

Global exploration review

APPEX, London, March 2019



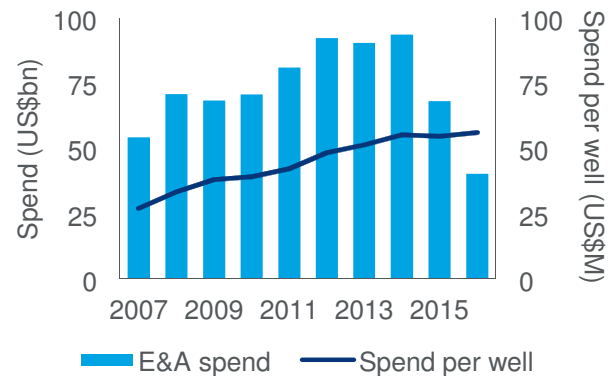
Exploration results and outlook

1. Exploration trends
2. 2018 exploration results
3. Outlook for 2019 and beyond

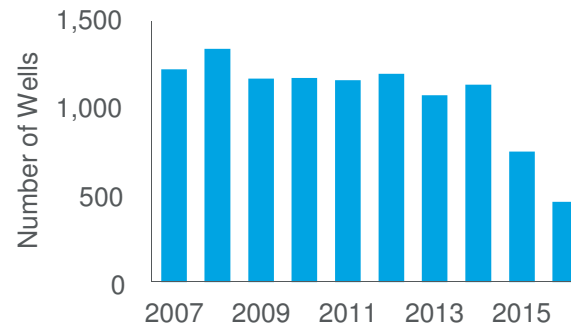
Context: exploration was struggling with dwindling volume & value

Global conventional exploration results 2007-2016

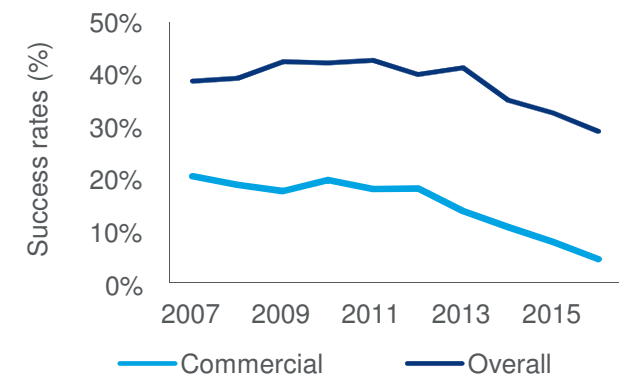
Exploration spend



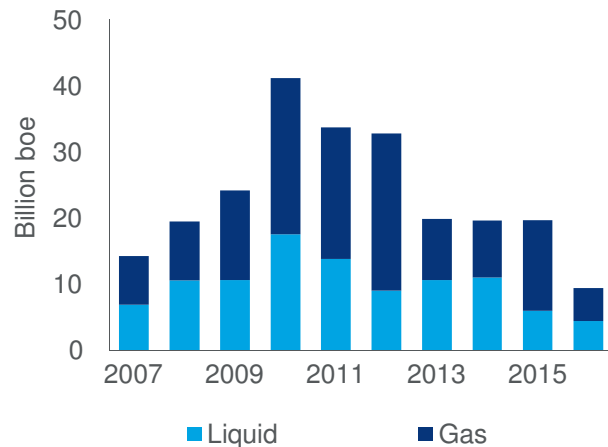
Exploration wells



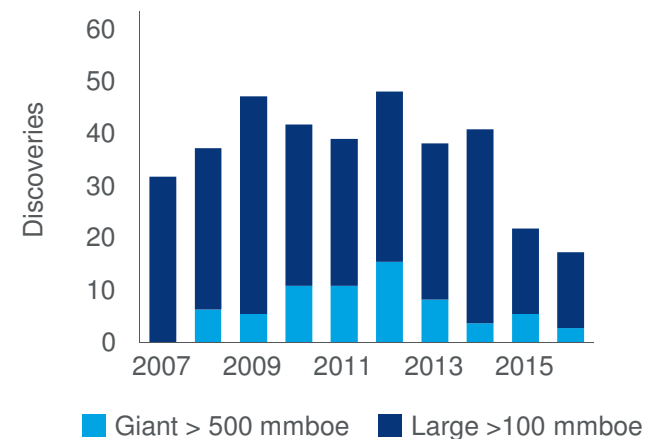
Success rates



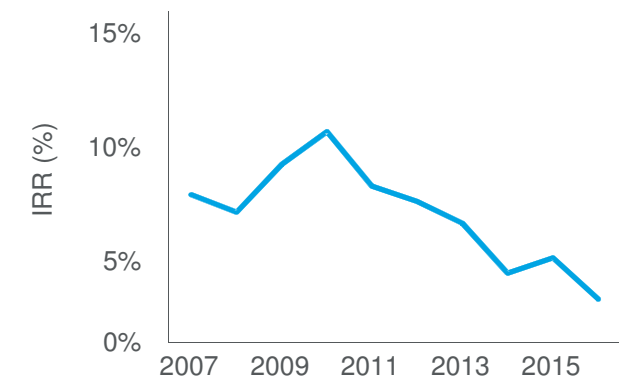
Volumes discovered



Large and giant discoveries



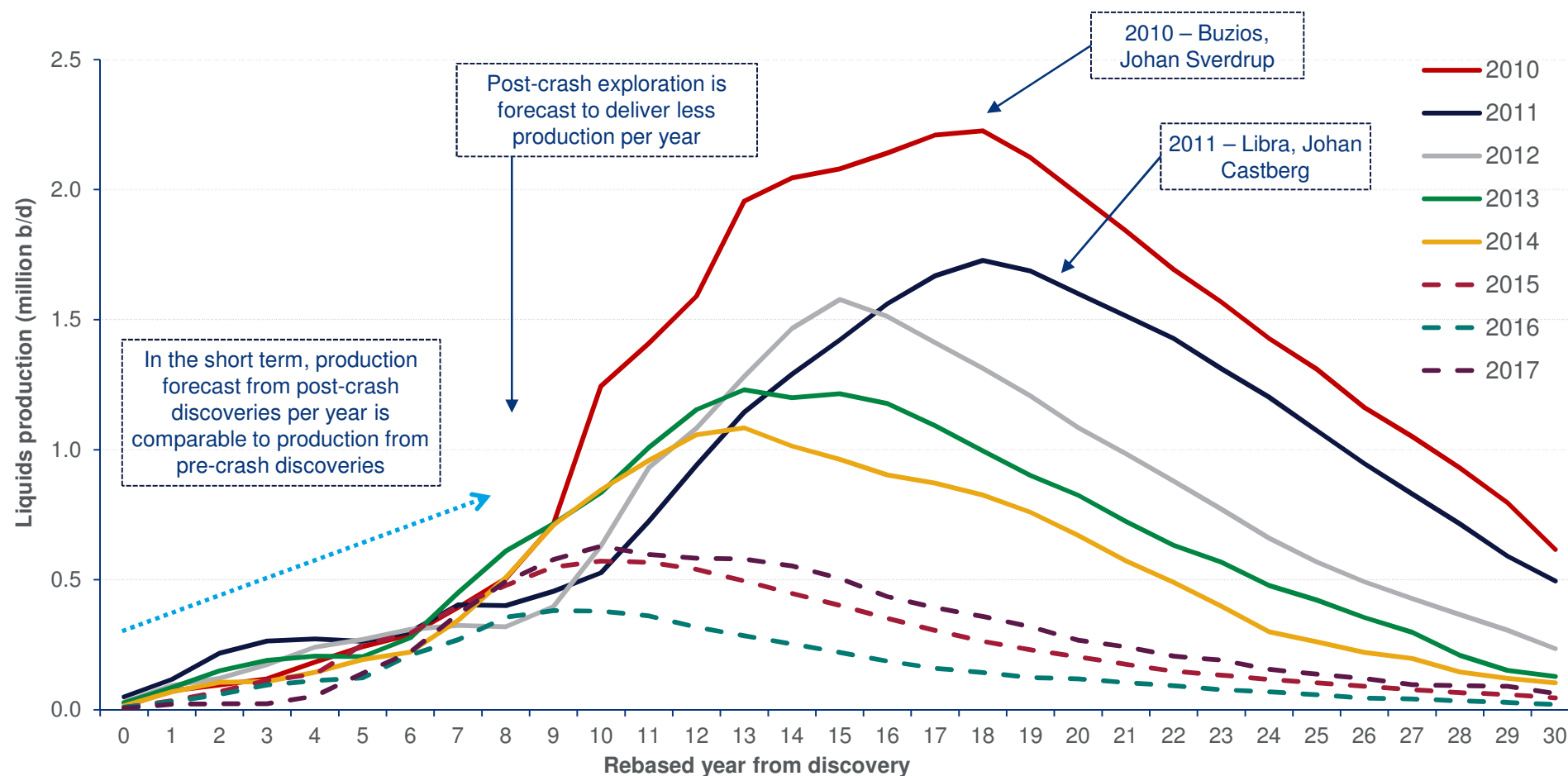
Full cycle returns



Poor recent exploration results impact oil supply

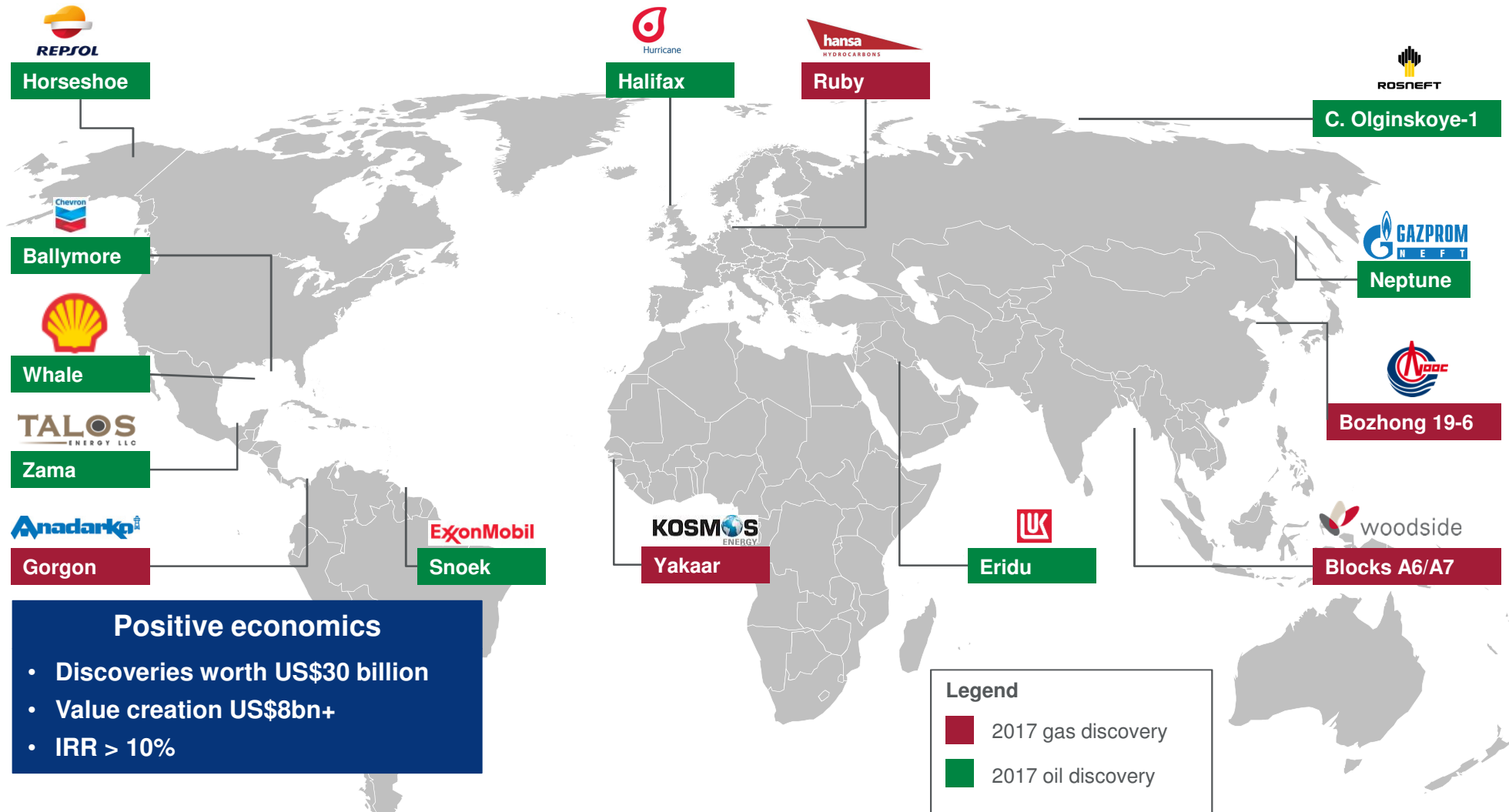
Production is comparable to pre-crash volumes only in the first few years from discovery

Total commercial liquids production each year from discovery



Exploration's return to profitability from 2017

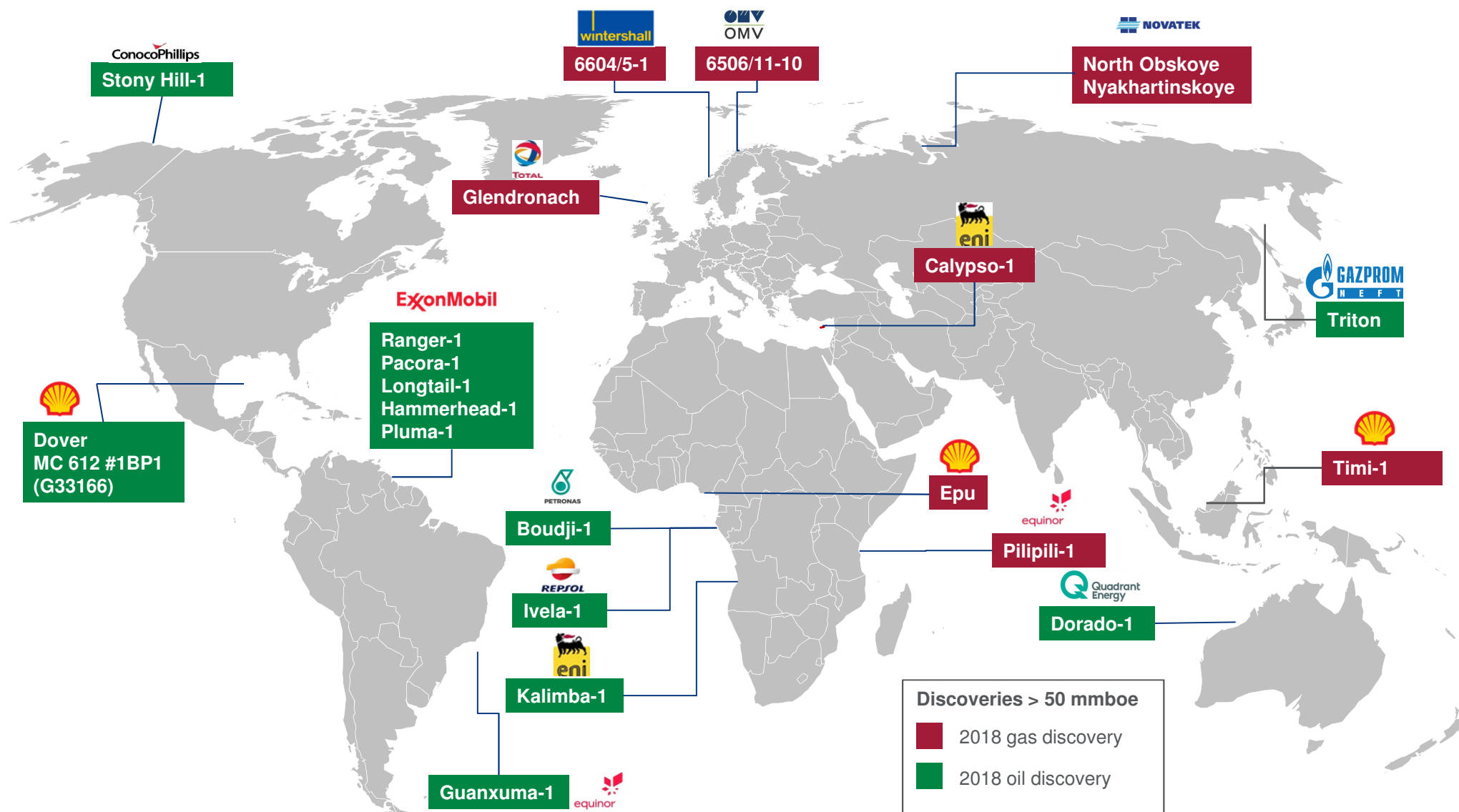
New discoveries add 11+ billion barrels of oil and 6+ billion boe gas



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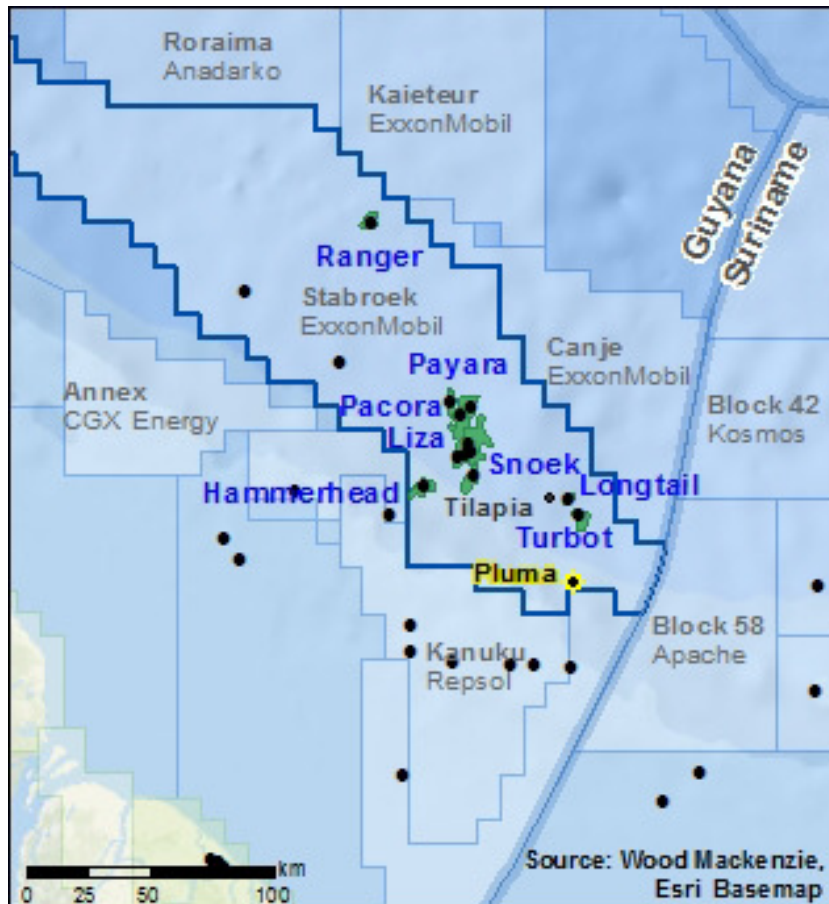
More success in 2018, including some high value discoveries



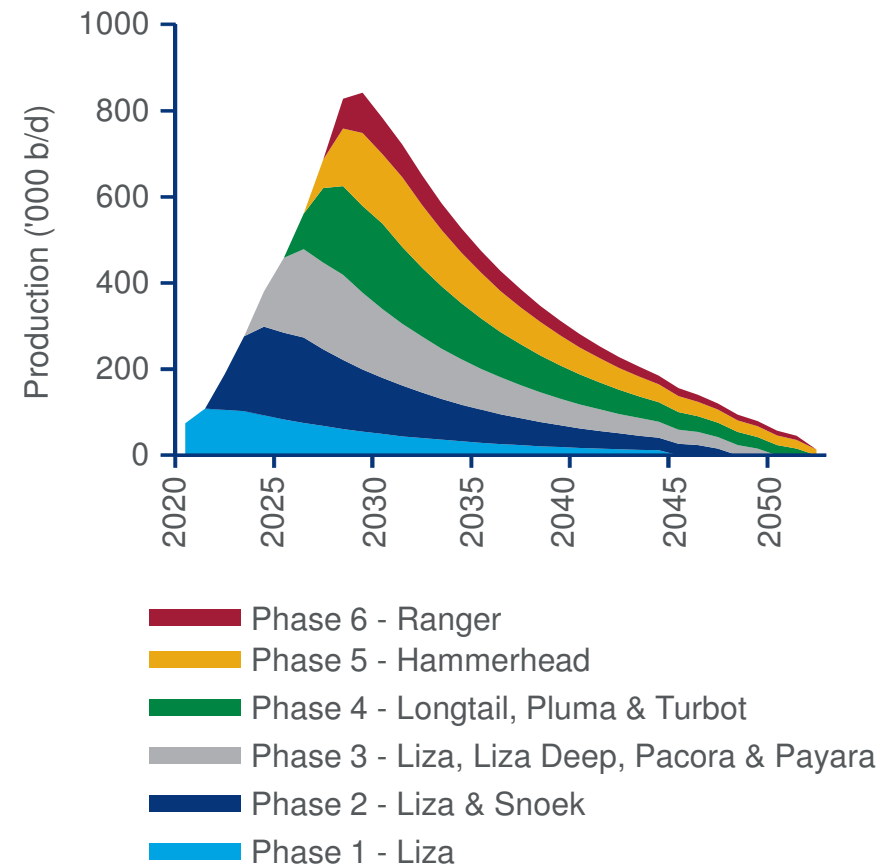
Guyana: volumes now > 5 billion boe, value > US\$25 billion

ExxonMobil's Pluma is the tenth discovery from 12 wildcats

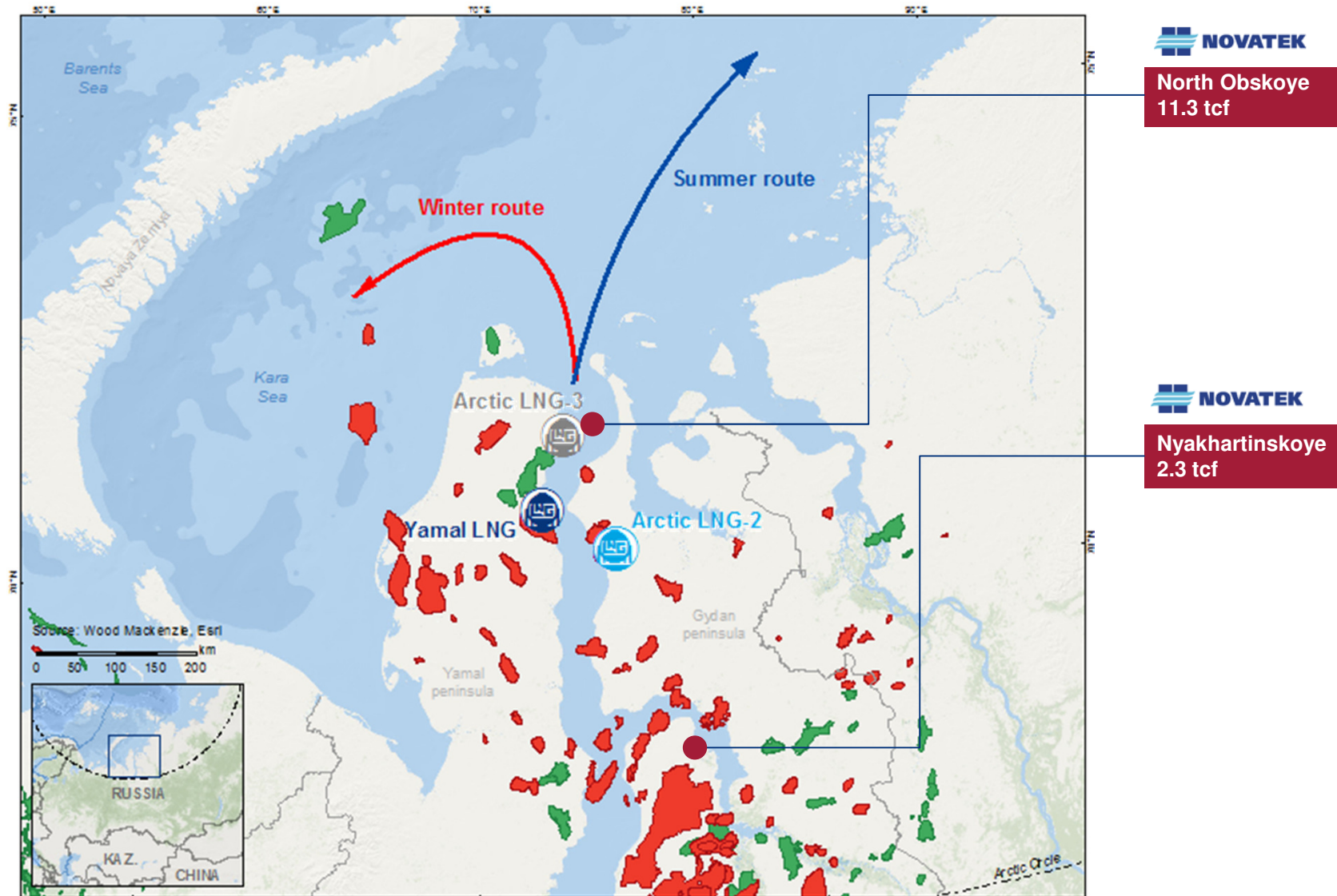
Stabroek licence, Guyana



Guyana production outlook by field



Russia: Yamal gas giants underpin future Arctic LNG projects



Australia: Dorado discovery

Key Facts:

171 mmbbl oil + 552 bcf
gas discovery

Status

Offshore
88 metre WD

Location

125 mmboe
(gas/condensate)

Pre-drill estimate

Caley Member Sst

Target

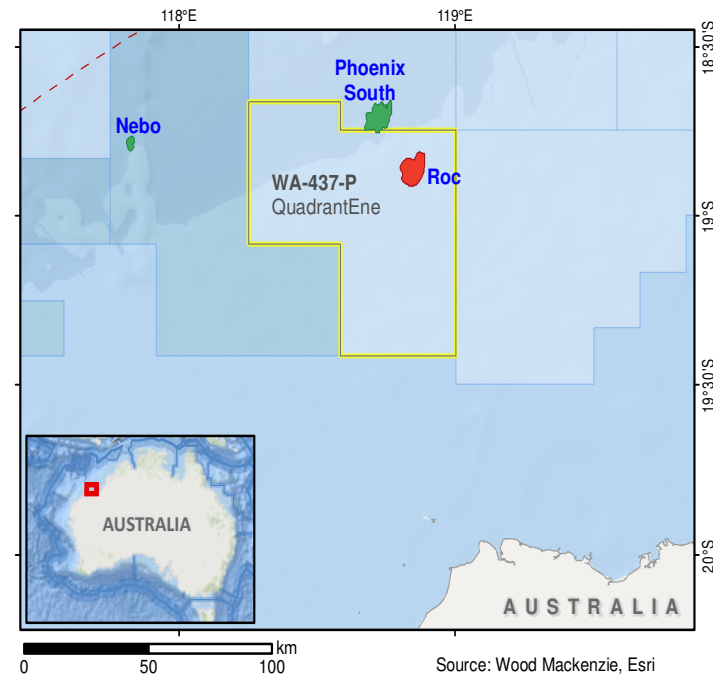
22-26%

Technical Risk – EV²

Santos (80%),
Carnarvon (20%)

Partners

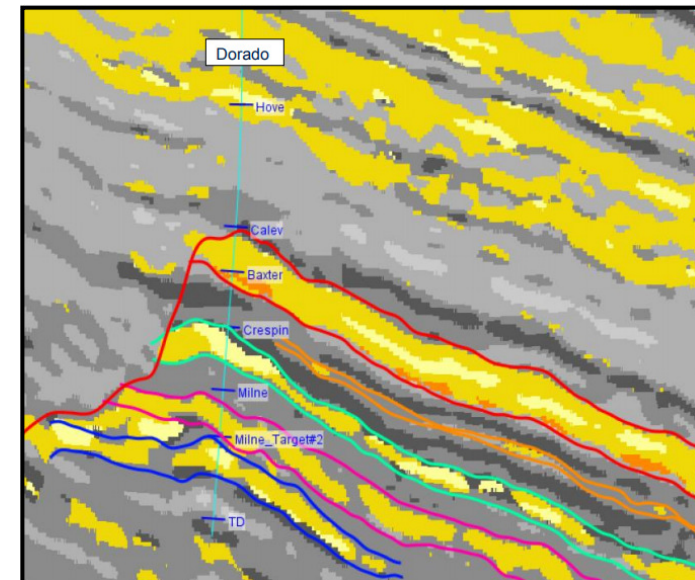
- Promising light oil discovery. The well intersected an 80 metre net oil column with excellent permeability and porosity characteristics
- Currently there are no offshore developments in the Roebuck basin
- The well is located less than 20km and up-dip of the successful Roc-1 and Roc-2 wells
- Multiple secondary targets (Crispin & Milne Members) also oil-bearing



woodmac.com



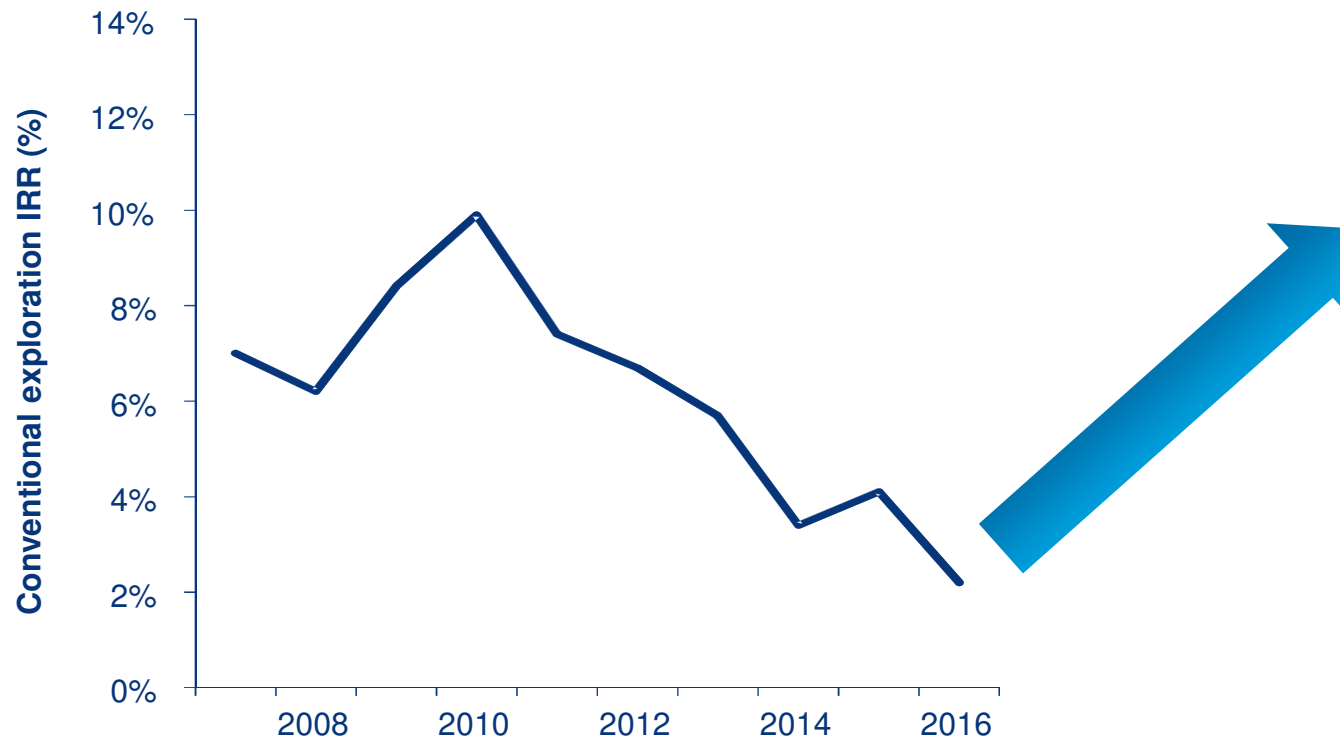
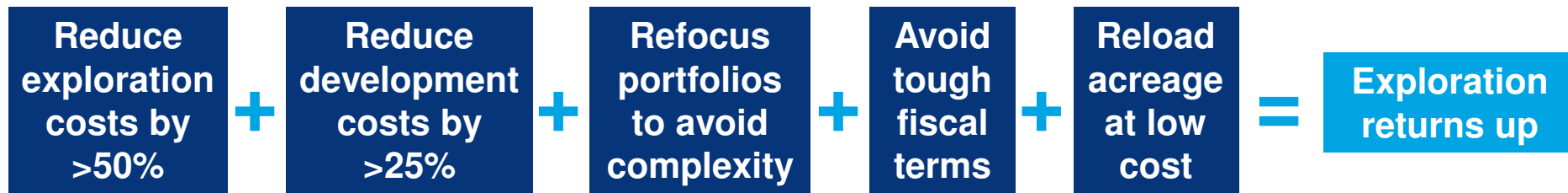
Santos



Source: Carnarvon Petroleum Ltd, 'Dorado-1 Oil Discovery 18 July 2018

Progress on many fronts is driving exploration recovery

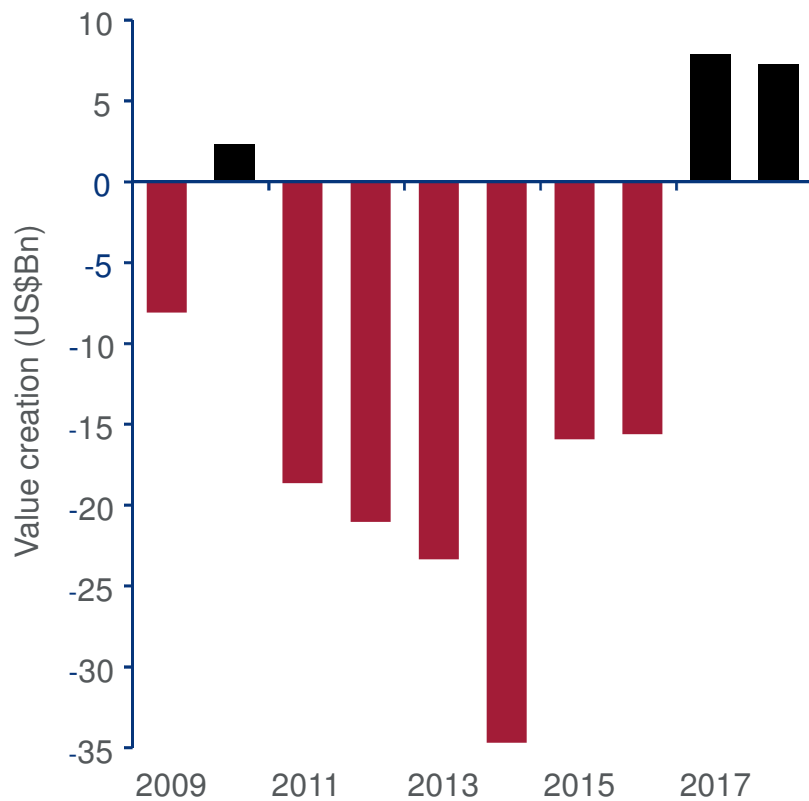
“How exploration can fix its broken economics” (published 2016)



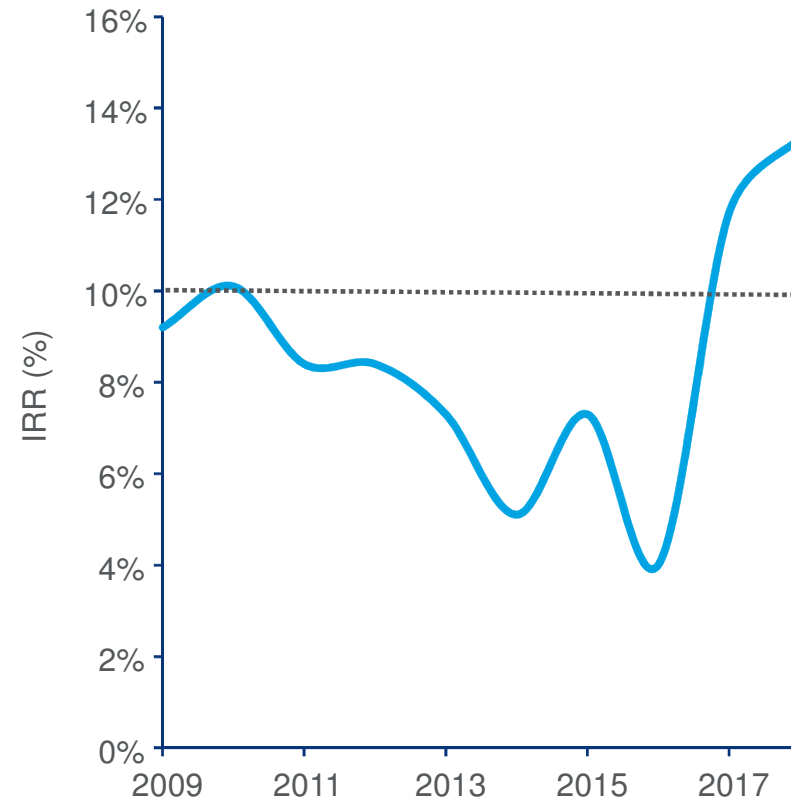
Exploration is now back in the black

Reduced costs and quicker commercialisation of discoveries are now creating value

Exploration industry value creation



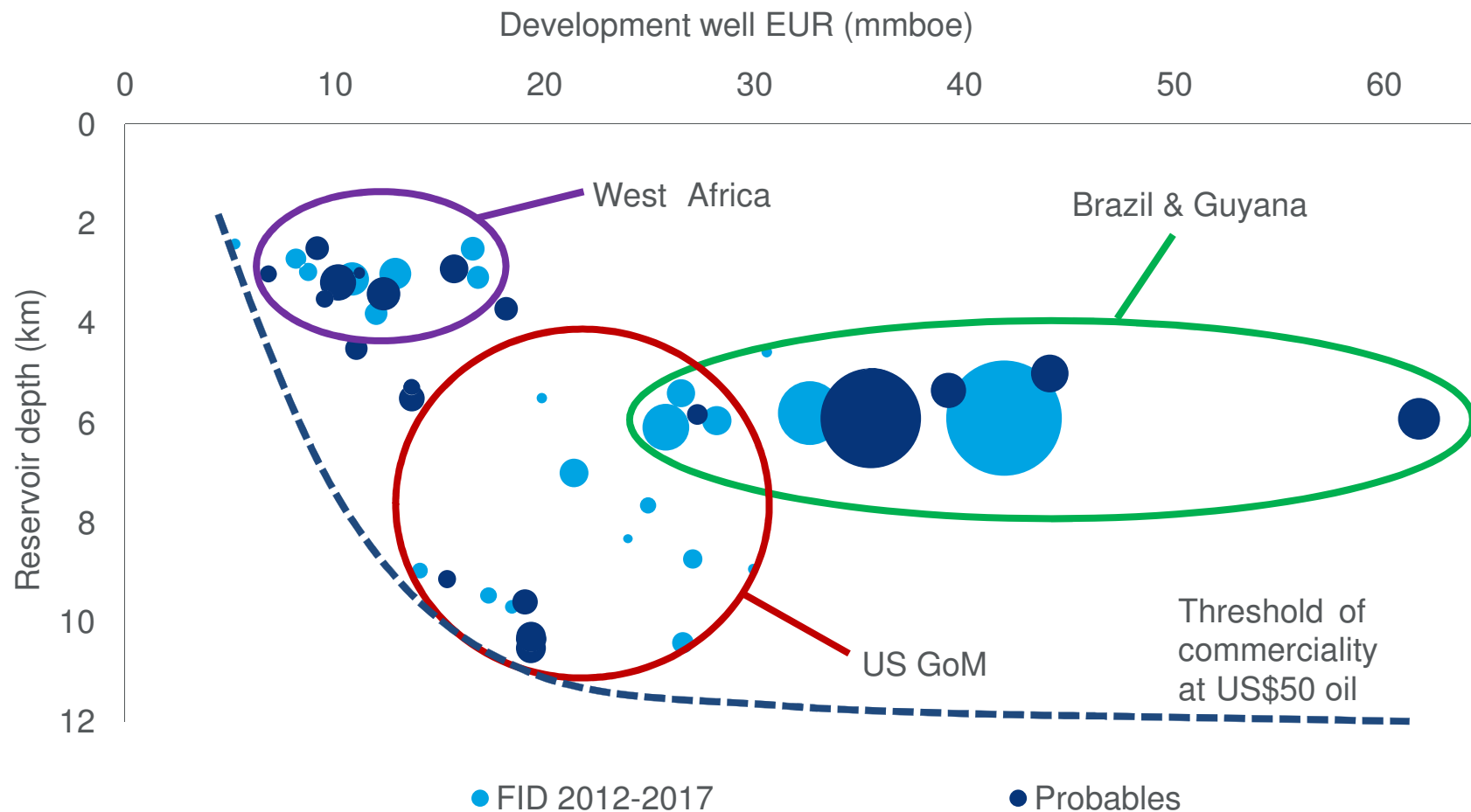
Exploration industry returns



Deepwater sweet spots a critical part of exploration's recovery

Key to the sweet spots: exceptional reservoirs at unexceptional depths

Deepwater oil FIDs add over 30 billion boe since 2012

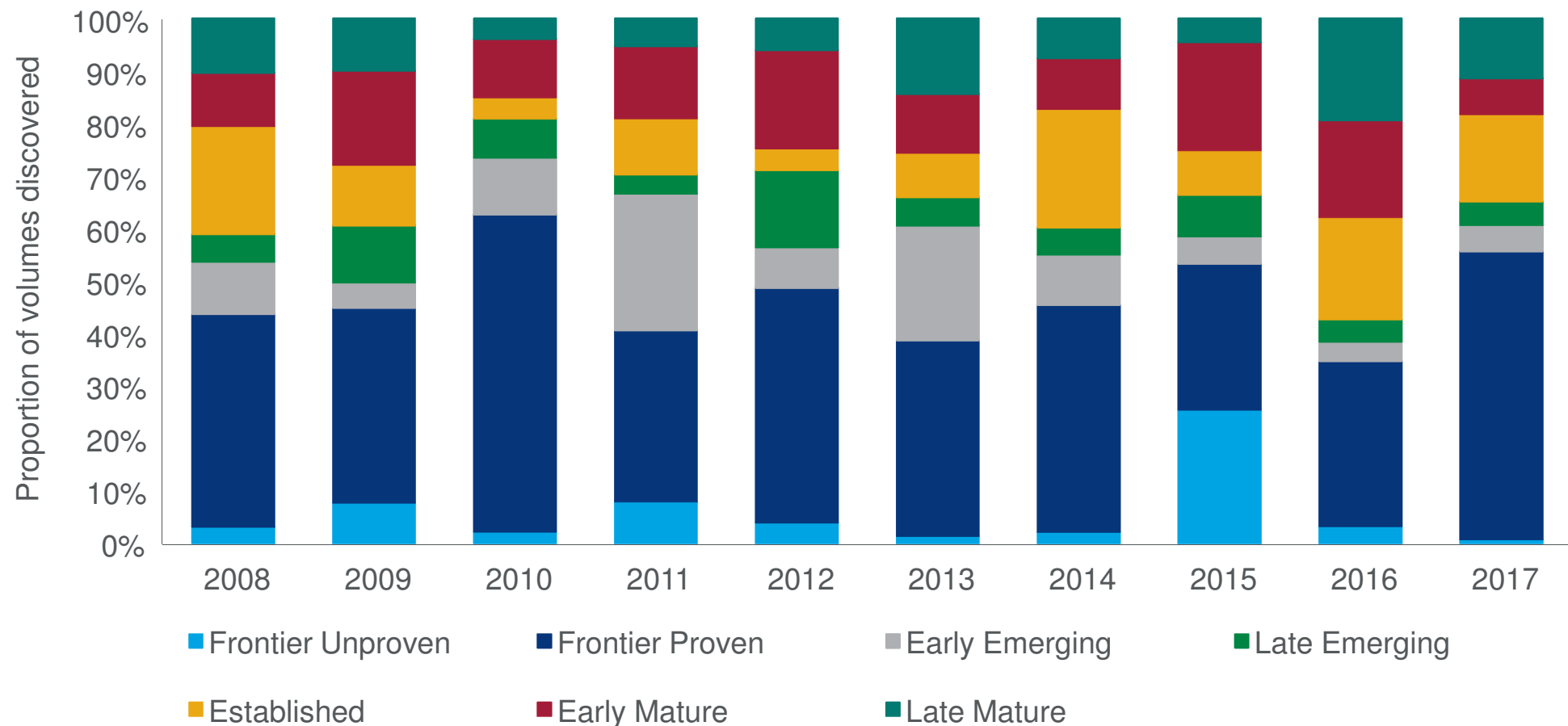


Source: Wood Mackenzie. Chart includes deepwater oil developments >50 mmboe achieving FID since 2012 or expected in the next few years. Bubble size represents full field reserves. Reservoir depth based on typical development well TD. Development well EUR is based on field reserves divided by well count including production and injection wells.

New frontiers also critical to exploration's recovery

Half of recent exploration volumes found before first production in the play

Proportion of new fields volumes discovered by play maturity



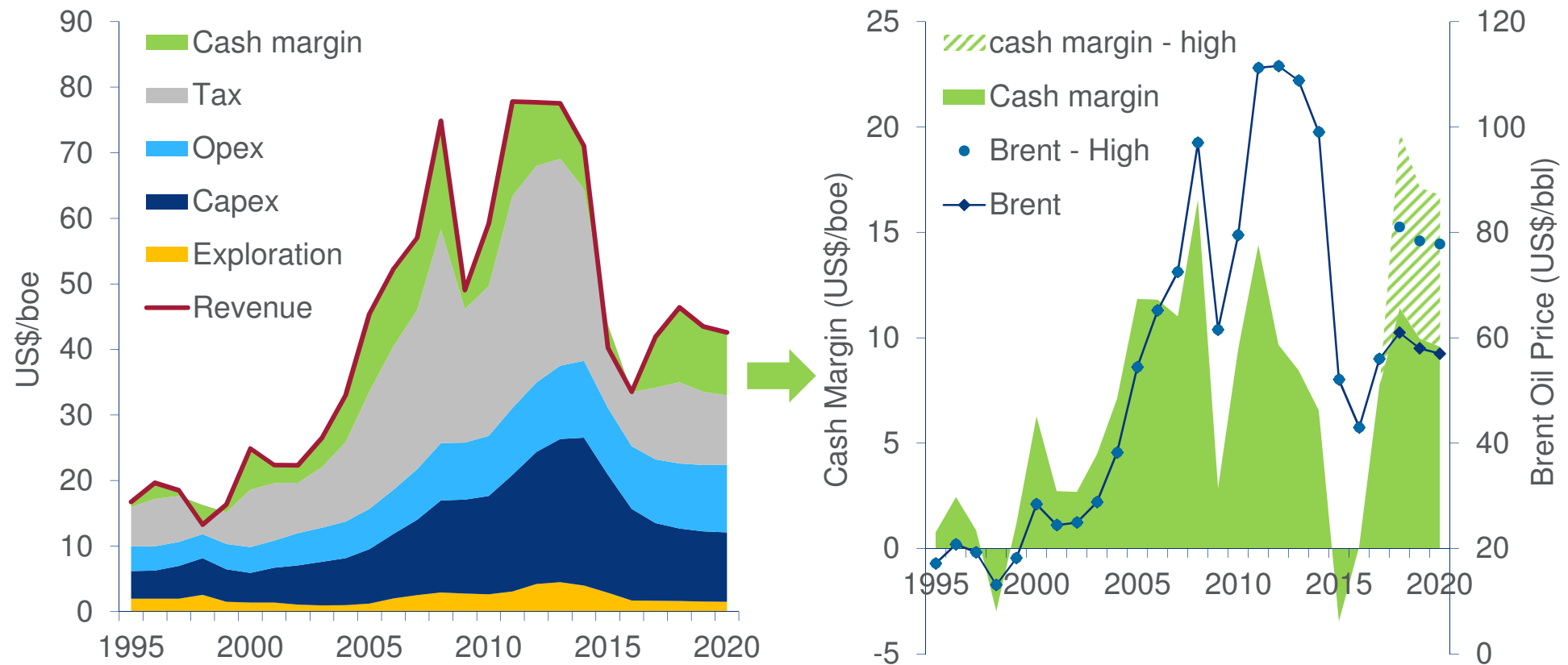
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Upstream cash margins looking strong

Outlook at US\$60 Brent as good as any time in past 20 years

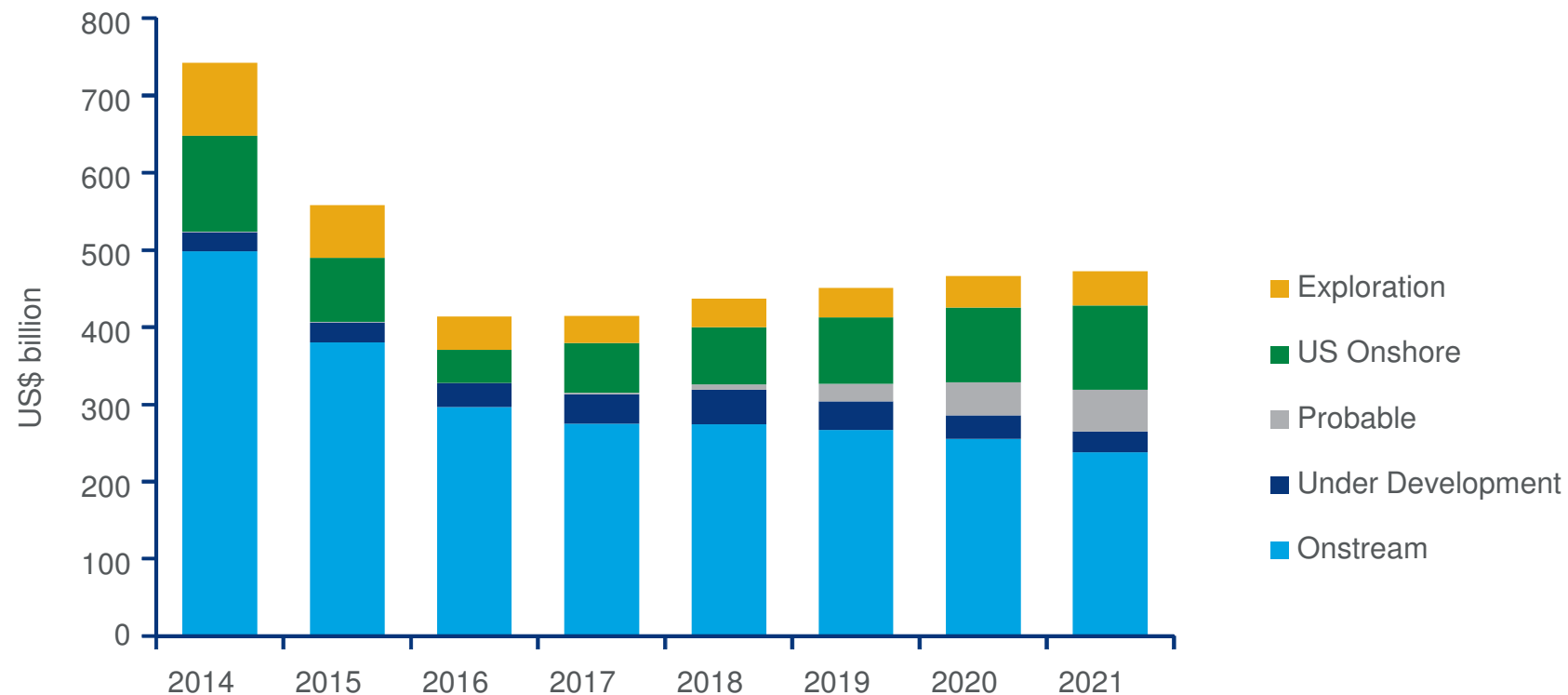
Majors' upstream Cash Flow per barrel produced Cash Margin v Brent



But exploration budgets will remain flat in real terms

Activity may edge up with further improvement on costs

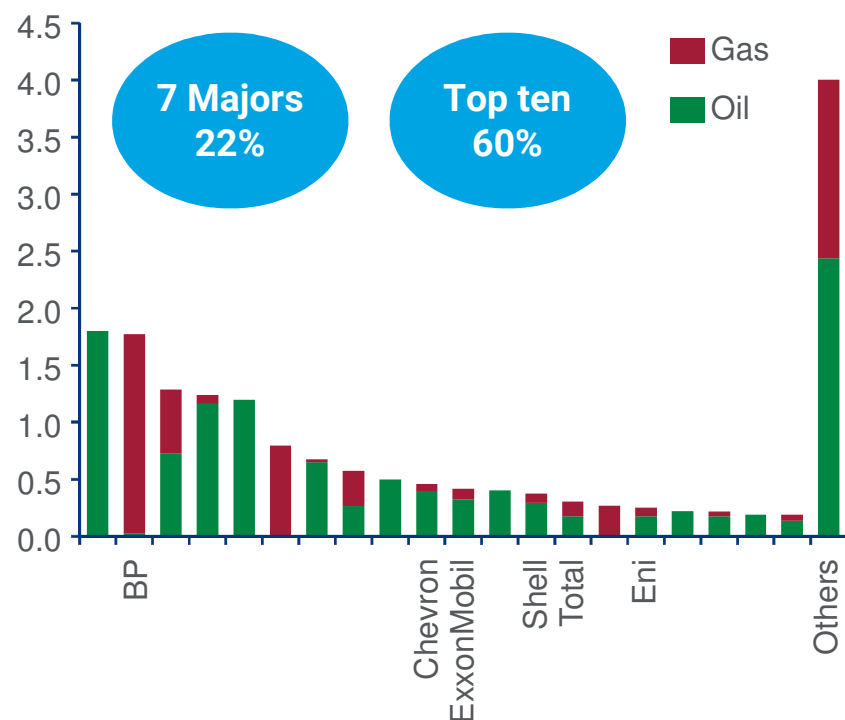
Global Upstream Capex



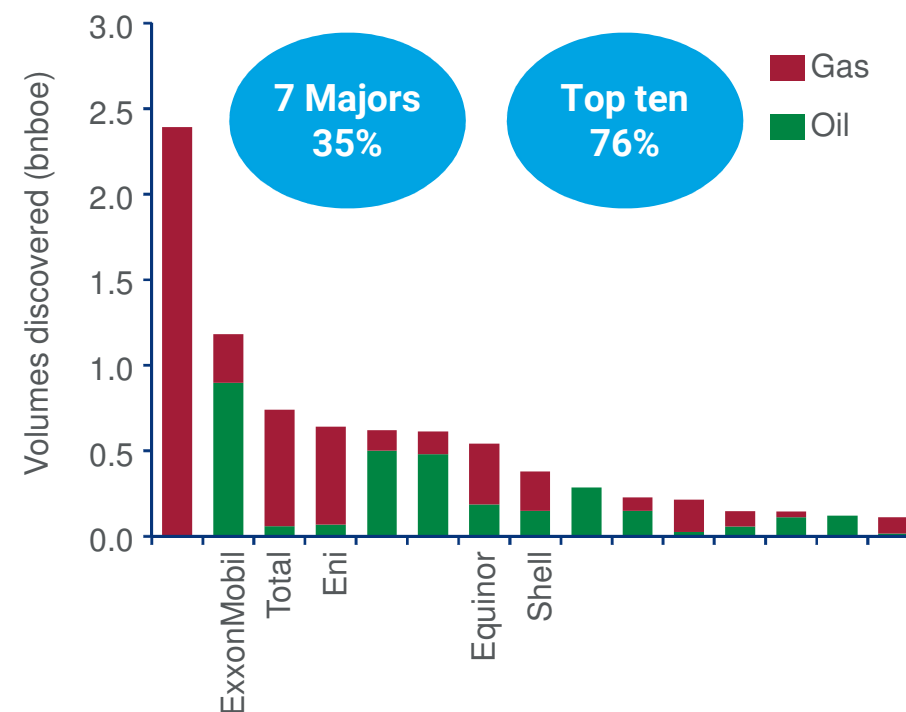
High-impact exploration is now a very exclusive club

Led by the Majors, selected NOCs and a handful of independents

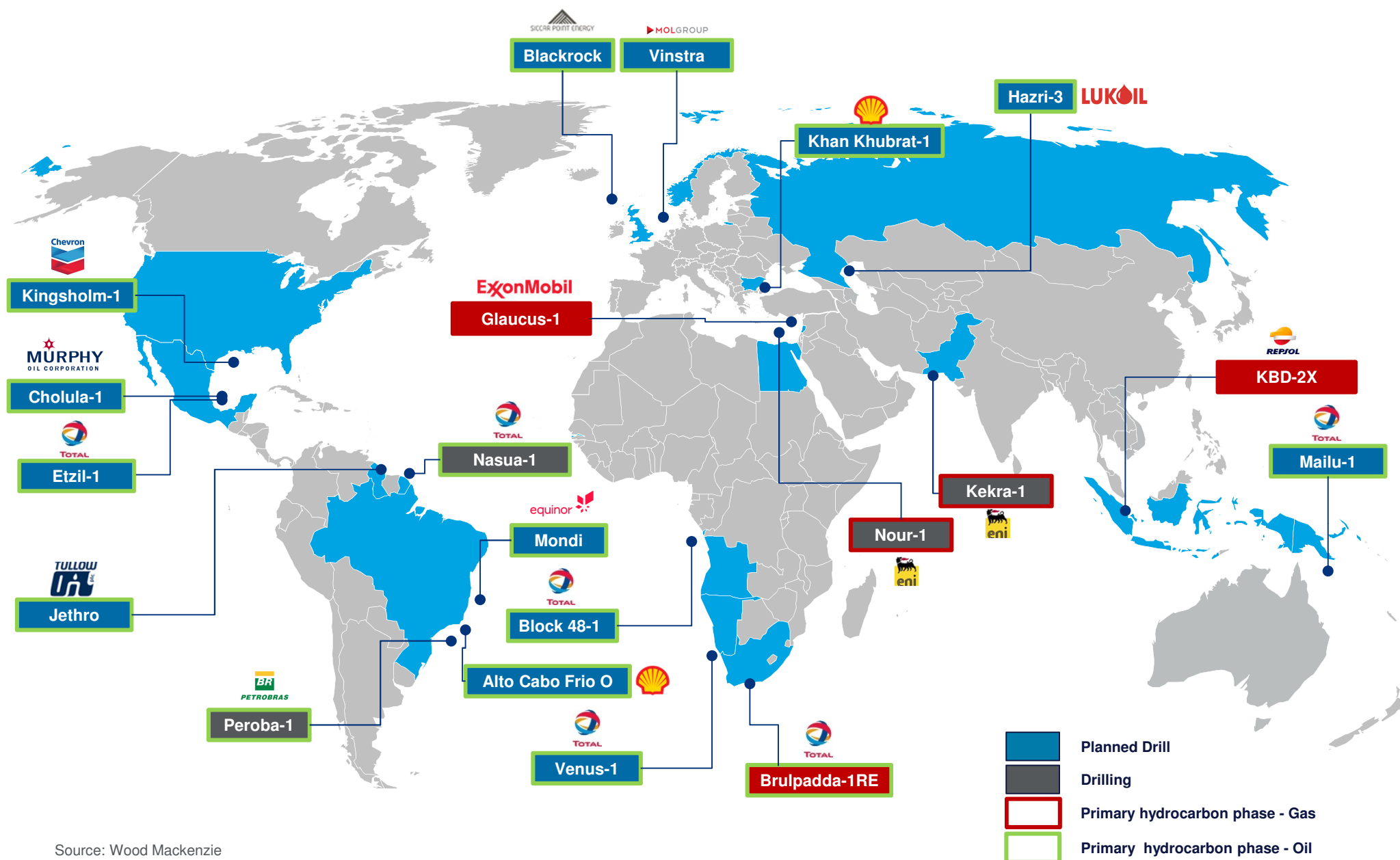
2017 volumes by company



2018 volumes by company



Top 20 wildcats to watch – more deepwater and frontiers in 2019



Key exploration themes

A smaller, more profitable industry

1. Majors continue to dominate
2. Little sign of inflation
3. Most budgets stay cautious, but will some break ranks?
4. Latin and North American deepwater and frontier basins drive success
5. Average full cycle returns well above 10%



Dr Andrew Latham

Vice President, Global Exploration

Biography

Andrew has over 25 years experience assisting majors and independents in the development of their exploration strategy and currently works on Wood Mackenzie's Exploration Research. He provides analysis of exploration economics, strategies and industry trends.

Andrew previously led the Exploration Strategy offering within the Upstream Consulting business. He worked with clients to help optimize their investments in petroleum exploration and advised on strategy, process, opportunity characterization and evaluation. As part of this offering, Andrew directed Wood Mackenzie's series of multi-client projects on exploration, deepwater and Arctic themes.

Andrew has been with Wood Mackenzie's energy team since 1995. Until the end of 2001, he managed the team responsible for Sub-Saharan Africa research products and consultancy, undertaking a range of market analysis and regional strategy projects.

He started his career in 1990 as an international new ventures geologist with Ranger Oil. Later, as Ranger focused on West Africa, he became project geologist for Angola.

Andrew graduated from Imperial College, London, with a BSc Honours degree in Geology, and holds a PhD in Geology from University College, Cardiff.

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