A Turning Point: Defining the Future of Midstream and Downstream Activities


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Pemex-Gas General Director
Downstream Rankings

Pemex Downstream is ranked among the largest producers in the world in different areas of the value chain.

- Pemex is the 9th producer of gasoline
- Mexico is the 5th largest consumer market for gasoline
- Pemex is the 15th producer of natural gas

Source: Pemex Statistical Yearbook, Forbes and ICIS Top 100 Chemical Companies.
Domestic Sales 2006 - 2013

USD MM

Gasolines, 17,358
Diesel, 6,919
Natural Gas, 5,896
Fuel Oil, 3,390
LPG, 4,131
Petrochemicals, 1,903
Others, 696
Jet Fuel, 1,480

Gasolines, 31,669
Diesel, 16,558
Natural Gas, 5,334
Fuel Oil, 6,107
LPG, 5,622
Petrochemicals, 2,707
Others, 981
Jet Fuel, 2,773
Downstream Infrastructure

**Production Capacity**

- **Refining**
  - Atmospheric distillation capacity 1,690 Mbd
- **Gas Processing**
  - Sour Nat Gas 4.5 Bcfd
  - Cryogenic 5.9 Bcfd
  - Condensate Sweetening 144 Mbd
  - Fractioning 568 Mbd
  - Sulfur Recovery 3,256 t/d
- **Petrochemical**
  - 13.55 MMt nominal per year

**Infrastructure**

- **Refining**
  - 6 Refineries
  - Fleet: 21 tankers
  - Storage of 13.5 MMb of Refined Products
  - 14,176 km of pipelines
- **Gas**
  - 70 Plants in 11 Gas Processing Centers
  - 12,678 km of pipelines
- **Petrochemical**
  - 8 Petrochemical Plants

[Map of Pemex's Downstream Infrastructure with labels for Producer Zone, Refinery, Petrochemical Center, Gas Processing Center, Sales Point, Pipeline, and Maritime Route]

www.pemex.com
• Gasoline market has shown a compound annual growth rate (CAGR) of 2.7% between 2006 and 2013, meanwhile PEMEX’s own production has declined 0.6% over the same period.

• This trend led to an increase in imports (CAGR 8.4%) representing 31% of demand in 2006 and 45% of demand in 2013.
Domestic market for natural gas has shown great dynamism in recent years, due to lower prices in the reference market in USA and Canada, and its environmental benefits.

The increasing trend in demand coupled with a decrease in domestic supply in recent years has led to a significant increase in import volumes of natural gas.
Petrochemical Production 2006-2013

Thousands Tons

<table>
<thead>
<tr>
<th>Year</th>
<th>Methane derivatives</th>
<th>Ethane derivatives</th>
<th>Aromatics and derivatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1,404</td>
<td>2,748</td>
<td>1,089</td>
</tr>
<tr>
<td>2007</td>
<td>1,859</td>
<td>2,607</td>
<td>1,085</td>
</tr>
<tr>
<td>2008</td>
<td>2,202</td>
<td>2,604</td>
<td>1,058</td>
</tr>
<tr>
<td>2009</td>
<td>1,962</td>
<td>2,695</td>
<td>957</td>
</tr>
<tr>
<td>2010</td>
<td>2,282</td>
<td>2,831</td>
<td>1,042</td>
</tr>
<tr>
<td>2011</td>
<td>2,306</td>
<td>2,750</td>
<td>923</td>
</tr>
<tr>
<td>2012</td>
<td>2,473</td>
<td>2,775</td>
<td>166</td>
</tr>
<tr>
<td>2013</td>
<td>2,460</td>
<td>2,473</td>
<td>799</td>
</tr>
</tbody>
</table>

1. Main petrochemicals chains
The Energy reform implies that all market players may participate in all segments of the value chain. Open and regulated market under the principles of asymmetric regulation and unbundling.

1. The new law creates the CENAGAS, responsible for the transportation of natural gas (PEMEX will be another participant).
Integrating the Value Chain: Key Dates

There are key dates for some segments of the value chain:

- Until 2015, import permits only for PEMEX, Productive Companies and its Subsidiaries.
- From 2016, propane & butane open to imports.
- From 2017, open market for gasoline and diesel imports.
- PEMEX becomes service user.
- Propane & butane prices will be determined under market conditions until 2017 or before.
- Gasoline & diesel prices will be determined under market conditions until 2018.
PEMEX creates value through the consolidation of the value chain of industrial processing activities in an open and regulated market. This will be achieved through:

- Cost efficiency and strategic pricing policies
- Assessment of infrastructure to maximize business value and returns
- Diversify marketing by geographic area
- Strategic alliances with private companies in a regulated environment
- High performance of human resources
Industry Transition

Regulatory guidelines:

I. Terms for firsthand sales (CRE)
II. Retail prices, transit of "regulated" free-market
III. Regulated tariffs for transport, storage and distribution (CRE)
III. Permits access to industry segments (SENER, CRE)
IV. Open access in logistics systems (CRE)
V. "Adequate" energy supply (SENER)

Road to transition

- New focus: participation in relevant markets (profitable)
- Business strategy: leadership in the industry
PEMEX as a State Productive Enterprise (SPE)

State Productive Enterprise aims to maximize economic value and profitability for the Mexican state, by improving its productivity, maximize oil revenues and contribute to national development.

- Oil Treatment
- Refining
- Gas & Petrochemical Processing
- Import & Export
- First-Hand Sales
- Marketing
- Sales & Distribution

Given market conditions and the need for greater operational flexibility there will be new subsidiaries\(^1\) companies that will give an array of services, from logistics to the end sale of fertilizers.

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1. The fertilizers business line will be under the umbrella of the PEMEX Productive Enterprise; meanwhile the Ethylene Subsidiary will be part of the downstream process.
Value proposal

Maximizing sustainable value

Value proposal to the market
Business Organization

• A renewal of the Mission and Vision of Downstream
• Value generation analysis by market segment, identifying "key segments"
• Growth and profit improvement based on target markets
• A business model for every market

• Reformulate the overall flow in decision-making
• Execution and development of new business models

• Cost structure analysis to identify “target markets” and "vulnerabilities"
• Performance indicators to measure segments of participation
• A new perspective (based on value generation) in:
  • CAPEX Investment
  • Alliances
Project Development Strengthening

Executive Business Process

- Elaborate the Business Plan focused on economic value creation
- Align projects to the strategy
- Promote coordinated execution of projects

Optimized Business Portfolio

- Business portfolio focuses on substantive areas of high profitability, attending relevant industry markets

Projects Development

- Project Development Institutional System which:
  - Uses international best practices
  - Promotes effectiveness in capital management
  - Supports efficient assignment of investment resources

PEMEX will participate only where it generates value
## Downstream Business Portfolio: Main Challenges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Main Projects</th>
</tr>
</thead>
</table>
| **Refining** | • Increase operational efficiency  
• Infrastructure for better fuels | • Investments in supply infrastructure  
(Reservoir Gulf-Center),  
• Refineries reconfiguring,  
• Clean fuels projects |

| **Gas Processing** | • Expand gas pipeline network  
• Capture trading opportunities | • Finish Los Ramones project  
• Transoceanic Corridor Project for propane, gas and refined products |

| **Petrochemicals** | • Integrate value chains: ethane, methane and aromatics | • Fertilizers strategy,  
• Ethylene oxide and monoethylene glycol projects  
• Modernization of Aromatics Train |

| **Cogeneration** | • Take advantage of PEMEX’s power cogeneration potential | • Cogeneration projects |
The required infrastructure for this system will be implemented through two projects:

- Import Project Gulf-center by PMI (paid via a built-in contract molecule to import a minimum volume of 125 Mbd).
- Projects Tula-Salamanca, debottlenecking and storage in Bajío Terminals.

### Project Gulf – Center\(^{(1)}\)

<table>
<thead>
<tr>
<th>Route</th>
<th>Diameter</th>
<th>Capacity</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuxpan- Arco Norte</td>
<td>24”</td>
<td>250 Mbd</td>
<td>Pipeline</td>
</tr>
<tr>
<td>Arco Norte – Tula</td>
<td>18”</td>
<td>150 Mbd</td>
<td>Pipeline</td>
</tr>
<tr>
<td>Arco Norte – Región Centro</td>
<td>16”</td>
<td>100 Mbd</td>
<td>Pipeline</td>
</tr>
<tr>
<td>Arco Norte - Apizaco</td>
<td>14”</td>
<td>80 Mbd</td>
<td>Pipeline</td>
</tr>
<tr>
<td>Región Centro – Cuernavaca</td>
<td>10”</td>
<td>32 Mbd</td>
<td>Pipeline</td>
</tr>
<tr>
<td>MT(^{(2)}) Tuxpan</td>
<td></td>
<td></td>
<td>Pier, tanks, land</td>
</tr>
<tr>
<td>CAB(^{(3)}) Arco Norte</td>
<td>1,500 Mb</td>
<td>6 days</td>
<td>CAB, land</td>
</tr>
<tr>
<td>Tula</td>
<td>450 Mb</td>
<td>3 days</td>
<td>Tanks, land</td>
</tr>
<tr>
<td>TAR(^{(4)}) Apizaco</td>
<td>175 Mb</td>
<td></td>
<td>Storage Terminal, land</td>
</tr>
<tr>
<td>TAR Región Centro</td>
<td>295 Mb</td>
<td></td>
<td>Storage Terminal</td>
</tr>
<tr>
<td>TAR Cuernavaca</td>
<td>195 Mb</td>
<td></td>
<td>Storage Terminal, land</td>
</tr>
</tbody>
</table>

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1. Estimated diameters. New pipeline project under analysis.
2. MT: Maritime Terminal
3. CAB: Pump & Storage Station
4. TAR: Storage and Distribution Terminal
Revamping Pemex Refineries

Objectives:
- Investment in high conversion plants to increase profitability by producing higher value distillates products.
- Increase process capacity to receive more heavy oil volumes (i.e. Maya Crude).
- Strategic reduction of residual fuel oil to balance the market.

Operations of Tula and Salamanca projects will start in 2018, and Salina Cruz in 2020.
To address changes in specifications for distillate fuels Ultra Low Sulfur (ULS) in accordance with the needs of the Mexican market, a set of projects is developed for the six refineries at the National Refining System, considering the following plants and investment:

- Gasoline (8 new plants), this projects are ongoing and will be completed by 2015.
- Diesel (5 new plants, 17 revamps) to be completed by 2018.

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Gasoline</strong></td>
<td><strong>Gasoline</strong></td>
<td><strong>Gasoline</strong></td>
</tr>
<tr>
<td>1 New HDS diesel</td>
<td>1 New HDS diesel</td>
<td>2 New HDS diesel</td>
</tr>
<tr>
<td>3 Revamps HDS DI</td>
<td>3 Revamps HDS DI</td>
<td>1 Revamp HDS DI</td>
</tr>
<tr>
<td><strong>Diesel</strong></td>
<td><strong>Diesel</strong></td>
<td><strong>Diesel</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tula Refinery</th>
<th>Salina Cruz Refinery</th>
<th>Minatitlán Refinery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gasoline</strong></td>
<td><strong>Gasoline</strong></td>
<td><strong>Gasoline</strong></td>
</tr>
<tr>
<td><strong>Diesel</strong></td>
<td><strong>Diesel</strong></td>
<td><strong>Diesel</strong></td>
</tr>
<tr>
<td>2 New plants. Postreat. Gnas. catalytic</td>
<td>4 Revamps HDS DI</td>
<td>1 New HDS</td>
</tr>
<tr>
<td>1 Revamp HDS DI</td>
<td></td>
<td>1 Revamp HDS DI</td>
</tr>
</tbody>
</table>

1. HDS: hydro-desulphurization Process Plant
Gas Supply Strategy

Actions

• **Short-term:**
  • Increasing imports of liquefied natural gas (LNG) (carried out during 2013 and 2014).

• **Long-term:**
  • Increase investments in gas production.
  • Expand gas transportation infrastructure.
  • Explore and evaluate the potential of shale gas reserves.
  • Expand the production of hydrocarbons in the country through the Energy Reform.
View of Natural Gas Transportation Infrastructure Projects, 2028

Pipelines
1. Nvo. Pemex - Cd.Pemex (Mayakán)
2. Los Ramones phase I
3. Los Ramones phase II (North & South)
4. Agua Dulce - Frontera
5. Tucson - Sásabe
6. Los Ramones - Cempoala
7. Colombia - Escobedo
8. Matapionche - Medellín
9. Jáltipan - Salina Cruz

Private:
10. Morelos
11. Tamazunchale - El Sauz
12. Norte - Noroeste

Storage and liquefaction
i. Natural gas storage (Altamira)
ii. Underground storage (Shalapa, Ver.)
iii. Liquefaction plant (Salina Cruz)
Los Ramones Phase I & II: Success Case

**Project Los Ramones phase I**

- PEMEX Gas signed a long term transport service contract with the company Gasoductos del Noreste.
- The construction of a 115 km pipeline was sped up, from the US border to Los Ramones, NL.
- Maximum transportation capacity: 2,100 MMcfd

**Project Los Ramones phase II**

- 738 km pipeline goes, from Los Ramones, NL. to the central west region of the country.
- Operations start: December 2015
- Additional maximum transport capacity: 1,430 MMcfd

**Scheme**

- Los Ramones I is being constructed by Gasoductos del Noreste, in strategic alliance with Pemex-Gas.
- Los Ramones II is developed by Tag Pipelines, a company owned by Mex Gas Supply and Mex Gas Enterprise, two Pemex Gas’ affiliates.
- Los Ramones pipeline will be supplied of natural gas by a new pipeline from Agua Dulce, Texas to the Mexican Border; it is constructed in a strategic alliance with NET Midstream.

**The advantages of the Tag Pipelines Subsidiary:**

- More flexibility and agility to analyze and develop infrastructure projects.
- Time and cost reduction in project execution.
- Ability to venture with third parties for project development and ownership in an efficient manner.
Trading Opportunities: PEMEX as a key player in the Pacific market (Transoceanic Corridor Project)

Pemex has identified the opportunity to move product from the US Gulf Coast to the Pacific markets

- Mexico has a privileged geographical position to move hydrocarbons from the Gulf Coast to the Pacific, through the Tehuantepec Isthmus.
- PEMEX has operating infrastructure in both coasts which are 186 miles apart.
- Expanding current existing infrastructure would allow PEMEX to move product from the USGC to the Pacific reducing shipping costs and time (compared to Panama Canal) and optimizing vessel’s fleet routes.
- The products to move to the Pacific are natural gas, crude oil, propane, naphtha, diesel and gasoline.
A new enterprise will integrate the production chain from ammonia to the end sale of fertilizers. The additional investment is focused on:
• three networks;
• four products; and
• new development center.

Ammonia production for PEMEX is of utter importance to ensure the supply of raw materials with which the fertilizers are made.

Currently, there are plants located at Cosoleacaque, Veracruz, and in Camargo, Chihuahua.

Energy Reform requires PEMEX to supply fertilizers to the domestic industry and distributors of ammonia, with long-term contracts and fixed prices.
Petrochemicals: Second Stage of the Ethylene Oxide Plant

Scope
- Construction and startup of two new water-cooled reactors at the Morelos complex which will replace the four existing oil-cooled reactors to increase the plant capacity from 280 Mt/y to 360 Mt/y of ethylene oxide equivalent.
- Operations start in 2018

Source: Pemex Business Plan 2015-2019
Petrochemicals: Modernization and Expansion of Aromatics Train at Cangrejera P.C.

**Scope**

- Modernization of the aromatics chain
  - Technology upgrade
  - Broad operational flexibility
  - Lower energy consumption and overall cost of production
  - Minimum feedstock consumption
  - Minimal environmental impact
- Increase the offer of Para-xylene in the domestic market.
  - Increase the capacity of Para-xylene production to 448 Kt/a
  - Reduce imports
  - Take advantage of the available benzene.
- Start of operations in 2020.

Source: Pemex Business Plan 2015-2019
**PEMEX’s Power Cogeneration Potential**

- PEMEX’s productive processes consume large amount of energy.
- Strategy for taking advantage of cogeneration potential (PEMEX’s Business Plan).
- On April 2013 the CPG Nuevo PEMEX cogeneration project (300 MW and 550 t/h steam) began operations.
- Five projects which represent 2,970 MW of energy generation.

<table>
<thead>
<tr>
<th>Project</th>
<th>E.E. Generation (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cactus</td>
<td>560</td>
</tr>
<tr>
<td>Salina Cruz</td>
<td>690</td>
</tr>
<tr>
<td>Tula</td>
<td>640</td>
</tr>
<tr>
<td>Minatitlán</td>
<td>690</td>
</tr>
<tr>
<td>Cadereyta</td>
<td>390</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,970</strong></td>
</tr>
</tbody>
</table>
Content

- Strategic Assets
- Integrating the Value Chain
- Main Projects
- Production Objectives
- Collaboration, Association & Divestitures
Decline in demand for fuel oil mainly due to environmental restrictions and competition with natural gas.
Introduction of Premium Ultra Low Sulphur (ULS) from October 2006 and all the demand since 2007.
Magna ULS since October 2008 in metropolitan areas. Total demand in 2015.
Natural Gas Domestic Balance 2015-2018

MMcfd

- Expected demand will need transportation infrastructure to handle natural gas imports
- The domestic supply considering PEP “Round Zero” granted by SENER.
Petrochemicals Production 2015-2018\(^1\)

**Thousand Tons per year**

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
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<tbody>
<tr>
<td>Methane derivatives</td>
<td>3,090</td>
<td>4,037</td>
<td>4,288</td>
<td>4,318</td>
</tr>
<tr>
<td>Ethane derivatives</td>
<td>2,256</td>
<td>2,424</td>
<td>2,321</td>
<td>2,486</td>
</tr>
<tr>
<td>Aromatics and Derivatives</td>
<td>6,286</td>
<td>947</td>
<td>944</td>
<td>944</td>
</tr>
</tbody>
</table>

Take advantage of growing demand for ethane and ammonia.
Content

Strategic Assets

Integrating the Value Chain

Main Projects

Production Objectives

Collaboration, Association & Divestitures
New Business Models - Downstream

PEMEX is seeking to create value through successful business schemes for new projects.

The business schemes PEMEX is looking for are:
• Alliances with partners that have capital and operational excellence.
• Strategic suppliers of materials.
• Joint Ventures (transportation, cogeneration, etc.)
PEMEX has developed successful strategic alliances in our downstream activities.

<table>
<thead>
<tr>
<th>Project</th>
<th>Partner</th>
<th>PEMEX’s Participation</th>
<th>Objective</th>
<th>Operations Startup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deer Park</td>
<td></td>
<td>Shell</td>
<td>1. Joint Venture 2. Oil supply</td>
<td>1993</td>
</tr>
<tr>
<td>Gas Pipelines</td>
<td></td>
<td>Gascodios de Chihuahua</td>
<td>Natural Gas and LPG transportation to power plants in the northern region of Mexico</td>
<td>1997</td>
</tr>
</tbody>
</table>

Objective:
- Refine Mexican heavy crude oil and increase gasoline supply to Mexico
- Increase production of vinyl chloride
- Natural Gas and LPG transportation to power plants in the northern region of Mexico