Critical times for the future of Brazil’s upstream industry

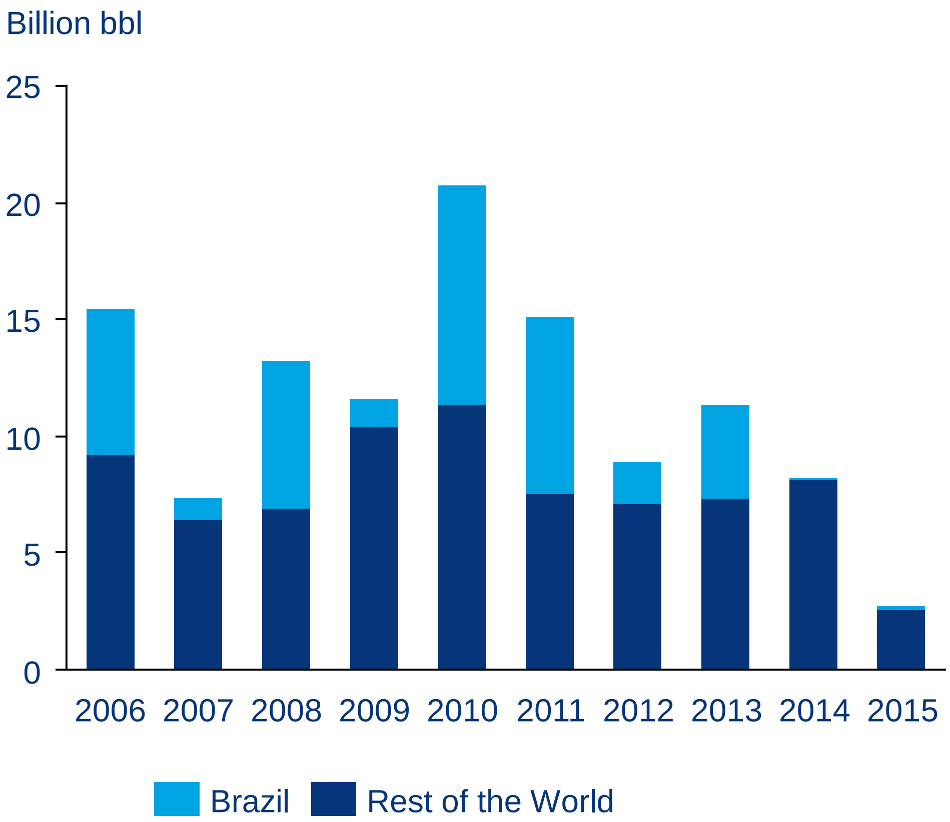
May 13, 2016

Horacio Cuenca
Upstream Research Director,
Latin America

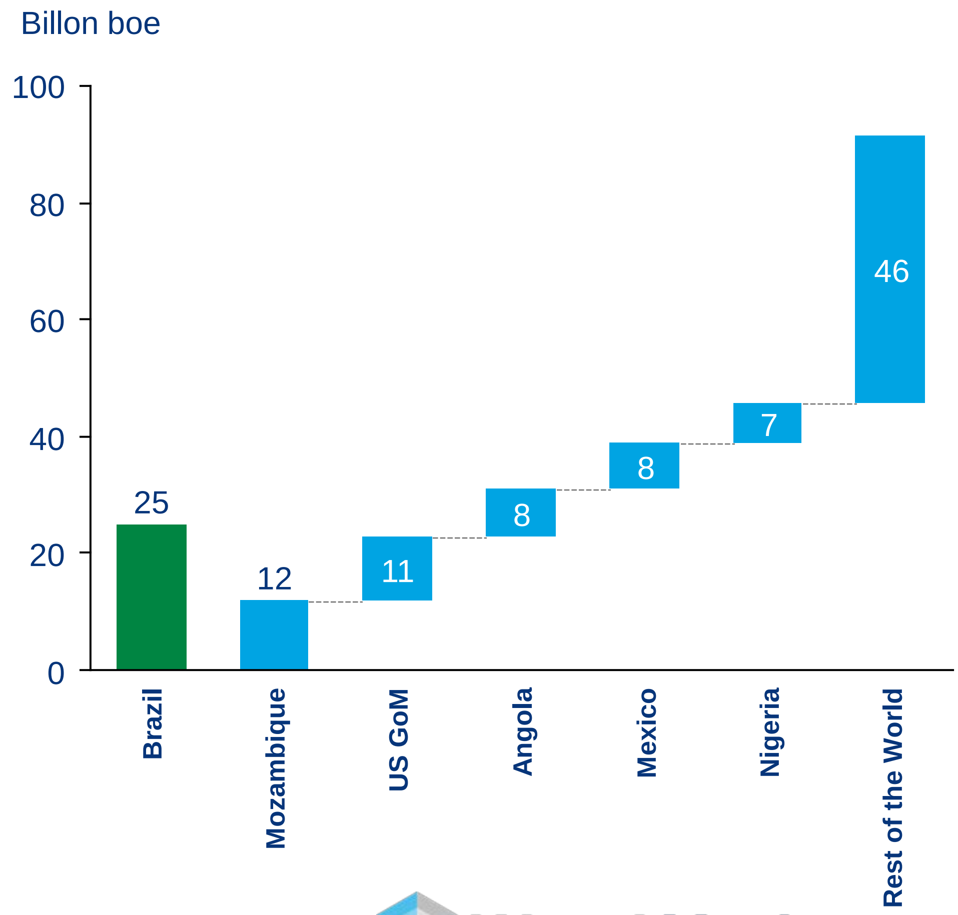
In the last decade, Brazil has been the most prolific offshore deepwater basin

168 discoveries representing 38 billion barrels of oil out of the 77 discovered globally

Conventional oil discoveries



Conventional YTF – Deep Water Basins



Source: Wood Mackenzie Exploration Service

However, the world has changed and operators are responding drastically to the prevailing oil price

Budget cuts, job reductions, project deferrals, efficiencies and supply chain wins

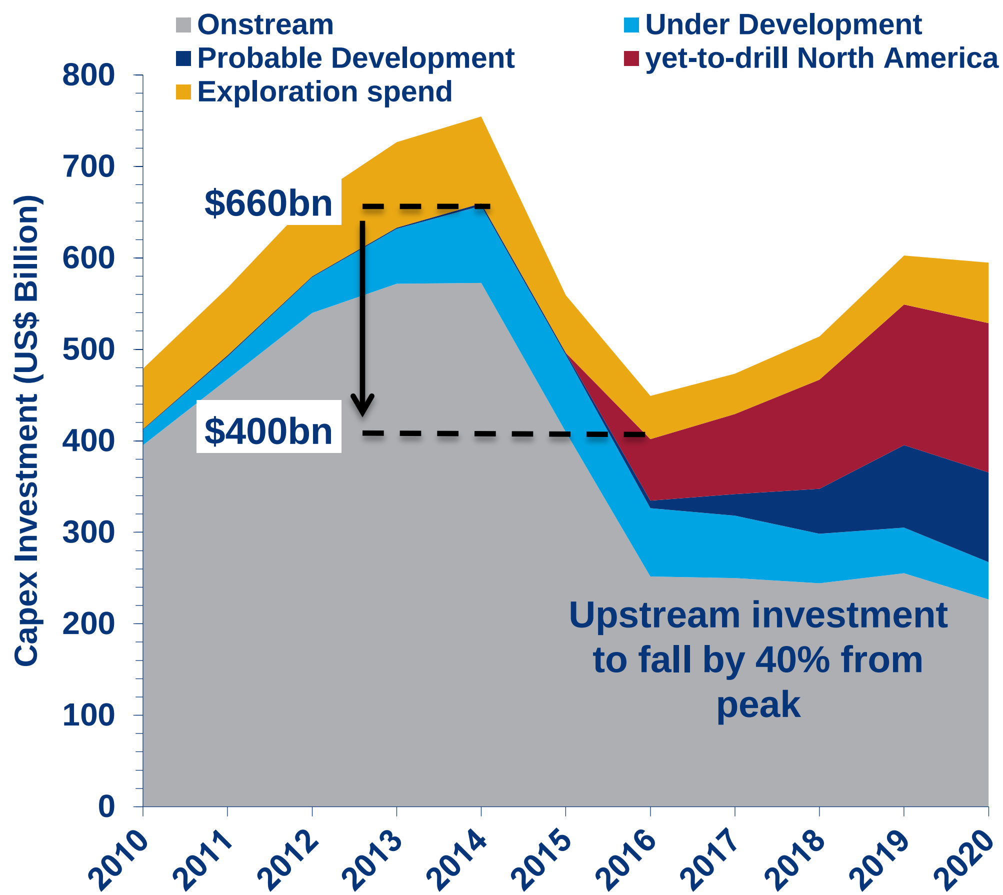
Global upstream spend (US$ bn)

Exploration spend halves to US$45 bn 2016-18 – consequences?

US$220 bn drop in annual development capex

Conventional FIDs:
- **6 in 2015**
- **similar in 2016?**

Some operators have given up deepwater exploration, e.g. Marathon, ConocoPhillips



Will Exploration spend pick up towards 2020?

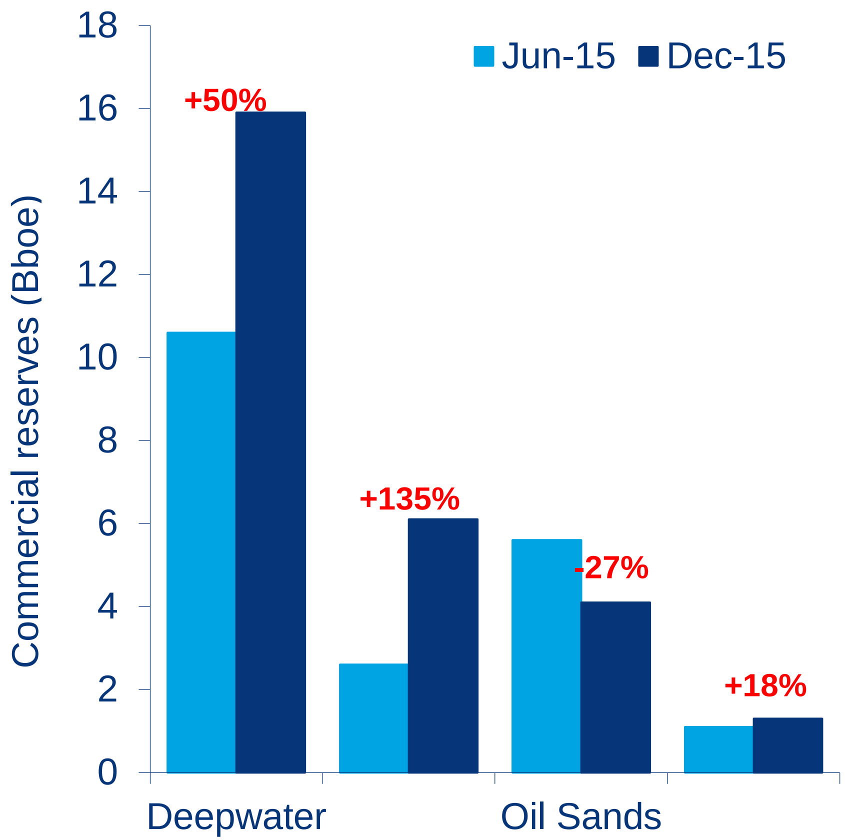
L48: uncons flexibility: recovers 2017 with firming oil price?

Source: Wood Mackenzie. Forecast of trend for development costs based on Wood Mackenzie database

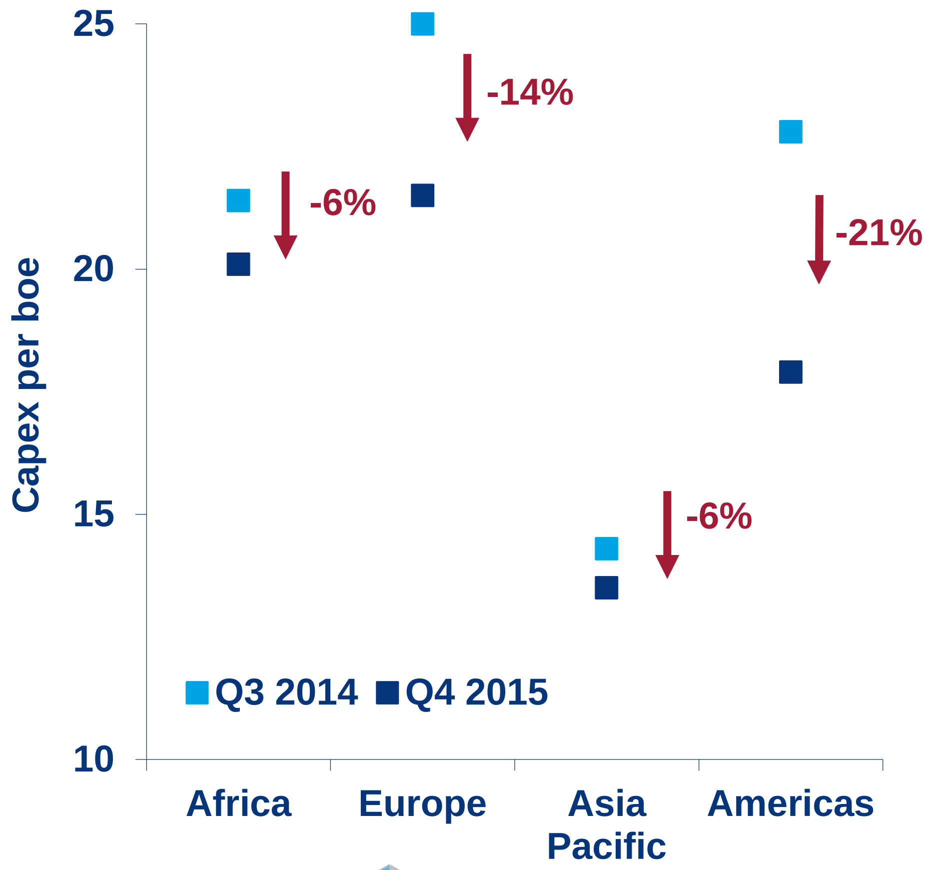
Deepwater developments have been hit hardest, with 16 Bboe in investments postponed

Costs are clearly down in all regions but Deepwater has remained "sticky"

Deferred reserves (Bboe) by theme



Changes in Capex/boe (Q3 2014 v Q4 2015)

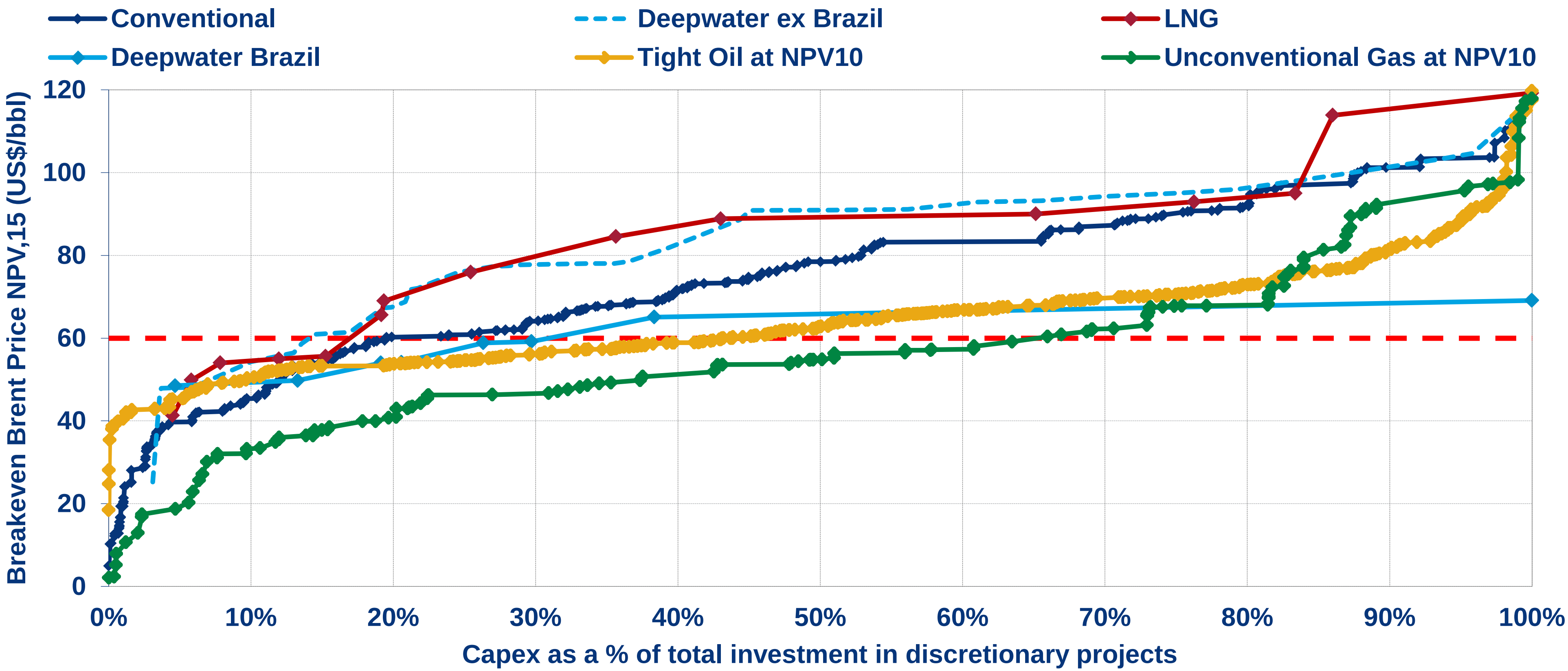


Wood Mackenzie
A Verisk Analytics Business

Brazil's offshore resources are cost competitive against other areas

Unconventionals have a competitive edge at low prices; LNG/deepwater challenged

Resource cost curve: Breakeven Brent Price versus % investment in discretionary projects

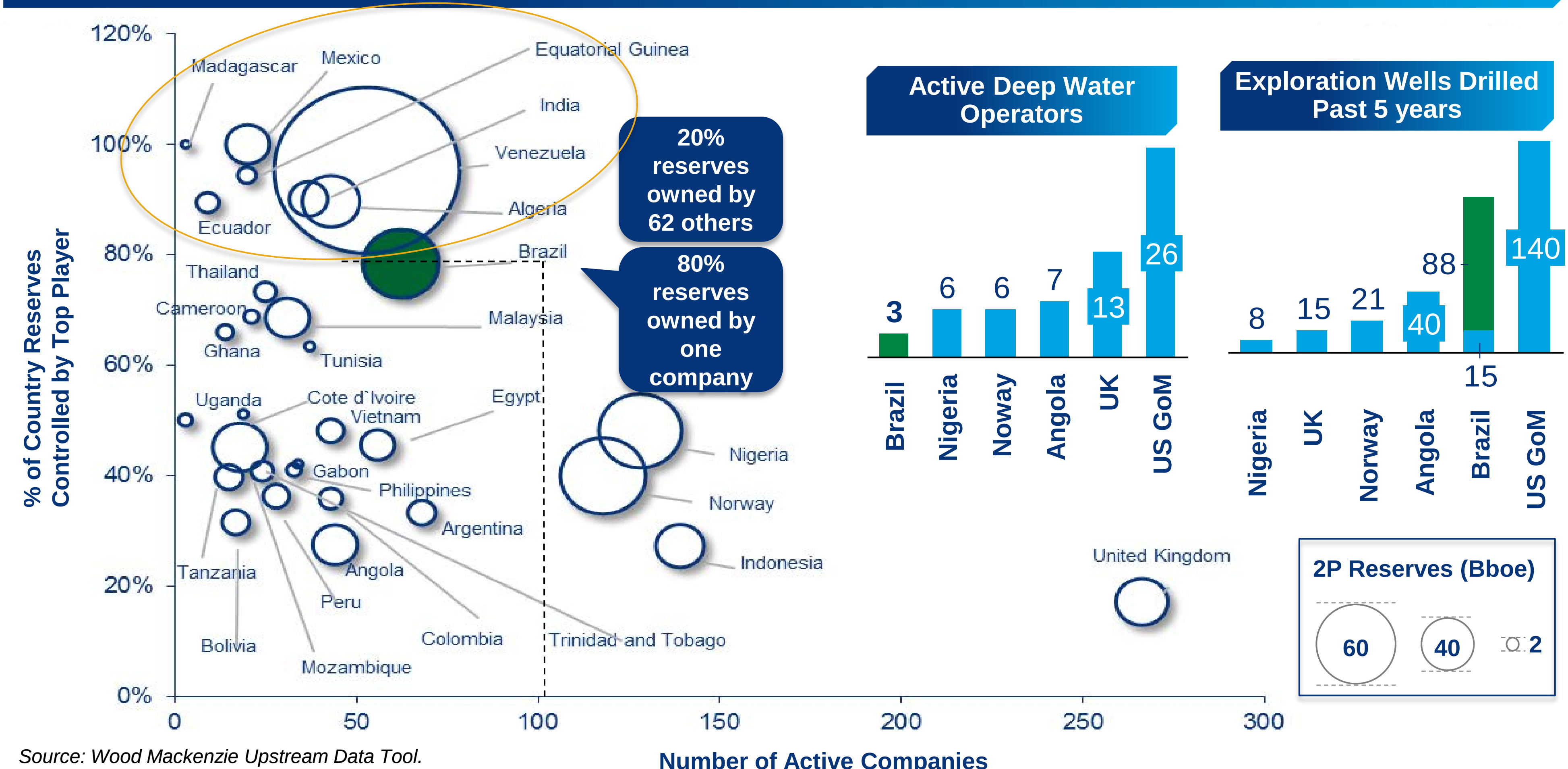


Source: Wood Mackenzie Q3 2015 dataset. % of investment in discretionary projects in each resource theme for the 2015-2030 period. NA onshore breakeven calculated using our base-case gas prices (US$3.75/mmbtu long-term real); excludes dry gas plays. Capital Spend is the net investment in probable developments and yet-to-drill wells onshore North America (nominal terms). It does not include investment in fields which are already onstream and newfield developments that fall under tax ring fences which are already onstream, with the exception of future expansions at Tengiz, Kashagan, Karachaganak, Lula, Shah Deniz, South Iototan, Haute Mer Zone D, ACG and Claire.

….but the country has been challenged in attracting non-Petrobras investment, even in periods of high-oil price

Although open since 1998, Brazil's upstream continues to be one of the most highly concentrated

Industry Concentration (% of country's reserves owned by largest player) and Number of Players

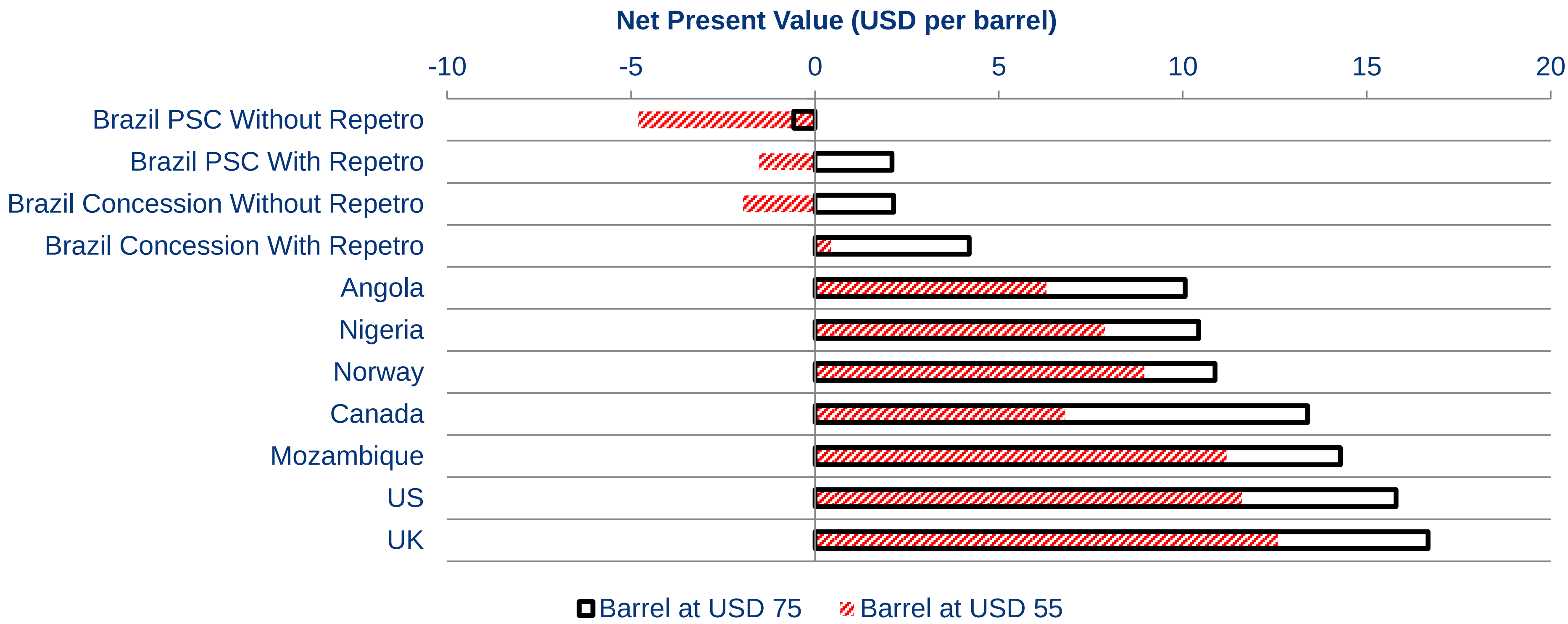


Source: Wood Mackenzie Upstream Data Tool.
Excludes Russia & CIS, Rest of Europe and North America

From a fiscal perspective, REPETRO sustains the competitiveness of the concession regime

Without REPETRO Brazil will stop been attractive in terms of investor returns

Deep Water Fiscal Regime Competitiveness



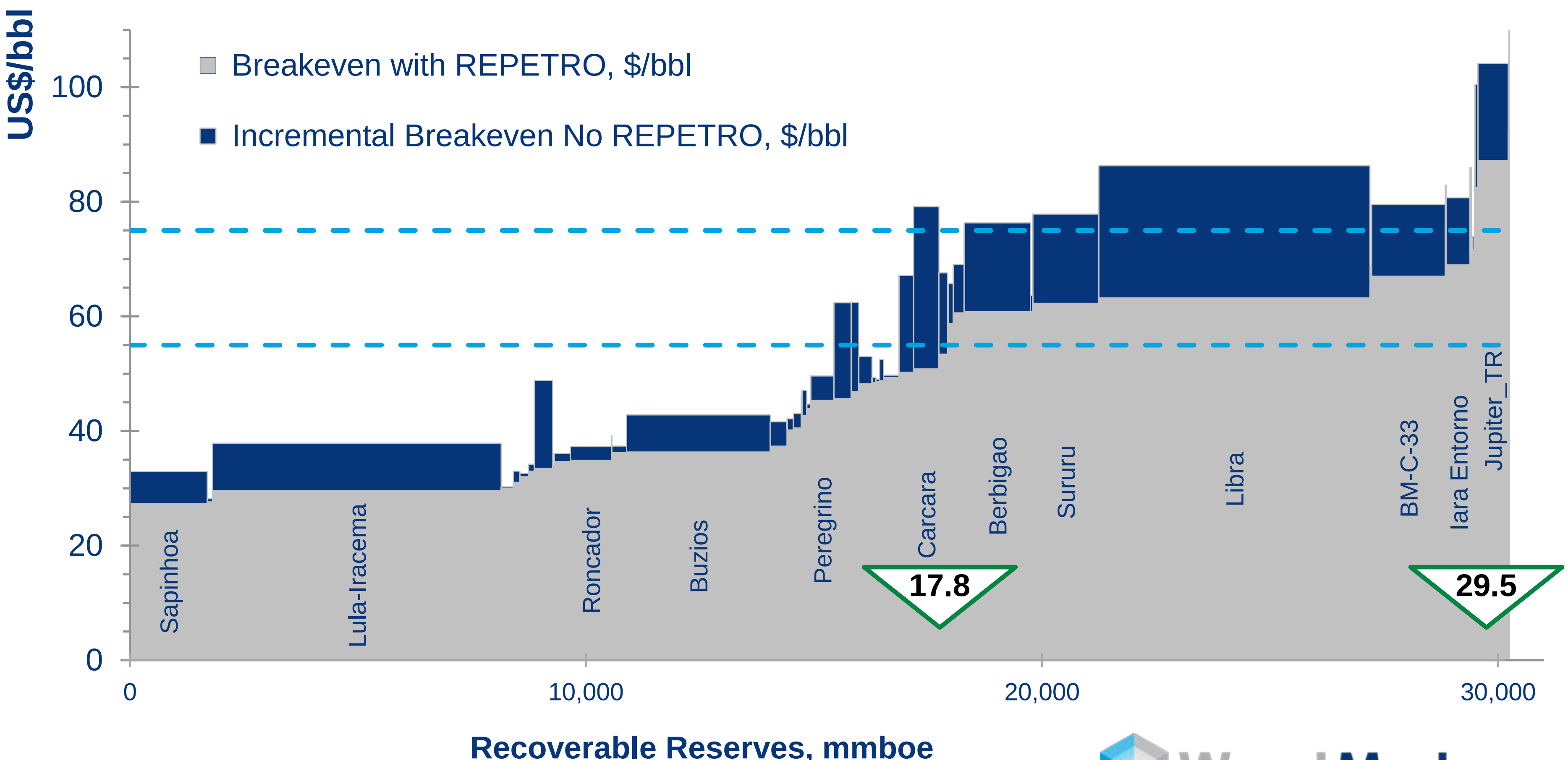
Note: NPV(10%) per bbl to the investor of developing a 660 mmbbl deep water oil field under each fiscal regime. No exploration risk included.

Wood Mackenzie
A Verisk Analytics Business

Between 2010-2030, 29.5 billion barrels are economic at US$75/bbl with REPETRO, reducing to 17.8 billion barrels without

REPETRO has a significant impact on economics at oil prices between US$50 – US$80/bbl

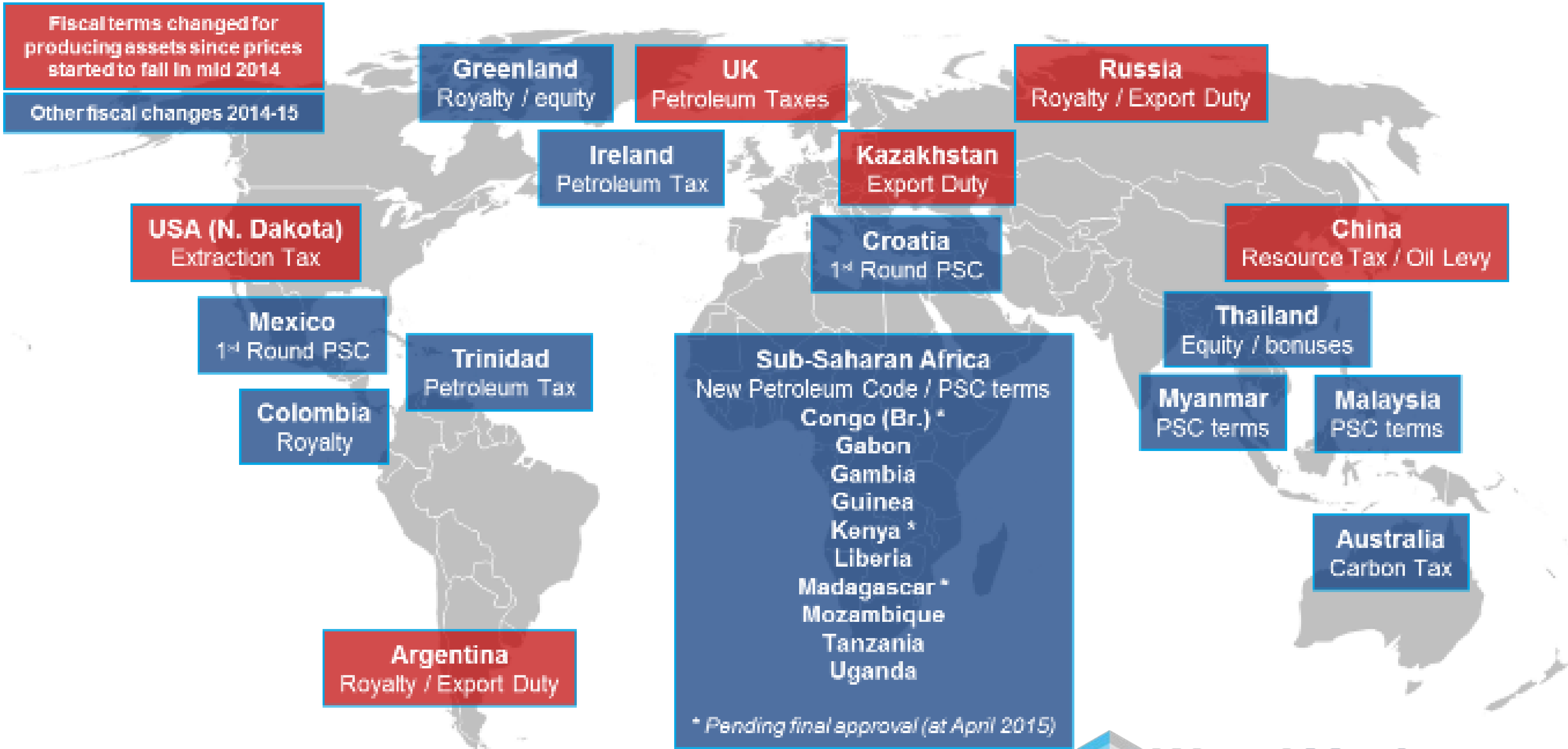
Break-Even Oil Price Estimate (10%) at FID date for Fields Onstream 2010-2030



Governments are adjusting their terms to remain competitive after the oil price decline

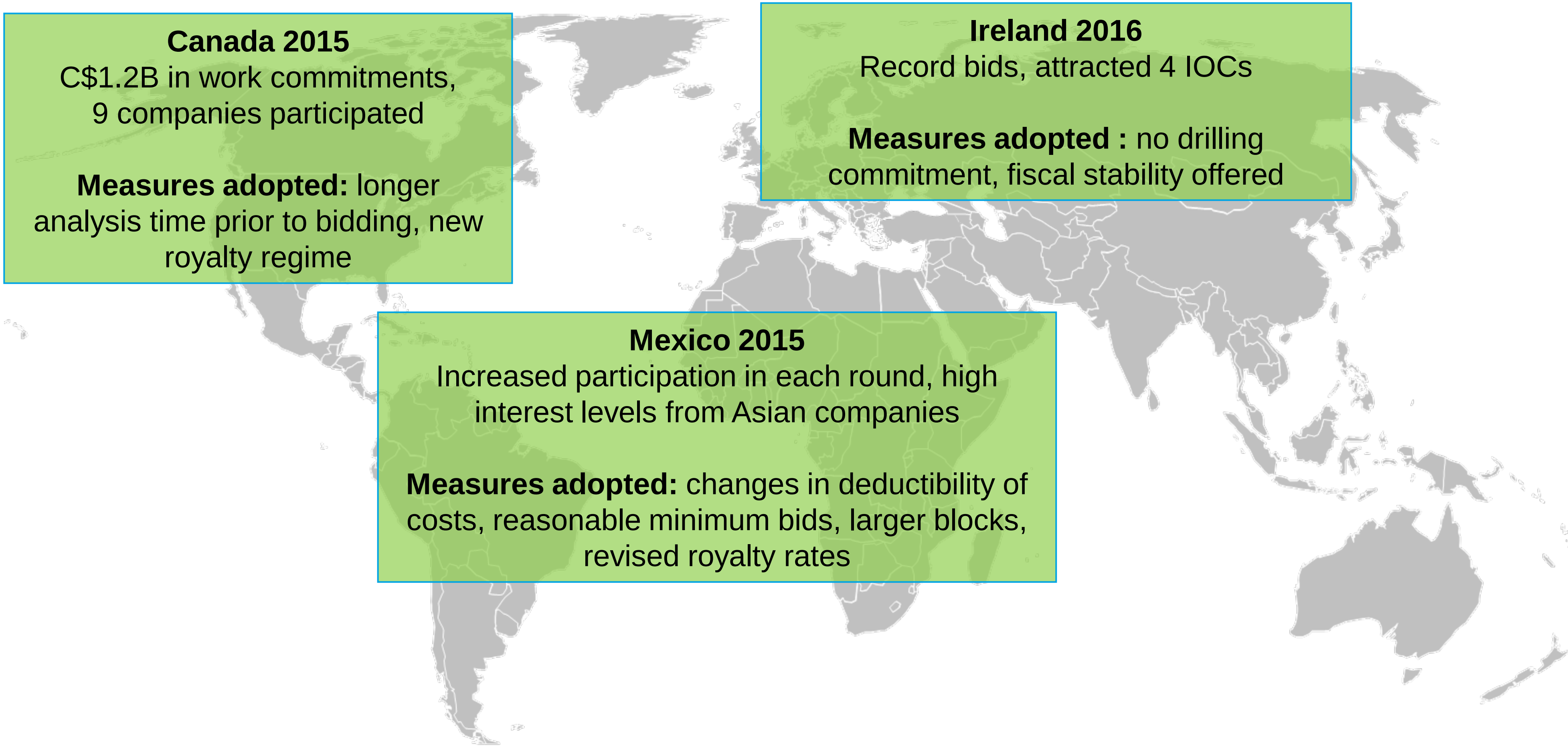
Several were already under study due to challenging high technical costs

Others change automatically…



Some countries have remained attractive and seen successful licensing round results

In spite of the depressed market, some countries continue to attract investment



Canada 2015
C$1.2B in work commitments, 9 companies participated

Measures adopted: longer analysis time prior to bidding, new royalty regime

Ireland 2016
Record bids, attracted 4 IOCs

Measures adopted : no drilling commitment, fiscal stability offered

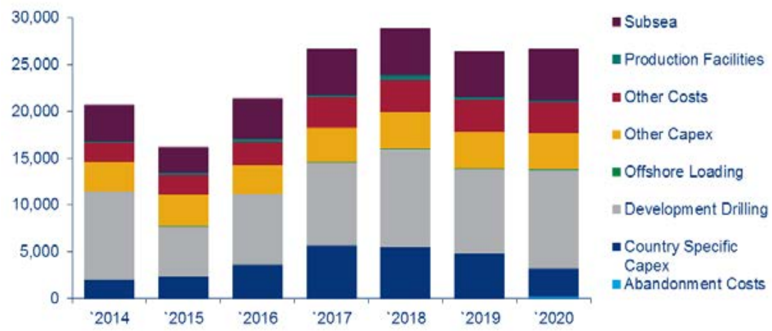
Mexico 2015
Increased participation in each round, high interest levels from Asian companies

Measures adopted: changes in deductibility of costs, reasonable minimum bids, larger blocks, revised royalty rates

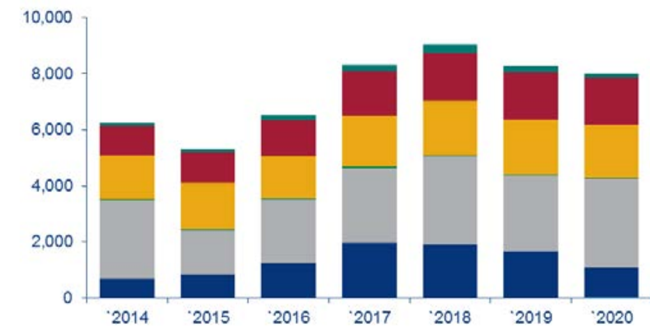
Local Content requirements will impact competitiveness and must be understood within the limits of the domestic supply chain

Upstream Development Projects

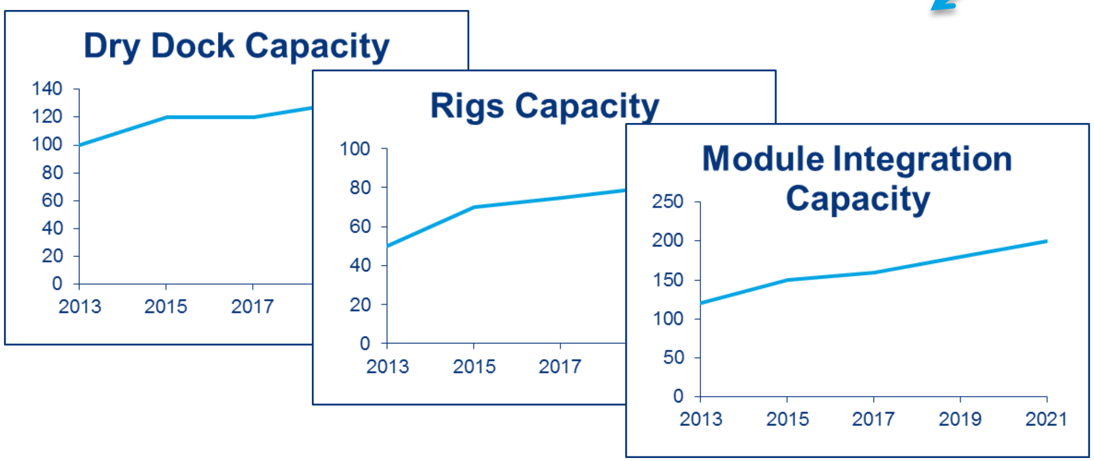
CAPEX Forecast by Component US$MM



Local Content Requirements US$MM



Domestic Supply Chain Capacity



Disclaimer

Strictly Private & Confidential

- This report has been prepared by Wood Mackenzie Limited. The report is intended solely for the benefit of attendees and its contents and conclusions are confidential and may not be disclosed to any other persons or companies without Wood Mackenzie's prior written permission.

- The information upon which this report is based comes from our own experience, knowledge and databases. The opinions expressed in this report are those of Wood Mackenzie. They have been arrived at following careful consideration and enquiry but we do not guarantee their fairness, completeness or accuracy. The opinions, as of this date, are subject to change. We do not accept any liability for your reliance upon them.

Europe	+44 131 243 4400
Americas	+1 713 470 1600
Asia Pacific	+65 6518 0800
Email	contactus@woodmac.com
Website	www.woodmac.com

INVESTORS IN PEOPLE | Gold

Wood Mackenzie™, a Verisk Analytics business, is a trusted source of commercial intelligence for the world's natural resources sector. We empower clients to make better strategic decisions, providing objective analysis and advice on assets, companies and markets. **For more information visit: www.woodmac.com**