Non-Geologic Factors Necessary to Develop a Shale Industry in Mexico*

Eduardo J. Meneses-Scherrer1, Gürcan Gülen1, and Scott W. Tinker1

Abstract

In 2013, the U.S. Energy Information Administration (EIA) ranked Mexico 6th and 8th in technically recoverable shale gas and oil resources, respectively. These resources are distributed in the northern, central, and southern parts of the country. Mexico's challenging geology requires a better understanding by drilling more wells in areas that are most promising on the basis of reliable geologic data. Lessons learned in the U.S. indicate that a better understanding of the geology is not a guarantor of success in developing Mexico's shale resources. The purpose of this work is to understand the non-geologic factors that led a rapid emergence of the U.S. shale resources, in order to identify the main gaps, uncertainties, and challenges that Mexico must overcome to succeed. The study area comprises northeast and east Mexico where the Eagle Ford and equivalent formations (late Cenomanian-Turonian) were deposited. This work presents a brief geographic context of these areas and discusses water resources, some population facts, socio-economic conditions, and road and pipeline infrastructure. Presented then is an explanation of the crucial roles that will play in Mexico's shale industry, the legal and regulatory framework, and the land and mineral ownership. In terms of geography, water resources, population facts, socio-economic conditions, and road infrastructure, northeast and east Mexico present specific and serious technical and operational challenges for companies, including water resources, insufficient road infrastructure, and the ability to deal with people with strong cultural and social roots. Regarding mineral and law ownership, although the law provides compensation for landowners and a process to negotiate, companies should consider that prioritization of energy sector activities over any other economic activity has raised concerns among civil, environmental, landowner, and indigenous groups and communities about the impacts of the law. Mexico is making considerable efforts to reinforce its pipeline capacity; however, it has a road ahead to ensure supply. Therefore, a shale industry in Mexico could be developed if the companies overcome the technical, infrastructure, social and cultural challenges. First and foremost, geology should permit commercially viable production in sufficiently large area to support the development of a shale supply chain.
Non-geologic Factors Necessary to Develop a Shale Industry in Mexico
Eduardo J. Meneses-Scherrer, Gürcan Gülen, Scott W. Tinker

• The Eagle Ford Play in Texas has had an amazing development in the last seven years.
• A straightforward geological correlation between the Eagle Ford Group in Texas and their equivalent formations in Mexico has spurred the possibility of replicating this success in Mexico.

Principal structural features of the study area (after Salvador, 1991; EIA, 2014; CNH, 2015)

- A regional geological screening of the Texas Gulf coast and east and northeast Mexico, along with the analysis of the geotechnical factors for the success of the Eagle Ford in Texas, has allowed identity of our focus areas to assess the shale gas potential of the Eagle Ford Play in this part of Mexico (Meneses-Scherrer, 2015).

- Three of these areas are located in northeast Mexico and the fourth one is in east Mexico in the region known as La Huasteca.

- The concomitant question is how a shale industry might be developed in Mexico around these four focus areas by taking into account the geographic features and other important non-geological factors that made the success of this industry in the U.S.

Geographic Context

- Two contrasting geographical settings: La Huasteca region and the Northeastern Mexico region.

Population Facts and Socio-Economic Conditions

- Data is from CONEVAL, 2015; CONAGUA, 2015.

Water Resources

- Map showing a sketch of three “Mexican Eagle Ford/Agua Nueva Focus Areas” (green), and areas where the equivalents formations of the Eagle Ford were exposed and/or eroded not deposited (Meneses-Scherrer, 2015).

- Map showing the largest population centers and the focus areas in Mexico (modified from CONAGUA, 2015)

- Map showing the sketch of the Eagle Ford Play boundary, areas where the equivalents formations of the Eagle Ford were exposed and/or eroded not deposited (Meneses-Scherrer, 2015).

- Map showing the hydrologic regions in Mexico and the focus areas (modified from CONAGUA, 2015).
Non-geologic Factors Necessary to Develop a Shale Industry in Mexico
Eduardo J. Meneses-Scherrer, Gürcan Gülen, Scott W. Tinker

Considerations For Development Of A Successful Shale Industry In Mexico

- Therefore, interested parties will need to shape a technological and management strategy adapted to each specific geographical condition to overcome these challenges and build a reliable reputation in the communities.
- A possible strategy that might take advantage of existing infrastructure could comprise a Northern Hub embracing the Burgos, Maverick and Sabinas Coal Basins, and an eastern Hub including the Tampico-Misantla Basin.

References

- Meneses-Scherrer, E. J., Lesmes learned in the Eagle Ford field play and applicability to Mexico [Master of Arts], University of Illinois at Austin, 162 p.

Mexican natural gas current infrastructure and current and future projects to increase the capacity (SENER, 2013, PEMEX, 2014; Salazar Diez de Sollano, 2015)

Natural Gas Processing Plants

<table>
<thead>
<tr>
<th>State</th>
<th>Total Area (km²)</th>
<th>%</th>
<th>Agrarian Crops</th>
<th>Common Land Use</th>
<th>Parish Lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veracruz</td>
<td>71,420</td>
<td>26,601</td>
<td>36%</td>
<td>3,725</td>
<td>Forestry (14.3%)</td>
</tr>
<tr>
<td>Puebla</td>
<td>34,290</td>
<td>15,419</td>
<td>45%</td>
<td>1,196</td>
<td>Livestock (41.3%)</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>20,646</td>
<td>9,832</td>
<td>48%</td>
<td>1,171</td>
<td>Livestock (43.6%)</td>
</tr>
<tr>
<td>San Luis Potosí</td>
<td>60,983</td>
<td>40,086</td>
<td>67%</td>
<td>1,834</td>
<td>Livestock (69.5%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7,536</td>
</tr>
</tbody>
</table>

Characteristics of the Agrarian Crops in the states occupied by the Focus Areas (data from Registro Agrario Nacional, 2015b)

Map showing the area occupied by Agrarian Cores in Mexico and the focus areas (made with data from Registro Nacional Agrario, 2015a).

Map showing the main roads in Mexico and the focus areas [modified from Gobierno del Estado de Chihuahua, 2007]

Map showing the area occupied by Agrarian Cores in Mexico and the focus areas (made with data from Registro Nacional Agrario, 2015a).

Mexican natural gas current infrastructure and current and future projects to increase the capacity (SENER, 2013, PEMEX, 2014; Salazar Diez de Sollano, 2015)