

Haynesville, TMS and the Austin Chalk

Louisiana's place in the Lower 48 supply stack

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Biography

Brandon is a senior analyst with our Lower 48 research team. Having joined Wood Mackenzie in 2017, he has worked on the integration of subsurface data with L48 research and conducted research into every major unconventional play in the US and Canada.

Prior to this, Brandon's career included roles in both energy efficiency and the oil and gas industry. He was a founding partner of Firefli LEDs, a carbon reduction focused LED lighting company that focused on solutions for high rise towers and industrial facilities.

After that he spent time as an energy analyst for Nemalux, a Canadian, heavy industry LED manufacturer that specializes in carbon and power reduction solutions for wellsite facilities.

He was a conventional field geoscientist for an innovative junior oilfield optimization exploration company in Calgary through 2016 and early 2017.

Brandon graduated from the University of Alberta with a BSc, Specialization in Geology. Academically his focus was on the organic geochemistry of the Duvernay shale and his thesis was focused on hydrocarbon generation and expulsion modelling across Encana's Kaybob acreage.

Connect with Brandon



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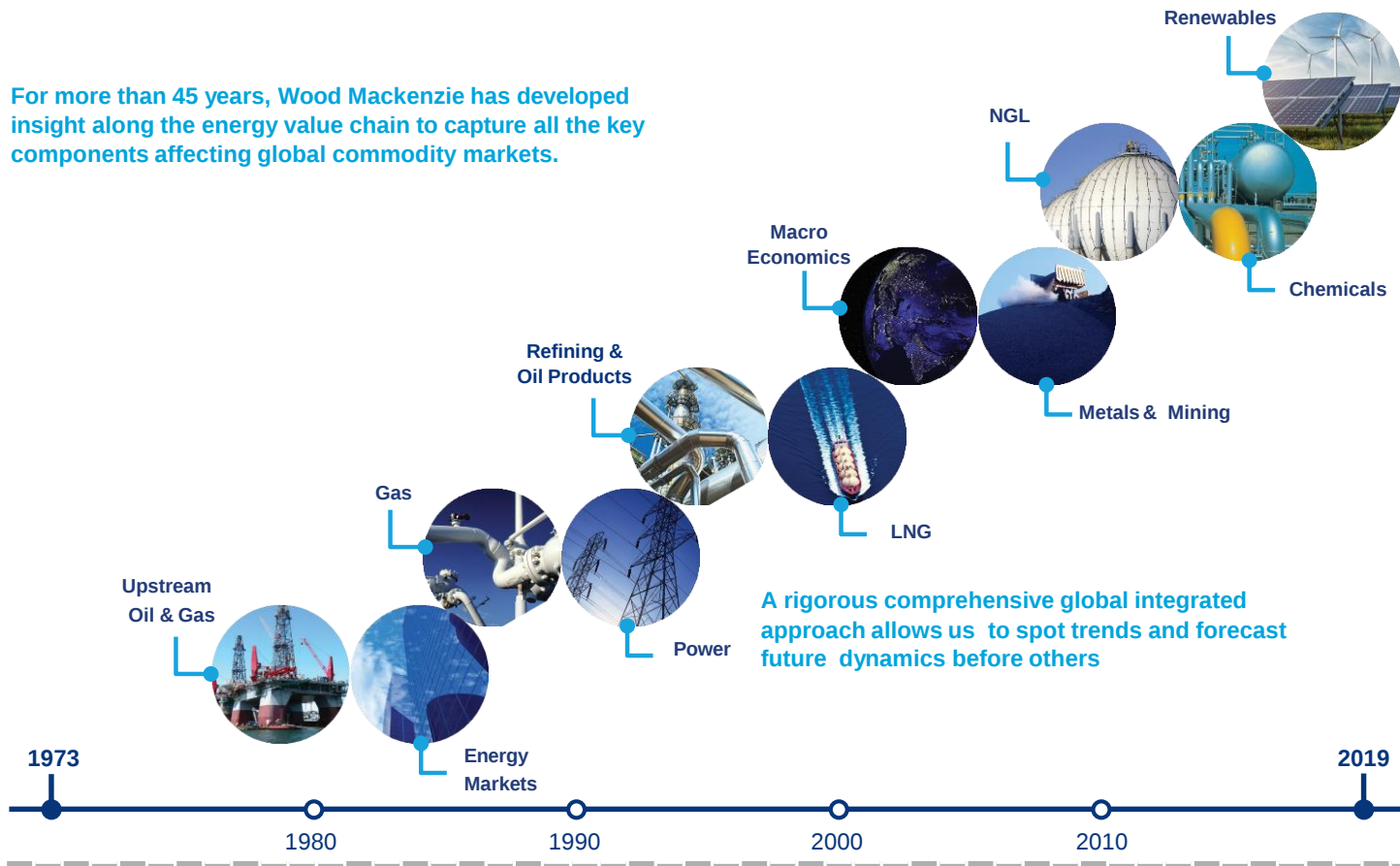
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Building a competitive advantage on strong foundations

For more than 45 years, Wood Mackenzie has developed insight along the energy value chain to capture all the key components affecting global commodity markets.



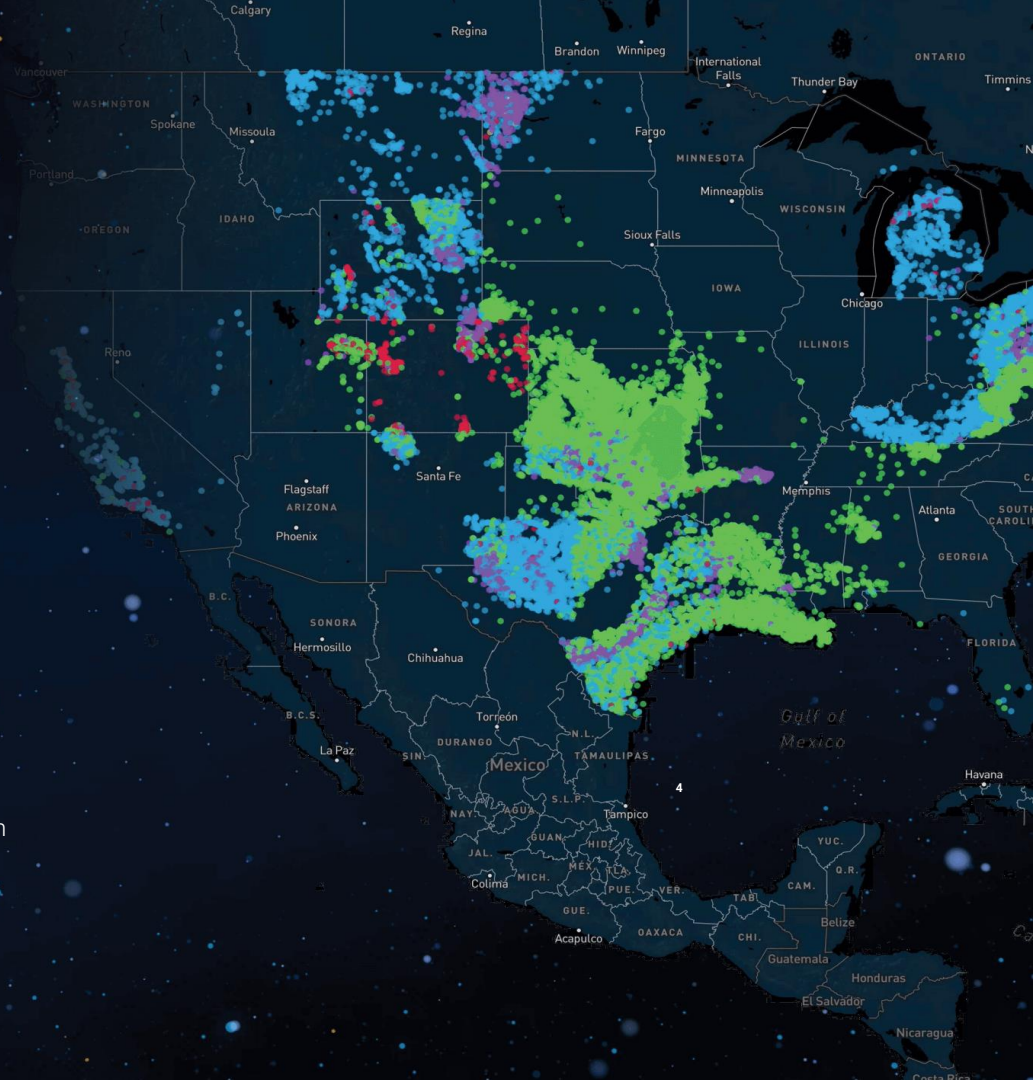
Quickly benchmark and compare operator performance at the well level

Your questions:

- What does a company's PDP decline rate look like?
- How does my onstream well performance compare to my peers?
- What companies are the top performers in the play?

Well Evaluator gives you the answers

- Run different scenarios and determine valuation impacts on the fly
- Build custom benchmark dashboards/reports and easily update them
- Compare well design & performance against peers
- Evaluate well performance at the reservoir level
- Communicate key performance drivers for a play





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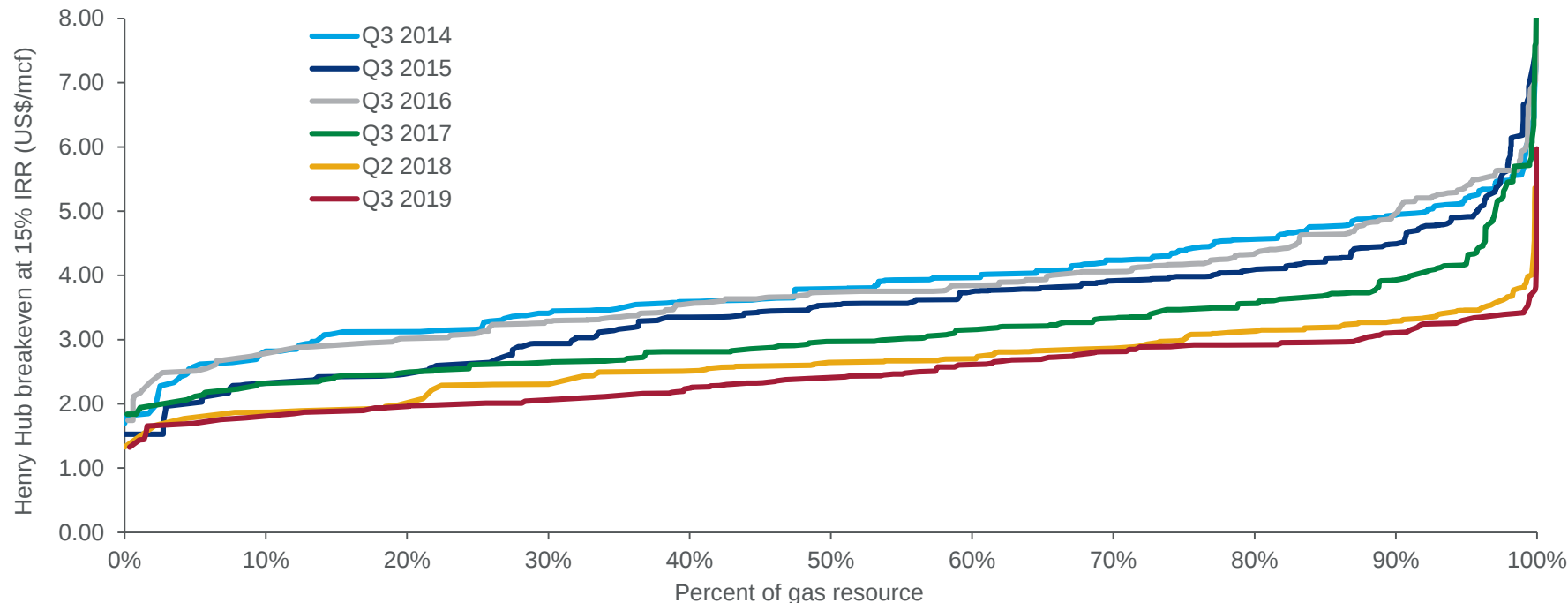
Gas: Haynesville 2020 and beyond



Differentiated from tight oil, gas breakevens are down again

Gas productivity continues to increase, compounded by savings from oilfield service costs. In 2014 only 13% of the resource broke even under \$3.00/mcf, by 2019 88% of it did.

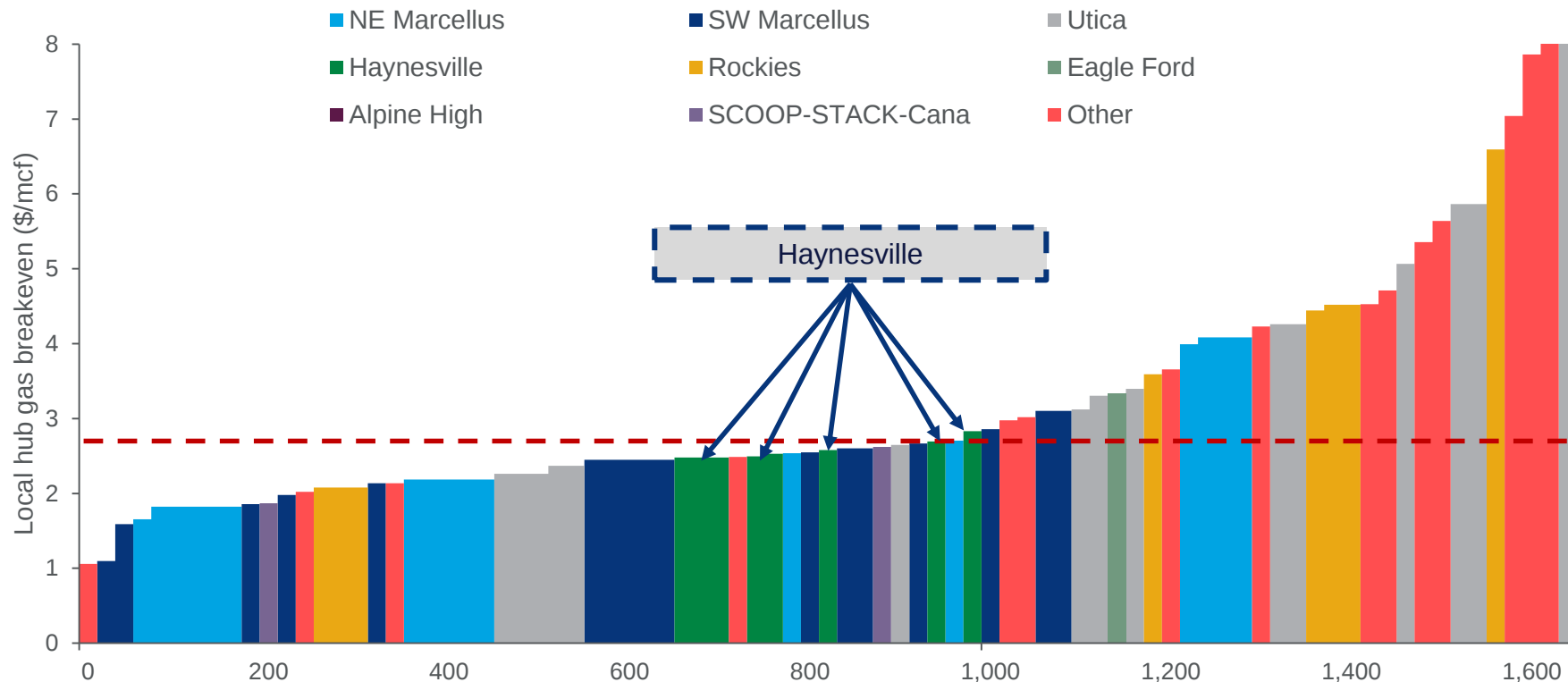
Gas breakeven curve vintages





Where does the Haynesville sit in the stack ?

Most of the Haynesville locations breakeven at \$2.75 or less.

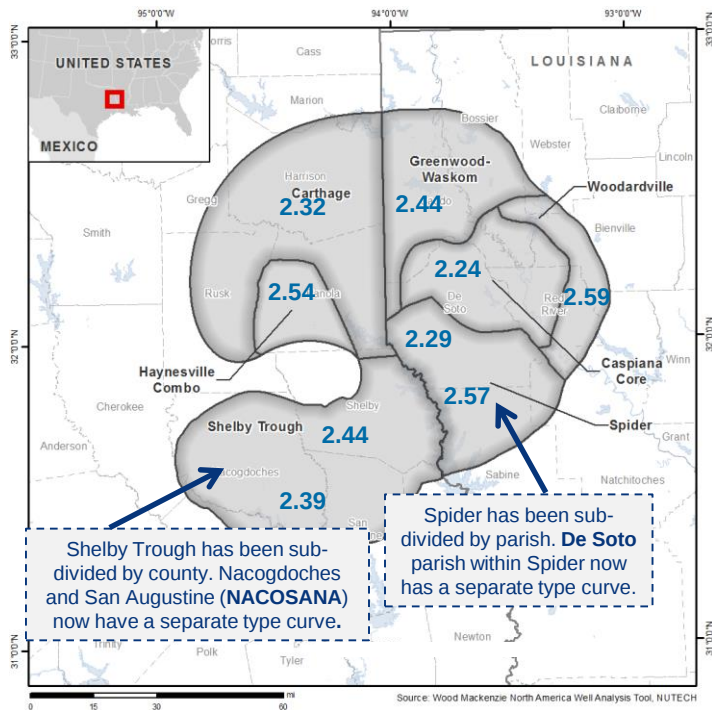




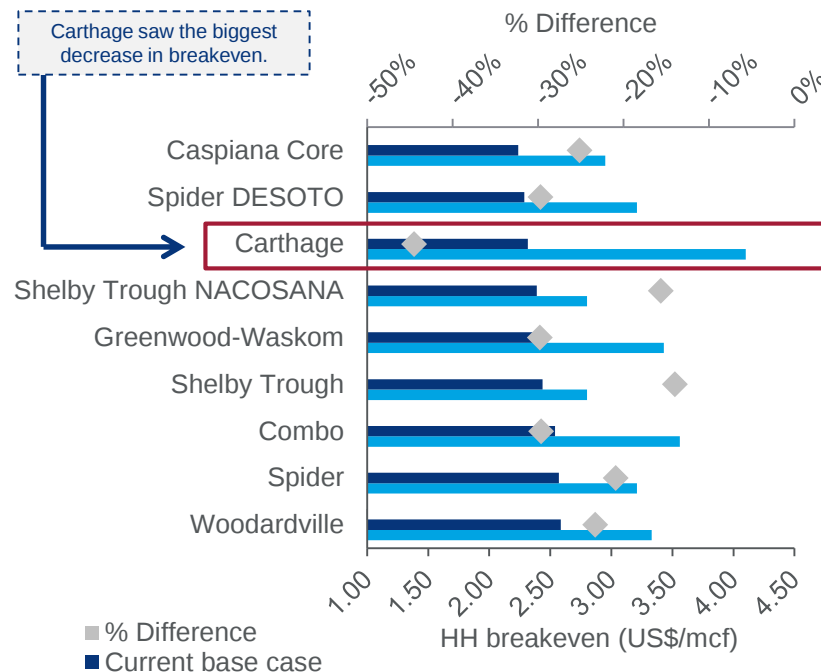
Where does the Haynesville sit in the stack ?

The Haynesville breaks even at \$2.75 or less with Louisiana still leading the way but Carthage saw the biggest decrease in breakeven.

10% breakevens by sub-play



Changes in breakevens by sub-play

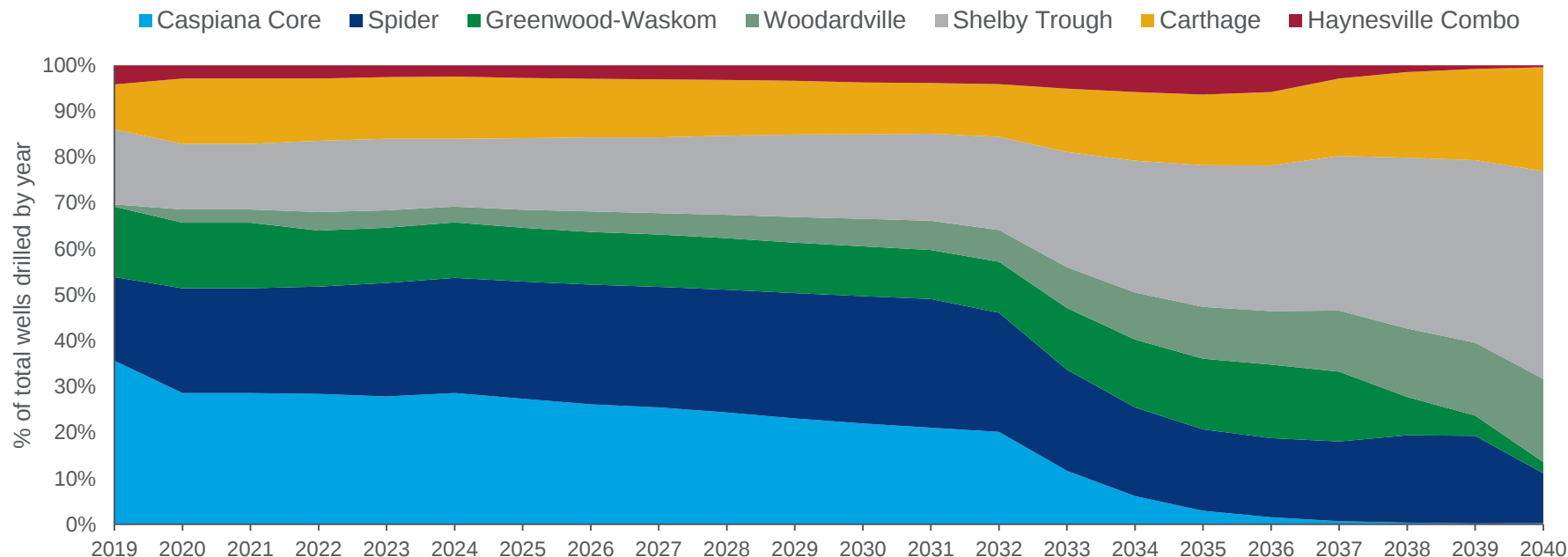




How long will Louisiana's Haynesville be number 1?

In 2020 we expect 70% of all Haynesville wells to be in Louisiana and that remains stable into 2030.

Haynesville % of total wells drilled by sub-play

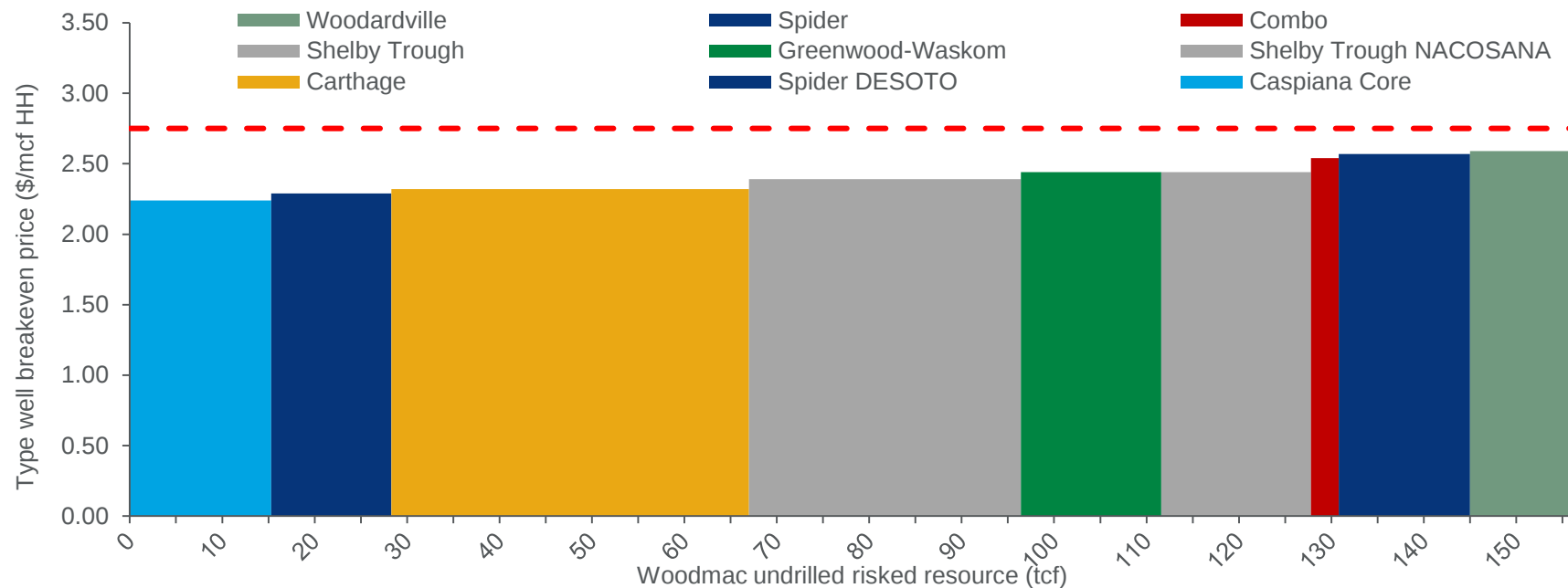




Cost of supply: running room despite low gas prices

Over 28 TCF of recoverable gas in the traditional Louisiana core breaks even under \$2.50 but the Texas sub-plays are competing for capital now.

Haynesville cost of supply curve



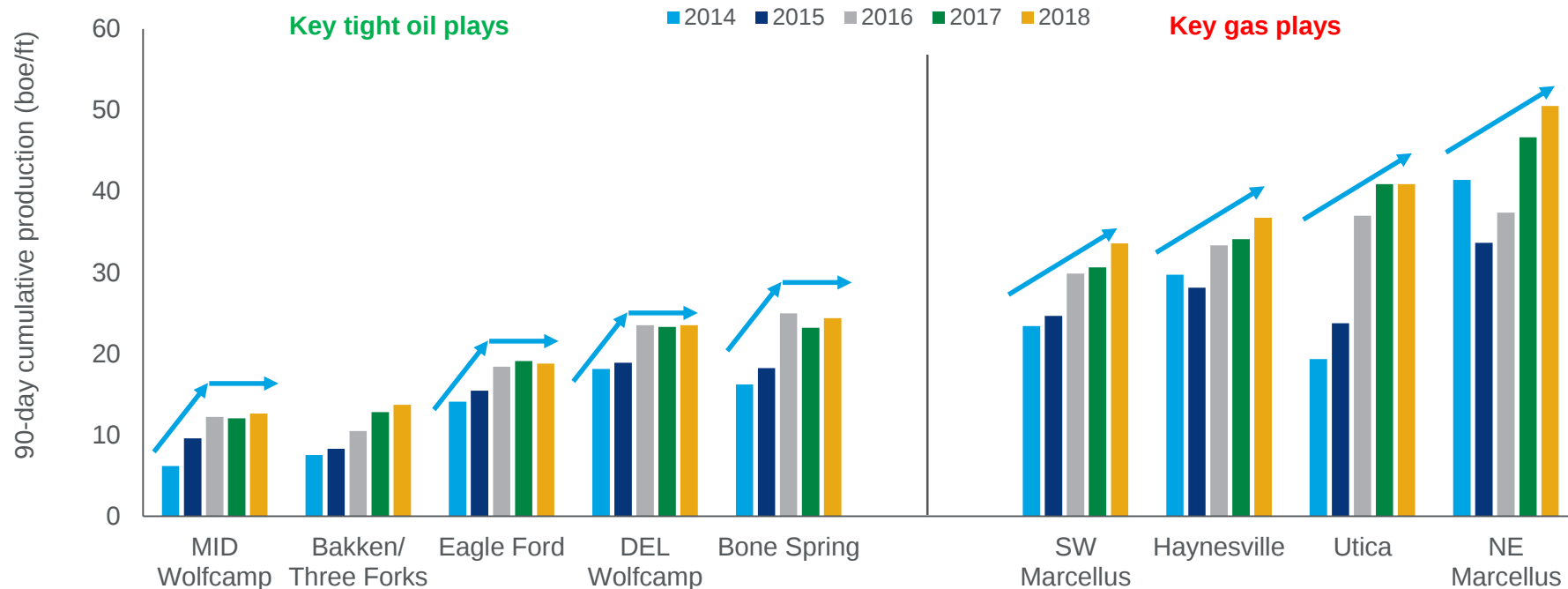
Oil: TMS & the Austin Chalk



Tight oil productivity gains are moderating while gas plays improve

In the gas plays longer laterals, proppant loading and wider inter-well spacing is pushing gas productivity higher.

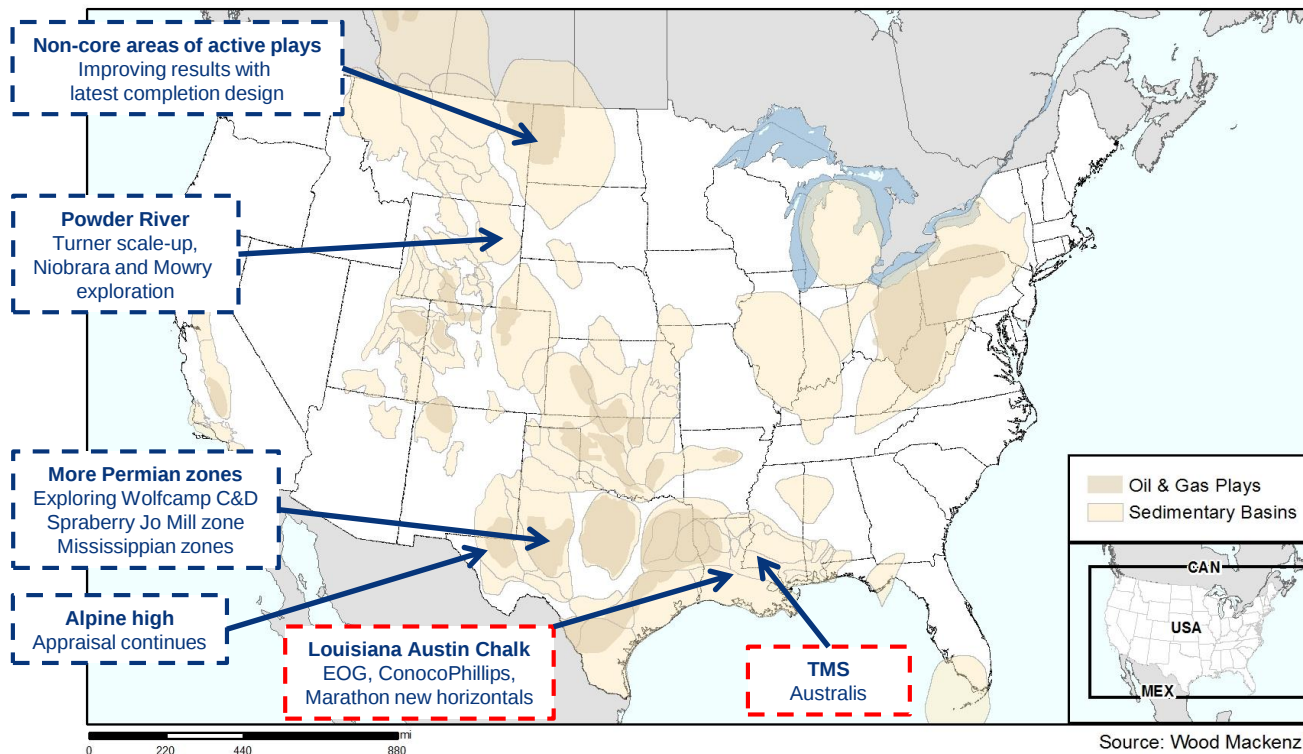
Lateral normalized productivity trends (full year datasets)





Lower 48 exploration and step-out activity

Louisiana is the only place we see true exploration right now. Most exploration plays are down-hole or up-hole tests.

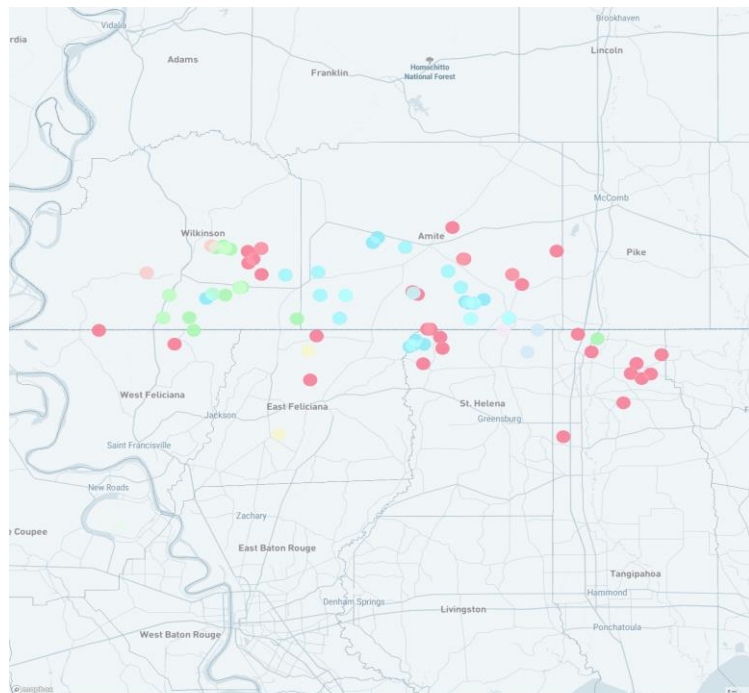




Tuscaloosa Marine Shale – When the wells are good, they're great

Traditionally the problem with the TMS was repeatability, this led to a huge spread in well results.

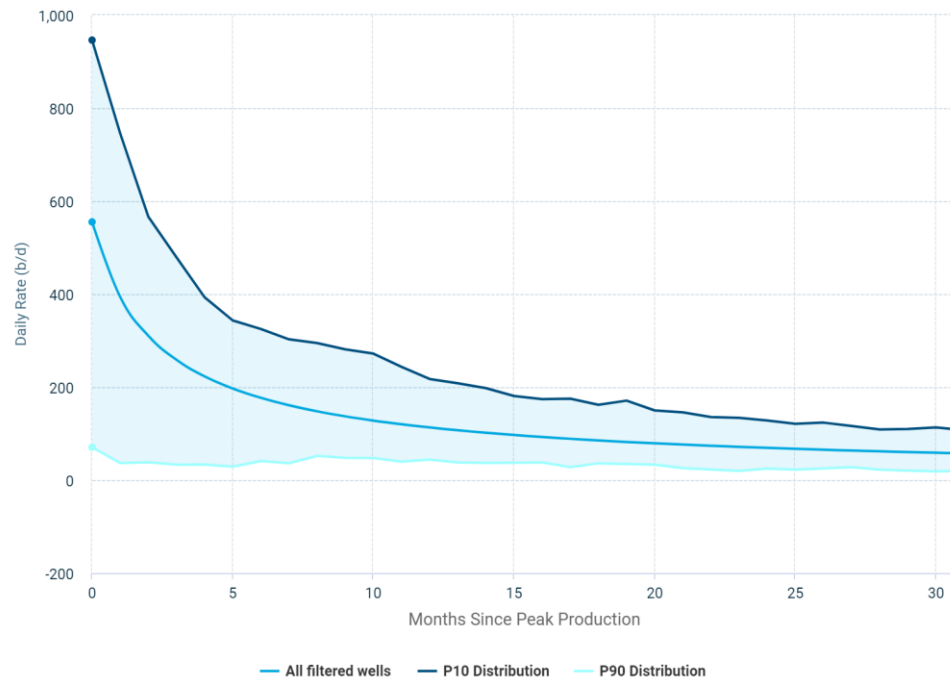
TMS play fairway



Color by Operator:
Aurora Oil & Gas
BP
Comstock Resources
Devon Energy
EOG Resources
Goodrich Petroleum
Halcon Resources
Monmouth W.A.
Paloma Resources
Sanchez Energy Corporation

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TMS production curve distributions (Oil only)

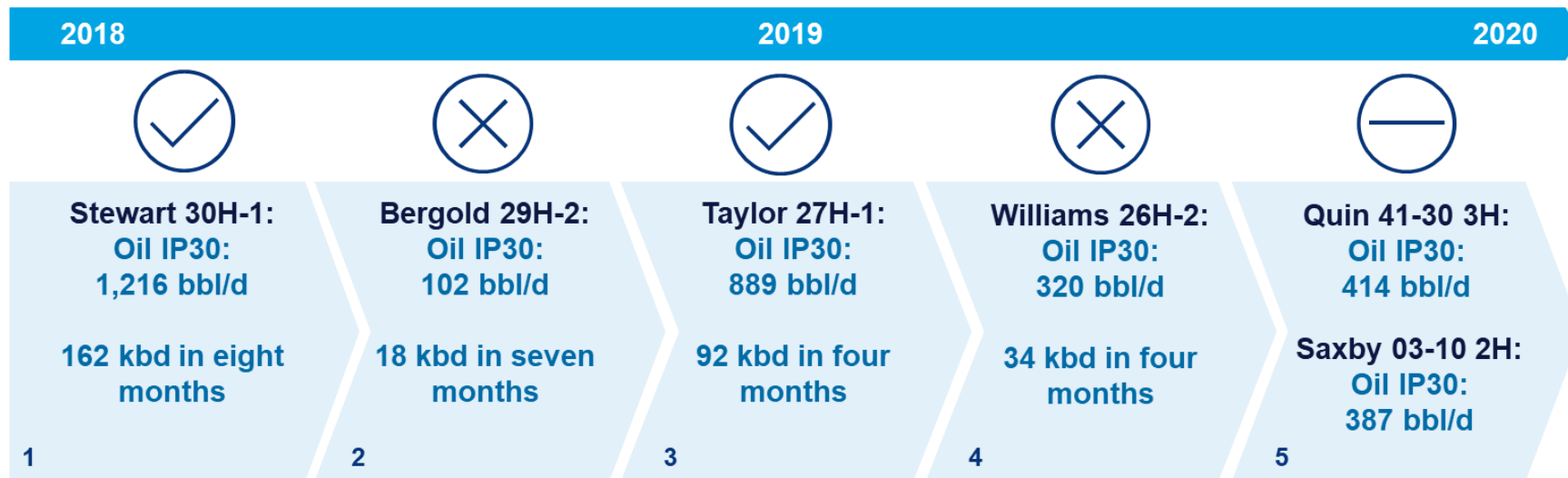




TMS: Recent developments

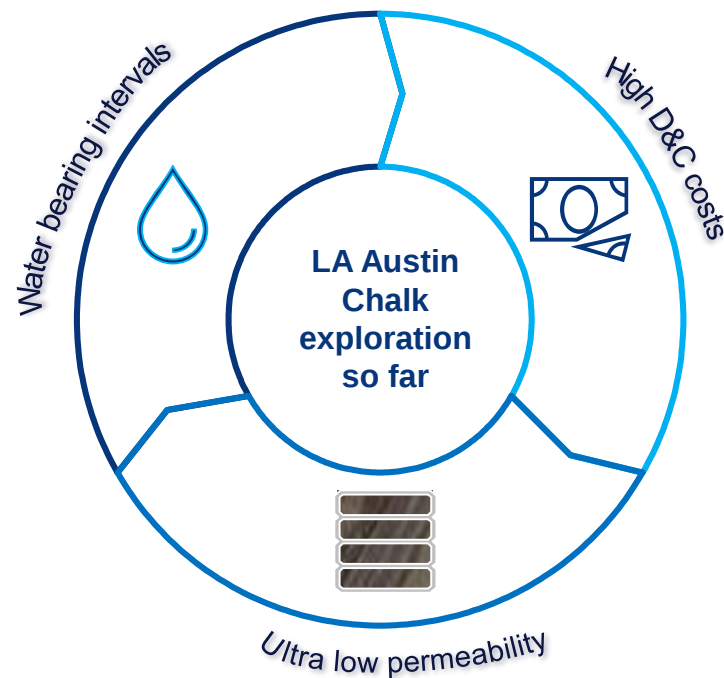
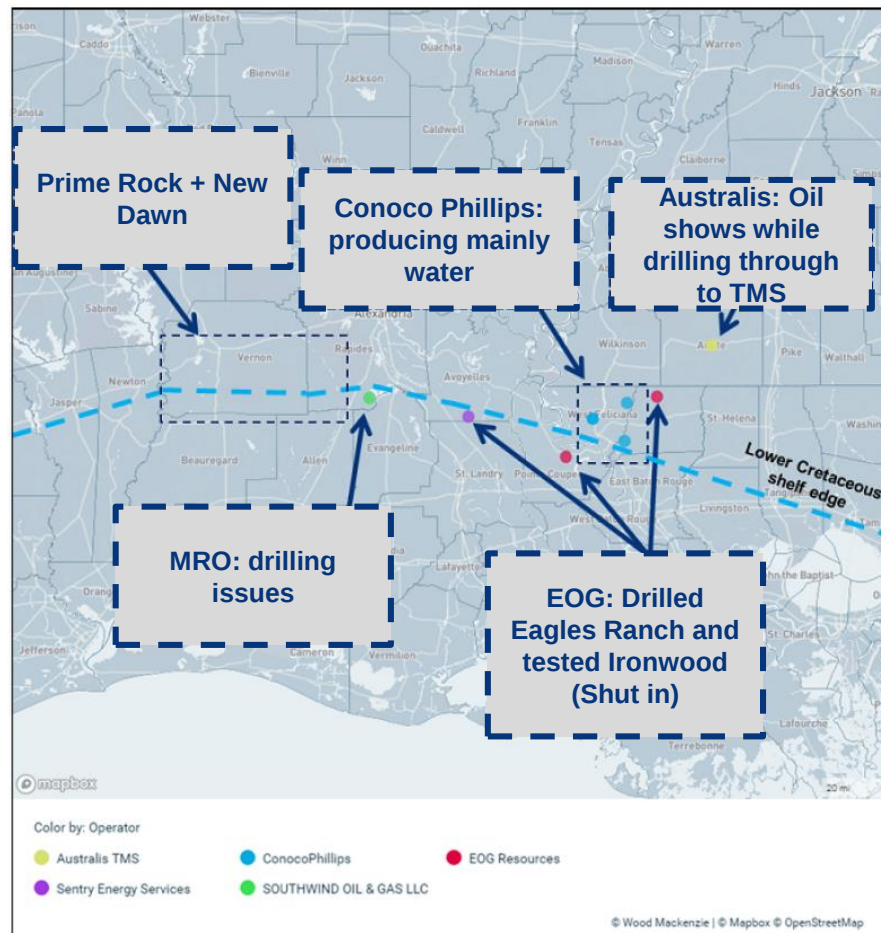
Progress has been made but complications in drilling and completing continue. Results continue to be mixed.

Australis TMS well evolution





Louisiana Austin Chalk: Water bearing zones, well costs and low perm





TMS still in exploratory phase

It's possible for breakevens to drop \$10/bbl or more (PRB Niobrara) but reliability achieved through a better understanding of reservoirs and landing zones is imperative.

Liquids breakevens by play





Louisiana Austin Chalk still has a long way to go

Geologic and engineering constraints combined with very high breakevens paint a bleak picture for future Austin Chalk development. Success in the western sub-play is crucial.

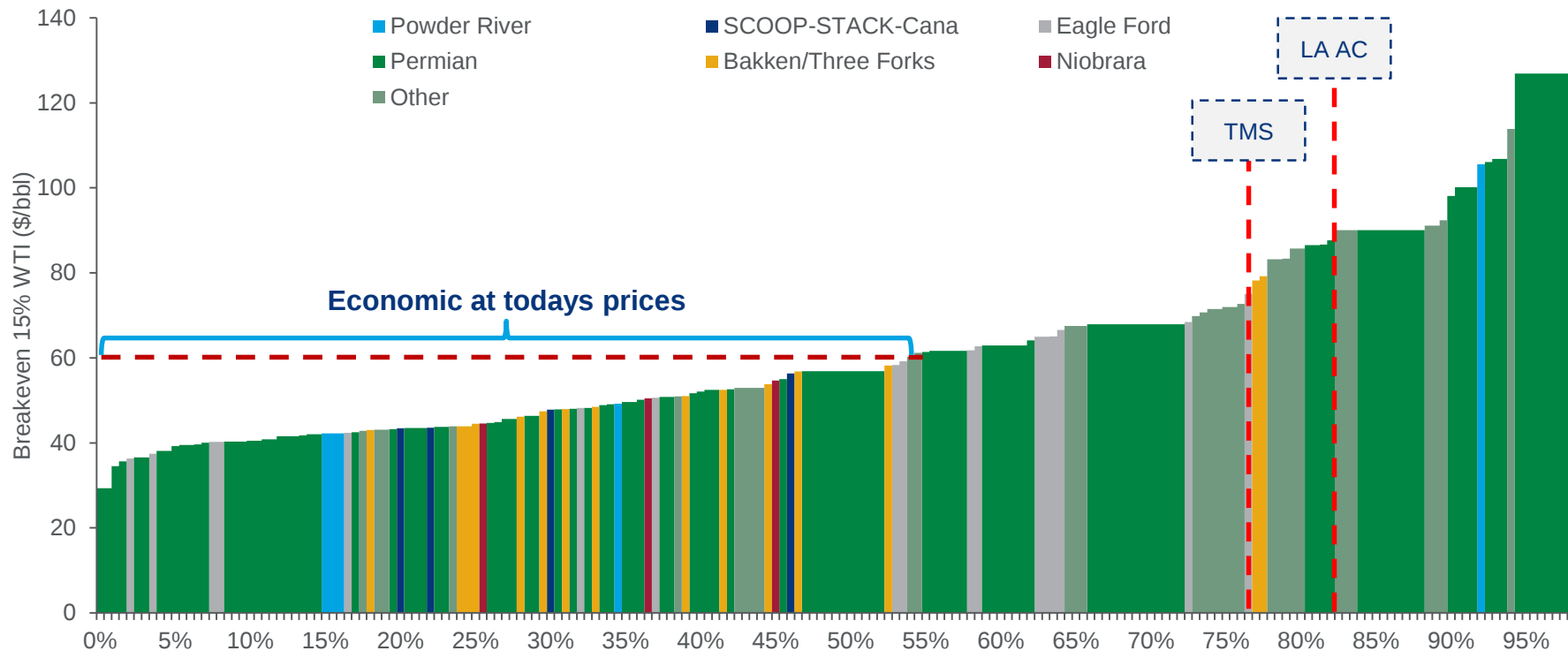
Liquids breakevens by play





Put another way....

Roughly 77% and 83% of all the Wood Mackenzie modelled resource breaks even below the current TMS and Austin Chalk developments, respectively.



Louisiana: Are you a bull or a bear?



Geographic advantage & lots of improvement room

Haynesville

- Export capacity
- Rock quality

TMS

- Repeatability
- Drill times

Austin Chalk

- West vs East
- Eagle's Ranch 14H



Inventory drops post 2030 & bad timing for new plays

Haynesville

- Locations
- Gas prices

TMS

- Challenging geology
- Capital pullback

Austin Chalk

- Operators are pulling out
- Water, well costs and perm

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