The International Energy Sector of Colombia, Mexico, Chile and Brazil

Opportunities for Virginia Defense Companies

Virginia Economic Development Partnership
Summary of Report

• An overview of the energy and refining sectors of Colombia, Mexico, Chile and Brazil, including:
  – An initial assessment on world energy and refining markets,
  – Information on each market,
  – Key players in each market
  – Economic, political and legislation information pertaining to the sector
  – Trends and opportunities
Summary of Energy Market in Central/South America

• As of 2014, 8.5% of total production of crude oil in the world is produced in Central and South America.
• Venezuela and Brazil lead the group of producing countries with a production contribution of 38% and 28% respectively with Argentina, Mexico, Colombia and Ecuador following, with percentages of 12%, 10%, 9% and 8% respectively.
• In terms of refining capacity, the region processed approximately 7 million bpd, representing 8% of the world total.
Fastest growing sectors are mining and energy
  – Comprised of the mining, oil, gas, and energy industries
Non-renewable natural resources are owned by the State
Oil potential is estimated at 47,000 million barrels
In June 2014, average oil production reached 1,008,000 barrels per day
Market Segments in Colombia

As of 2014, power generation is divided as follows:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Power (MW)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic</td>
<td>9319.8</td>
<td>64</td>
</tr>
<tr>
<td>Thermal</td>
<td>4521</td>
<td>31</td>
</tr>
<tr>
<td>Small plants</td>
<td>662.3</td>
<td>4.5</td>
</tr>
<tr>
<td>Co-Generators</td>
<td>66.3</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14,569.4 MW</strong></td>
<td><strong>100%</strong></td>
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Declining reserves show that the rate of oil production (1 million barrels a day) is not sustainable in the mid and long term.

Due to a 60% drop in oil prices in the last six months, investment and operating expenses have declined.
Trends and Opportunities in Colombia

• Opportunities:
  – Science, innovation and technology
  – IT services
  – Environmental management
  – Maritime security
  – Technical training
  – Cyber security
  – Police force equipment and training
The oil industry is regulated primarily through the Oil Code which is comprised of:

- regulations on pricing, distribution of products and byproducts, royalties, specific environmental and tax legislation for the oil industry, foreign investment, import and export procedures, agent obligations and operations.

Industry unions are also largely influential.
Top Energy Sectors in Mexico

• The state-owned Federal Electricity Commission (CFE) is responsible for the generation, transmission, distribution and sale of electricity.

• Installed capacity includes the following forms of generation:
  – Thermoelectric - 44.80%
  – Hydroelectric - 22.17%
  – Coal-fired - 5.22%
  – Nuclear - 2.74%
  – Geothermal - 1.92%
  – Wind farms - 0.171%
  – Independent operators - 22.98%
Trends and Opportunities in Mexico

• The Mexican energy sector is expected to undergo a significant change, with renewable energy participation increasing to 35% by 2026.

• New installed renewable energy capacity will be driven by wind power, which by 2025 is expected to account for 60.3% of the national energy sector, followed by hydro with 24% and solar energy with 12%.
Trends and Opportunities in Mexico

• Opportunities:
  – Crime prevention through intelligence technologies
  – Investment in telecommunication technologies
  – Environmental management
  – Technical training
  – Data information technologies
  – Cyber security and defense technologies
Legal Issues and Outlook in Mexico

• In November of 2012, the government enacted a new labor reform that aims to increase market flexibility and reduce hiring costs.

• A 2013 energy reform opened the power generation market to private parties who will be able to participate in the construction, maintenance and operation of the electrical grid.
Market Segments in Chile

- Projected electricity generation in Chile:
Trends and Opportunities in Chile

• Chile faces the challenge of obtaining sufficient and competitive energy resources in order to achieve development forecasted for the coming decades.

• There are a number of mining projects under execution in the amount of 20 billion dollars and other projects under evaluation equivalent to another 45 billion, placing the mining sector at the precipice of a major upswing.
Trends and Opportunities in Chile

- Opportunities:
  - IT technical training
  - Environmental management
  - Cyber security training and software
  - Data recovery and protection software
  - Video surveillance
  - Industrial safety training
  - Personal protection elements
Legal Issues and Outlook in Chile

• The National Energy Commission is responsible for the development and coordination of plans, policies and standards for the proper functioning and development of the Chilean energy sector.

• In 2013, the government enacted that all generating companies produce non-conventional renewable energy sources at a compulsory quota of 20%.
Top Energy Sectors in Brazil

- In 2013, Brazil had an installed generating capacity of 127,000 megawatts (MW).
- Hydroelectricity accounted for 86 MW of generating capacity, fossil-fuel sources contributed 37 MW, and small amounts from wind, solar, and nuclear made up the rest.
- Brazil’s energy sector generated 30 billion kWh in 2013. At least 71% of electricity generated in 2013 came from hydroelectric plants. Natural gas and oil represented 11% and 4%, respectively, and biomass accounted for 8%.
Market Segments in Brazil

Existing Power Generation Capacity
(125 GW - December 2013)

- Hydro (91GW) 73%
- Gas (11.4GW) 9%
- Coal, Fuel Oil and Diesel (8.1GW) 6%
- Nuclear (1.99GW) 2%
- Non-renewable 17%
- Wind (2.2GW) 2%
- Biomass (9.9GW) 8%
Trends and Opportunities in Brazil

• Brazil is the largest economy in Latin America and one of the largest in the world.

• While raw materials remain the main export from Brazil, various sectors that diversify the economy are expanding.

• Oil and gas are projected as one of the more attractive business opportunities, especially for companies that wish to become Petrobras suppliers.
Trends and Opportunities in Brazil

• Opportunities:
  – Cyber security
  – Border control technology
  – Technical training
  – Environmental management
The power generation industry is regulated by the Federal Government through the Ministry of Mines and Energy (MME) and the National Electric Power Agency (ANEEL).

In 2004 the rules for the commercialization of energy in Brazil changed - all distribution utilities have to sign a power purchase agreement (PPA) with all sellers (generators), through the Brazilian Electric Power Commercialization Chamber (CCEE).