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GOING GLOBAL: TIGHT OIL PRODUCTION

Leaping out of North America and onto the World Stage

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Key Message: Tight Oil Will Have Unconventional Effects

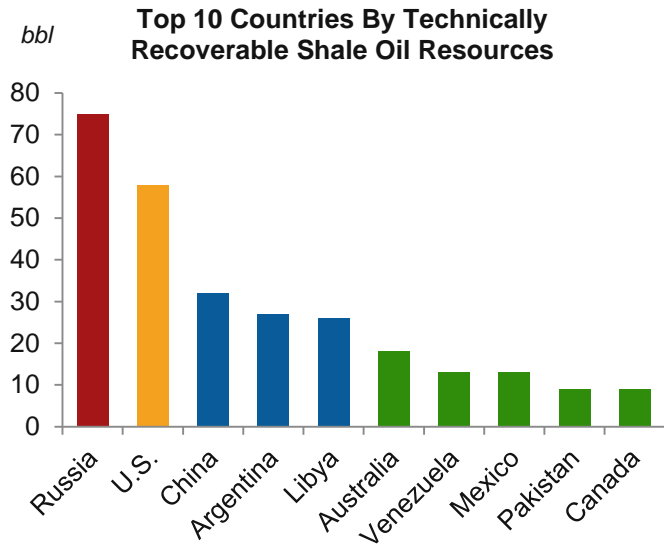
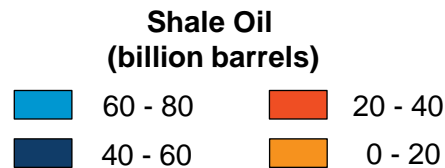
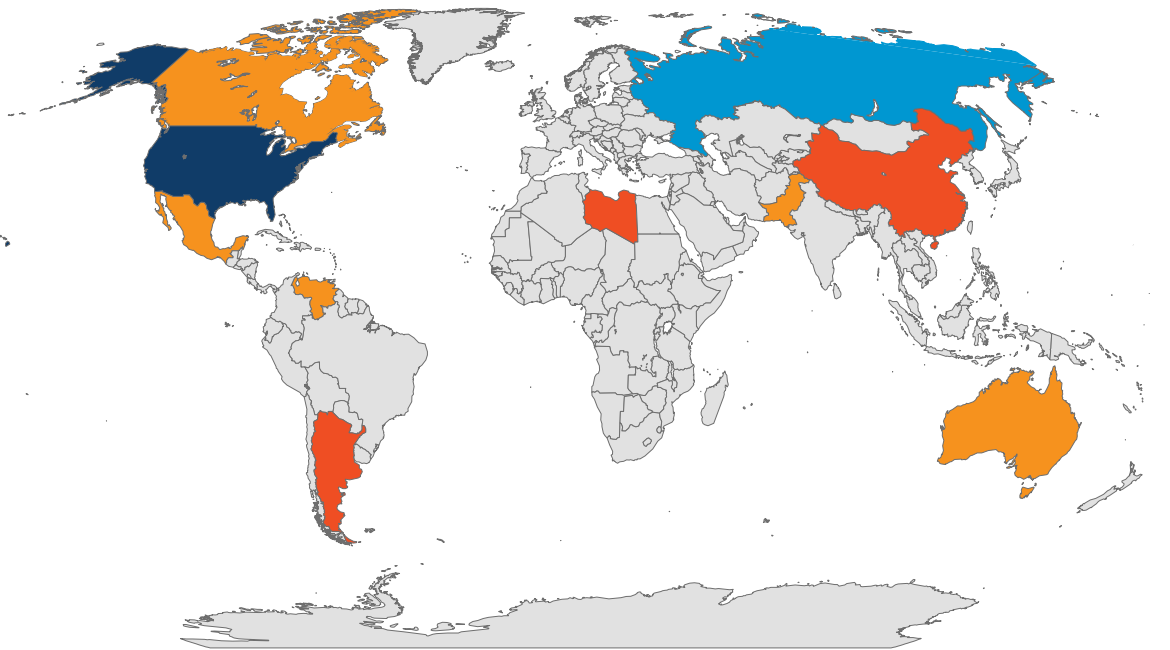
Tight Oil Production will change in the coming decades. It will be:

- **More global**, as it leaps out of North America
- **More inclusive**, as companies come to the US for experience and US companies go international for production
- **A source of renewal**, as unconventional techniques are used in conventional fields

The United States will continue to be an important laboratory for global development of tight oil and unconventional techniques

Global tight oil production has significant energy security implications

Top Ten Countries with Largest Shale Oil Resources



Source: EIA Report, June 10 2013

Shale oil resources are concentrated in Russia and the United States – their resources are almost equal to those of the other eight countries combined.

US Success Factors in Tight Oil: Internationally Repeatable?

Key factors in US tight oil success:

Resource Base Quality

Resource Base Quantity

Cooperative Government

Property Rights

Innovation via competition

Service sector capacity

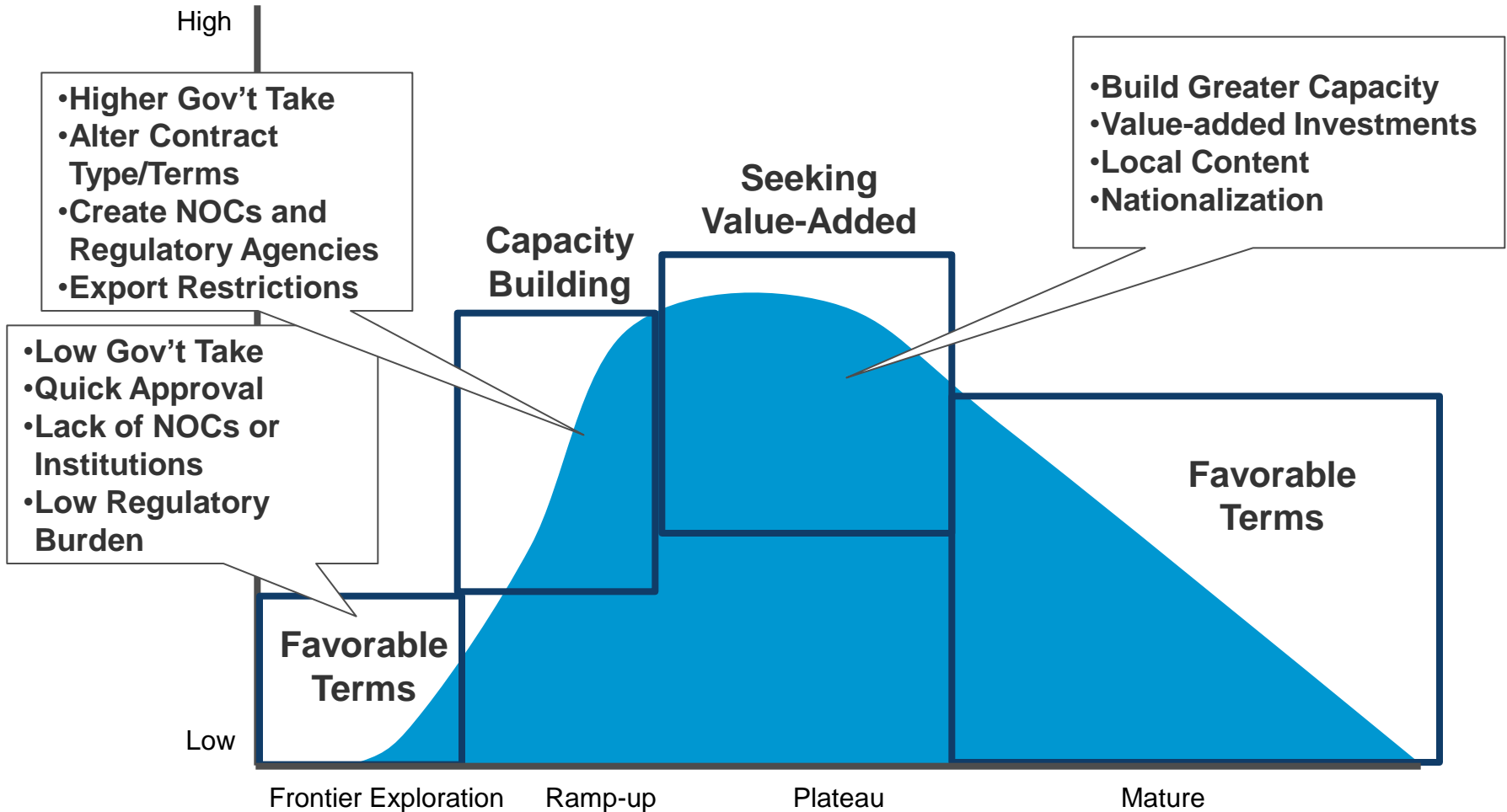
Financial markets

Functioning and available market

The US focused on natural gas first, then switched to oil as gas prices fell. The opposite is likely to occur in many other countries.

Typical Risk Progression and Investment Impact on Investors

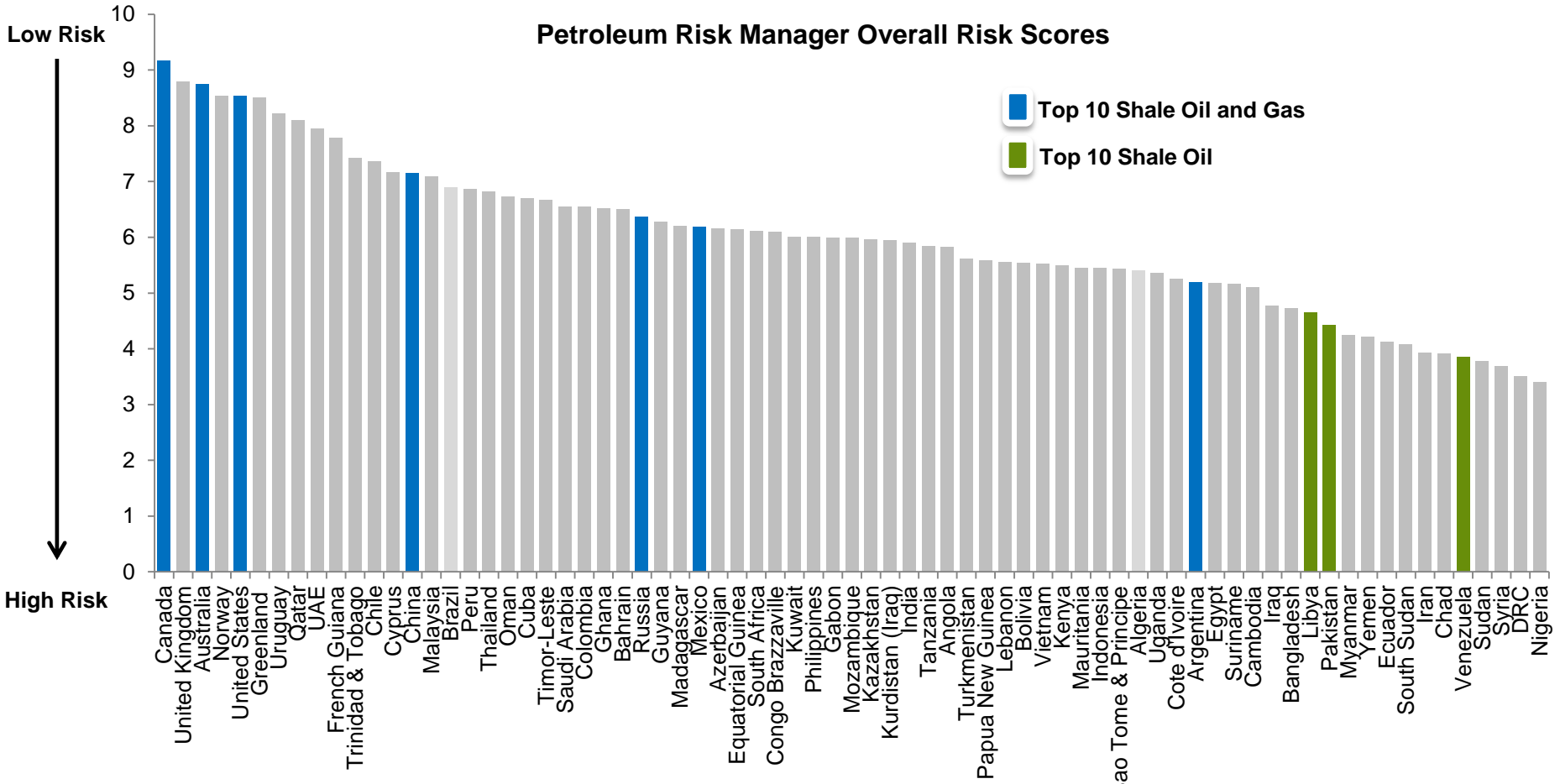
Typical Risks Faced by Operators



Source: Petroleum Risk Manager, IHS

Production Cycle

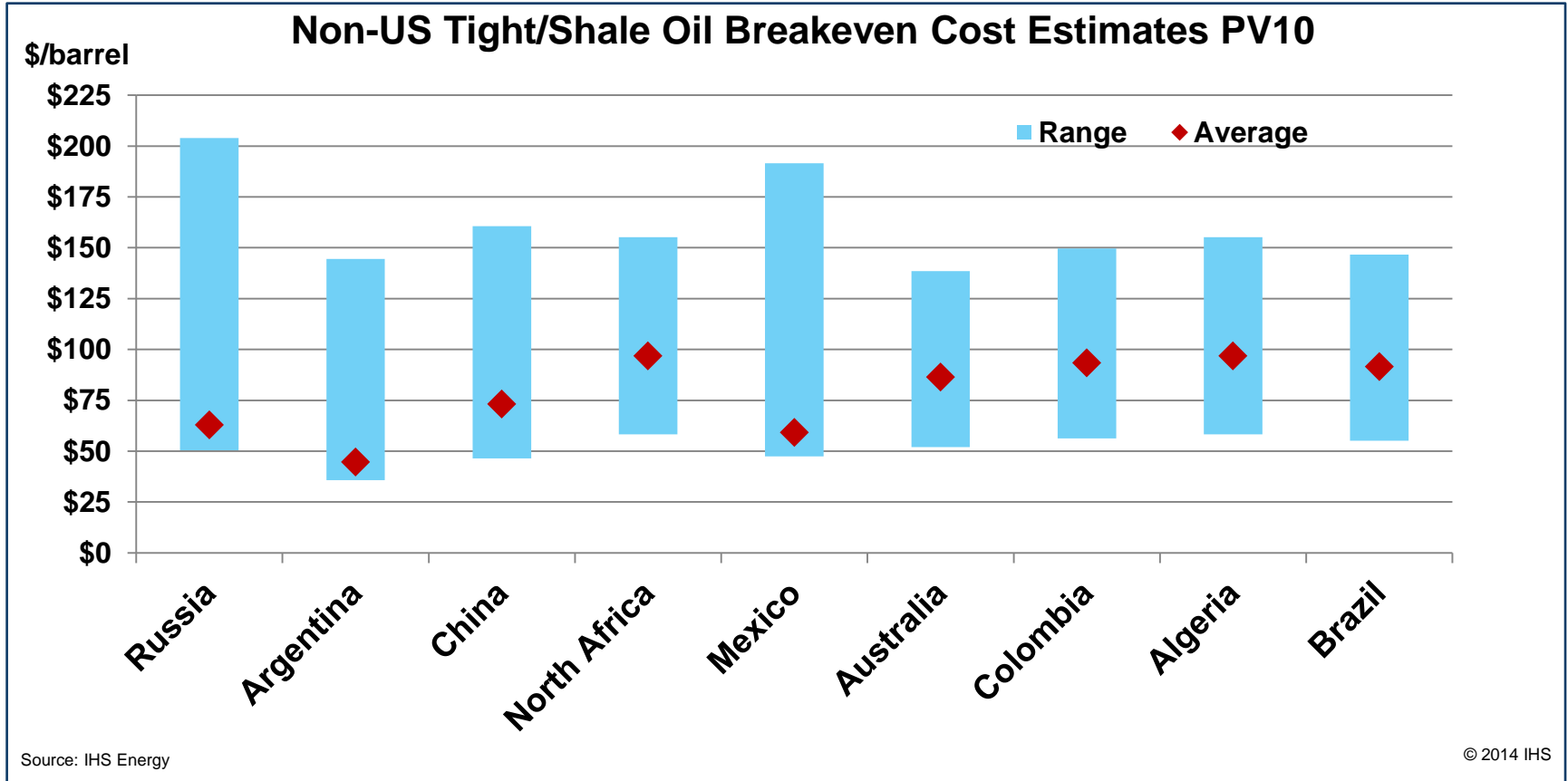
Top 10 Shale Oil and Gas Resources: Span the Gamut of Above-Ground Risk



Countries identified by the EIA with the largest unconventional resources vary widely in terms of overall above-ground risk – but those in the top ten for both shale gas and shale oil are mostly found in the top half of the risk range.

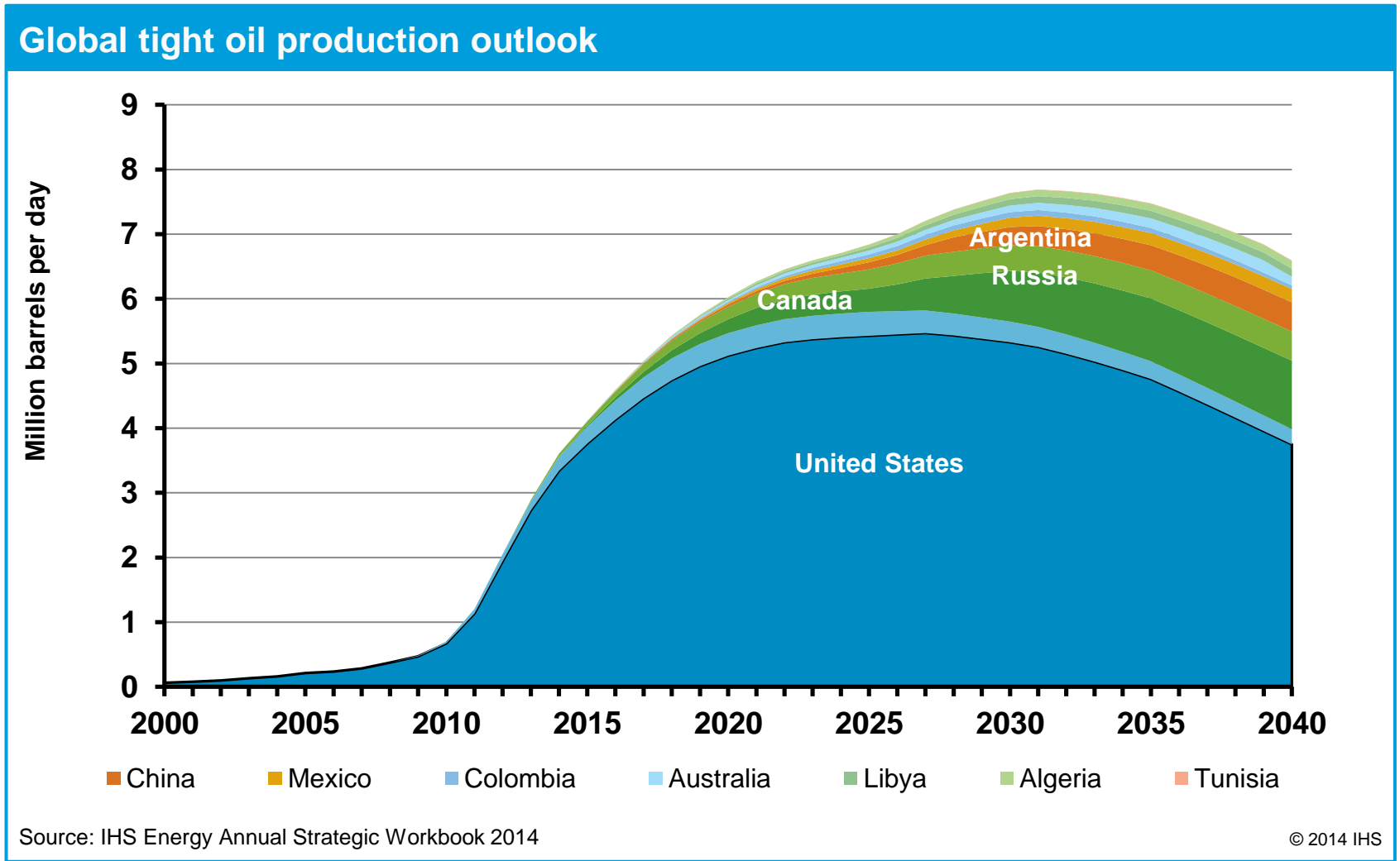
Source: Petroleum Risk Manager, IHS

Tight/Shale oil plays will exhibit the same wide range of breakeven economics as in the US



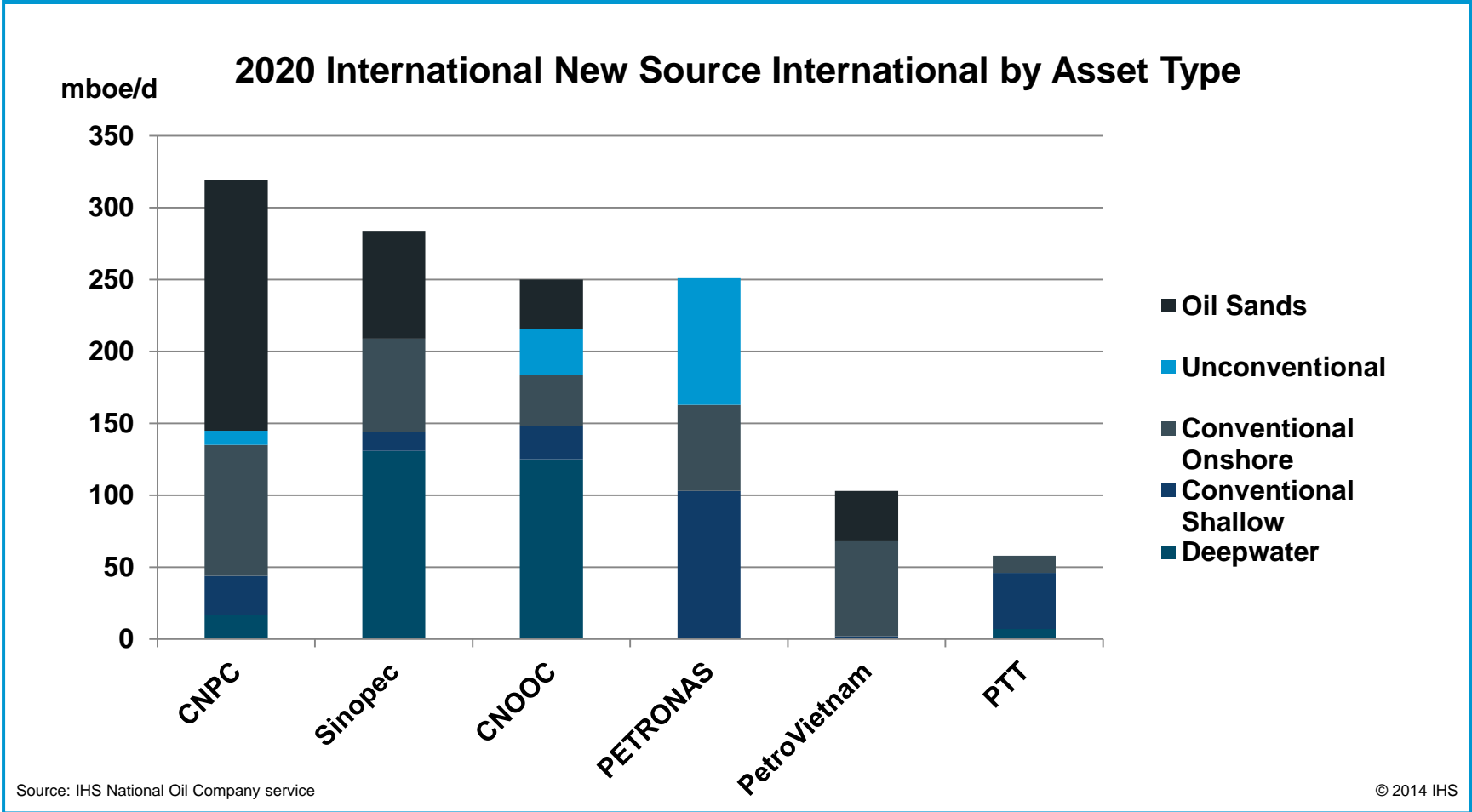
- Incubating a play requires a very high oil price. Sustaining a known play only needs a fraction of that price.

By end of decade, up to 10% of tight oil production could come from outside North America



Companies coming to North America to learn techniques, US companies to go international for production

2020 new source production by asset type of internationalizing Asian NOCs



Applying unconventional techniques to conventional plays

Concept is still in early stages – but has potential to renew old oil fields in new ways, while helping to increase recovery factors - critical in meeting future supply

Low-productivity conventional reservoirs, horizontal wells:

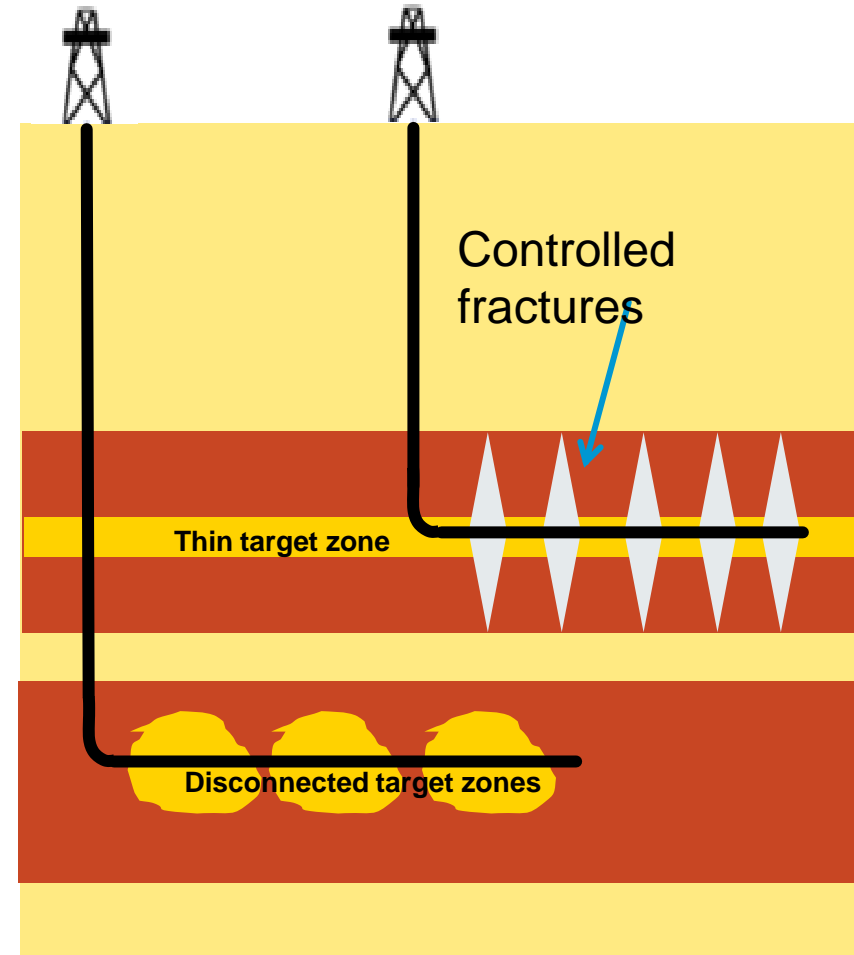
Allow access to thinner zones where vertical wells were not commercially productive.

Can connect compartmentalized portions of the reservoir with one well instead of many vertical wells.

Hydraulic fracturing may or may not be used

It may not be practical or necessary in conventional reservoirs that have higher permeability than shales.

Horizontal wells decline faster than vertical wells, but decline rates are highly variable—typically between 40% and 90% in the first year.



Tight Oil has Significant Energy Security Impacts

Tight oil production growth impacts:

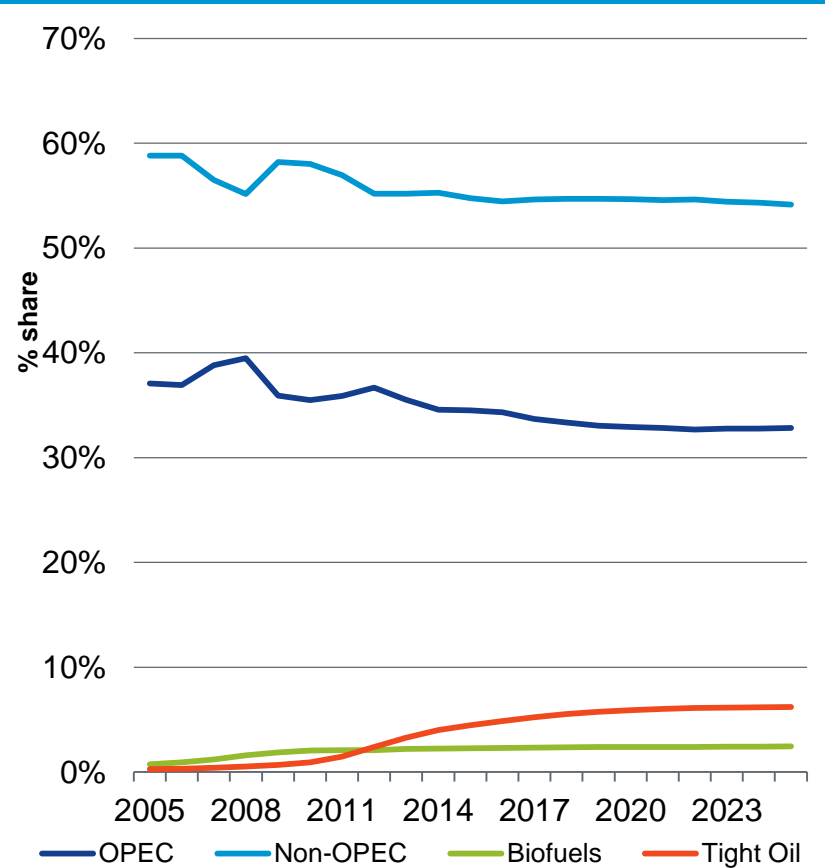
**A barrel of oil anywhere increases
energy security everywhere**

**Can radically change the import/export
balance of a country**

**Has the potential to disrupt OPEC as it
collapses the signal to production time**

Tight oil, and particularly responsive tight oil, can disrupt OPEC's control – an event that could add price volatility

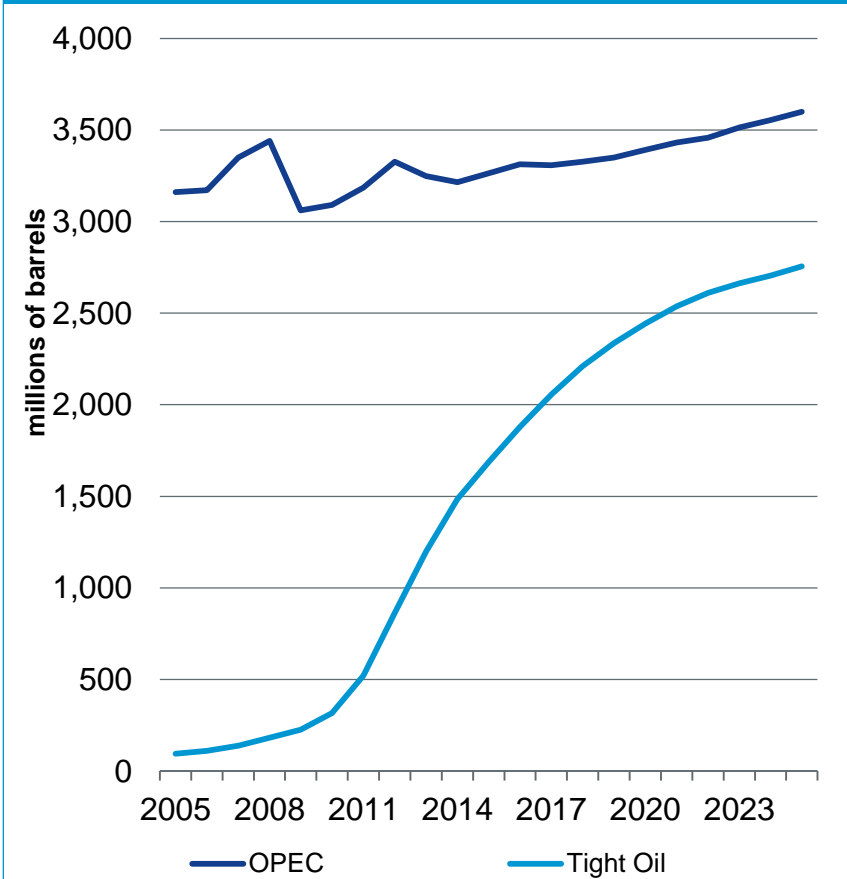
Share of Oil Demand by Type



Source: IHS

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Short-Term Responsive Oil Production



Source: IHS

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**Key Messages:
Global tight oil
production is
coming – and will
disrupt like the US**

Tight oil production will be more global in the future.

Countries will unlock their recipe for allowing tight oil production as they gain from the US laboratory

Companies will see big opportunities- potentially reversing the trend towards less international openness

The continuation of the US laboratory is critical for global success of tight oil

Energy security will be improved- but within it is the potential for price volatility if OPEC power is disrupted

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