



Comisión Nacional
de Hidrocarburos

Eagle Ford Consortium Texas Binational Sub-Committee



Shale Gas in México

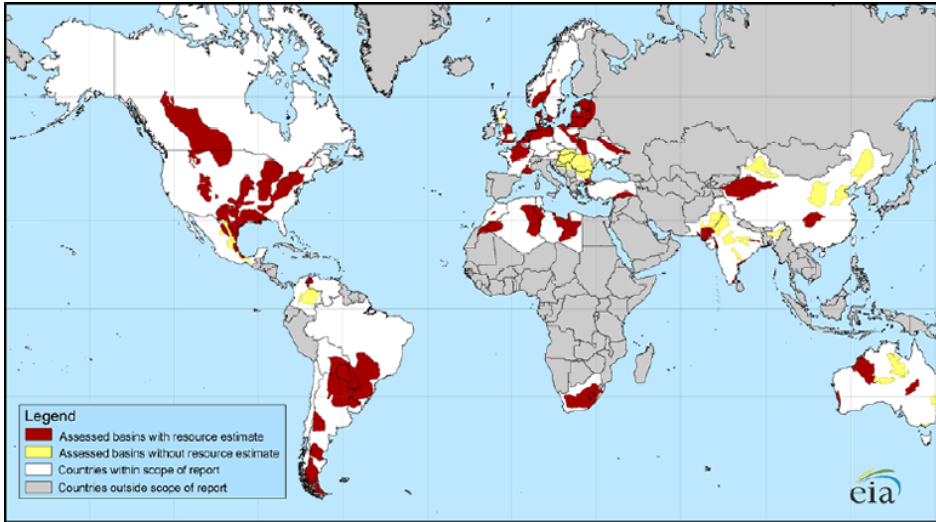
Dr. Guillermo C. Dominguez-Vargas
Commissioner

Laredo, Tx. January 29, 2014

- **Introduction**
- **Unconventional resources and Shale oil/gas strategy in Mexico**
- **Conclusions**

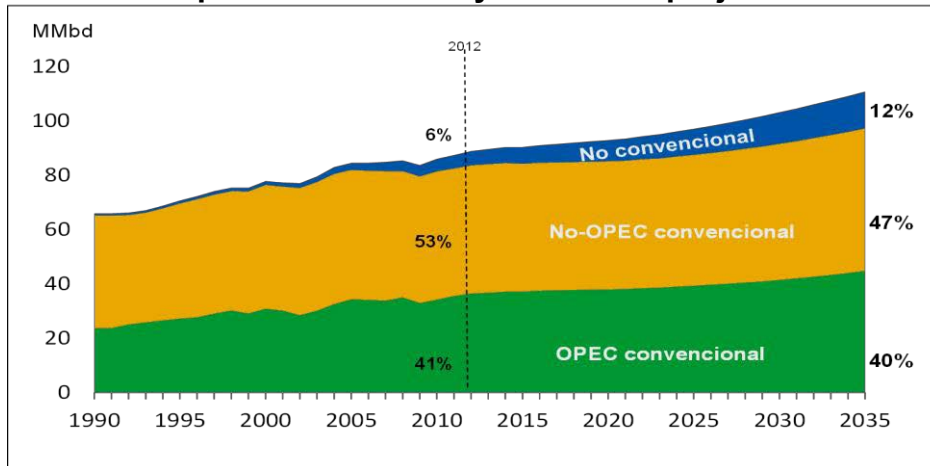
Introduction

Global distribution of potential shale oil and gas basins



- Shale oil/gas business is a global phenomena that has gained importance, based on the search for solutions to future energy demand, especially in emerging economies and high population countries.

World oil production: history and future projection

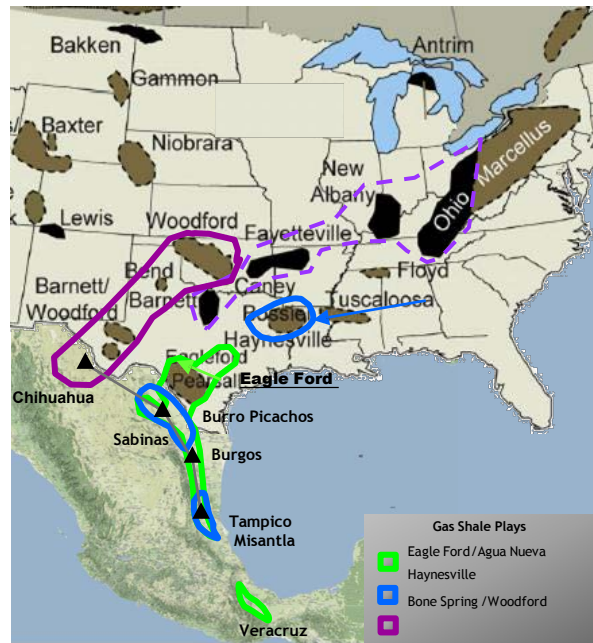


- The contribution of unconventional reservoirs, especially those related to liquids, begins to be noticeable and it is important to establish strategies to explore and develop these resources.

Source: Energy Information Outlook, EIA, 2011

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Unconventional resources in Mexico

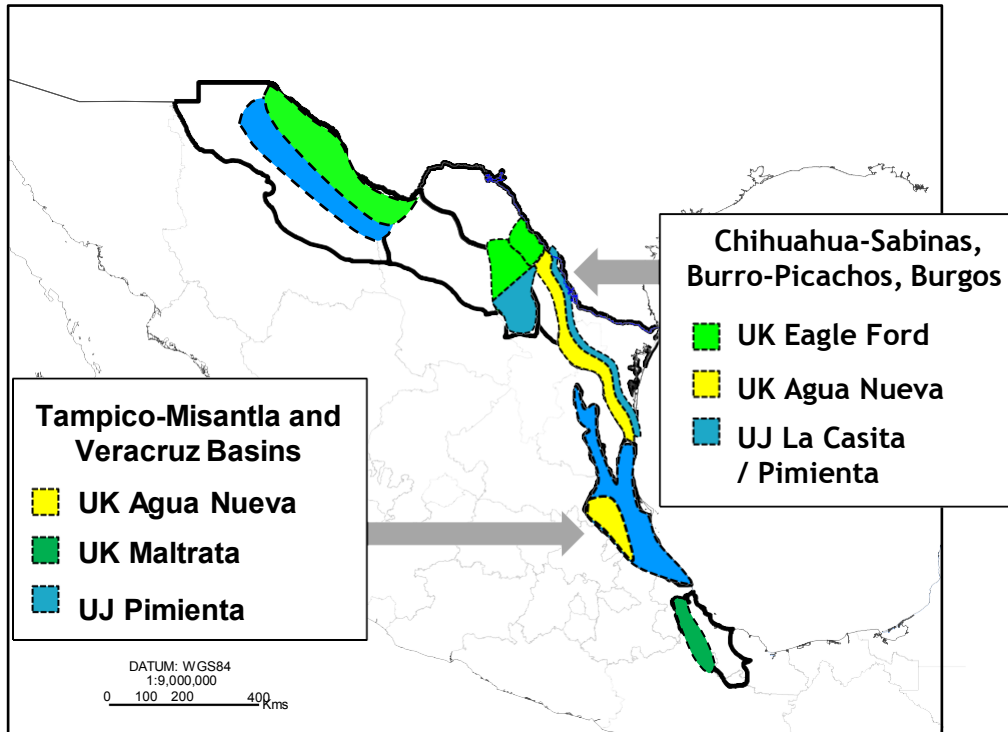


Shale gas technically recoverable resources

	Energy department USA	PEP, 2011
Upper Cretaceous	507	54-106-171
Middle Cretaceous	8	0
Upper Jurassic	166	95-190-285
TOTAL	681	150-297-459

- ◆ Pemex started exploration shale oil and gas at the turn of 2010
- ◆ The Energy Information Administration (EIA) on April 2011 published a global assessment, where the technically recoverable resources in Mexican basins were esteemed in 681 Tcf
- ◆ PEP based on the knowledge of Mexican provinces, determined that: Burro-Picachos - Sabinas, Burgos, Tampico-Misantla, Veracruz and Chihuahua, have elements to be considered as shale oil and gas basins
- ◆ Assessment of these basins resulted in the range of 150 to 459 Tcf as technically recoverable resources, with a mean of 297 Tcf

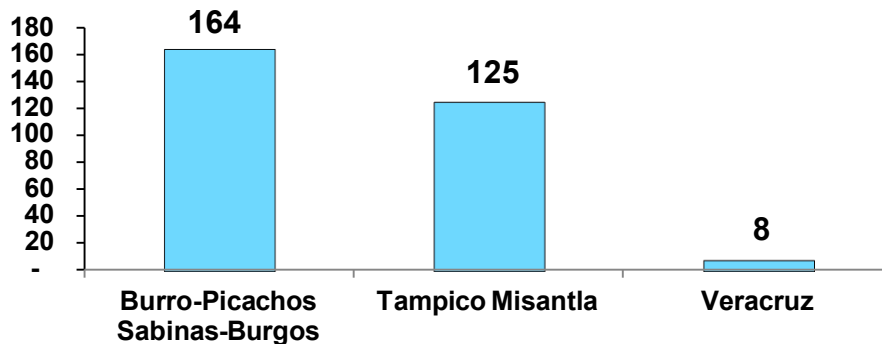
Shale oil/gas strategy



With the purpose to assess the hydrocarbon potential of unconventional plays in the northern and northeastern Mexico, the following aspects were raised to meet such commitment:

- ◆ Document a nation-wide investment project to formalize the requirements of investment funds.
- ◆ Perform geological-geochemical studies to grow up the understanding of the identified unconventional plays, in order to give certainty to its prospective volumes of oil, condensate and gas.
- ◆ Based on the results, propose exploratory wells to test the concept and the productivity of the plays and associated areas.

**Prospective unconventional resources:
297 Tcf**



Update of shale oil/gas potencial

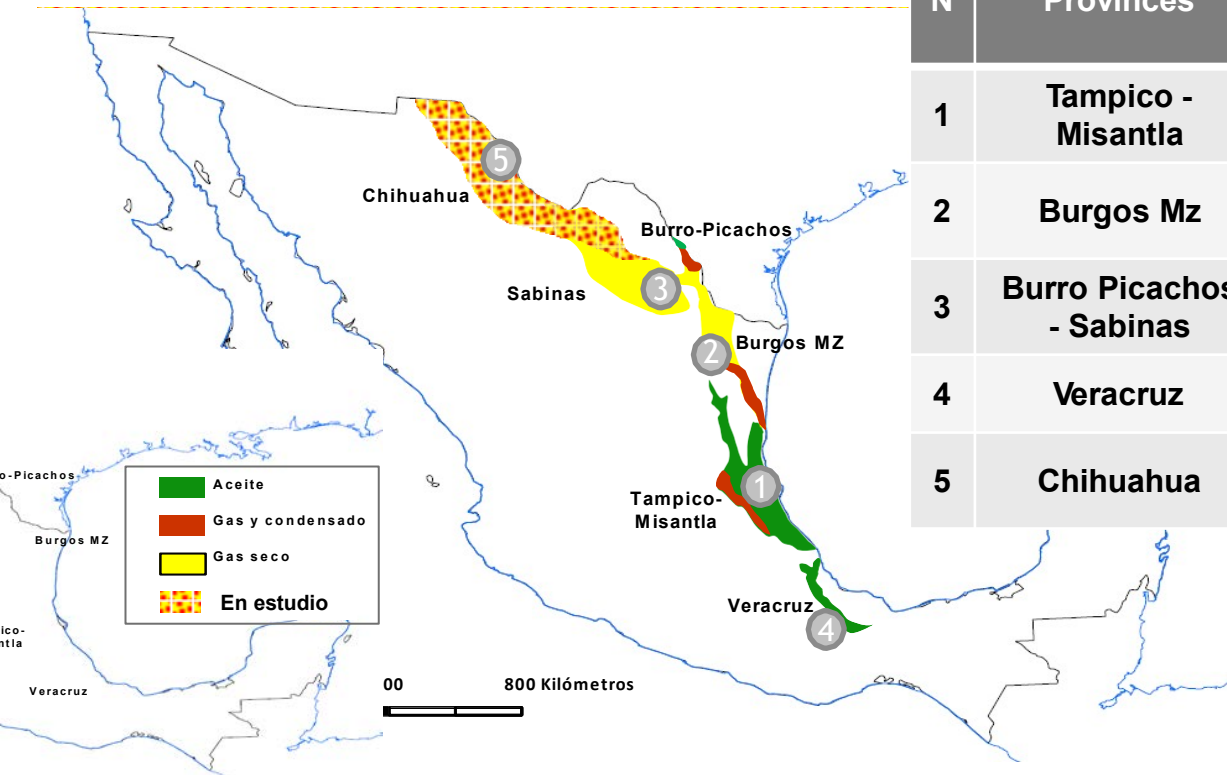
After updating the potential the whole estimation, considering oil resources , the strategy is strengthen in the following features:

- ◆ Evaluated prospectively focusing in oil and wet gas areas
- ◆ Give certainty to the estimated resources through the drilling of 175 wells
- ◆ Characterization and delineation of reservoirs
- ◆ Development and exploitation , the earlier the better

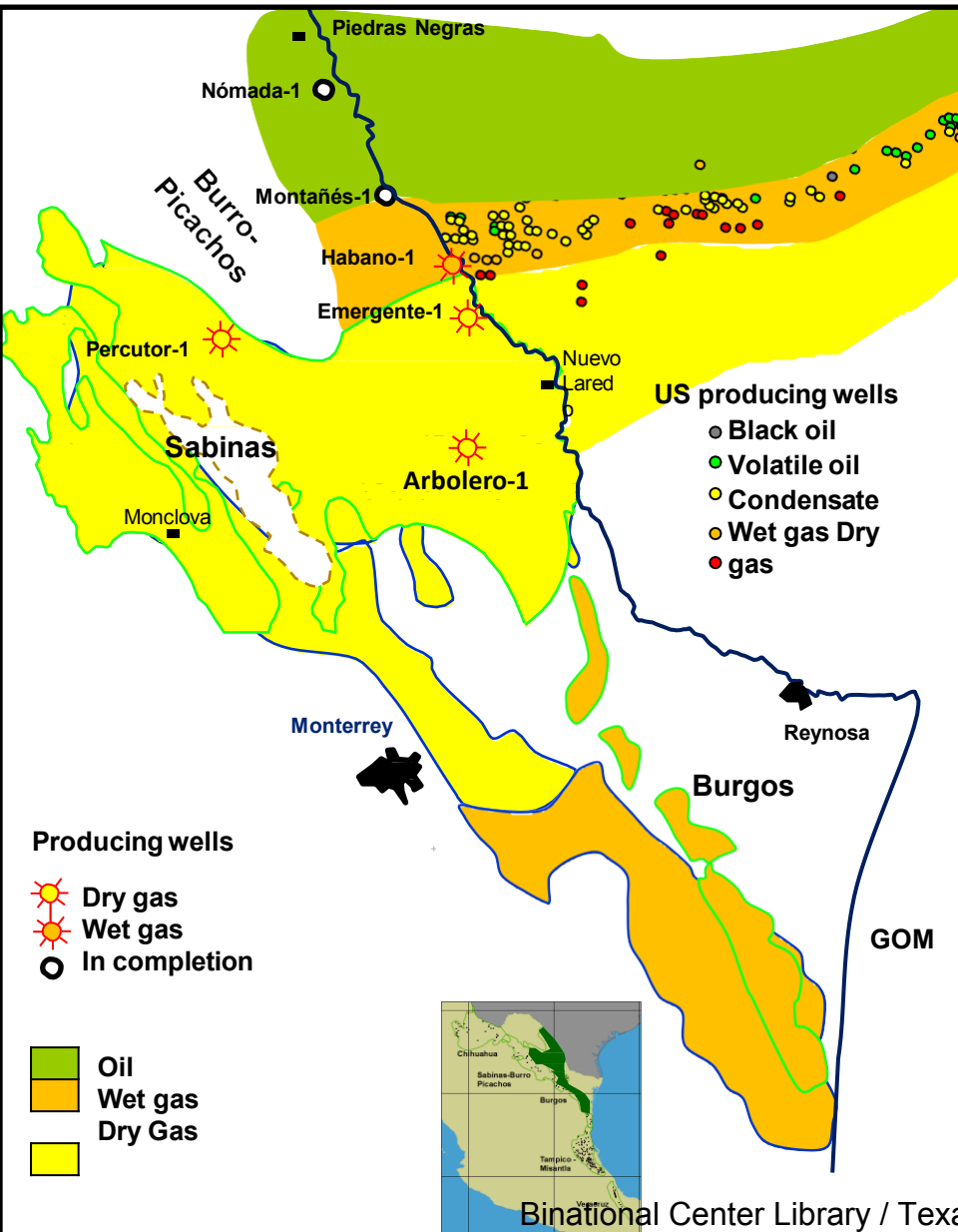
Main Areas

N	Provinces	Mean resources (BBOE)	Product
1	Tampico - Misantla	34.7	Oil Wet gas
2	Burgos Mz	8.9	Wet gas Dry gas
3	Burro Picachos - Sabinas	16	Wet gas Dry gas
4	Veracruz	0.6	Oil
5	Chihuahua	Under evaluation	Dry gas

**Total mean resources:
60.2 BBOE**



Strategy advances Sabinas-Burro-Picachos-Burgos Areas



Overviews

- ◆ Prospective area: 43,000 Km²
- ◆ Upper Cretaceous Eagle Ford has resources from 27 to 89 with a mean of 55 Tcf
- ◆ The Upper Jurassic La Casita - Pimienta play has resources from 54 to 163 with a mean of 109 Tcf
- ◆ 133 exploratory opportunities had been identified, eventually they will give certainty to estimated resources

Results

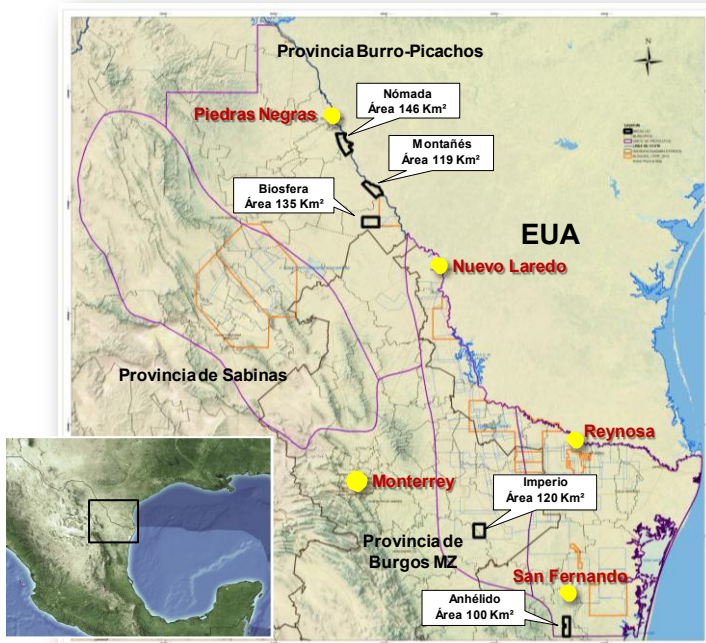
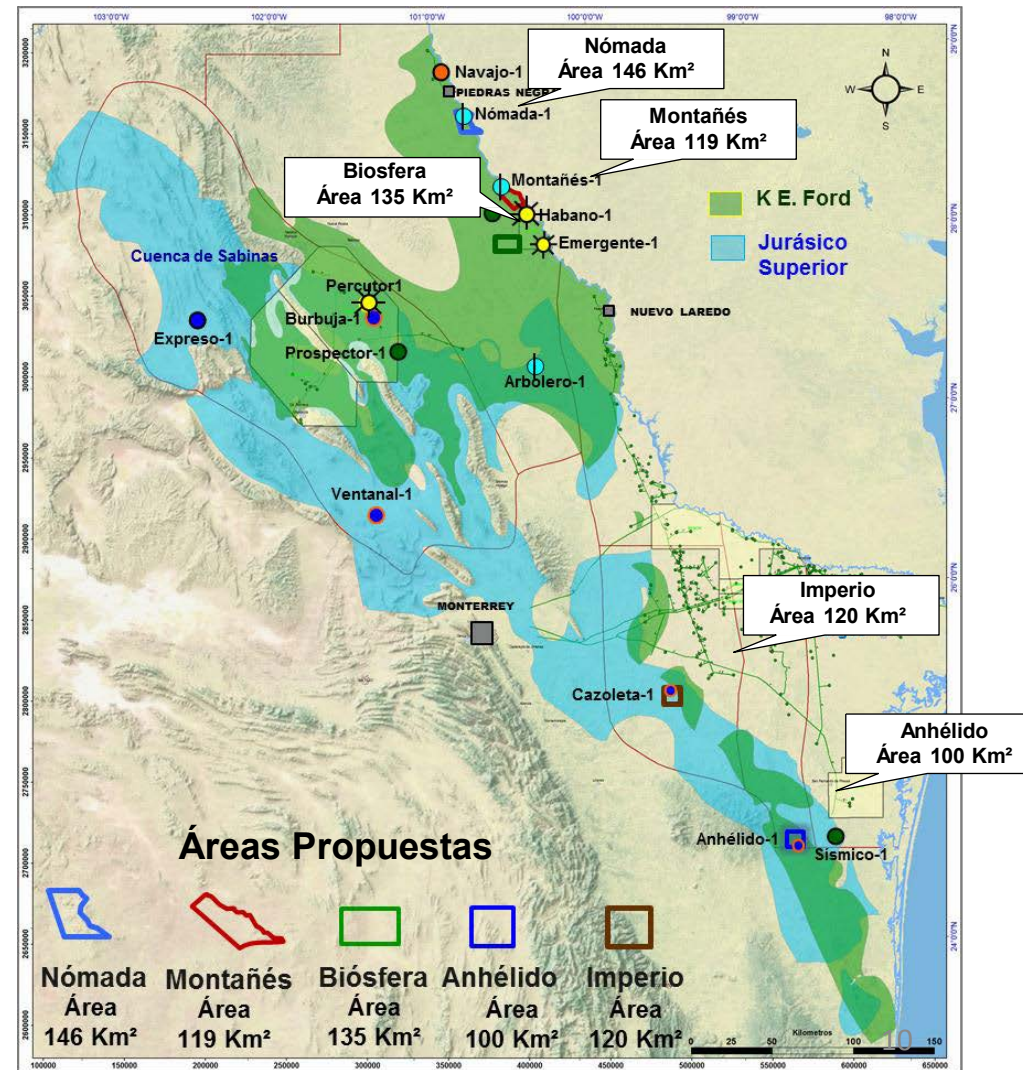
- ◆ The drilled wells such as Emergente-1 and Habano-1 have proved the Eagle Ford play continuity to Mexico.
- ◆ Besides the well Percutor-1 have proved the Eagle Ford play presence in Sabinas basin.
- ◆ Nomada-1 and Montañés-1 wells are in completion process on the oil and wet gas zones, respectively.
- ◆ Arbolero-1 have successfully proved the Upper Jurassic Shale gas play in Sabinas.

PEMEX Results on shale gas exploration

Well	Depth (m)	Objective	Initial Prod.	Cumulative Production		Fracking
			Qgi (MMPCD)	Gp MMMPC	Np Barrels	Stages
Emergente 1	4,071	K. Eagle Ford	2.8	0.5	0	17
Montañés 1*	3,200	K. Eagle Ford	0.1	0.01	140	14
Nómada 1*	2,850	K. Eagle Ford	Tz			16
Percutor 1	3,436	K. Eagle Ford	2.2	0.07	0	16
Habano 1	3,770	K. Eagle Ford	2.8 Gas 27 bd Cond.	0.18	5,177	16
Arbolero 1	4,007	J. Pimienta	3.1			11
Anhérido 1	3,913	J. Pimienta	1.9 Gas 333 bd Acei	0.2	42,000	17
Chucula-1	3,705	K. Eagle Ford	1.9 Gas 24 bd Cond			16
Durián-1	4,256	K. Eagle Ford	1.9			18

* Not commercial

- ◆ In the case of the Burro-Picachos and Burgos Mesozoic provinces, field research laboratories shall be implemented in order to move forward with greater speed in the understanding of the behavior of this kind of reservoirs
- ◆ This business models represents an initiative to determine the productivity scheme in short term in order to start the massive development
- ◆ They are oriented toward areas with liquid hydrocarbon prospectivity (gas-condensate and oil)



- ◆ To select the area in which each company would participate, prior knowledge or work on a specific area was taken into consideration, the specific skills for each of them given the challenges of the areas and the proximity of their operations. Below it is showed a table with the prevailing criteria for recommending the allocation of each company in a particular area.

Area	Company	Criteria
Montañés	Halliburton	<ul style="list-style-type: none"> ▪ For specific services previously provided in the area ▪ Leadership and fractures in shale drilling
Imperio	Baker	<ul style="list-style-type: none"> ▪ It is the most challenging area for drilling deeper ▪ Leadership in well completions, directional drilling and drilling fluids.
Nómada	Tecpetrol	<ul style="list-style-type: none"> ▪ Experience in artificial production systems required to handle different types of fluids, just as exist in the area ▪ Operations in a block contract with high decline wells
Biósfera	Lewis Energy	<ul style="list-style-type: none"> ▪ Partial knowledge for Biosfera area by previous seismic ▪ Proximity of its existing operations in Mexico and in the United States.
Anhérido	Petrofac	<ul style="list-style-type: none"> ▪ Demonstrated experience in drilling in shale ▪ Anhérido is an area with challenges in drilling ▪ Demonstrated experience in developing production facilities

CNH Activities related to Shale Gas

1. Development of the new regulation for the Shale Gas Development in Mexico.

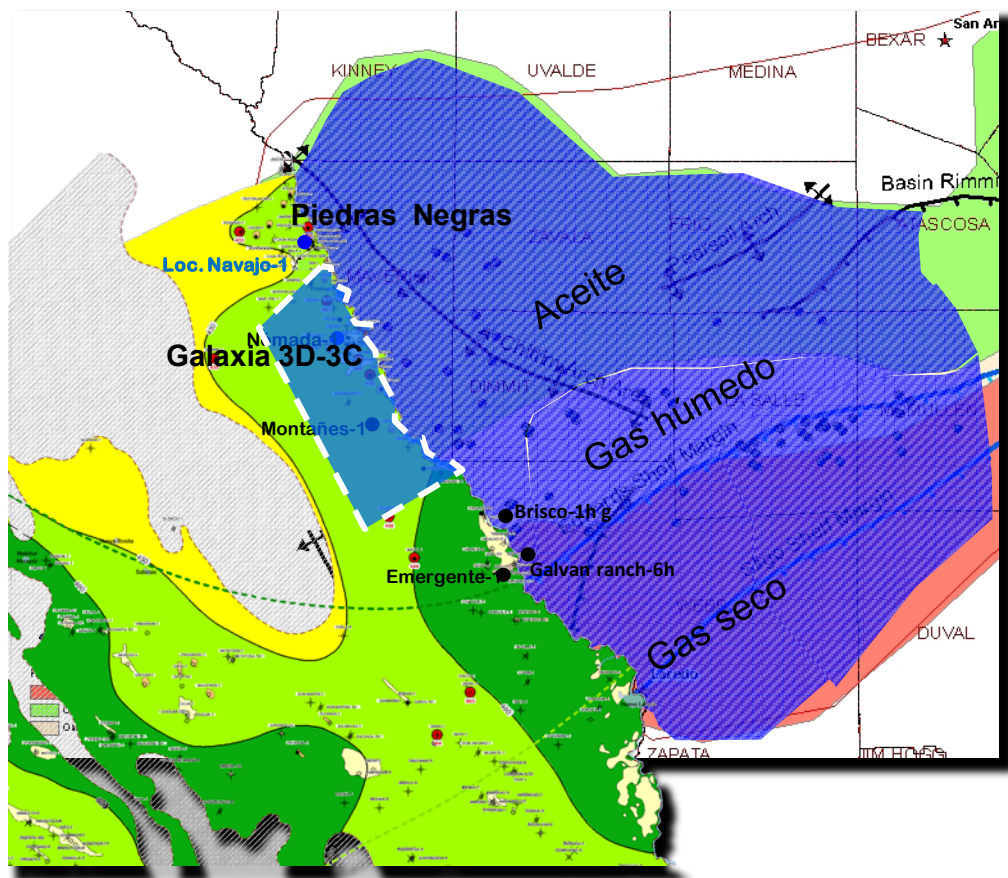
CNH is working in the technical regulation for the exploration and development of the hydrocarbon fields related with shale

CNH considers that the new License Contracts could help to promote the development of the shale gas in the northern part of Mexico. However, it will depend of the Energy Reform Secondary Legislation.

CNH Activities related to Shale Gas

- 2. Contract Assignment to the Mexican Petroleum Institute for Assimilation and development of technology in design, acquisition, processing and interpretation of 3D-3C seismic data with a focus on plays of Shale gas / oil in Mexico**

Galaxia 3D-3C, Play Upper Cretaceous Eagle Ford



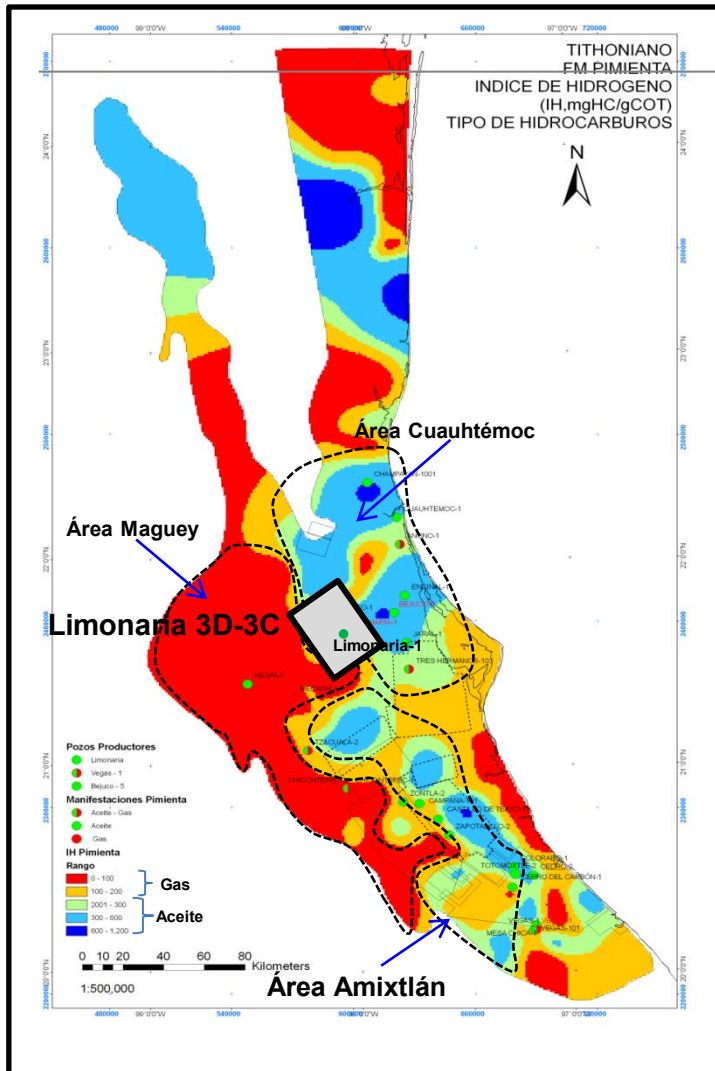
• El estudio Galaxia constituye la continuidad del play Eagle Ford productor de gas y aceite en la porción norteamericana al sur de Texas.

• A la fecha se tienen 4 pozos exploratorios, que han probado el play Shale gas confirmando la riqueza orgánica, madurez y la variabilidad en contenido de gas en México.

• La importancia de adquirir la información sísmica del estudio Galaxia 3D-3C, radica en explorar y desarrollar recursos prospectivos de Shale gas/oil del play Cretácico Superior Eagle Ford en el trend productor de aceite y gas húmedo.

Limonaria 3D-3C, Play Jurassic

IH Tithoniano



- El área de estudio Limonaria pretende explorar el play Shale gas/oil del Jurásico Superior Pimienta en la provincia petrolera de Tampico-Misantla.

- En esta provincia se han determinado condiciones favorables de riqueza orgánica, madurez, manifestaciones de hidrocarburos e inclusive producción de aceite en el pozo Limonaria-1 con un gasto inicial de 440 barriles por día.

- La importancia de adquirir la información sísmica del estudio Limonaria 3D-3C, radica en explorar y desarrollar recursos prospectivos de Shale gas/oil principalmente en el play Jurásico Superior Pimienta, sin embargo se presenta potencial en el play Shale gas/oil del Cretácico Superior Agua Nueva.

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Conclusions

- Mexico has identified five areas with a good potential for shale gas.
- The New Reform just approved by the Mexican Congress will allow private Mexican as well as foreign companies to explore and produce oil and gas from these shale areas.
- Creation of the Eagle Ford Consortium Binational Sub-Committee will help to create a synergy between Mexico and US to develop their shale gas potential.



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