EagleFord & Burgos Basin Cross Border Development Summit
Developing Realistic Exploration Cost Models To Support Large Scale Exploration in Frontier Markets

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Angle Capital

- Non-Operated Focus
- WI and Minerals
- Invest with Top Operators
- Diversify through Different Plays, Operators
- Try not to be “Ahead of the Curve”
- Avoid Science Projects, Hype
- Focus Areas include Williston Basin, Ardmore/Arkoma Basins, South/East Texas, Permian, Appalachian, DJ and Uinta Basins
- EagleFord, Mississippian, Woodford, Wolf Plays, Niobrara, Bakken
- Select Canadian Plays

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Introduction

- Challenges in building exploration cost models in frontier markets
- EagleFord Costs and EUR updates
- EagleFord Cost Improvements Over Time
- Likely Major Cost Drivers in Burgos Basin Wells
- Finding Comparables where they exist
- Lessons Learned from Vaca Muerta, Canadian Tight Plays

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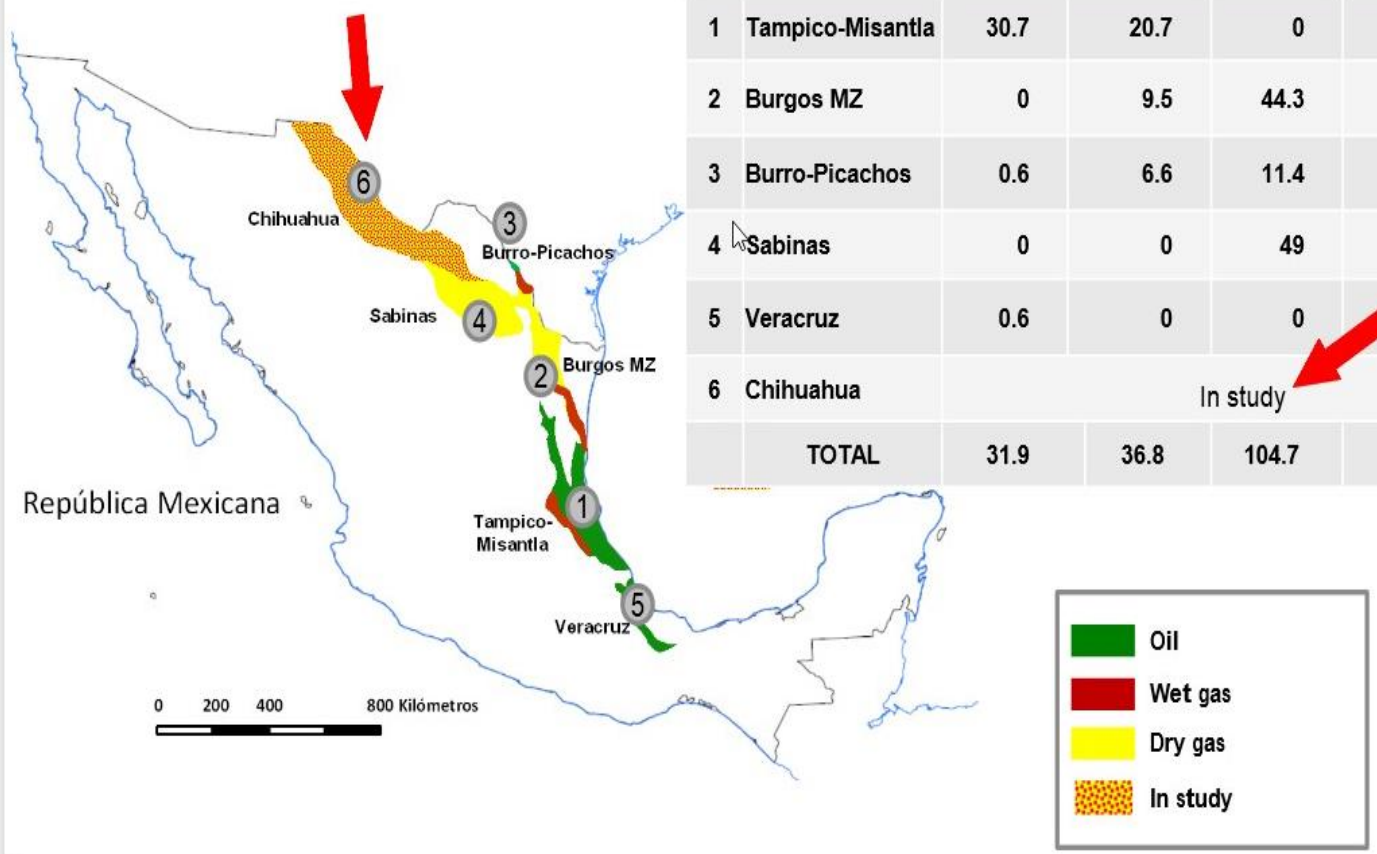
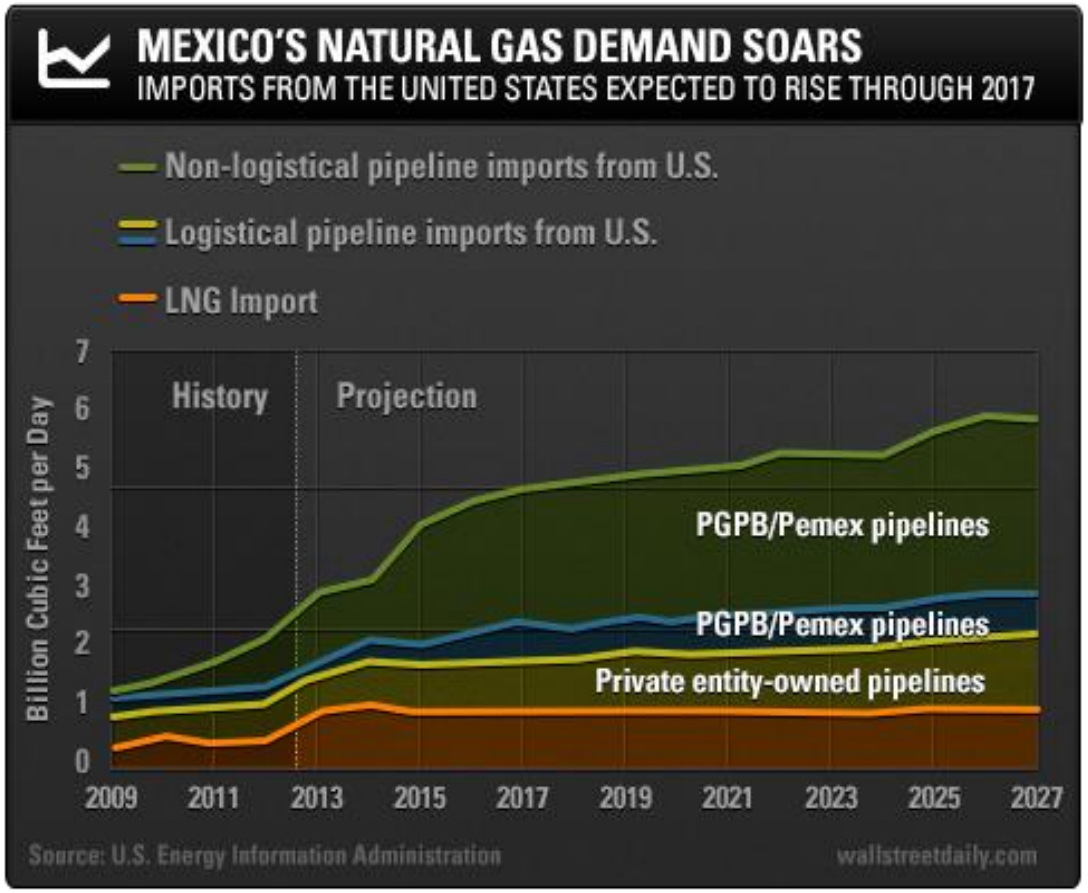
MX Reserve Estimates

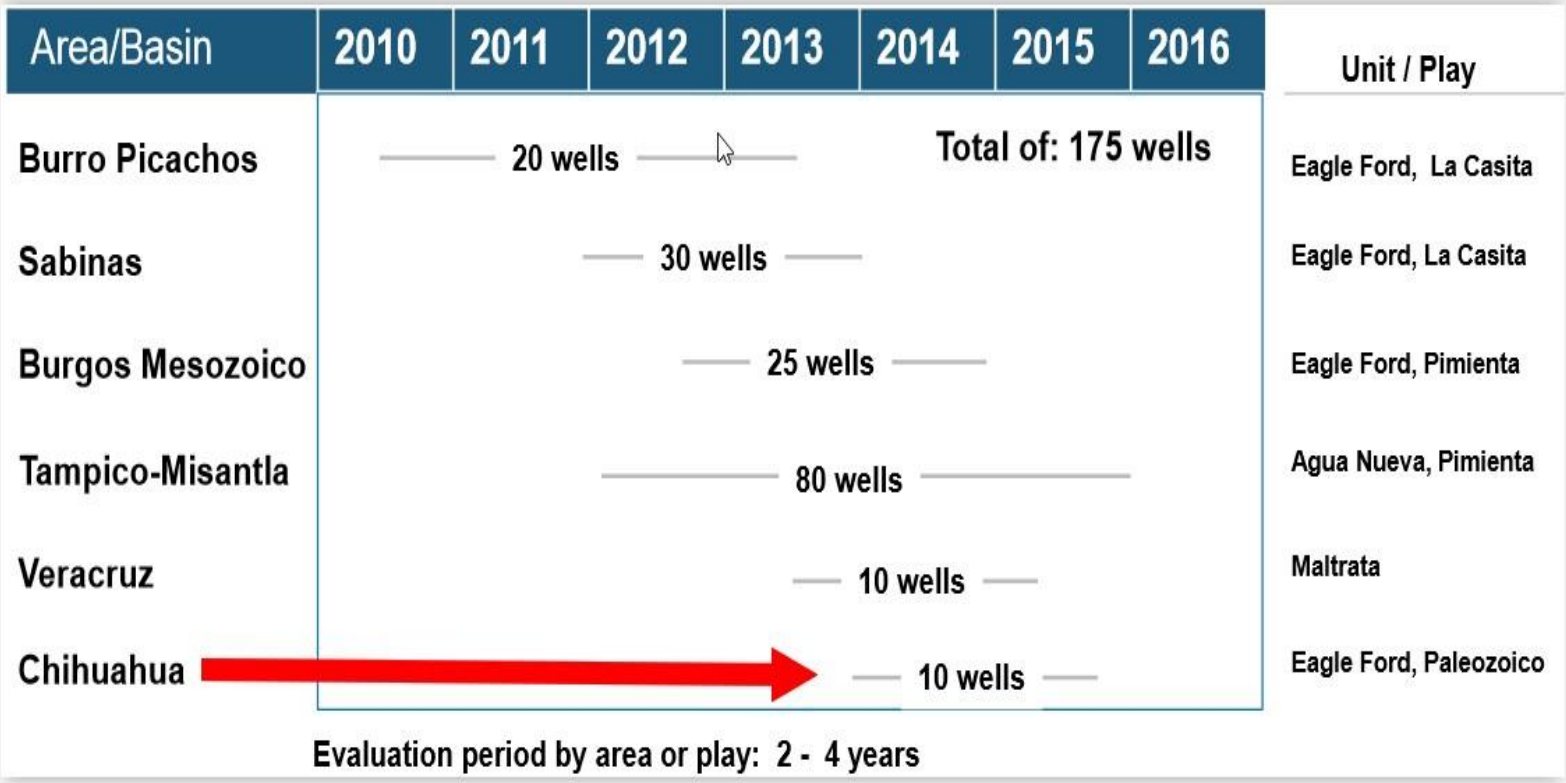


#	Province	Oil (Bbls)	Wet gas (TCF)	Dry gas (TCF)	Billion (BOE)
1	Tampico-Misantla	30.7	20.7	0	34.8
2	Burgos MZ	0	9.5	44.3	10.8
3	Burro-Picachos	0.6	6.6	11.4	4.2
4	Sabinas	0	0	49	9.8
5	Veracruz	0.6	0	0	0.6
6	Chihuahua	In study			
	TOTAL	31.9	36.8	104.7	60.2

MX Gas Imports -> Gassy Shales in Play



MX Shale Activity



Major MX Basin Analysis

SHALE GAS RESERVOIR PROPERTIES AND RESOURCES OF MEXICO

Basic data	Basin/gross area		Burgos basin, 24,200 sq miles		Sabinas basin, 23,900 sq miles	
	Shale formation		Eagle Ford shale	Tithonian shales	Eagle Ford shale	Tithonian La Casita
	Geologic age		L-M Cretaceous	Upper Jurassic	L-M Cretaceous	Late Jurassic
Physical extent	Prospective area, sq miles		18,100	14,520	12,000	12,000
	Thickness, ft	Interval	300-1,000	100-1,400	300-1,000	200-2,600
		Organically rich	600	500	500	800
		Net	400	200	400	240
	Depth, ft	Interval	3,390-16,400	5,000-16,400	5,000-12,500	9,800-13,100
		Average	10,380	12,000	9,000	11,500
Reservoir properties	Reservoir pressure		Normal	Normal	Underpressured	Underpressured
	Average TOC, wt %		5.0	3.0	4.0	2.0
	Thermal maturity, % Ro		1.30	1.30	1.30	2.50
	Clay content		Low	Low	Low	Low
Resource	GIP concentration, bcf/sq mile		209	75	113	58
	Risked GIP, tcf		1,514	272	218	56
	Risked Recoverable, tcf		454	82	44	11

Basic data	Basin/gross area		Tampico basin, 15,000 sq miles	Tuxpan platform, 2,810 sq miles		Veracruz basin, 9,030 sq miles
	Shale formation		Pimienta	Tamaulipas	Pimienta	Maltrata
	Geologic age		Jurassic	Jurassic	L-M Cretaceous	Upper Cretaceous
Physical extent	Prospective area, sq miles		14,240	1,950	1,950	8,150
	Thickness, ft	Interval	16-650	50-500	400-1,000	0-600
		Organically rich	490	300	490	300
		Net	245	225	245	120
	Depth, ft	Interval	3,300-10,700	6,000-10,100	6,600-10,700	9,850-12,000
		Average	6,200	7,900	8,500	11,200
Reservoir properties	Reservoir pressure		Normal	Normal	Normal	Normal
	Average TOC, wt %		3.0	3.0	3.0	2.0
	Thermal maturity, % Ro		1.30	1.25	1.30	1.50
	Clay content		Low	Low	Low	Low/medium
Resource	GIP concentration, bcf/sq miles		63	65	72	29
	Risked GIP, tcf		215	25	28	38
	Risked recoverable, tcf		65	8	8	9

Source: "World Shale Gas Resources: An Initial Assessment of 14 Regions," EIA April 2011. Using data from Advanced Resources International.

Challenges in Building Cost Models

- Little publicly available data (Production, Costing, Etc)
- Opaque cost structures of State Owned Oil Companies
- Very few onshore players
- Little relevant/related recent exploration history
- Difficulty in obtaining public data (infrastructure, pipelines, production and permitting data, etc)
- Few-to-nil public comparables
- Easy to be fooled by proximity

Cost Drivers

- Infrastructure (roads and rail)
- Terrain/Site Prep
- Security
- Water access, availability
- Electricity
- Customs, Tariffs & Taxes
- Royalty Schemes
- Regulatory Considerations (disposal, injection, cuttings, etc)
- Takeaway capacity
- Processing and Storage capacity

Key Questions

- What is the state of oilfield logistics?
- To what degree can private entrants control operations, key services and infrastructure?
- Can some vertical integration be accomplished?
- Will wells be stimulated with Ceramic Proppant, RCS or Sand?
- What is the supply of Frac Sand providers in the vicinity?
- Proximity to rail?
- Proppant logistics “last mile” considerations
- Limiting proppant trucking will be key in managing completions costs
- Establishing a quality framework for the transportation and delivery of proppant

Frontier Markets: Canadian Learnings

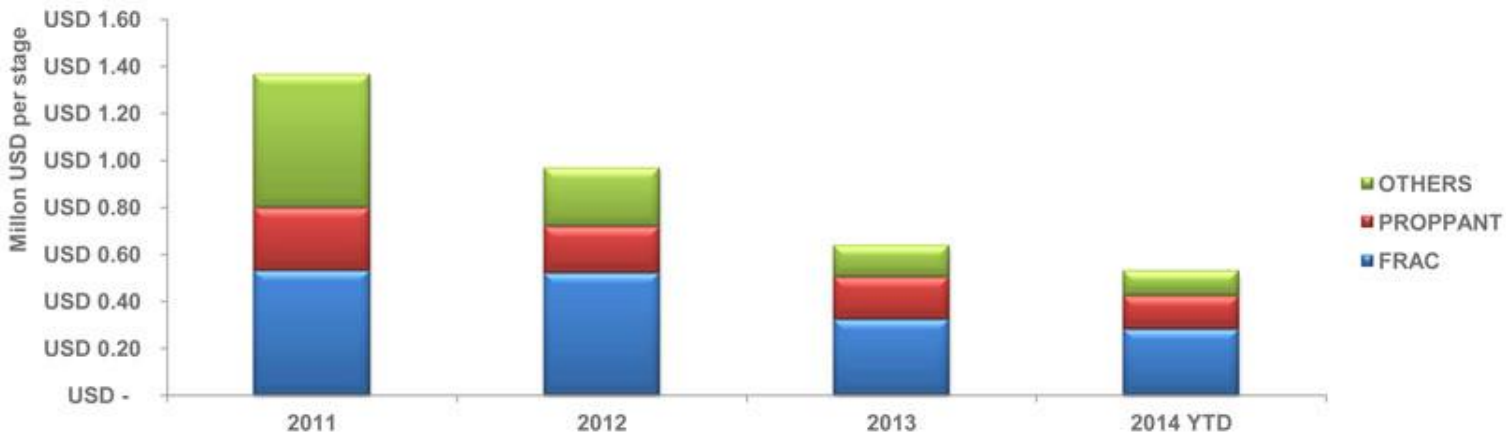
- Deep Northern Plays (Duvernay, Montney) extroadinarily expensive vs similar US tight plays
- Comparative cost drivers are higher unit labor costs, transportation, regional infrastructure, site costs (clearing, etc) and completions
- Takeaway capacity and midstream infrastructure have slowed development
- Majority of first $2B of industry exploration uneconomic
- Shallow, southern plays (Cardium, Viking) wells reached profitability and scale sooner

Frontier Markets: Canadian Learnings

- Lack of northern rail and road infrastructure led to skyrocketing Total Delivered Cost of Proppant (TDCP)
- Transportation & Logistics often comprise up to 90% of TDCP in far northern programs
- Although similar to EagleFord geology, completions costs in Duvernay remain 70-100% higher
- Rail capacity and infrastructure challenges remain large obstacle to controlling exploration program costs
- Although there are local sources of Frac Sand, most buyers prefer importing from as far away as 2,000 km away, leading to surging proppant costs
- The “last mile” is dominated by expensive trucking
- Industry development remains far below potential due to supply chain issues
- Favorable royalty scheme primary driver in development

Vaca Muerta Completion Costs

YPF | **Completion:** Costs Improvements



Implemented Initiatives:

- Monthly "Bundle" contracts
- Multiple proppant providers
- Adoption of new technology
- Operational efficiency Optimization:
  3 stg/day, SIMOPS, Plug & Perf technology

Future Opportunities:

- Renegotiation of Bundle Contracts
- 100 % local proppant utilization
- Bulk proppant logistics
- Water distribution Network

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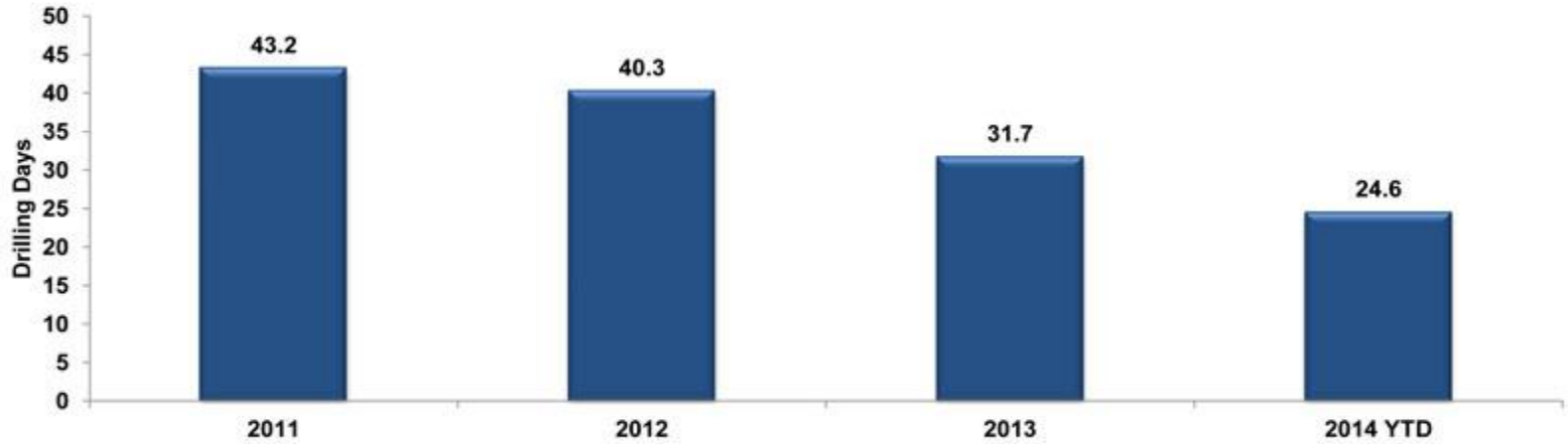
Vaca Muerta Drilling Time Improvements

YPF | **Drilling:** Time Improvements



Implemented Initiatives:

- MPD / UBD Operational Procedure
- Introduction of Casing Drilling
- Directional Drilling Optimization
- Multipad locations

Future Opportunities:

- Widespread use of Casing Drilling
- New automated rigs / skidding
- Use of 4" DP for entire well
- Mud Plant

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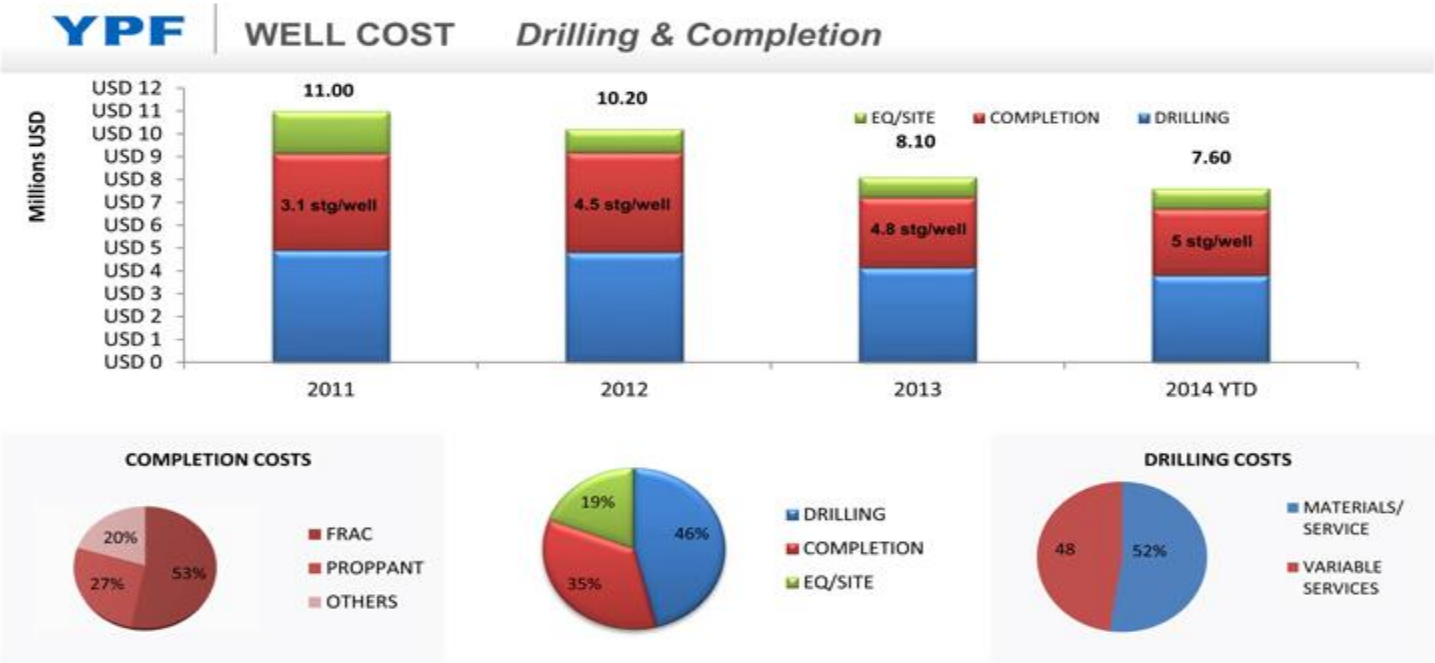
Vaca Muerta Drilling & Completion Costs



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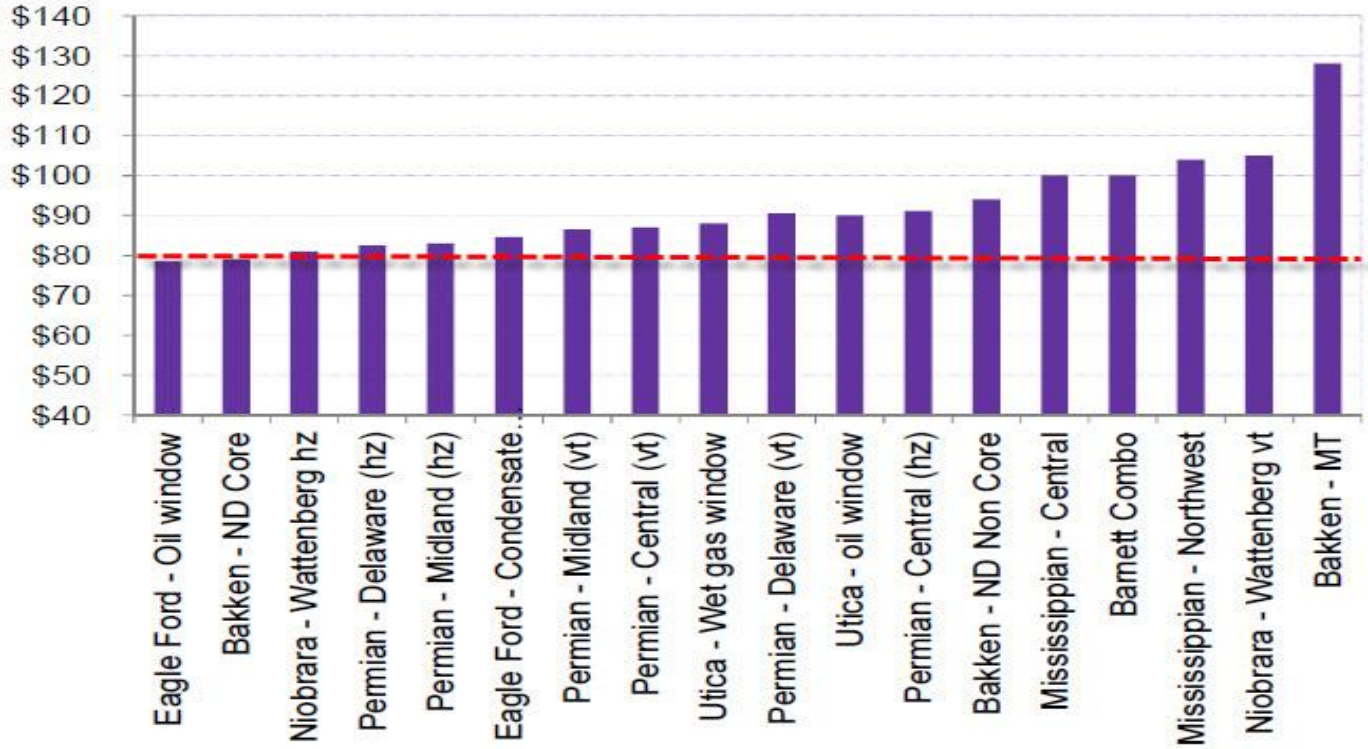
Major Play IRR's

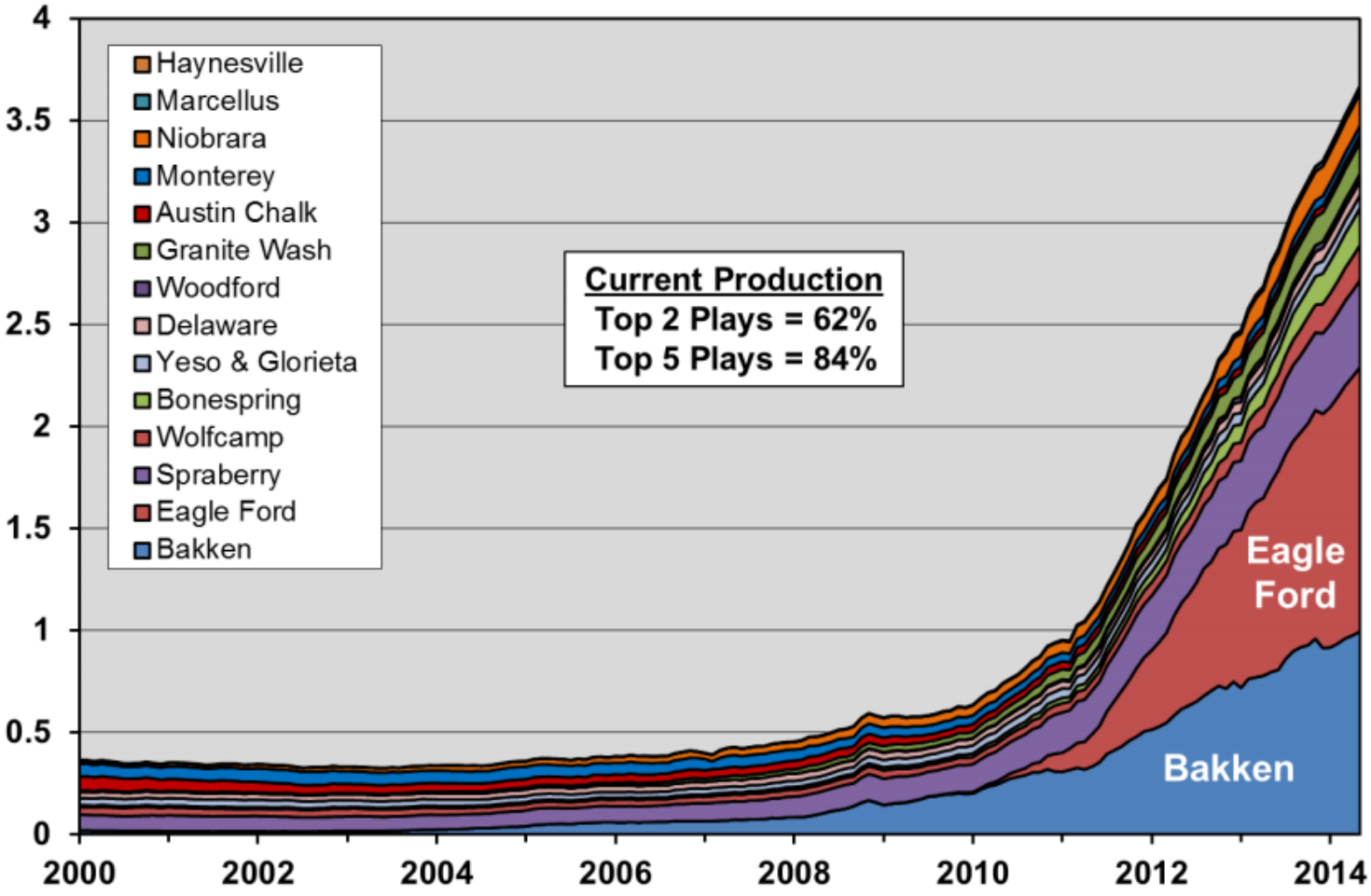
Exhibit 11: Most fields achieve 11% IRRs in the $80-$90/bbl Brent range; this would fall by about $6/bbl for a 10% reduction in capital costs

Brent oil price in $/bbl for 11% IRR



Source: Goldman Sachs Global Investment Research.

Top Unconventional Plays



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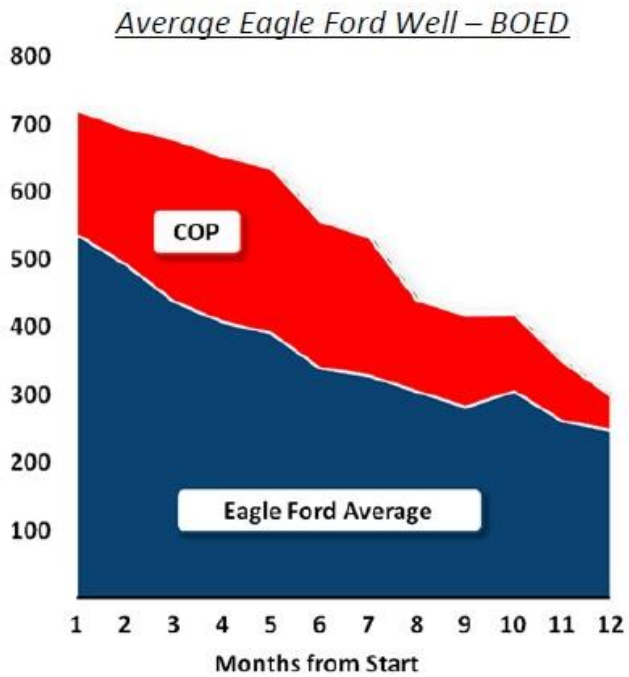
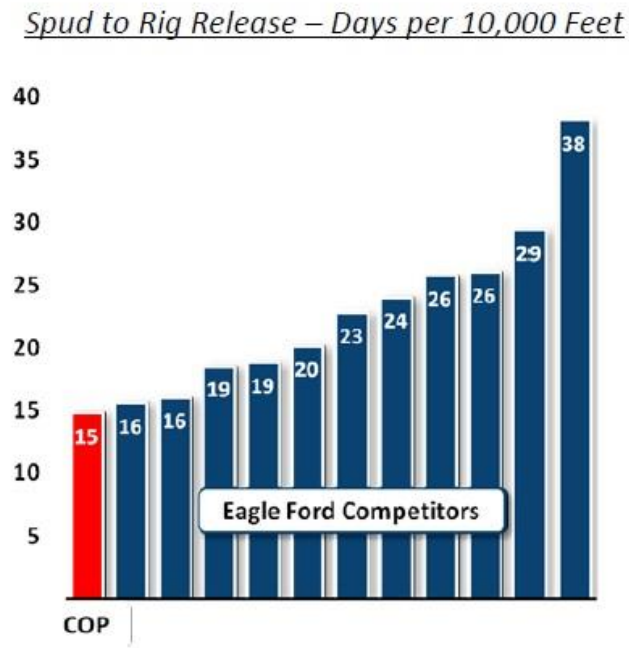
Ongoing EagleFord Improvements

Eagle Ford Excellence

- Best-in-play results driven by acreage quality, drilling and completion performance

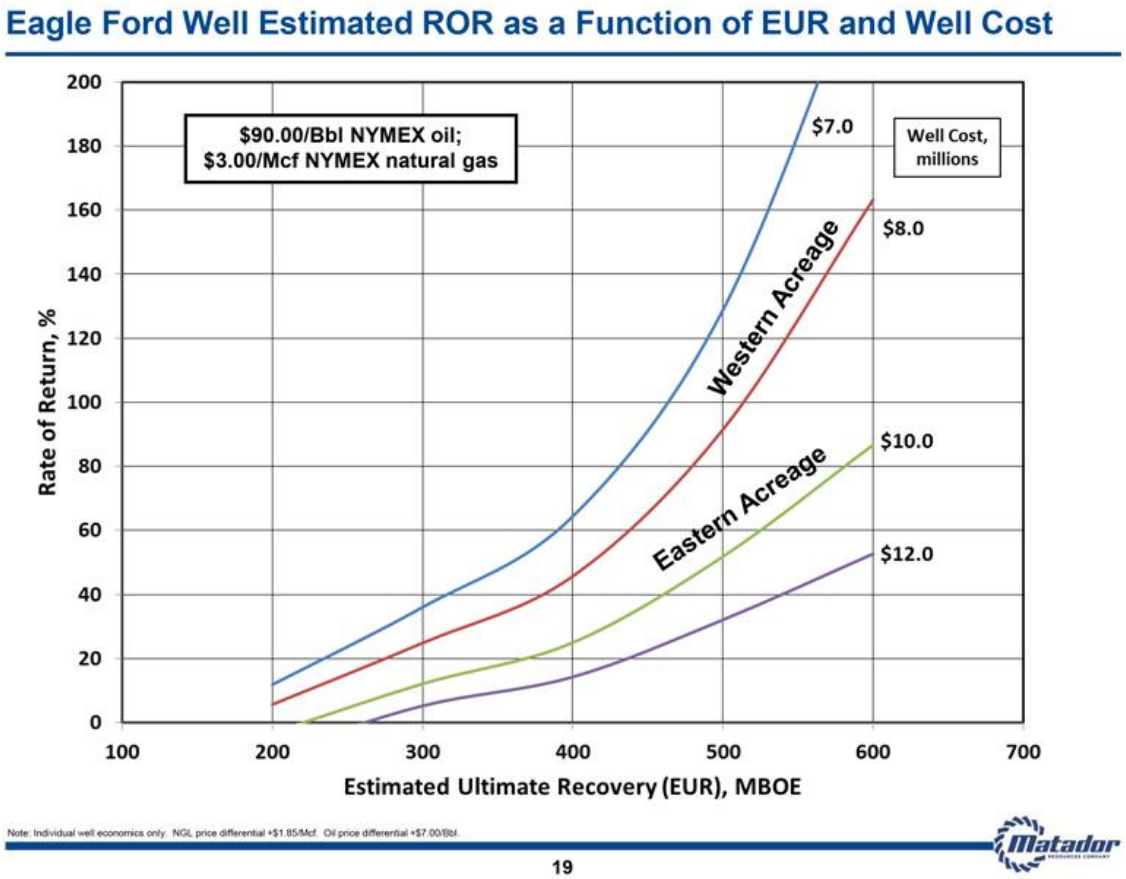




Production averages adjusted for first full month of production
Source: IHS Enerdeq

16 ConocoPhillips

Well Costs Impacts on ROR



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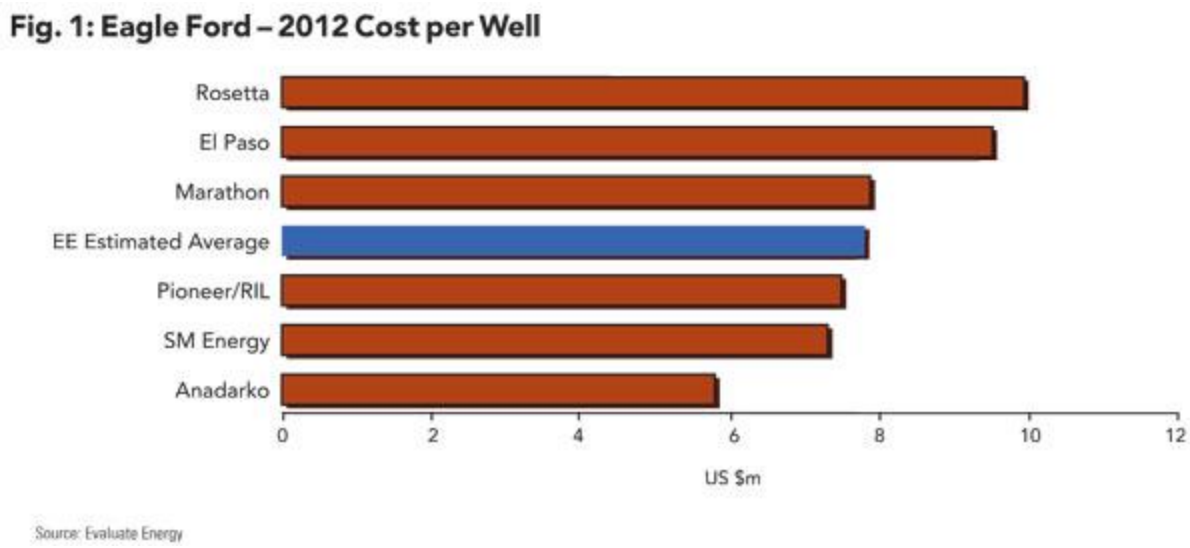
2012 EagleFord Well Costs



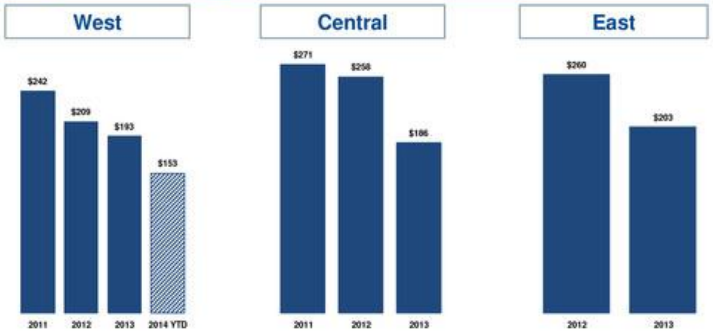
Drilling & Completions Cost Improvements

Operational Improvements (Normalized)

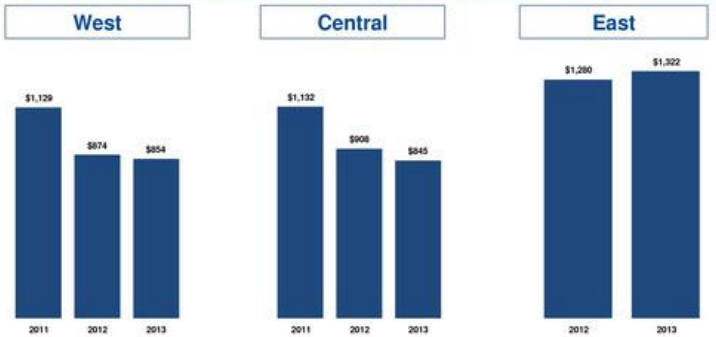
Overview

- Over the past two years, made significant progress and increased knowledge of how to drill, complete and produce Eagle Ford wells
- Experience and operational improvements have led to significant reductions in drilling and completion costs
- In 2013, began drilling from batch drilled pads using a drilling rig equipped with a "walking" package
  - Realized cost savings of approx. $325,000 per well on initial wells drilled using this rig
  - Expect the use of batch drilling and the "walking" rig will lead to total cost savings of approx. $400,000 per well or more going forward

Eagle Ford Drilling Costs / Drilled Foot(1)



Eagle Ford Completion Costs / Completed Foot(2)



Note: "2014 YTD" – As of March 1, 2014. Year classification is based on spud date.
(1) Drilled foot is the measured depth from surface to total depth. Excludes any/all wells drilled with a pilot hole, any/all wells drilled outside the West, Central and East and any/all wells drilled with three strings of casing.
(2) Completed foot is the completed length of the lateral. Excludes any/all wells drilled with a pilot hole. Excludes any/all wells in the West and Central where premium proppant was used.

Matador RESOURCES COMPANY

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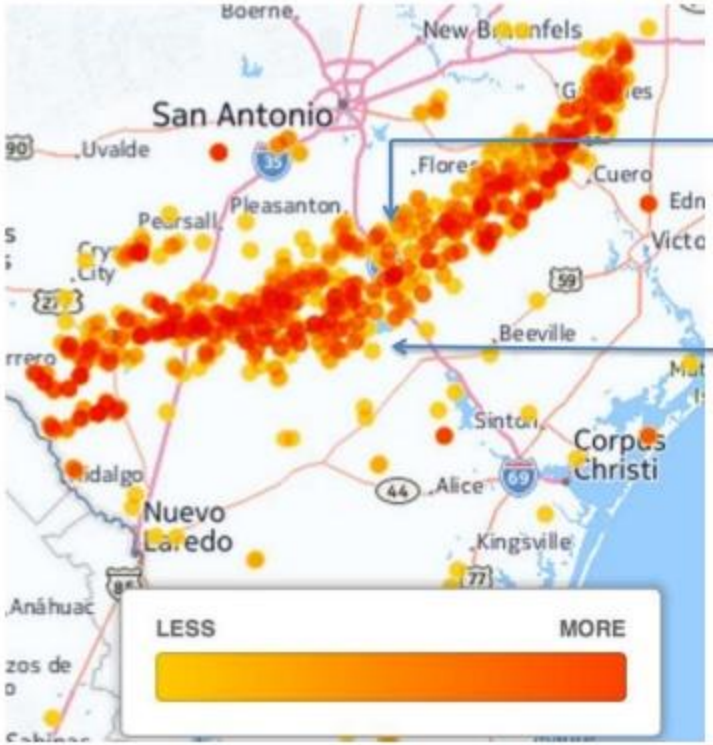
EagleFord Sand Usage Map

EAGLE FORD SAND USAGE

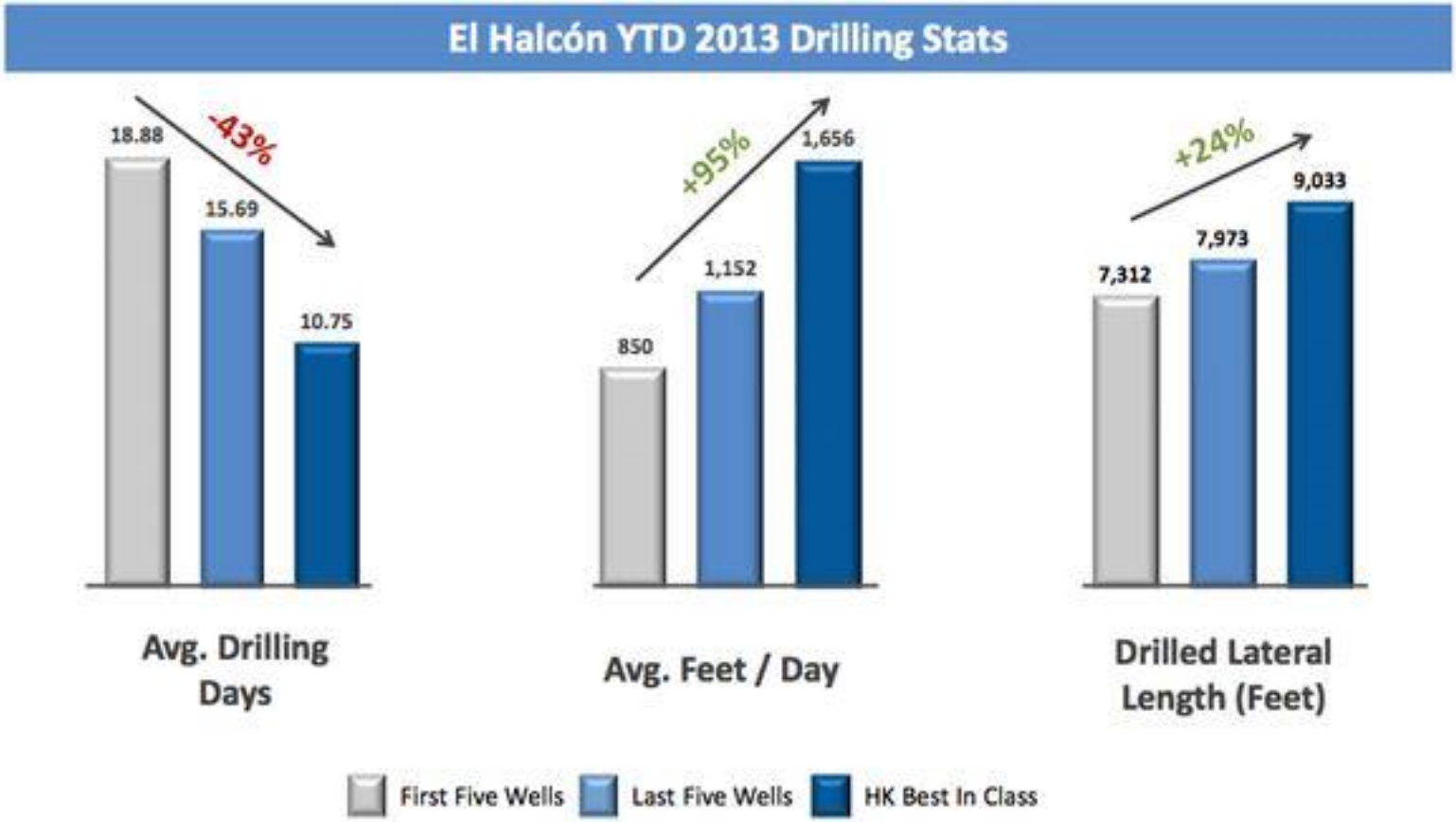
Energent Group



Oil Window

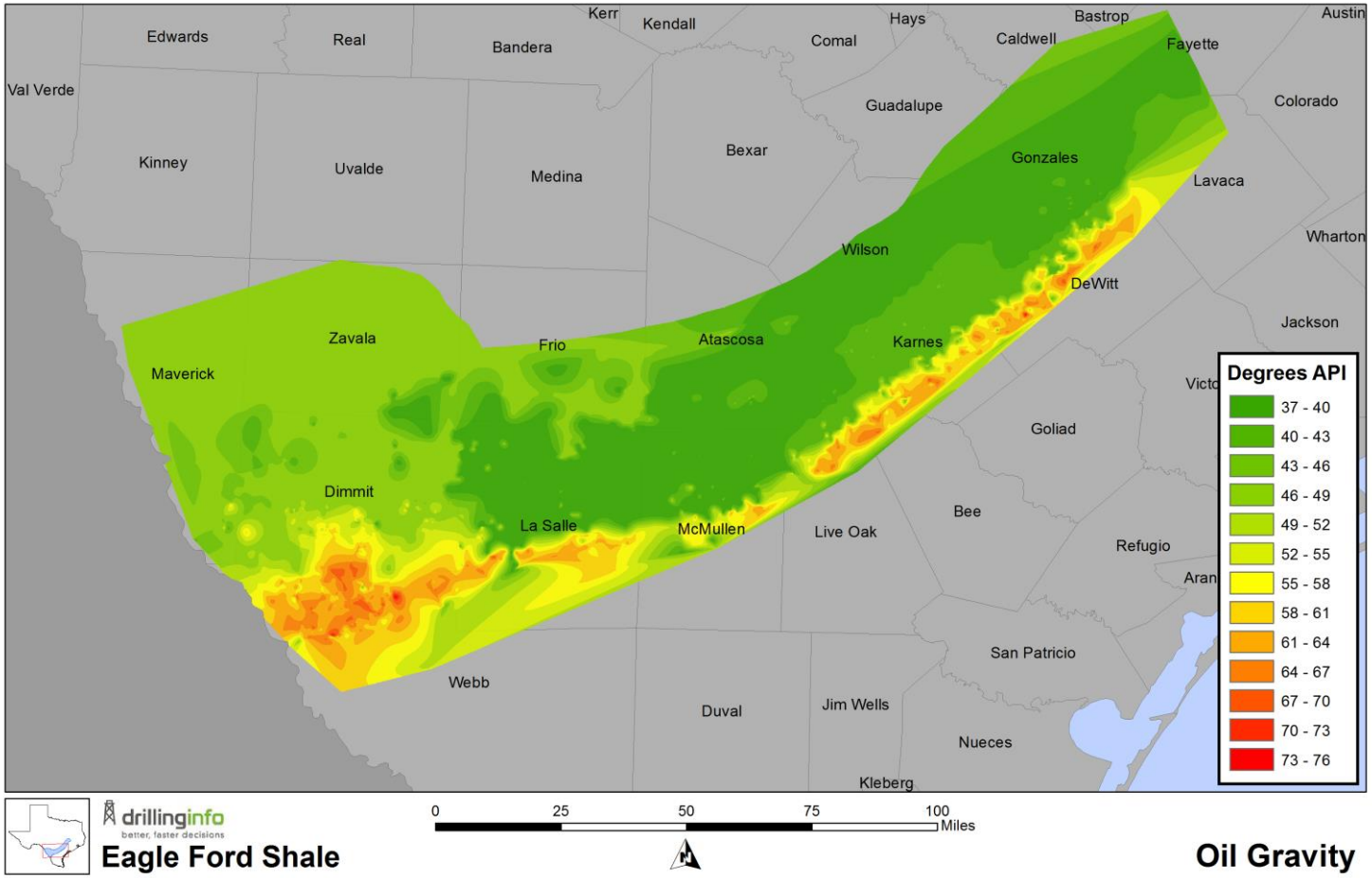
Gas Window

Drilling Stats



Cost Reduction Drivers

EagleFord Oil Gravity Map



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Conclusion

- Cost drivers in MX shale plays not publicly disclosed as yet
- Proppant and Oilfield Supply Chain cost structures likely to be substantially higher than Eagleford
- Well costs will be much higher than Eagleford, for similar lateral lengths
- Direct correlation between transportation infrastructure, proppant demand and well costs
- Royalty regime can have large impact on amount of investment in the Burgos Basin

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