Think Chile, Think Oil & Gas

ENAP's Innovation Model with Suppliers

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June 14, 2017

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1. CHILE

2. ENAP AND ITS BUSINESS LINES

3. INNOVATION MODEL WITH SUPPLIERS

4. SPECIFIC BUSINESS CHALLENGES

CHILE – Serious about Business

Standard & Poor's sovereign risk rating AA-

⇒ Highest rating in Latin America

⇒ One notch below rating for France and Britain (AA)

OECD member

⇒ Together with Mexico, only OECD member in Latin America

GDP per head (PPP 2017) **~USD 24,000**

⇒ Highest GDP per head in Latin America

Ranked 24th (out of 176 countries) by Transparency International

⇒ 2nd highest ranking in Latin America (Uruguay 21st)

Competitiveness (IMD World Competitiveness Center)

⇒ Highest ranked country in Latin America

Life expectancy 81.5 years (2014)

⇒ Higher than U.S. (78.9 years)

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ENAP in a Nutshell

3 Business Lines

Upstream

Downstream

Gas&Power

100% state-owned company
Chairman of the Board – Minister of Energy

Solid Credit Ratings

Moody's Investors Service	**Baa3**
Standard & Poor's Ratings Services	**BBB-**
FitchRatings	**A**

Net Revenues 2016	USD 5,217m
EBITDA 2016	USD 678m (13%)
CapEX 2017-2020	USD 3,200m
Employees	>3,500
International Presence	Chile, Argentina, Ecuador, Egypt

EBITDA 2016 (USD millions)

Downstream Business

3 Refineries in Chile

- **Aconcagua** Refinery (120km west of Santiago)
- **Bio Bio** Refinery (600km south of Santiago)
- **Gregorio** Refinery (Magallanes)

Refining capacity (total) ~230,000 bbl / day

>95% of crude processed by refineries is imported

- refineries have to be able to process different types of crude oil
- products have to comply with strict environmental standards (max. 15 ppm of sulfur)

2016 – Sales by Client (m^3)

2016 – Sales by Product (m^3)

- **Market share ENAP**
  ~99% gasoline
  ~44% diesel
  ~66% kerosene
- **ENAP contributes ~30% to Chile's energy matrix**

Chile's energy matrix (2014)

Upstream Business

Operations

- **Chile** – exploration & production in Magallanes (on-shore and off-shore)
- **Argentina** – on-shore production in Chubut province, off-shore production in Santa Cruz province
- **Ecuador** – on-shore production in Francisco de Orellana province
- **Egypt** – on-shore production, partnership with Kuwait Energy Company

Oil

Gas

(in '000 barrels per day)

Tight Gas production in Magallanes (mill. m³/year)

- Focus in Magallanes today on **unconventional drilling**
- **Horizontal drilling** to be initiated in **Q4/2017**

Gas & Power Business

Business area created in 2014, in line with new government's **'Energy Agenda'**

Objectives

- **Stimulate usage of Natural Gas** in power plants, industrial projects and with final customers in Chile
- **Increase competition in power generation** sector

Important advances in 2016

- **Construction of co-generation power plant** at Aconcagua refinery initiated
- Acquisition of 100% of Petropower power plant (Bio Bio refinery)
- **Sale of gas to Argentina** during winter period

Significant interest in LNG terminal Quintero

1st re-gasification terminal for LNG in the southern hemisphere.

Initiated operation in 2009.

*Capacity of **15 mill. m³/day of natural gas**.*

Distribution to Aconcagua refinery and to external clients.

Important LNG supplier for the south of Chile

***Re-gasification satellite plant** in Pemuco (Bio Bio region).*

Distributes natural gas to Bio Bio refinery and to external clients.

Virtual pipeline (truck fleet) to transport LNG to satellite plant.

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Innovation – A Critical Issue for ENAP

Innovation as a driver to …

- … reduce exposure of workers to the 'line of fire' and improve **safety**
- … minimize **environmental impact**
- … decrease maintenance times and increase **plant up-time**
- … optimize **costs**

Innovation model with suppliers (GIP*) as a potent tool to stimulate innovation at ENAP

1. Identify high-value challenges for ENAP's business lines
2. Very ample search for expert suppliers
3. Present to suppliers not a specific tender but a business challenge
4. Together with supplier, generate new solution to business challenge and/or develop new business model
5. Form strategic partnership with supplier to implement new solution/ business model

(*) Gestión Integral de Proveedores

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8 Specific Business Challenges

ENAP
ENERGÍA QUE MUEVE A CHILE

Downstream

Reduce energy losses at steam traps in the refinery

Specialization for electric/electronical services and instrumentation

Optimize inspection services at the refinery

Specialization and technology for maintenance services

Upstream

Water Management

Increase safety and efficiency through digital integration

Sustainable waste management

New technologies for training in risk reduction and accident prevention

Downstream Challenge

Reduce energy losses at steam traps in the refinery

Challenge Description

Energy efficiency is a critical issue at ENAP's refineries. Currently, we don't have an integrated model for inspection and maintenance of steam traps, that would allow us to minimize energy losses and equipment failure related to the steam traps.

Type of Solution we are looking for

Help ENAP to implement an integrated model for inspection and maintenance of steam traps, assuring safety, efficiency and continuity of operation, by minimizing failures and energy losses.

Profile of Suppliers

- Companies with expertise in steam traps, i.e. diagnosis, gap-analysis, re-design, inspection and maintenance
- Experience in industries with high-complexity and high-pressure equipment

Downstream Challenge

Specialization for electric/electronical services and instrumentation

Challenge Description

Current service providers are focused only on one of the 3 areas. Service is not integrated and opportunities of transversal improvements are not exploited.

Type of Solution we are looking for

Implement an integrated model that optimizes the 3 services (electric/electronical/instrumentation), incorporates better technology, specialized know-how and continuous improvement.

Profile of Suppliers

- Companies with expertise in managing electric, electronical and instrumentation services in an integrated way
- Technology and specialized know-how
- Experience in high-complexity industries (i.e. Mining, Oil&Gas etc.)

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Downstream Challenge

Specialization and technology for maintenance services

Challenge Description

Current service includes general civil and mechanical maintenance work, e.g. modifications in piping, repair of ovens and heat exchangers. Current service labor intensive with limited use of technology.

Type of Solution we are looking for

Improve maintenance services in terms of quality, use of technology, training and specialized know-how. Implement international best practice, thereby increasing up-time of plants and equipment.

Profile of Suppliers

- Companies with proven experience in maintenance services and piping
- Companies with experience in maintenance of high-complexity equipment

Downstream Challenge

Optimize inspection services at the refinery

Challenge Description

Current service includes inspection of lines, rotating and static equipment, in particular monitoring of thickness in process circuits. Labor-intensive, little use of technology. A lot of scaffolding to do inspection at height.

Type of Solution we are looking for

Assure compliance with inspection plans, making better use of technology, especially for inspection at height. Reduce risk exposure of inspection workers.

Profile of Suppliers

- Companies with proven experience in (line) inspection, i.e. from Oil&Gas, Mining, Pulp&Paper or similar
- Companies with new technologies for improving service, especially inspection at height

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Upstream Challenge

New technologies for training in risk reduction and accident prevention

Challenge Description

Risk reduction and accident prevention – with regard to high-risk tasks, by using modern technologies in training for workers.

Type of Solution we are looking for

Implement training technologies in 3 critical areas:

- Work at height
- Safe driving
- Energy isolation/blocking

Profile of Suppliers

Companies with experience in applying modern technology in (safety) training, i.e. simulation, virtual reality, augmented reality, internet of things, intelligent fabrics etc.

Upstream Challenge

Increase safety and efficiency through digital integration

Challenge Description

Develop and implement solutions of digital integration for remote area operation, thereby improving safety and efficiency.

Type of Solution we are looking for

- Central view of information from remote areas, real-time
- Recollection of information in remote areas with minimal risk to workers
- Documentation of data and traceability of critical projects and processes

Profile of Suppliers

Companies with experience in digital integration for remote area operations.

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Upstream Challenge

Water Management

Challenge Description

Optimize usage of water resources – with regard to transport, storage, treatment and disposal – in the process of **hydraulic fracking.**

Type of Solution we are looking for

Implement innovative solutions with regard to the water cycle which are economically and environmentally sustainable. Water transport, storage, treatment and disposal.

Profile of Suppliers

- Companies with experience in water treatment, transport and storage of liquids
- Companies with experience in water cycle optimization projects
- Experience in Oil & Gas desirable

Upstream Challenge

Sustainable waste management

Challenge Description

Management of non-dangerous waste at ENAP Magallanes (i.e. wood, scrap metal, electronic waste, tires etc.) today is not integrated.

Type of Solution we are looking for

- Implement an integrated solution for management of non-dangerous waste
- Focus on efficiency and sustainability
- Minimize environmental impact, promote innovative solutions that help strengthen ENAP's image as an environmentally responsible and innovative company

Profile of Suppliers

- Companies with experience in waste management, transport and disposal
- Experience in Oil&Gas or similar industries
- Experience in recycling or intelligent re-sale of waste
- Capable of implementing the necessary logistical structure in Magallanes

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NEXT STEPS

Companies with proven expertise in the b.m. business challenges should write to us at: ***gip@enap.cl***

Workshop in Santiago de Chile on June 22, where each business challenge will be explained in further detail. Presentations in Spanish & English, participation possible also via Streaming.

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Reduce energy losses at steam traps in the refinery	Water Management
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