizes

Public or mixed companies

Concessions

Private companies and / or foreign State companies

Public Selection Process
- It is awarded to the offer that, fulfilling the technical requirements and presents the lowest price.
- Winner signs long-term contract with all distributors
Mining Outlook

- Lower mining operating costs (around 40% lower), second country with the lowest electricity rates in the region.
- Less than 6% of the territory has been explored.
- First generation mining projects:
  - Fruta del Norte Project: investment of $1,240 MM.
  - Mirador Project: Investment of $2,015 MM.
  - Río Blanco Project: Investment of $89 MM.
  - Loma Larga Project: Investment $432 MM.
- 2nd generation mining projects have a huge potential (investments around 10 bn. $)