Mexico Natural Gas Outlook 2019

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Overview of Presentation

• Mexico’s Natural Gas Production, Consumption and Imports
  • Historical figures
  • Mexican and US projections
  • The CNH Proposals - Projections under alternative scenarios
  • Projected imports and cross-border gas pipeline capacity

• Projected increases in imports – Assessing the risks
  • Availability risk
  • Price risk
  • Dependency political risk
Overview of Presentation (cont.)

• Strategies Going Forward
  • The Production side - Alternatives with varying degrees of effort
  • Increase natural gas storage
  • Bolster clean energy strategy to reduce demand for natural gas

• President López Obrador and Natural Gas
  • Strengthening PEMEX and a reduced role for foreigners
  • Likely Increased demand
  • Uncertainty on clean energy
  • The issue of fracking
Historical Figures from SENER

(MMpcd)

*Datos Disponibles hasta diciembre de 2017.
Projections - SENER and EIA (US)

Production, Consumption and Imports (2018-2032) - SENER Prospectiva de Gas Natural 2018-32,
US Pipeline Exports (2018-2032) - EIA/AEO 2019
Projected (bcfd)
Projected Imports – SENER and EIA

US Pipeline Natural Gas Exports to Mexico (2018-2050) – EIA/AEO 2019
Mexico Total Natural Gas Imports (2018-2032) – SENER Prospectiva de Gas Natural 2018-2032
Projected (bcfd)
Projected Imports – SENER v EIA

• SENER Prospectiva de Gas Natural 2018-2032 - Imports peak at 5.57 bcf/d in 2021, with hypothetical cost of $6.6 billion at 2017 price of $3.26/mcf, and decline thereafter, down to 3.97 bcf/d in 2032, with hypothetical cost of $4.7 billion

• EIA export figures continue to go up over time, up to 8.38 bcf/d in 2050, with hypothetical cost of $10 billion at 2017 price (AEO 2018 had peak of 7.1 bcf/d in 2029; down to 6.0 bcf/d in 2050)

• Why are EIA figures so much higher than SENER figures? Possible reasons:
  • Production will not be as high as SENER projects.
  • Clean energy won’t come on line as quickly as projected.
The CNH Proposals – Alternative Scenarios

Instrumentation of public policies focused on addressing the assumptions established for each scenario

<table>
<thead>
<tr>
<th>PREMISE</th>
<th>BASE CASE</th>
<th>PROSPECTIVE CASE</th>
<th>DISRUPTIVE CASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Annual Growth</td>
<td>2.3%</td>
<td>2.9%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Oil Production Growth (AAGR)</td>
<td>-3.64%</td>
<td>2.98%</td>
<td>2.98%</td>
</tr>
<tr>
<td>Gas Production Growth (AAGR)</td>
<td>-2.97%</td>
<td>2.4%</td>
<td>14.44%</td>
</tr>
<tr>
<td>Vehicle Growth (AAGR)</td>
<td>5.27%</td>
<td>1.36%</td>
<td>5.27%</td>
</tr>
<tr>
<td>% Electric Vehicles until 2030</td>
<td>&lt;1%</td>
<td>2%</td>
<td>22%</td>
</tr>
</tbody>
</table>

**Electricity Generation**

- No plant closings
- New projects for electricity generation from dry gas start at 98% and decrease to 72% by 2030. For wind and solar start at 1% and end at 14% by 2030

**Usage change**

- No change of use.
- Reduces the use of firewood and increases the number of electric cars
- Reduces the use of firewood and increases the number of electric cars

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Natural Gas Imports by Scenario (CNH)

National production, demand, and technology improvements drive natural gas imports

<table>
<thead>
<tr>
<th>Year</th>
<th>Base Case</th>
<th>Prospective Scenario</th>
<th>Disruptive Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>1,758</td>
<td>2,791</td>
<td>0</td>
</tr>
<tr>
<td>2030</td>
<td>1,758</td>
<td>2,727</td>
<td>0</td>
</tr>
</tbody>
</table>

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Import Volumes – Cross-Border Pipeline Capacity

• Key point: Capacity is far beyond projected deliveries.
  • As of 2016, Mexico already had cross-border gas pipeline crossings with a capacity of 7.5 bcfd. Increasing to 13.5 bcfd by 2019.
  • Review of corresponding US figures shows existing and authorized pipelines with capacity of 15 bcfd.
  • Not clear why capacity is so much bigger than projected imports. Developers think it will be needed. Will facilitate greater imports.

• The capacity is in place if Mexico’s need for US natural gas grows:
  • 59% of all natural gas consumed in Mexico in 2017 came from imported US natural gas.
  • If current trends continue, the CNH projects that in 2030 94% of all natural gas consumed in Mexico will come from imports. The CNH does not comment on sourcing, but substantially all will come from the US.
Projected imports – Assessing Availability Risk

• Will US natural gas be available in sufficient volumes to meet projected exports to Mexico, while also satisfying US domestic needs and projected exports to other countries?

• Must rely on forecasts and probability analysis. Based on US Department of Energy (DOE) studies, high probability that gas will be available. Relying on:
  • NERA Economic Consulting, “Macroeconomic Outcomes of Market Determined Levels of U.S. LNG Exports” (2018 NERA Study), commissioned by DOE.
Availability Risk – US Production and Consumption

History and projections from AEO 2019

US Natural Gas Consumption

US Natural Gas Production
Availability Risk – Competing LNG Exports

• DOE has received applications for natural gas exports in the form of liquefied natural gas (LNG) exceeding 50 bcfd.

• The potential LNG exports dwarf potential exports to Mexico and present a significant competing demand upon the US natural gas supply.

• The 2018 NERA Study finds that where increased exports are the result of increased market demand for LNG, 80% of the increase in LNG exports is satisfied by increased production of US natural gas.

• Exports are not a “zero-sum game” where supplies are fixed and the demand side must fight over shares of the fixed supply. Instead, the supply will grow in response to demand, including demand for exports.
Projected imports – Assessing Price Risk

• What prices might Mexico have to pay to purchase natural gas from the US in the future?
• High prices would divert resources from other needs in Mexico, and affect Mexico’s energy balance of trade.
• AEO 2019 forecasts a moderate price rise or stable prices through 2050 in all cases, except the Low Oil and Gas Resource and Technology case. That is of low probability.
• The 2018 NERA Study shows that these price trends hold even where there are high LNG exports.
• The critical determinant of price is the availability of supply, which in turn is predicated on the technology supporting further development of the natural gas resource.
Assessing Dependency Political Risk

• With Mexico depending on US natural gas, could the US cut off or cut back deliveries, or threaten the same, in order to pressure the Mexican government to accept US political objectives?

• E.g. The Russian cutoff of Ukraine: “This is not about gas. This is a general plan for the destruction of Ukraine” —Ukraine Prime Minister

• President Trump: “Germany, as far as I’m concerned, is captive to Russia because it’s getting so much of its energy from Russia.”
Dependency Political Risk – US Political Constraints

• US natural gas producers are in the private sector and are politically well-connected. They would fight strenuously against a reduction of natural gas exports to Mexico. The US natural gas industry now earns in the range of $6.4 billion per year. Likely to go higher.

• All natural gas exporters, including LNG, would fight back.

• Congress too. “Throughout the entire range of scenarios, we find that overall U.S. economic output is higher whenever global markets call for higher levels of LNG exports, assuming that exports are allowed to be determined by market demand.” 2018 NERA Study.
Dependency Political Risk – US Legal Constraints

• Tariffs on exports are prohibited by the US Constitution.
• US law provides for export permits on exports of natural gas. The test is whether the export is in the “public interest.”
  • Mexico is now an FTA country because of NAFTA. Exports to FTA countries are deemed by statute to be in the public interest.
  • If the US withdrew from NAFTA, Mexico would no longer be an FTA country, but Mexico could still get gas under a more time-consuming process.
  • Assuming that USMCA is adopted, Mexico remains an FTA country.
• The International Economic Emergency Powers Act (IEEPA) gives the President extraordinary powers. But the President must consult with Congress, explain why there is an emergency and explain the proposed actions. Congress would resist, including resolution of disapproval.
Dependency Political Risk – GATT Prohibition

• The General Agreement on Tariffs and Trade (GATT) forbids prohibitions or restrictions on exports other than duties, taxes or other charges. The US and Mexico are parties.

• There are exceptions for environmental and resource conservation reasons, but the exceptions cannot be “applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade.”

• There is an exception for natural security, but not on point.

• The US has successfully enforced this against China. Its own arguments would apply to forbid export restrictions on natural gas.
Strategies Going Forward—Prospective Resources

- Mexico has enormous prospective natural gas resources. Among the largest in the world. Mexico should continue analytical work so that it is ready to take advantage of those resources.

<table>
<thead>
<tr>
<th>RESERVAS Y RECURSOS PROSPECTIVOS (R. P.)</th>
<th>PROVINCIAS PETROLERAS</th>
<th>Reserves at January 1, 2018 (trillion cubic feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sabinas, Burro-Picachos</td>
<td>Burgos</td>
</tr>
<tr>
<td>Reservas 1P</td>
<td>0.03</td>
<td>1.05</td>
</tr>
<tr>
<td>Reservas 2P</td>
<td>0.05</td>
<td>1.74</td>
</tr>
<tr>
<td>Reservas 3P</td>
<td>0.07</td>
<td>2.28</td>
</tr>
<tr>
<td>R. P. Convencionales</td>
<td>2.00</td>
<td>13.10</td>
</tr>
<tr>
<td>R. P. No Convencionales</td>
<td>67.00</td>
<td>53.80</td>
</tr>
<tr>
<td>Total R.P</td>
<td>69.00</td>
<td>66.90</td>
</tr>
<tr>
<td>% del total R.P</td>
<td>32</td>
<td>31</td>
</tr>
</tbody>
</table>
Strategies Going Forward – Production

• The CNH Proposals contemplate three scenarios
  • “Inertial scenario.” Existing production trends continue. Production declines by 2.96% per annum. 94% of consumption in 2030 from imports.
  • “Prospective scenario.” Existing production increases by 2.4% per annum. This corresponds to the “maximum scenario” for production of natural gas under the “Prospectiva de Gas Natural 2017-2031;” E&P reaching 3P reserves.
  • “Disruptive scenario.” Existing production increases 14.44% per annum.

• Key Issue is how to reach the Prospective or Disruptive Scenarios
  • More drilling
  • Create a separate natural gas-only company
  • Change tax regime and provide incentives
  • Pursue non-conventional plays
  • Build natural gas industry infrastructure – processing plants, storage, services
Strategies Going Forward – Natural Gas Storage

• Mexico needs strategic reserves to provide a cushion if for any reason the US cuts off its natural gas exports to Mexico.

• SENER has analyzed the issues in its “Política Pública en Materia de Almacenamiento de Gas Natural,” March 2018. Policy set as follows:
  • Mexico to build a strategic inventory of natural gas of 45 billion cubic feet, equivalent to 5 days of the national demand estimated for the year 2029.
  • A bid process to go forward in 2018 for the first 10 bcf. That is now underway.
  • But is 5 days enough? E.g. Spain requires strategic reserves equal to 35 days of firm sales or consumption over the past 12 months; Italy requires reserves equal to 50% of the maximum input capacity over a period of 60 days.
Strategies Going Forward – Clean Energy

• Clean energy reduces demand for natural gas. SENER’s Programa de Desarrollo del Sistema Eléctrico Nacional 2018 (Prodesen 2018) includes a robust clean energy strategy.

• According to the Prodesen 2018, 66% of new generation in place by 2032 will be from clean energy sources: 14,818 MW for wind energy, 11,403 MW for photovoltaic solar, 4,081 MW for nuclear and 2,214 MW for hydropower.

• Will President López Obrador be supportive? We don’t know.
Political Environment - AMLO and Natural Gas

• President López Obrador wants to strengthen PEMEX and reduce foreign participation. But
  • Easily accessible hydrocarbons are coming to an end.
  • The more complex hydrocarbon plays that remain require substantial investment and advanced technology for exploration and development.
  • Can PEMEX assume all the risks associated with the new E&P activities?

• Gas demand may increase. President López Obrador’s Proyecto de Nación includes objectives in that direction including:
  • Extending the gas pipelines to regions that do not have access yet.
  • The conversion of conventional plants to combined cycles (4,000 MW)
  • To adapt other thermal plants (5,800 MW) to dual fuels.
  • The only disincentive for gas growth included in the Proyecto is increasing 800 MW of hydroelectricity.
AMLO’s National Hydrocarbons Production Plan
As compared to Prospectiva de Gas Natural 2018-2032

Natural Gas Production for 2019-2024 (MMcfd)

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Political Environment – Stand-Alone Strategy

“Needs” vs 2019 Budget (billion pesos)

Source: CRE Presentation, *Retos de la regulación energética en Mexico*, January 2019

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Political Environment - Fracking; Initial Policy Moves

• President López Obrador has indicated opposition to fracking. But if non-conventional fields, requiring fracking, are off the table, this could affect production.

• Initial steps
  • The E&P auction for Round 3.3, for non-conventional natural gas fields, is suspended.
  • The fourth Long-term Auction for clean energy has been cancelled: about 2,644 MW of renewable generation capacity has been delayed (due to start in 2021). If replaced by combined cycle, it would mean 59.27 Bcf more natural gas.
“[W]e are not going to use the famous fracking to exploit this oil, we are not going to use those methods of oil extraction, gas.” – Andrés Manuel López Obrador (2018)

- Most of the prospective resources are non-conventional (need fracking)
Thank you!

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