



KAYRROS

How Disruptive Technologies are Changing the Energy Industry & Trading

The New York Energy Forum
February 11, 2020

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An asset-centric technology platform



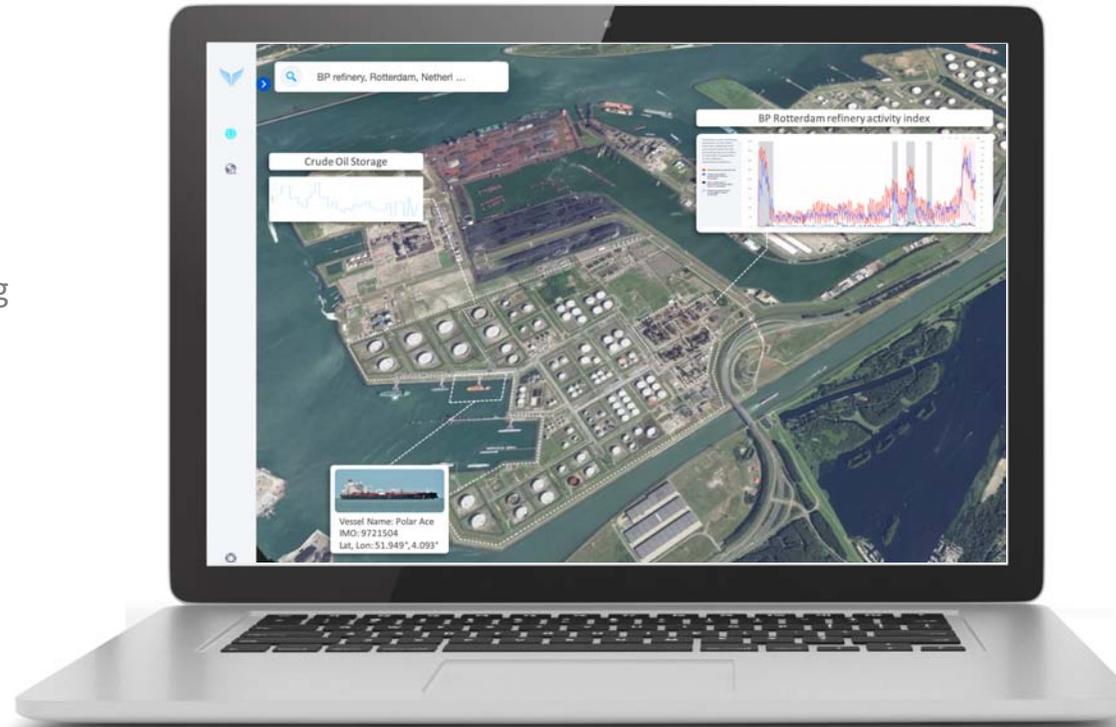
IoT and ground sensor data

Multiple sensor data (including ground emission sensors, imagery, and more)



Position tracking

Multiple updates per day (AIS)



200,000+ Assets monitored
O&G Wells, storage tanks, refineries,
landfills, power plants and more



3D Reconstruction and satellite measurements

Dynamic offering of satellite measurements (gas emissions, temperature, water levels, and more)



News & social media alerts

Realtime on targeted assets

Diverse customers

Multiple use cases



Oil & gas producers



Chemical companies



Utilities



Banks & insurers



Airline & shipping companies



Physical traders



Hedge funds & asset managers



K

ayrros is bringing
transparency to
opaque markets

- *Rapid response (KRR)*
- *Price regime analysis*
- *Operator benchmarking*
- *Emissions detection &
measurement*



KRR – Two-speed country

China labor-intensive & non-intensive industries in wake of coronavirus outbreak

Wuhan Iron and Steel corp. steel plant; Wuhan coal-fired power plant

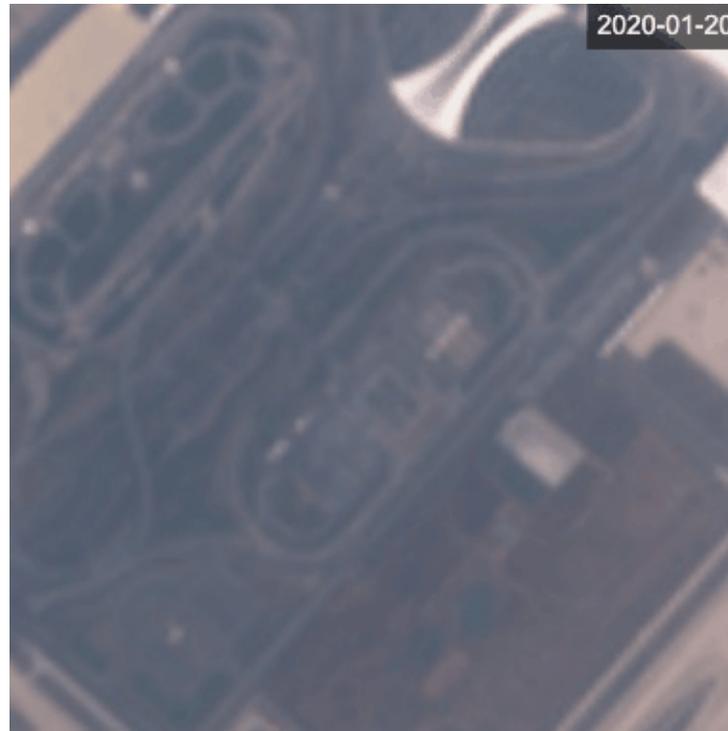




KRR – Two-speed country

China labor-intensive & non-intensive industries in wake of coronavirus outbreak

Empty parking lots at Dongfeng-Renault car factory (left); and at Wuhan airport (middle); railway cars stuck at Wuhan station (right)

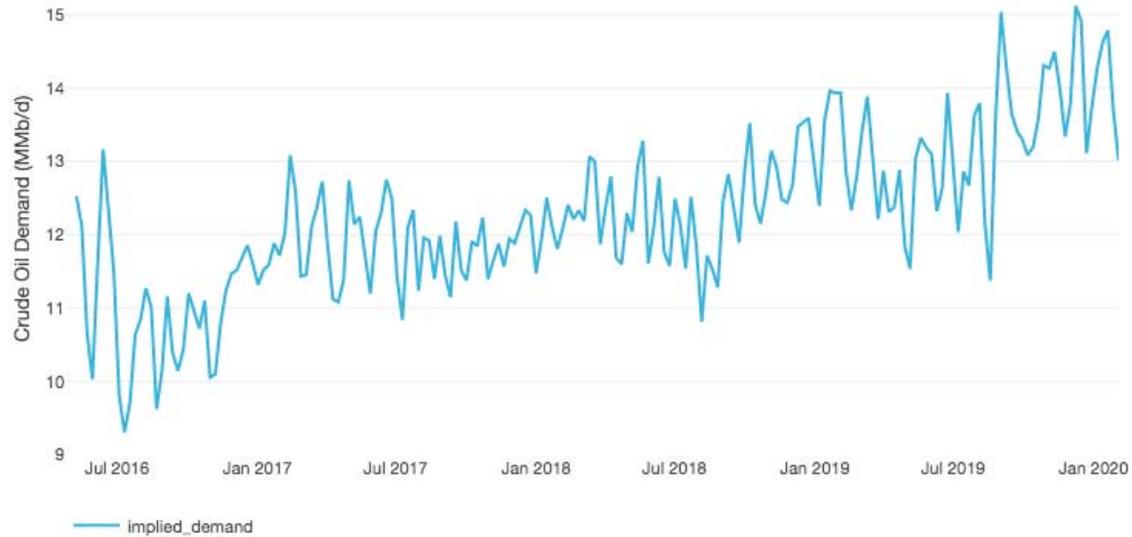




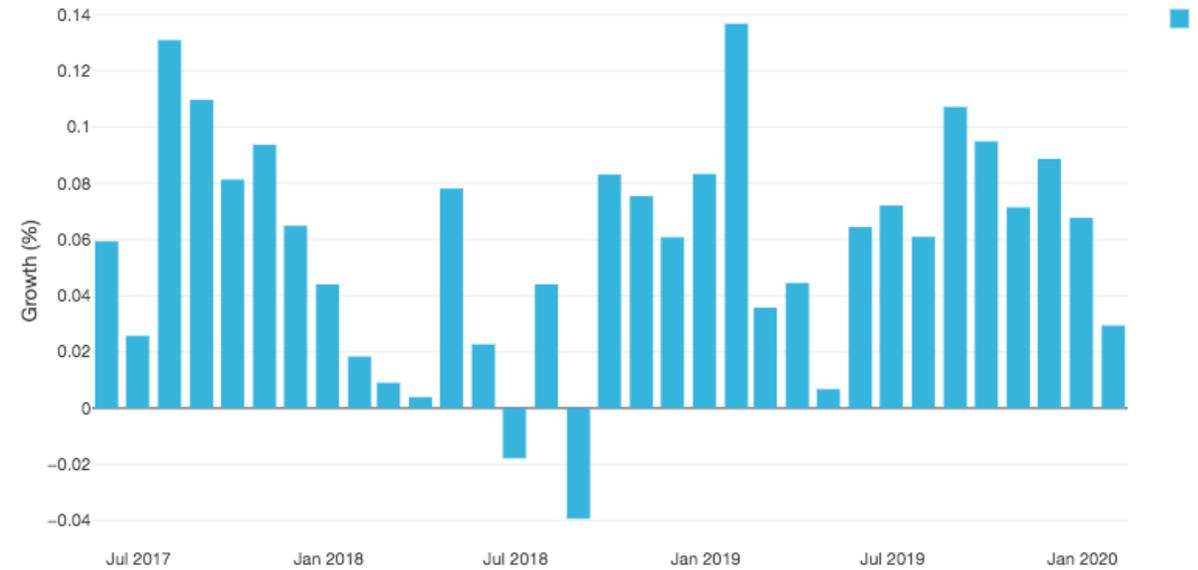
KRR – Down but not out

China apparent crude demand in wake of outbreak

China crude oil implied demand, two-week average



China crude oil implied demand, monthly, y/y growth



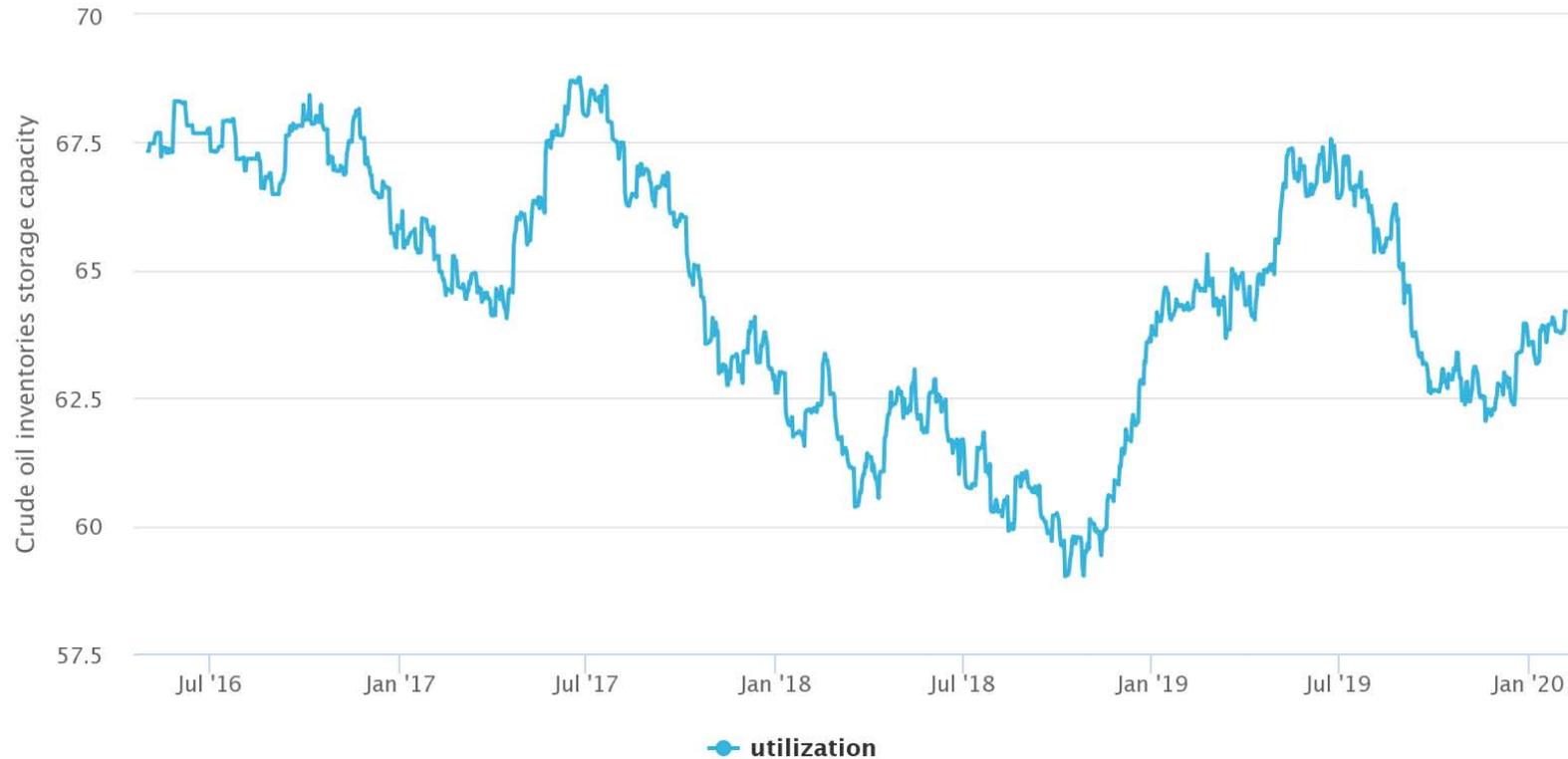
Sources: Kayrros analysis



KRR – Room to grow

Chinese inventories show first signs of building pressure as runs slow

Kayros crude oil inventories capacity utilization in China

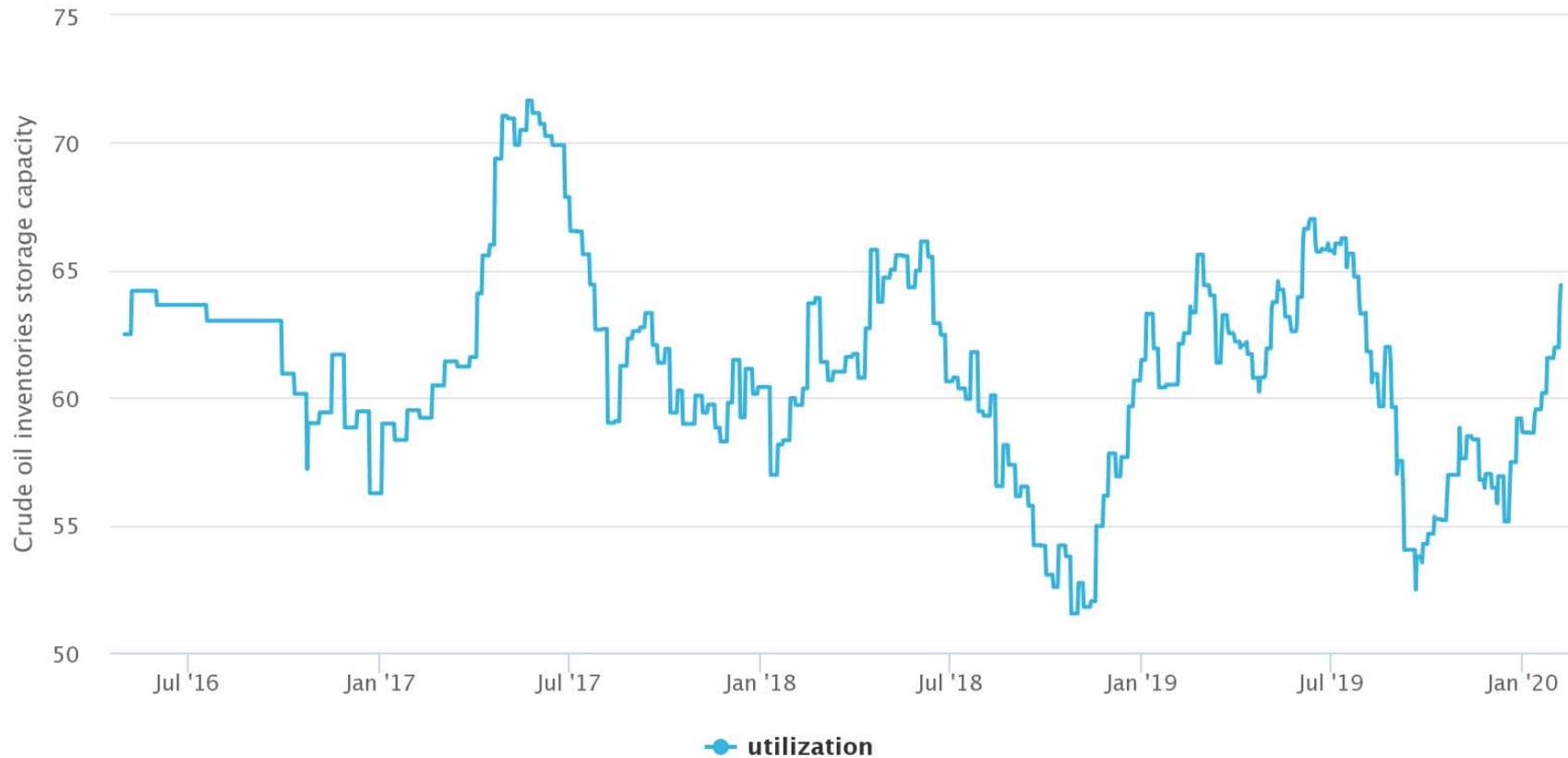




KRR – Shandong, building as usual

Shandong crude stocks lead nationwide builds

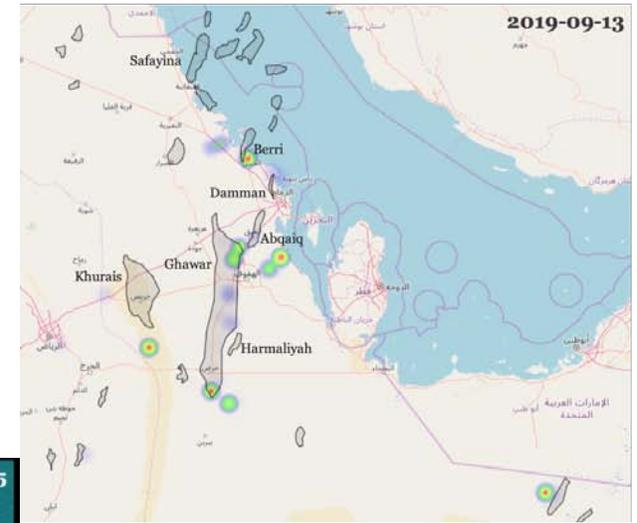
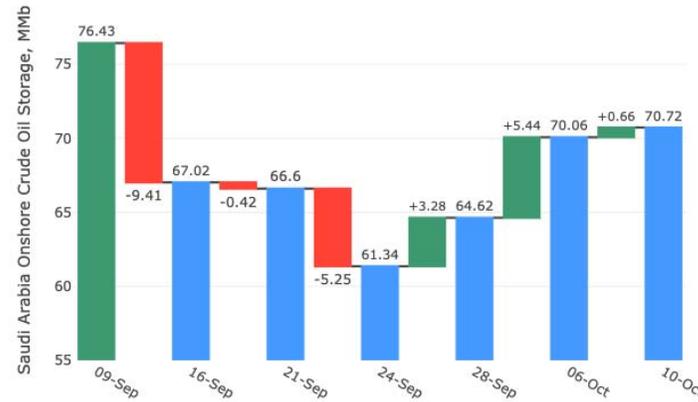
Kayrros China crude oil inventories capacity utilization in Shandong region





KRR – Abqaiq: first disruption in satellite era

Kayros leveraged its expertise in satellite imagery to track Saudi output in the wake of the September Abqaiq attack





KRR – Keystone pipeline peak

Kayros analysts sprang into action to track TC Energy after the November Keystone pipeline leak

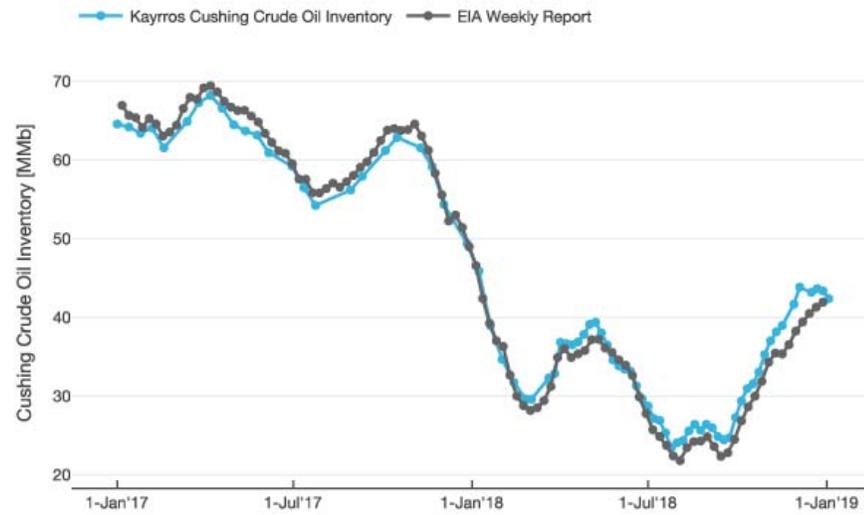




Price regime: global stocks as leading indicators

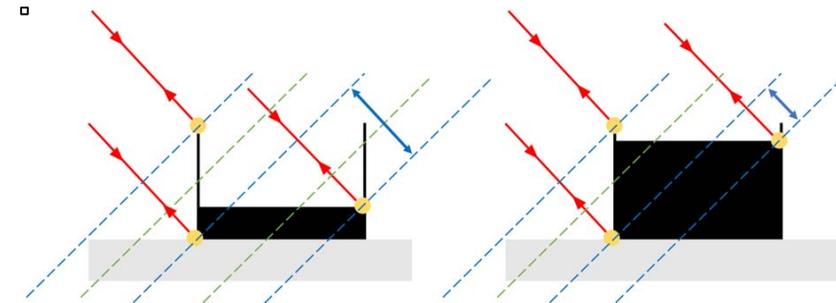
SAR satellite technology ensures reliable, accurate, timely measurements

Reliable Benchmarking Against Publicly Available Data

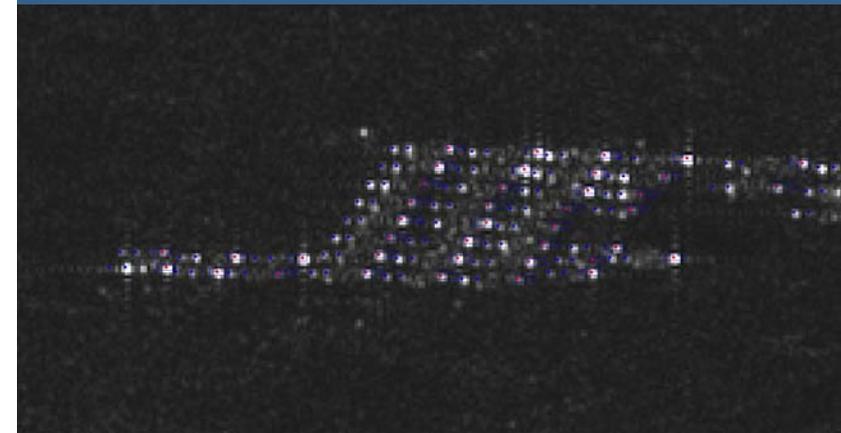


Source: Kayrros, EIA, ESA

Our storage monitoring has a demonstrated accuracy level of 97.2% (based on 2017-18 figures)



Cushing Storage Facilities, SAR Satellite Imagery



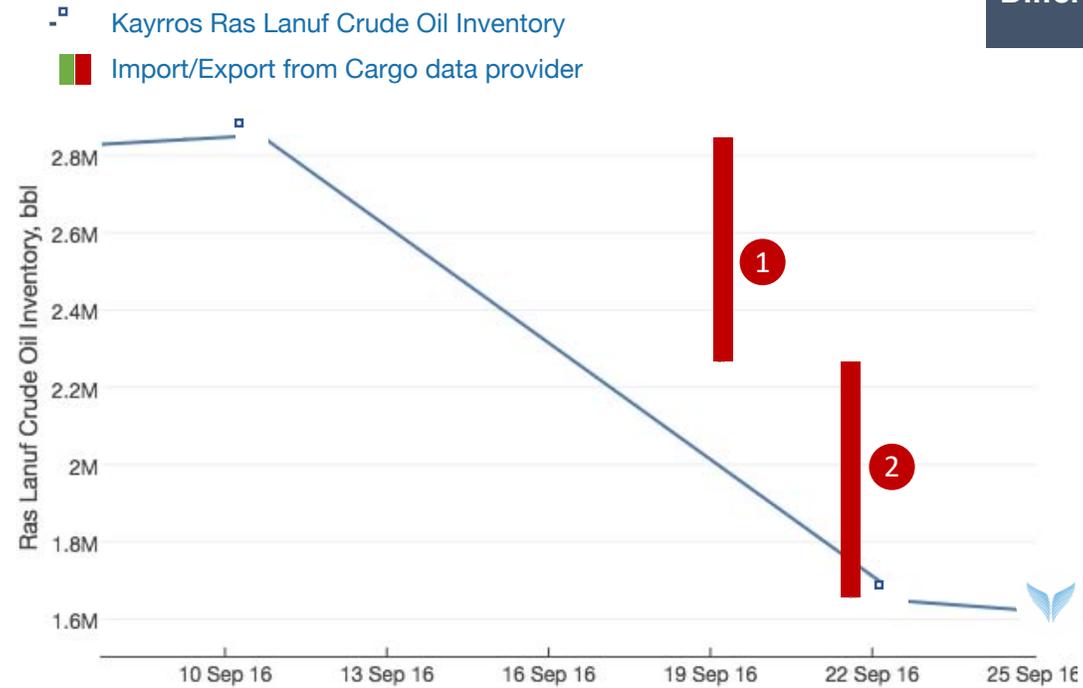
Source: Kayrros



Stock change accuracy crosschecked by cargo data

Kayros Ras Lanuf Crude Oil Inventories and Cargo Data

MMb



Vessel Details:

1 Syra
- 596 kbbl reported



2 Seadelta
- 596 kbbl reported



Source: Kayros



Global stocks vs. Brent flat price

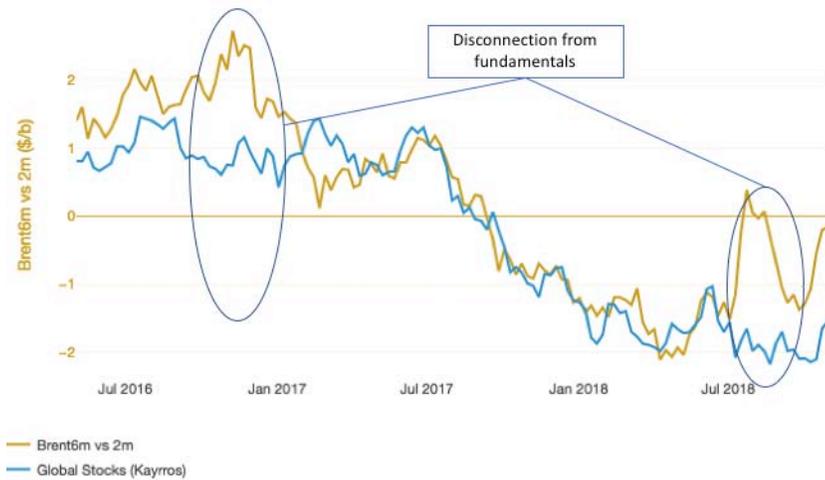
Kayros Global Crude Oil Inventories Capacity Utilisation (including US crude stocks deseasonalized) versus Brent 1m (reversed axis)



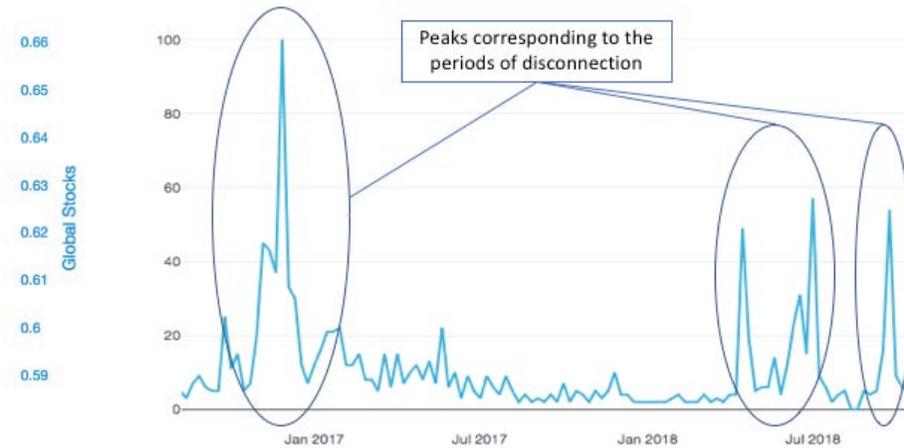


Sentiment index

Kayros Global Crude Oil Inventories vs Brent time spreads



Intensity of “geopolitics of oil” keywords in the news

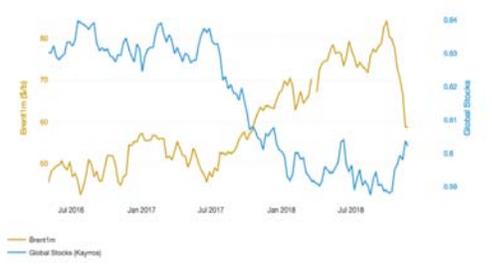
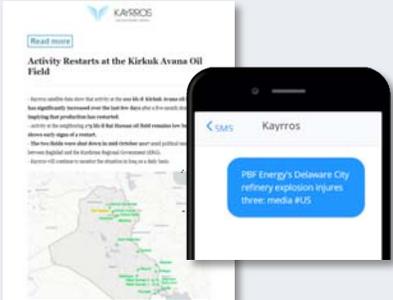


Kayros uses natural language processing to identify when the market is driven by sentiment

Sources: Thomson Reuters, Google News, Twitter, Kayros analysis



From fundamental analysis to trading signals

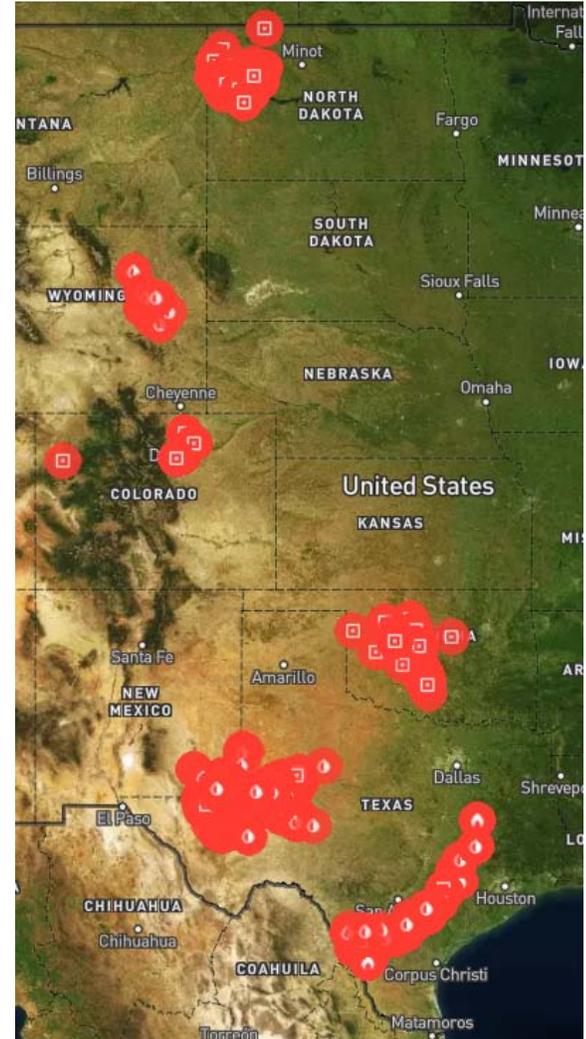
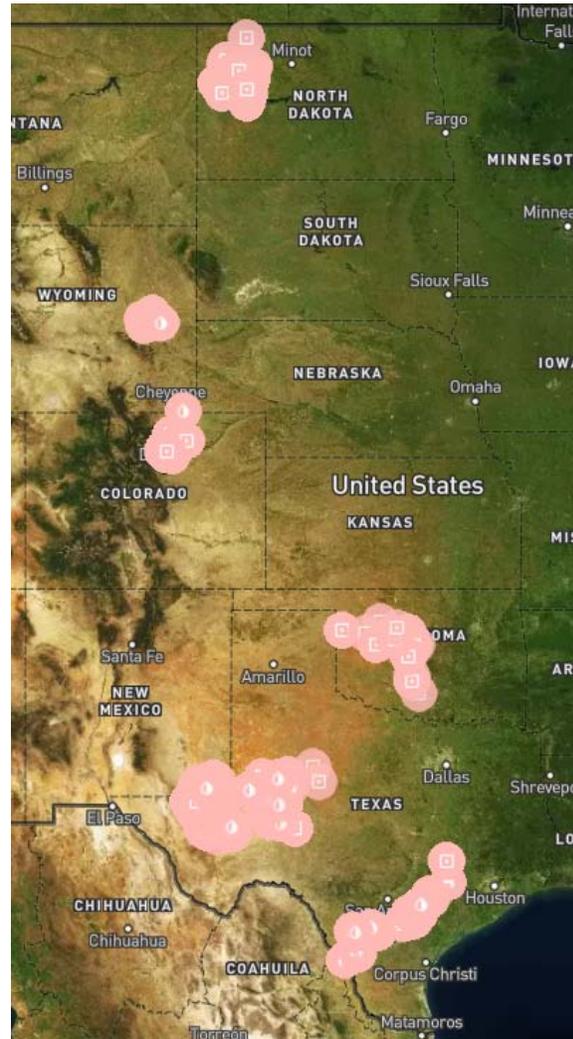
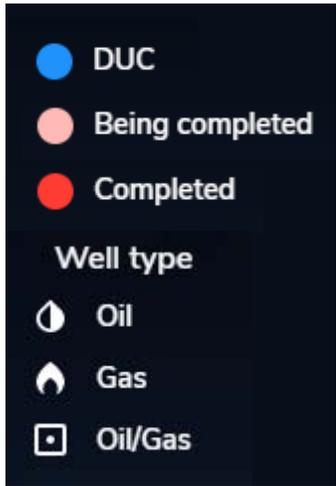
Fundamentals analysis	Comprehensive view of the crude oil balance	<div>Crude Production + Net Crude Imports - Delta Crude Stocks = Crude Demand</div> <div><p>More certainty in our coverage of crude marginal production</p></div> <div><p>AIS + Port Agents + Satellite</p></div> <div><p>Comprehensive up-to-date view</p></div> <div><p>Calculated in near real-time with our data</p></div>
Trade timing / volume	Global crude oil inventories measurement and price correlations	
Risk & volatility	Geopolitical events and supply disruptions	



Operator benchmarking

Kayros monitors every well permitted, drilled and completed in the five largest tight oil basins

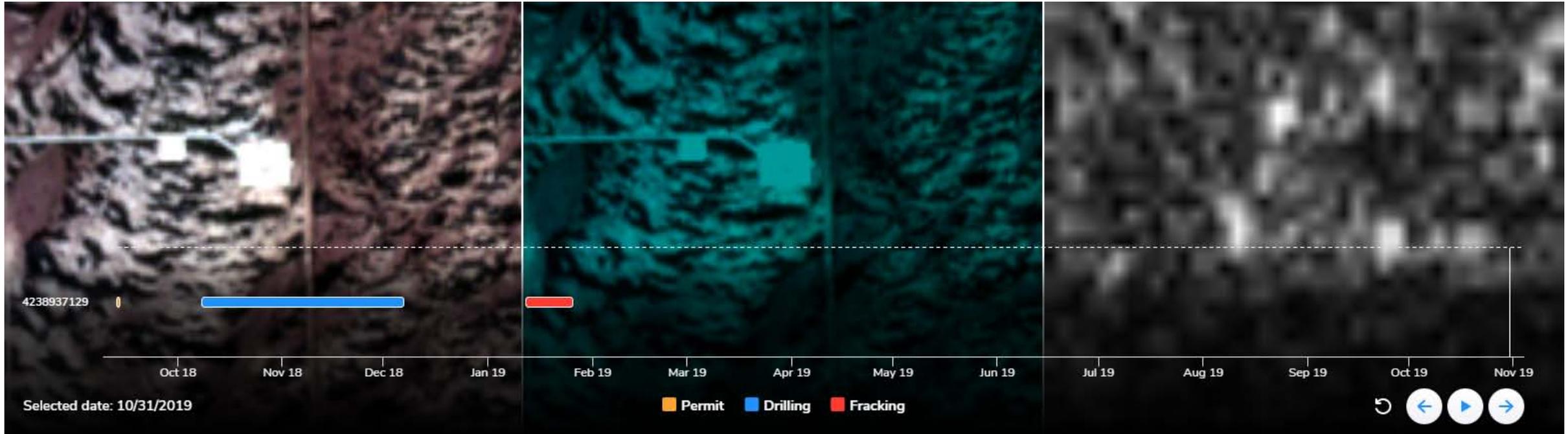
October 2019





Kayrros portal shows progress of every well location

Kayrros Dashboard allows users to browse complete satellite history of a well, from pre-permit to after completion



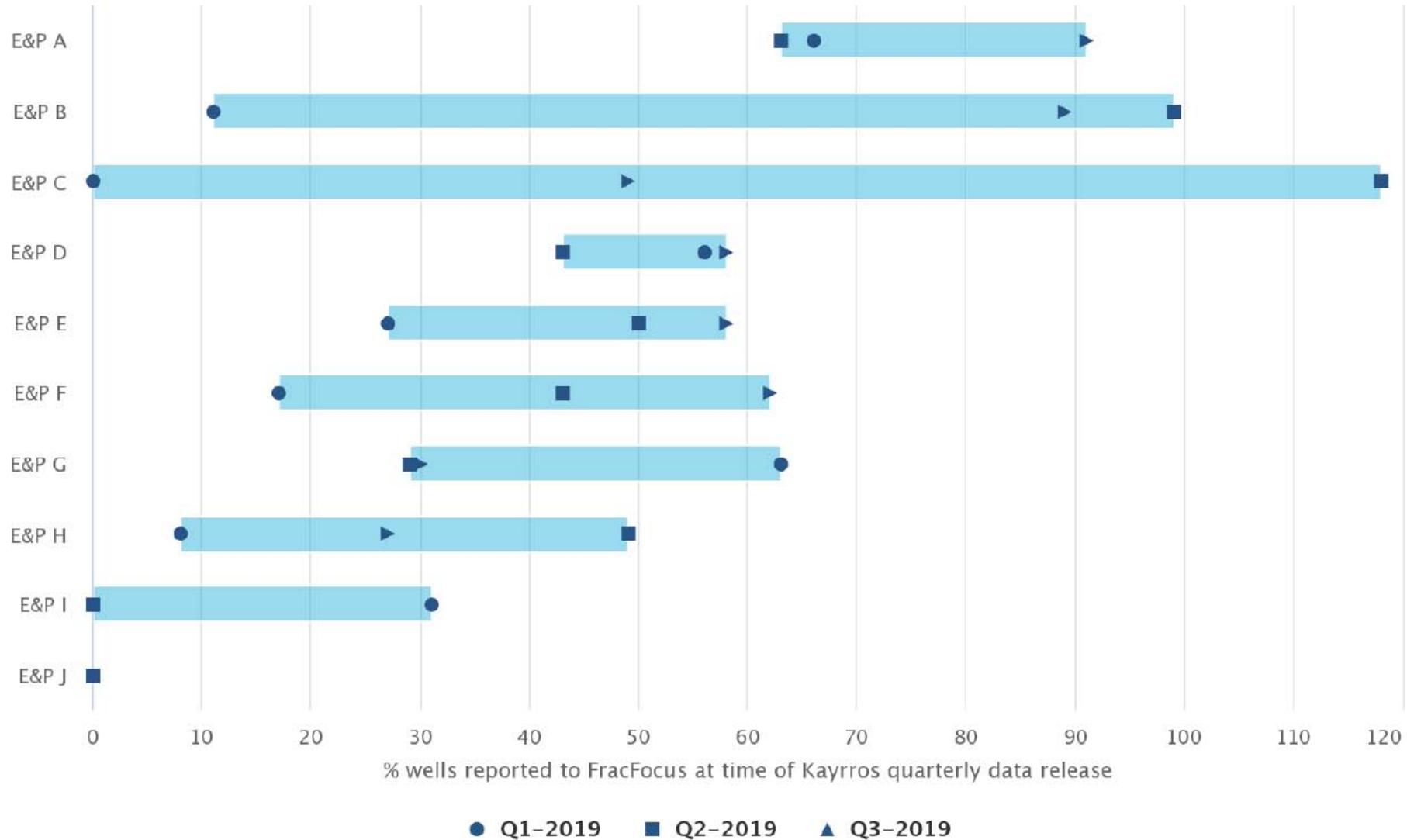
Location : 31.0246969333, -103.3660835312

API	Well orientation	Permit date	Drill Beg.	Drill End	Drill Durat.	Frac Beg.	Frac End	Frac Duration
4238937129	Horizontal	09/13/2018	10/08/2018	12/07/2018	60 days	01/12/2019	01/26/2019	14 days



Reporting delays vary by operator

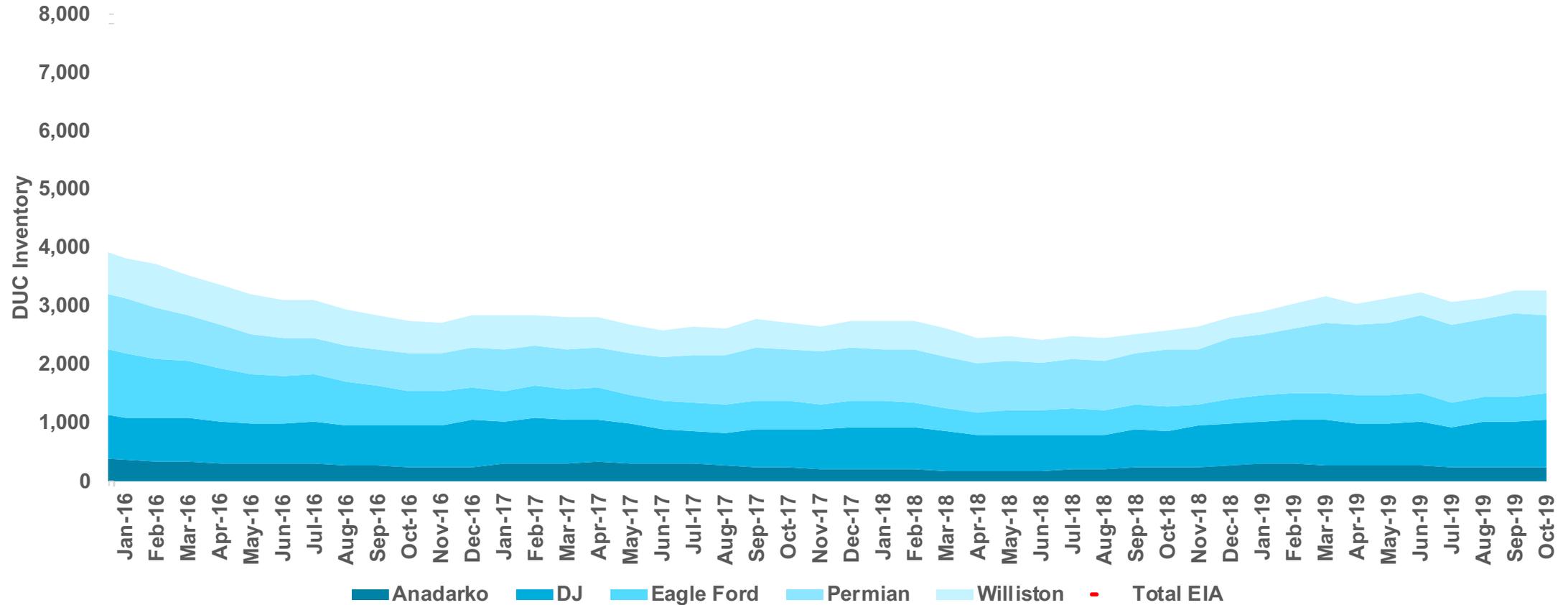
Most publicly-traded operators report completions to FracFocus, virtually none do so in a timely fashion





Debunking the DUC inventory myth

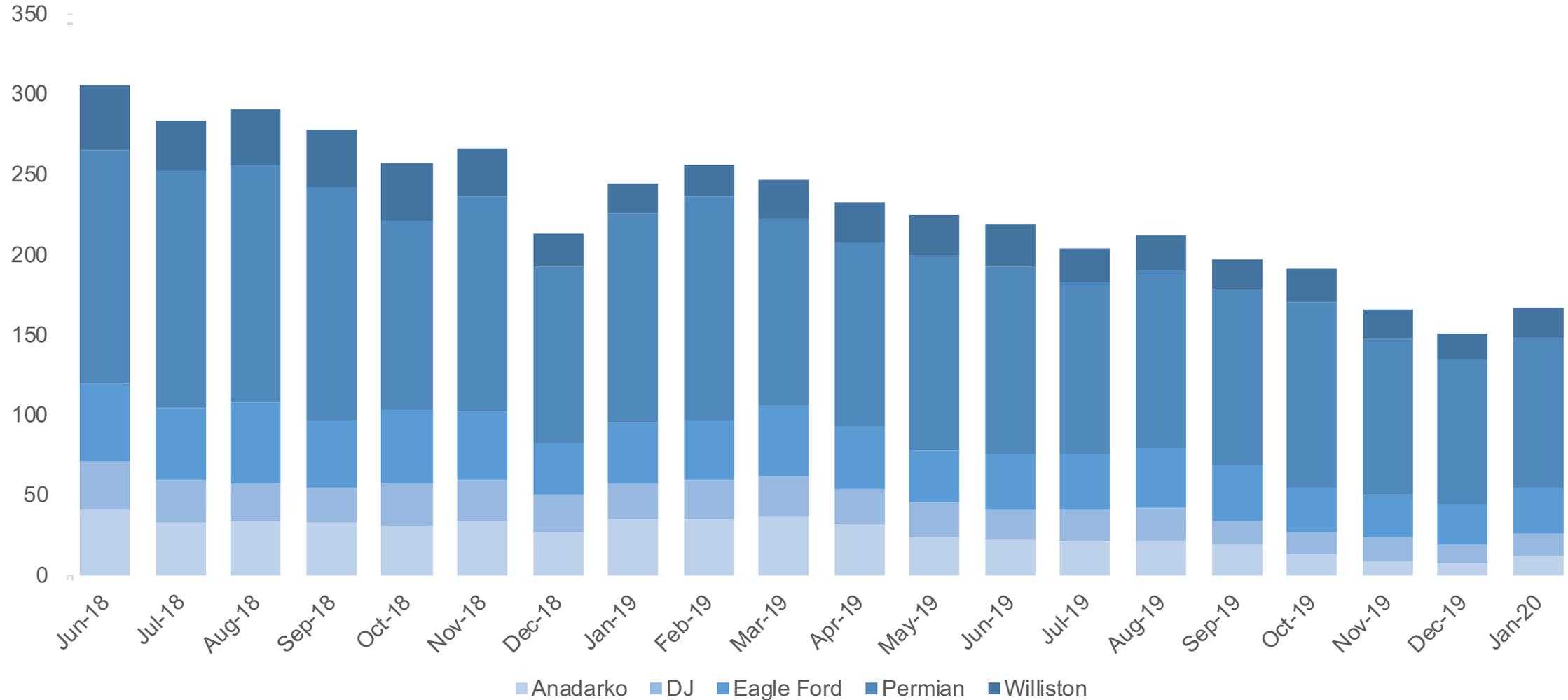
Kayros-measured DUC well inventories across the 5 major tight oil basins continues to diverge from EIA estimates





Dropping frac spreads

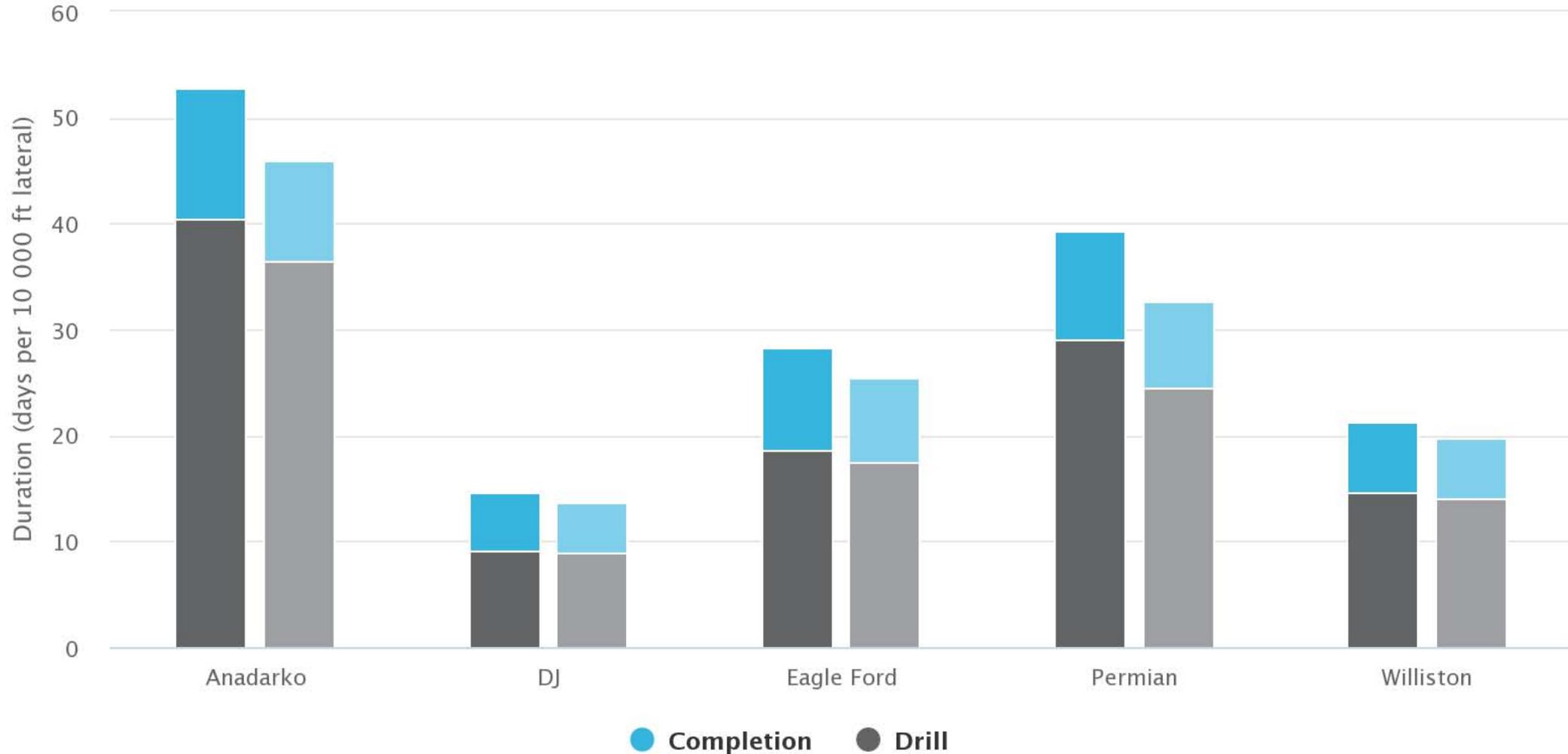
Kayros-monitored active frac crews across the five largest oil basins fell below 200 in 2019





E&Ps continue operational efficiency gains...

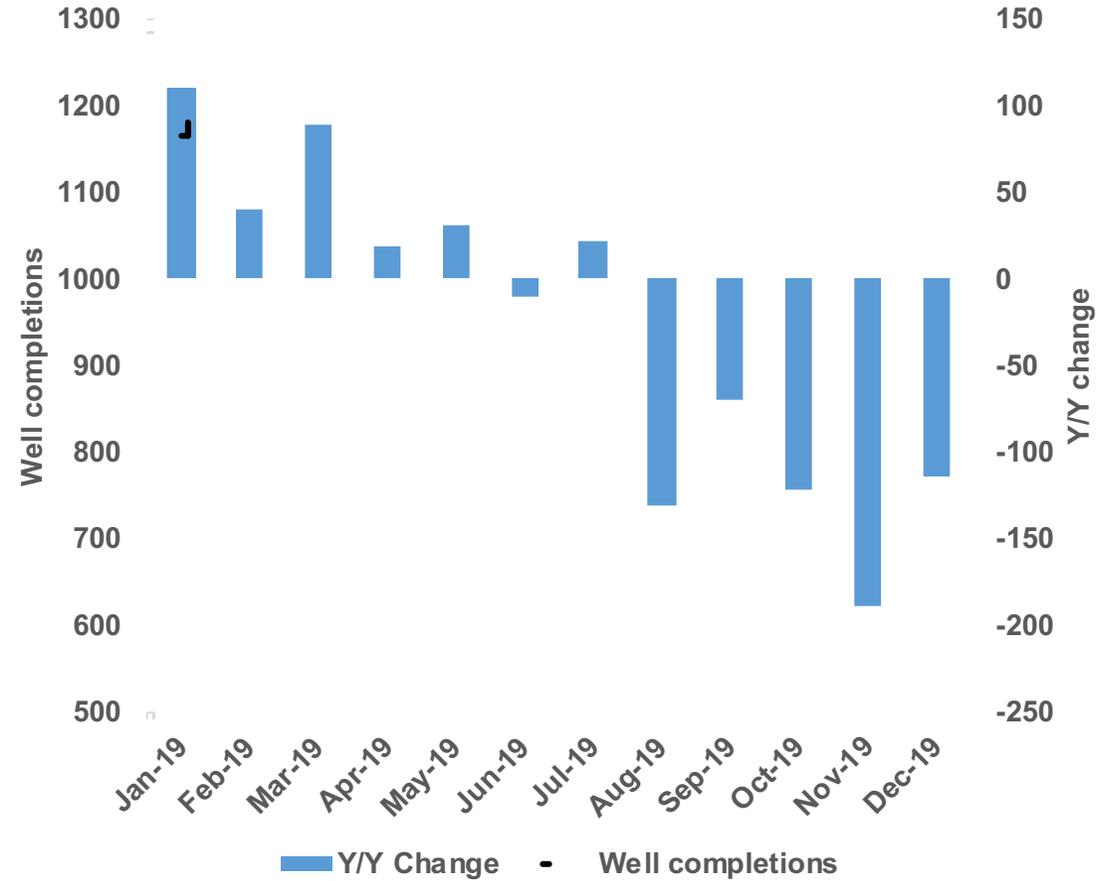
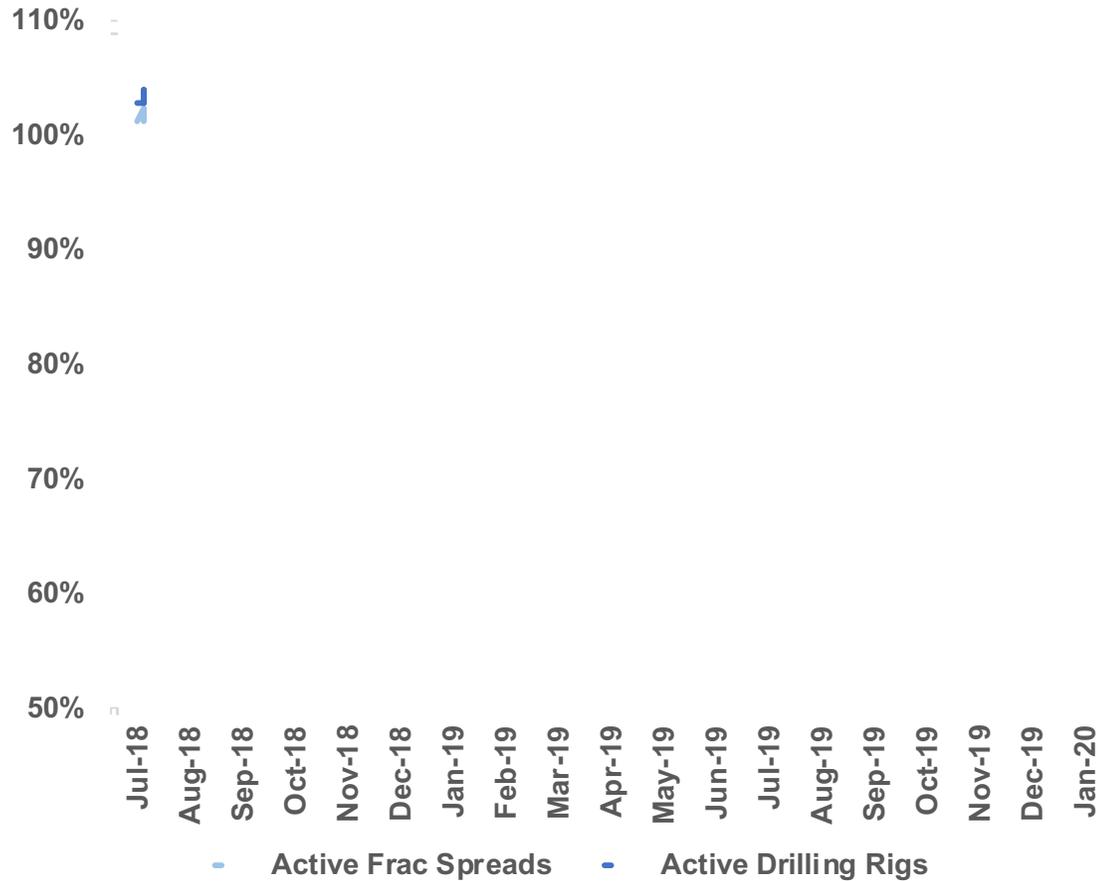
Drilling and completion (normalized to 10k ft lateral) faster y/y in every basin





...but tight oil activity drop shows up in H2 2019

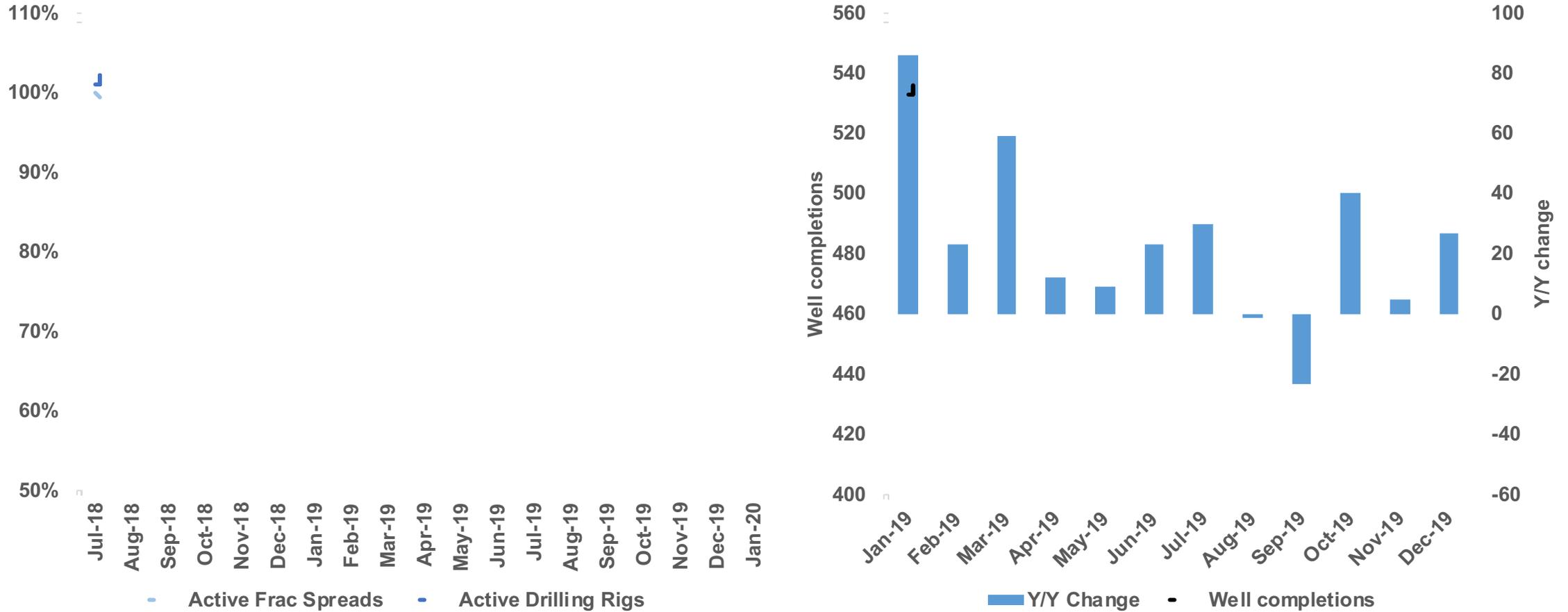
Completions across the 5 largest US tight oil basins begin to decline after holding steady in H1 2019





Permian well completions hold steady

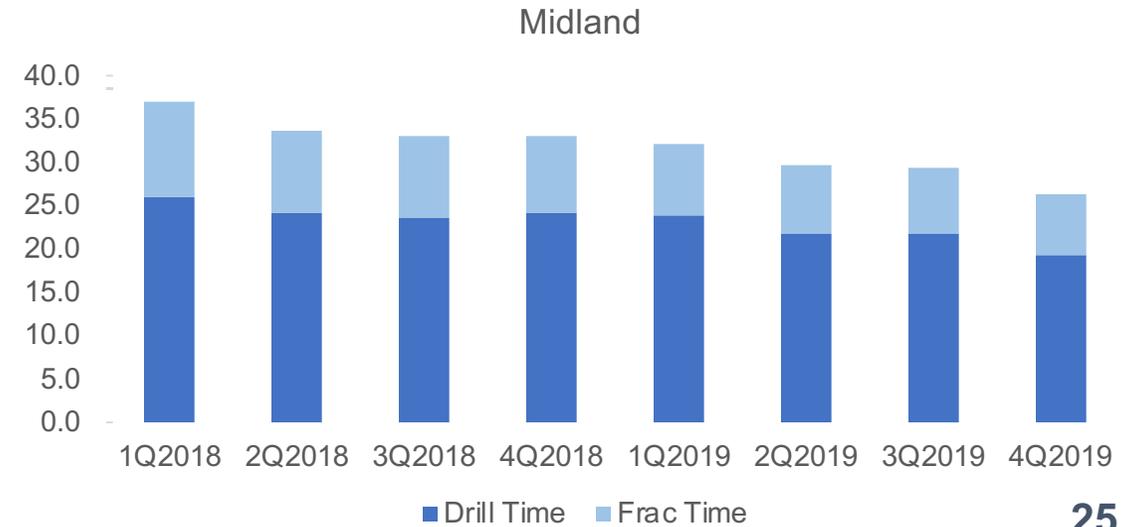
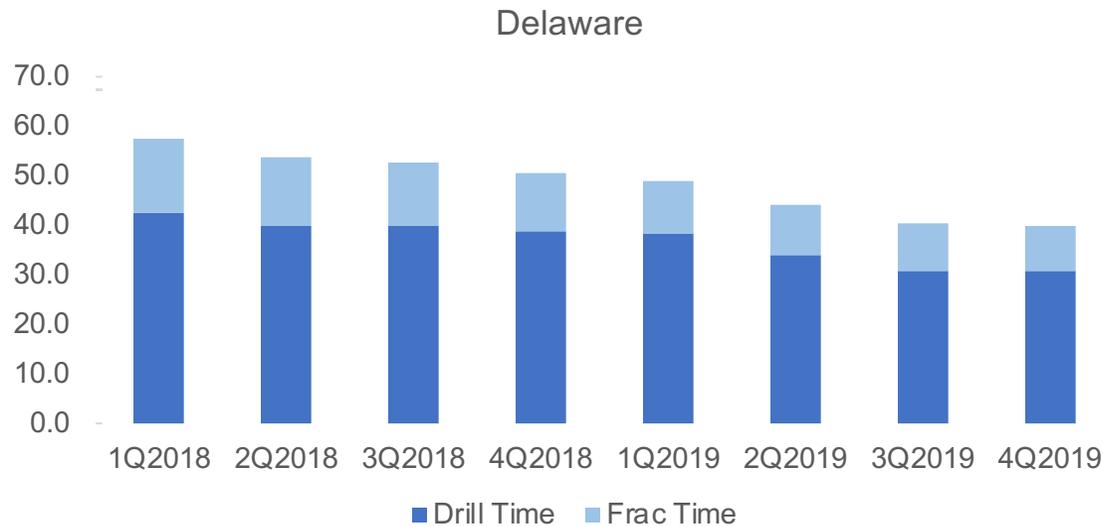
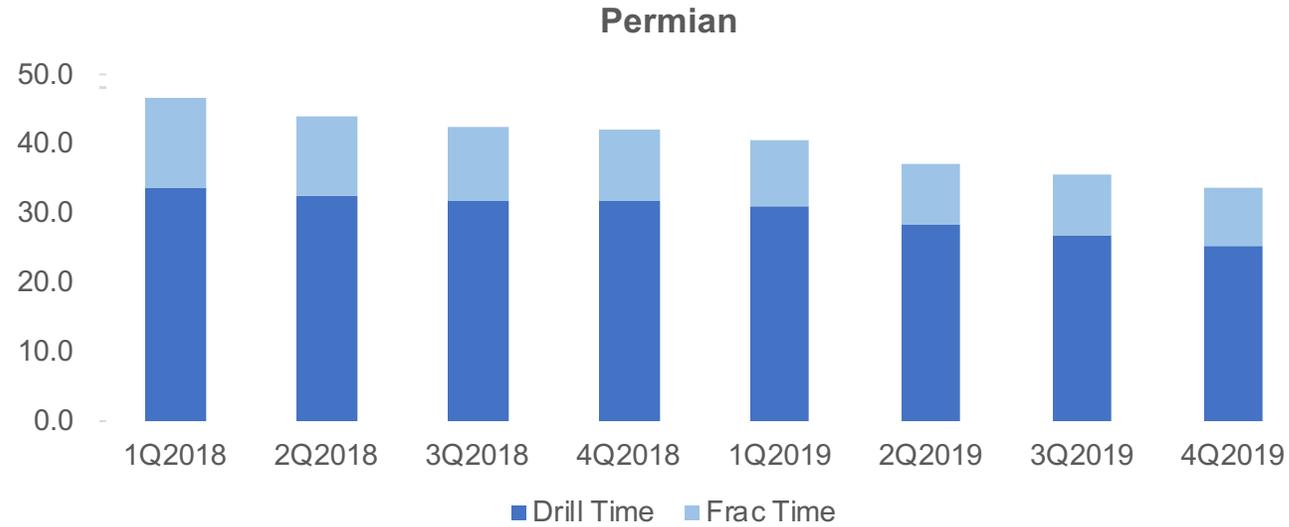
Kayros-monitored Permian activity down nearly 40% from 2018 peak, but completions remain above 2018 levels





Permian operators steadily more efficient...

Delaware operators drill and complete wells more efficiently, shaving off nearly 11 days per well y/y in Q4 2019

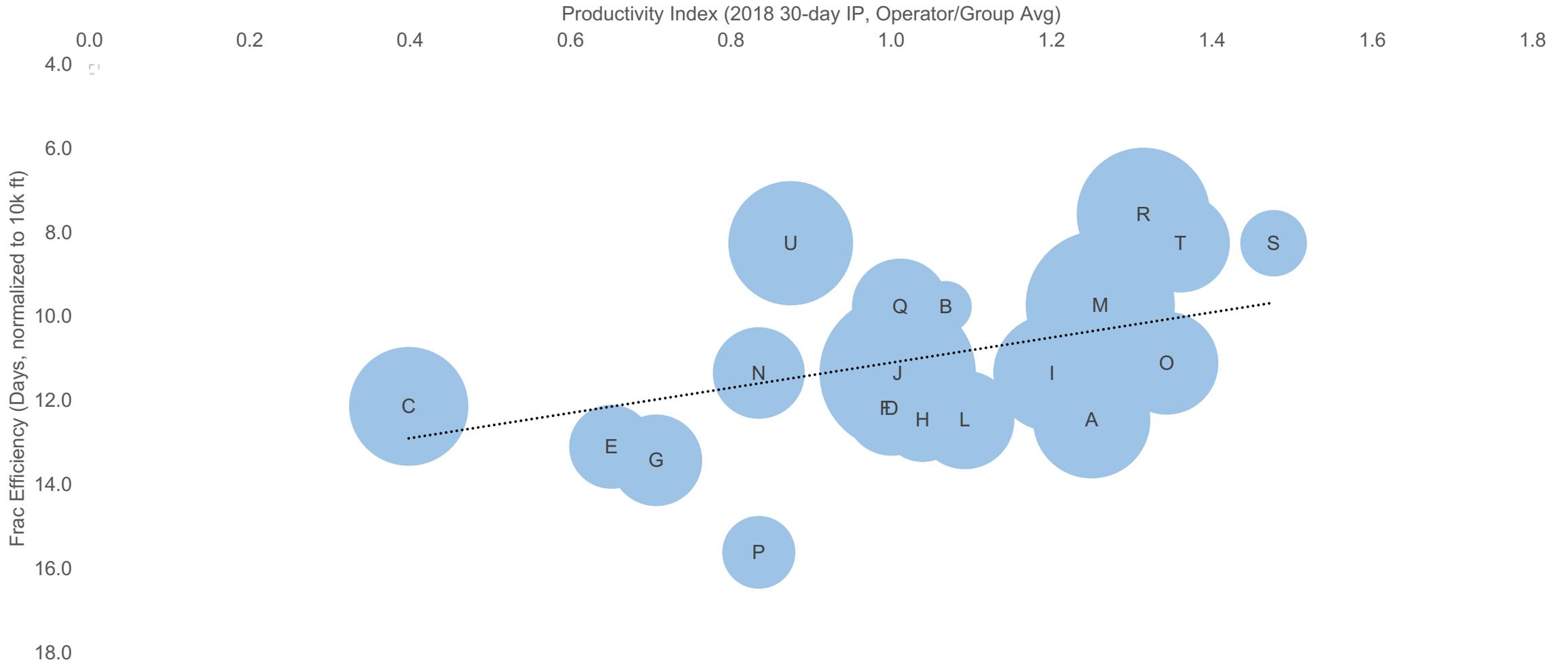




Superior Del. operators completed faster in 2018...

Delaware operators with higher quality wells also drilled and complete wells faster than their peers Q4 2018

Q4 2018 Delaware Completion Efficiency by Operator

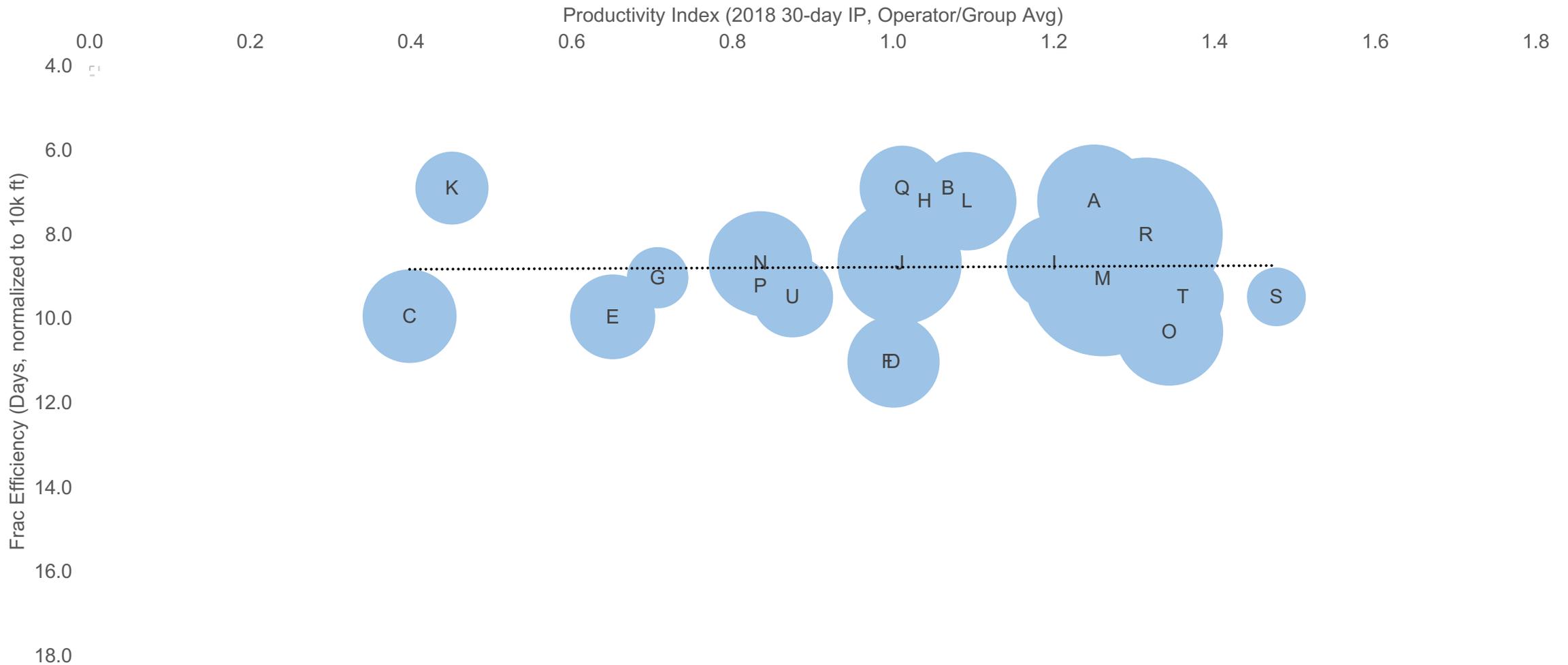




...but others caught up by end 2019

Delaware operators with less productive assets completed wells as efficiently as the group leaders in Q4 2019

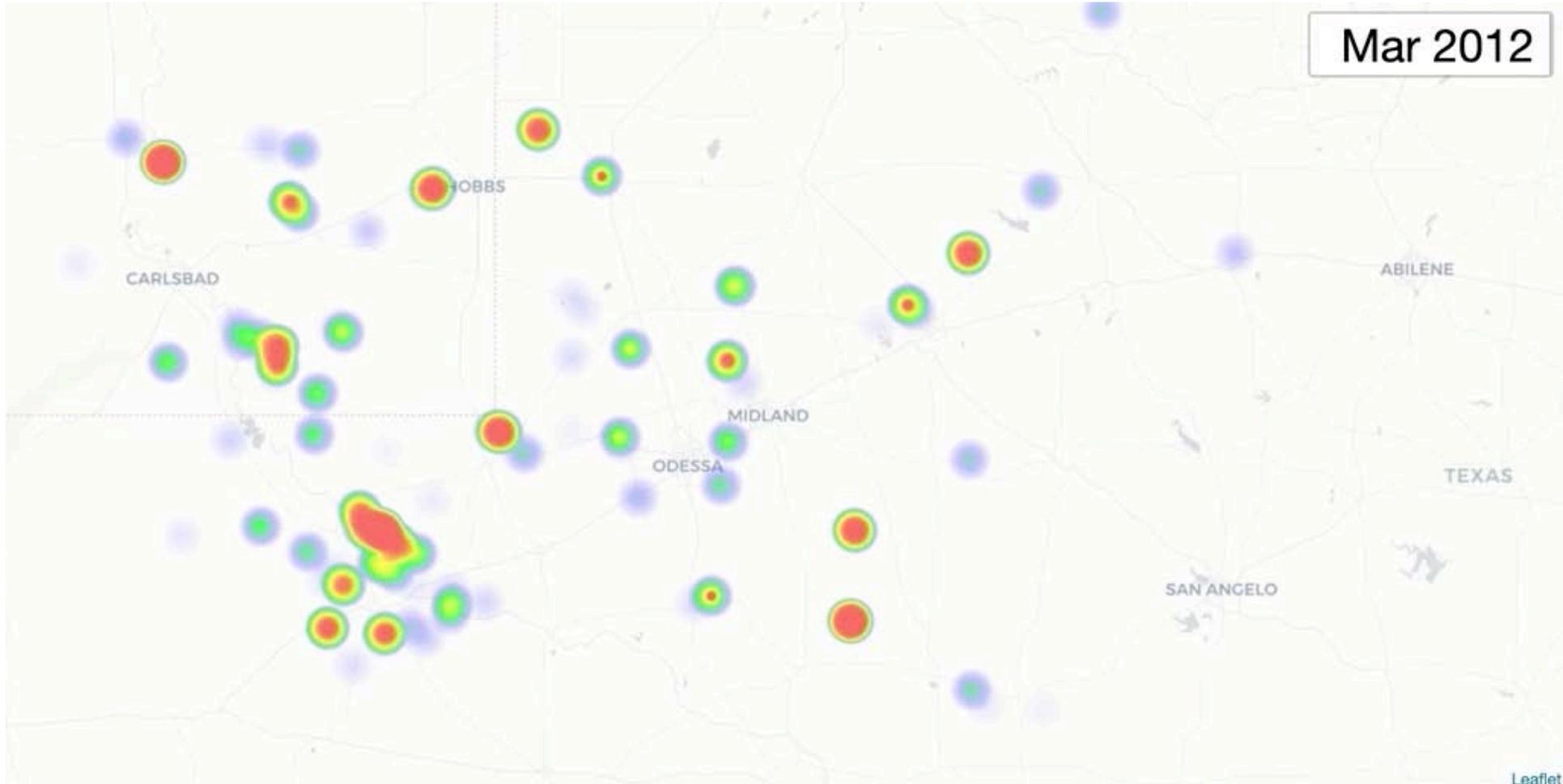
Q4 2019 Delaware Completion Efficiency by Operator





ESG Investment: tracking flaring & emissions globally

Kayros uses optical satellite imagery to measure flaring intensity in OPEC countries, in the North Sea and in the Permian



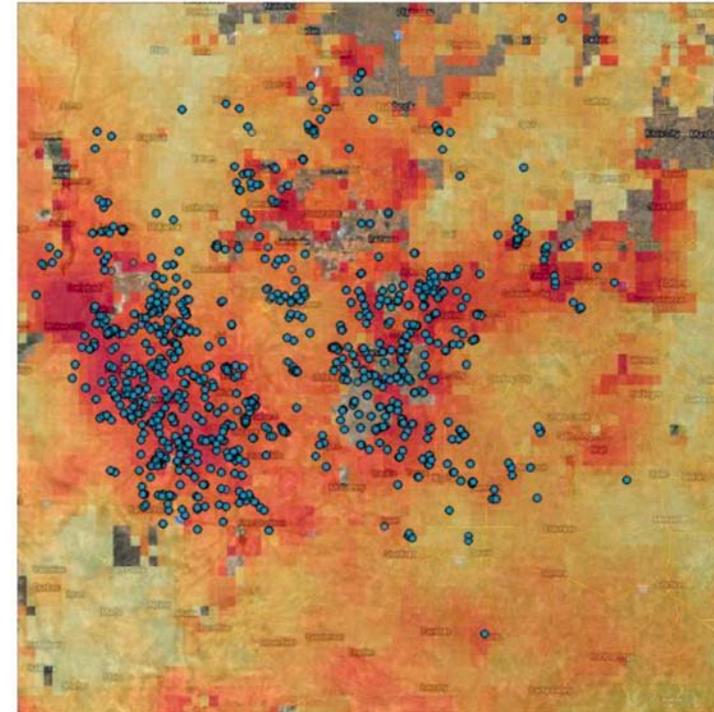


Leveraging O&G expertise to track Permian methane

CH₄



Kayrros monitors completion activity at well level to study the impact on methane emissions



Blue: Nov 2018 – Jan 2019 well completions
Red: high methane concentrations in Jan 2019

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