



EXPLORATION CHALLENGES IN LOW OIL PRICE ENVIRONMENT

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About PETFORM



Established in 2000, PETFORM has played a crucial role in the transfer of private sector views to the public authorities regarding to Turkish energy legislation amendments. Member companies mainly have activities in 2 sectors:

- Exploration & Production Sector
- Natural Gas Market

Member Companies

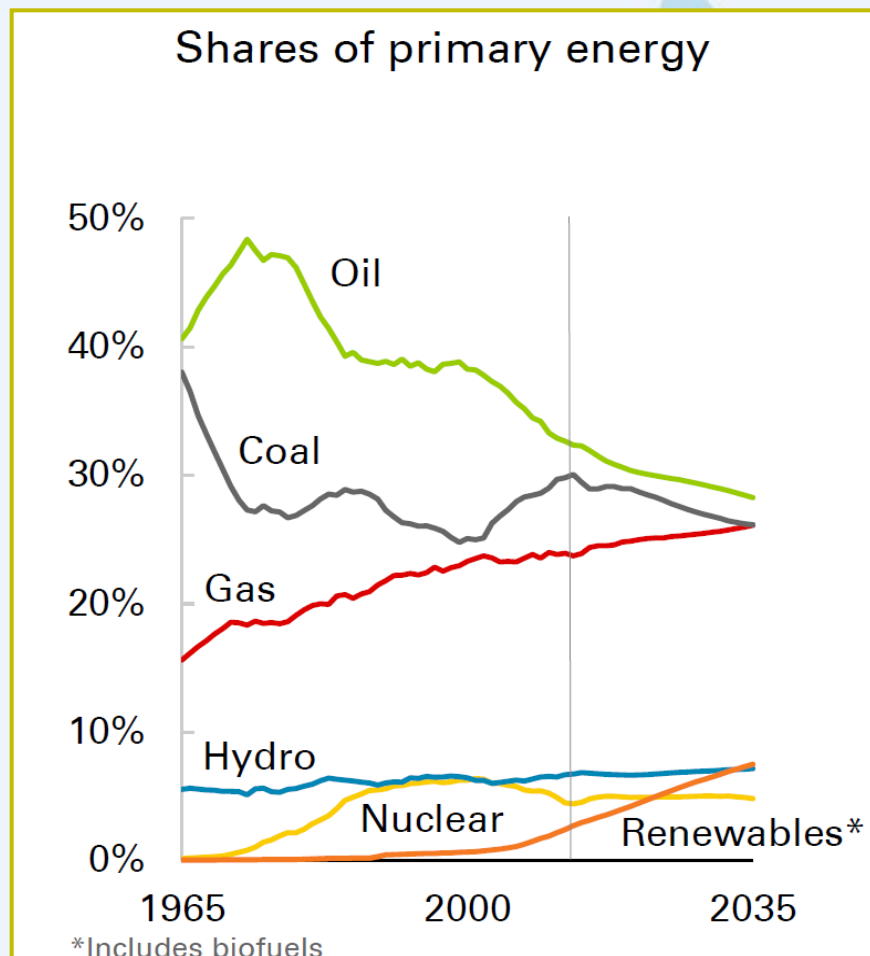


- AKENERJİ
- AKFEL
- AKSA
- ALADDIN MIDDLE EAST
- ANATOLIA ENERGY
- ANGORAGAZ
- ATTILA DOĞAN İNŞAAT
- AVRASYA GAZ
- AYGAZ
- BATI HATTI GAZ
- BM HOLDİNG
- BORDRILL SONDAJ
- BOSPHORUSGAZ
- BP
- CHEVRON
- ÇALIK ENERJİ
- DEMİRÖREN EGL
- DOĞAL ENERJİ
- DOĞAN ENERJİ

- EDİSON
- EGEGAZ
- ENERCO ENERJİ
- ENERJİSA
- ENERYA
- ERDGAZ
- EWE ENERJİ
- EXXONMOBİL
- GDF SUEZ
- GENEL ENERGY
- GLOBAL ENERGY
- GÜNEY YILDIZI PETROL
- HATTUŞA ENERJİ
- HİPOT ENERJİ
- IBS RESEARCH
- KİBAR ENERJİ
- MARSA ENERGY
- NATURGAZ
- OMV

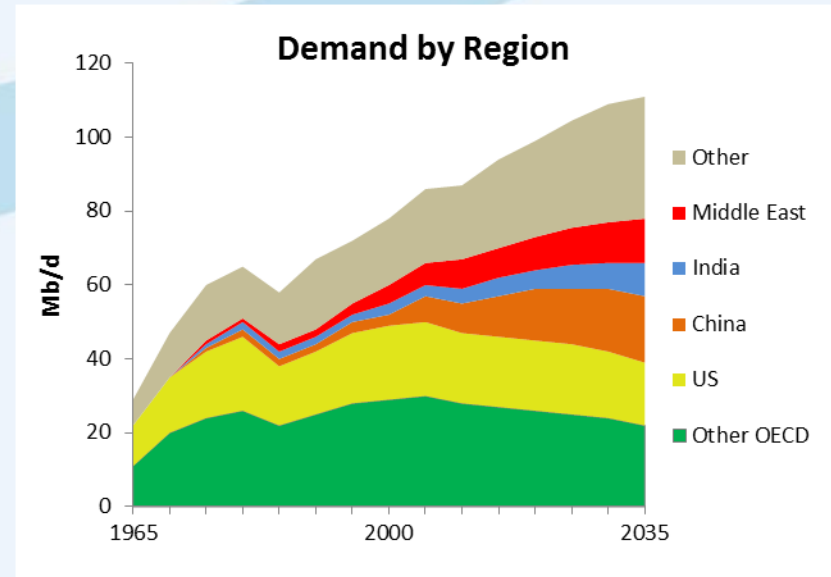
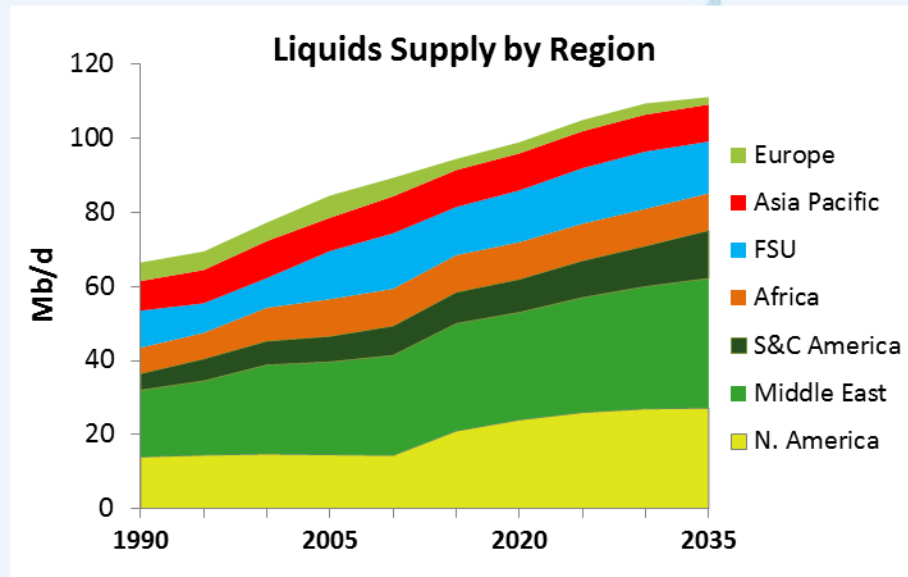
- PALMET ENERJİ
- PERENCO
- POZİTİF DOĞALGAZ
- RWE & TURCAS GÜNEY ELEKTRİK
- SHELL ENERJİ
- SOCAR
- STATOIL
- TBS PETROL
- TEKFEN İNŞAAT
- TEMİ
- THRACE BASIN
- TIWAY
- TOTAL
- TURCAS
- VALEURA ENERGY
- VOLT ENERJİ
- YENİ ELEKTRİK
- ZMB GAZ DEPO
- ZORLU ENERJİ

Fossil Fuels Continue to Provide Most of the World's Energy



By 2035 all the fossil fuel shares are clustered around 26-28% with no single dominant fuel – a first since the Industrial Revolution. Fossil fuels in aggregate lose share but remain the dominant form of energy in 2035 with a share of 81%, down from 86% in 2013.

The Global Liquids Balance

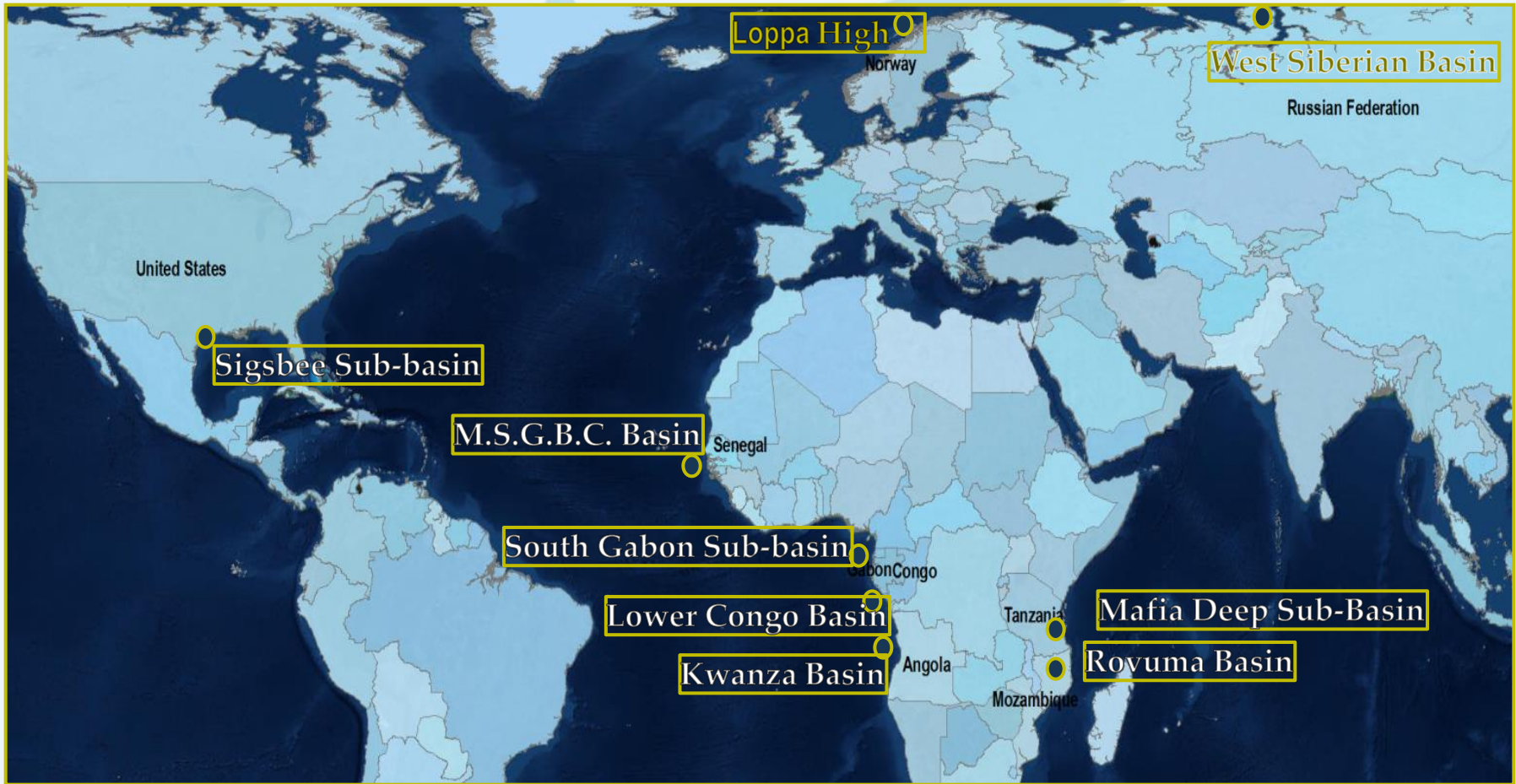


The increased demand is met initially by supply from non-OPEC unconventional sources. By 2035, non-OPEC supply is expected to have increased by 13 Mb/d, while OPEC production expands by 7 Mb/d.

The largest increments of non-OPEC supply come from the US (6 Mb/d), Brazil (3 Mb/d), and Canada (3 Mb/d), which offset declines in mature provinces such as the North Sea. OPEC supply growth comes primarily from NGLs (3 Mb/d) and crude oil in Iraq (2 Mb/d).

Global liquids demand (oil, biofuels, and other liquids) is projected to rise by around 19 Mb/d, to reach 111 Mb/d by 2035.

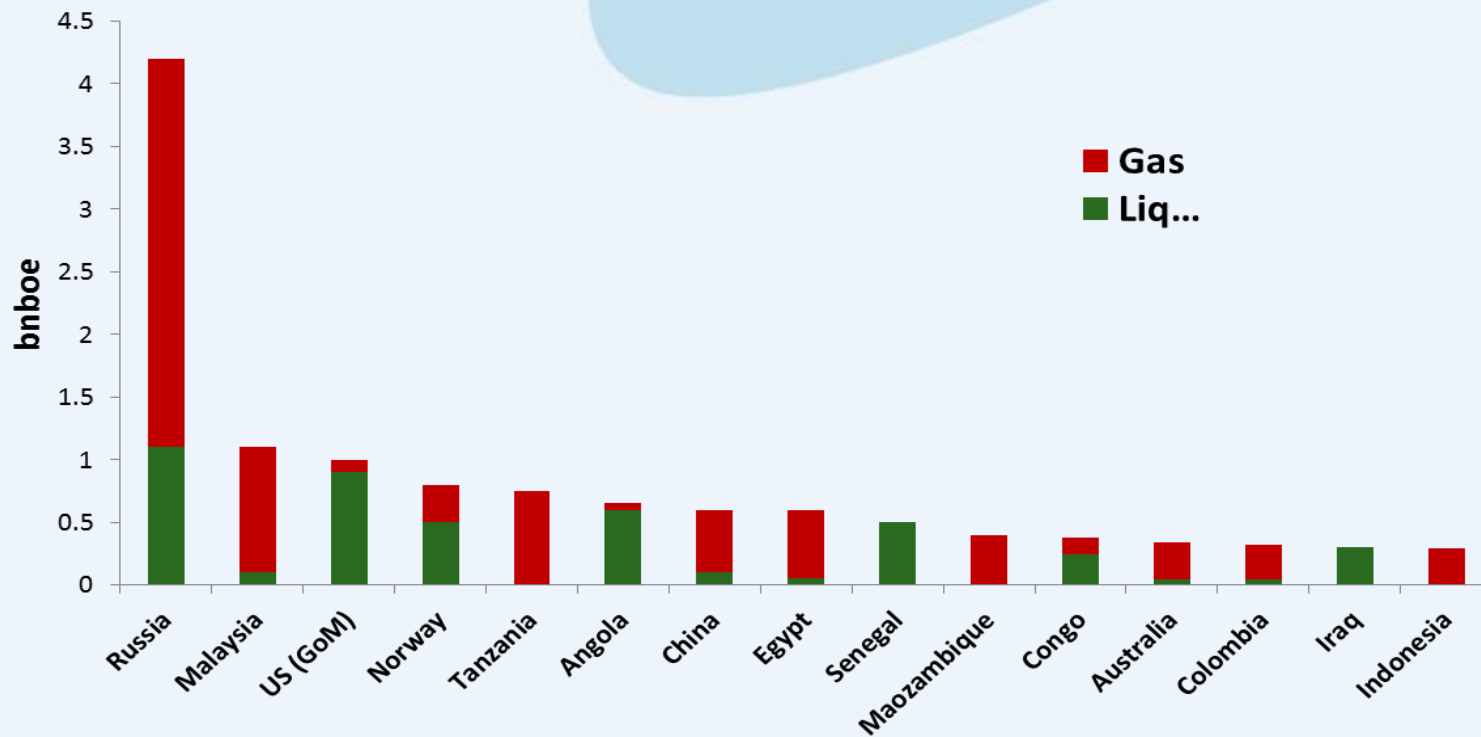
Top Ten Discovery Rating in 2014



Provisional 2014 Conventional Exploration Results

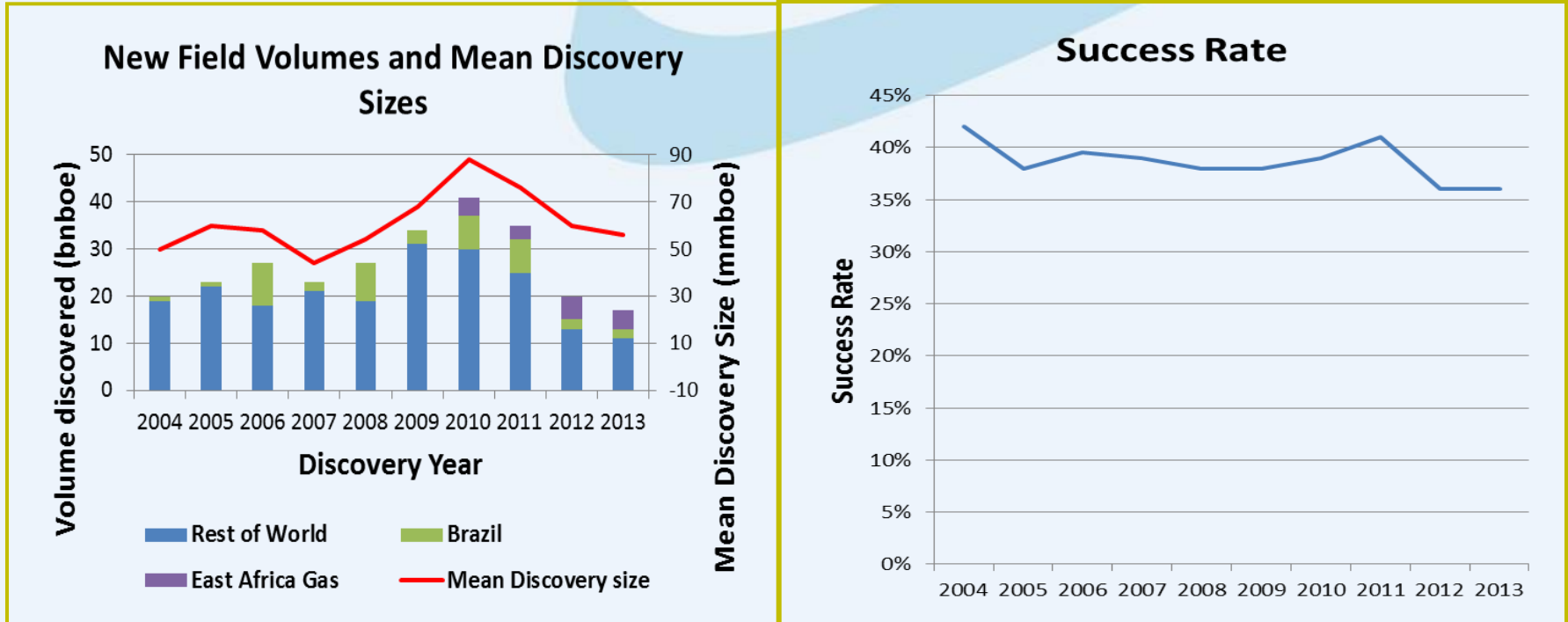


Resource discovery by country



Based on well results disclosure so far. Excludes appraisal adds to earlier finds.

Discovery Sizes and Drilling Success Rates

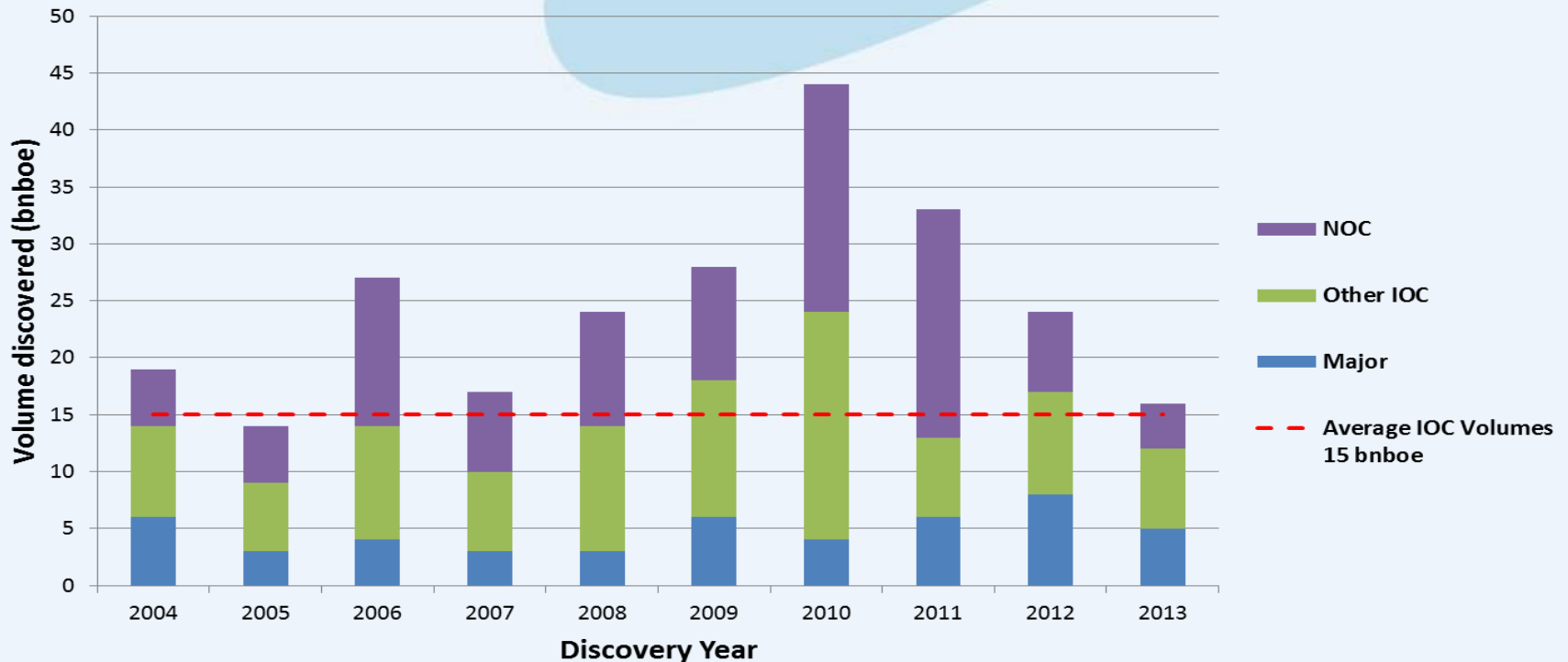


Discoveries are not getting smaller and explorers are not drilling more dry holes.

Contributors : NOC-IOC-Major



Industry Conventional Exploration

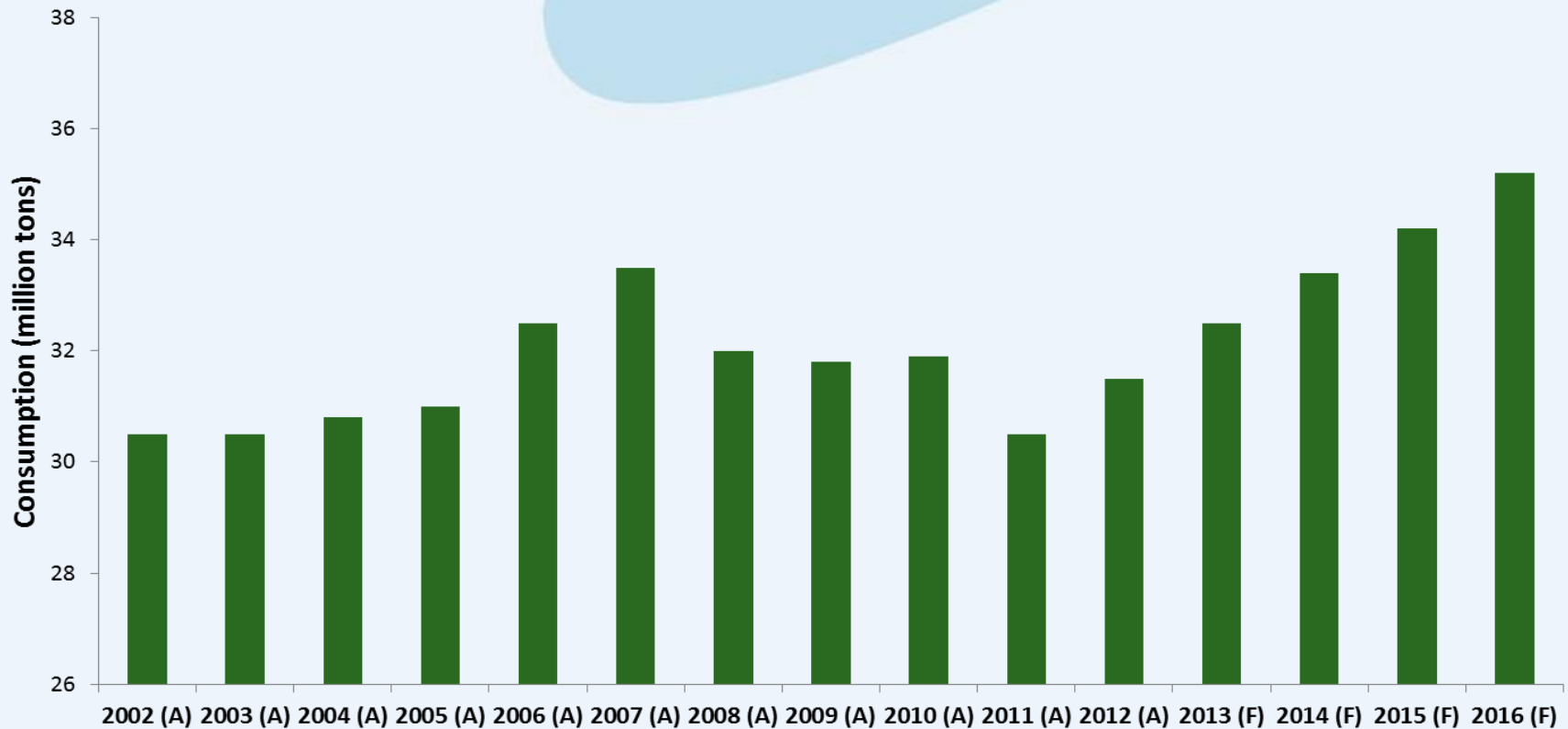


Recent NOC decline in conventional exploration
Leading explorers hold conventional steady & add unconventional

Turkey's Position in Global Energy Market



Oil Consumption Million Tons

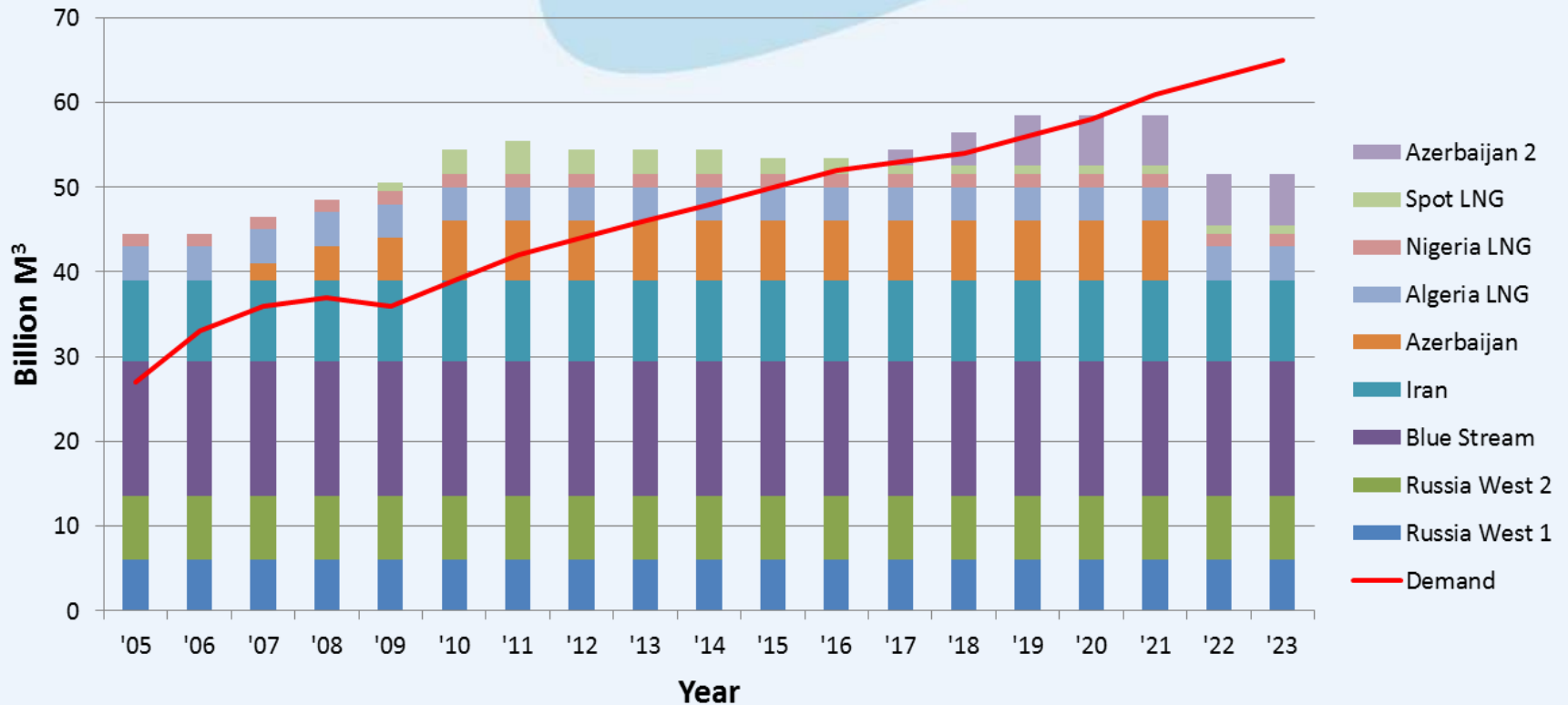


Source: BP Statistical Review (Actual), EIU (Forecast) A: Actual , F: Forecats

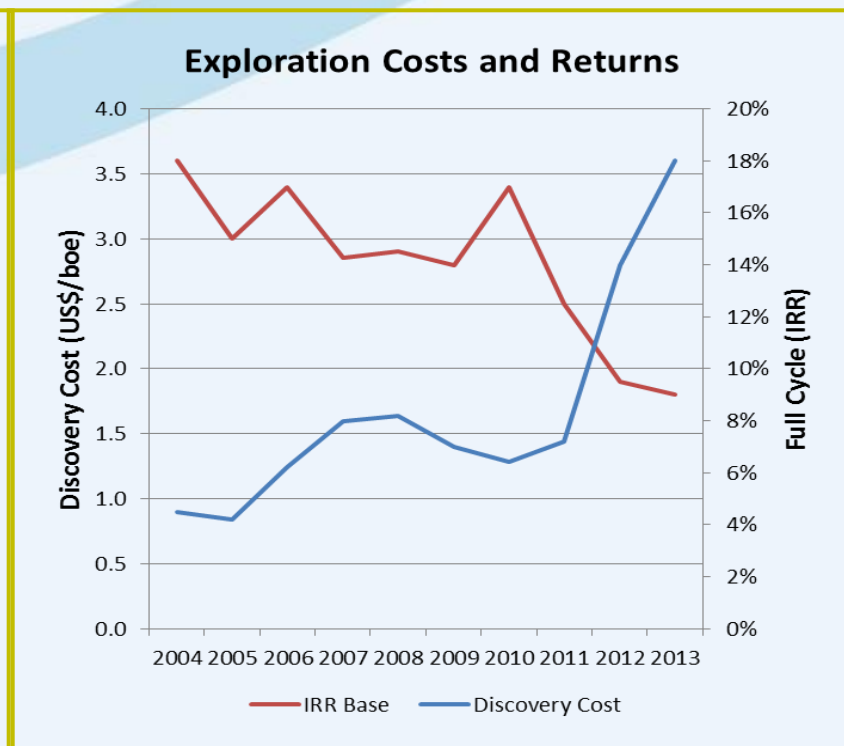
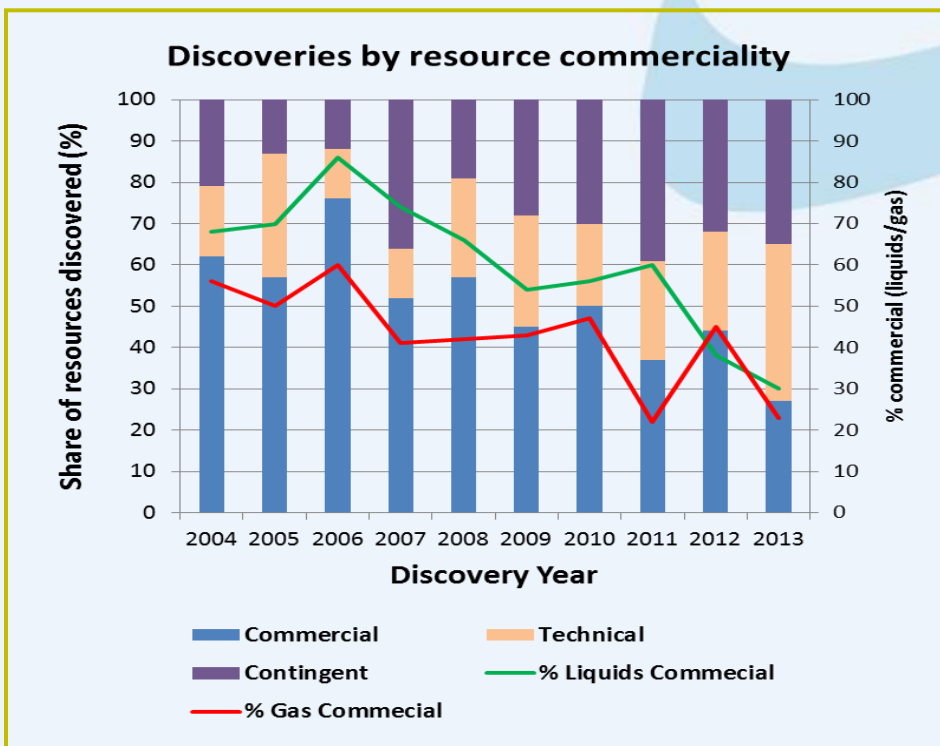
Turkey's Position in Global Energy Market



Natural Gas Demand and Supplying Countries



Exploration Technical Challenges



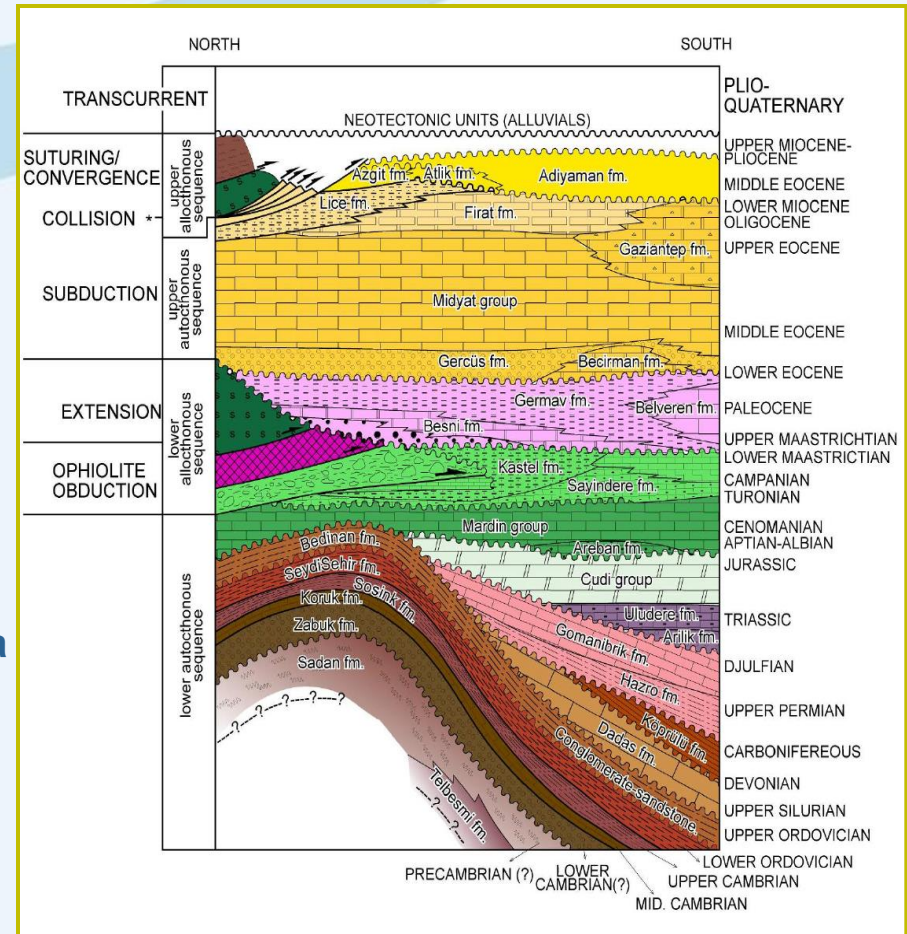
Even before the price fall, explorers were struggling with high costs, lower returns and a failure to convert discoveries to reserves.

Exploration Technical Challenges



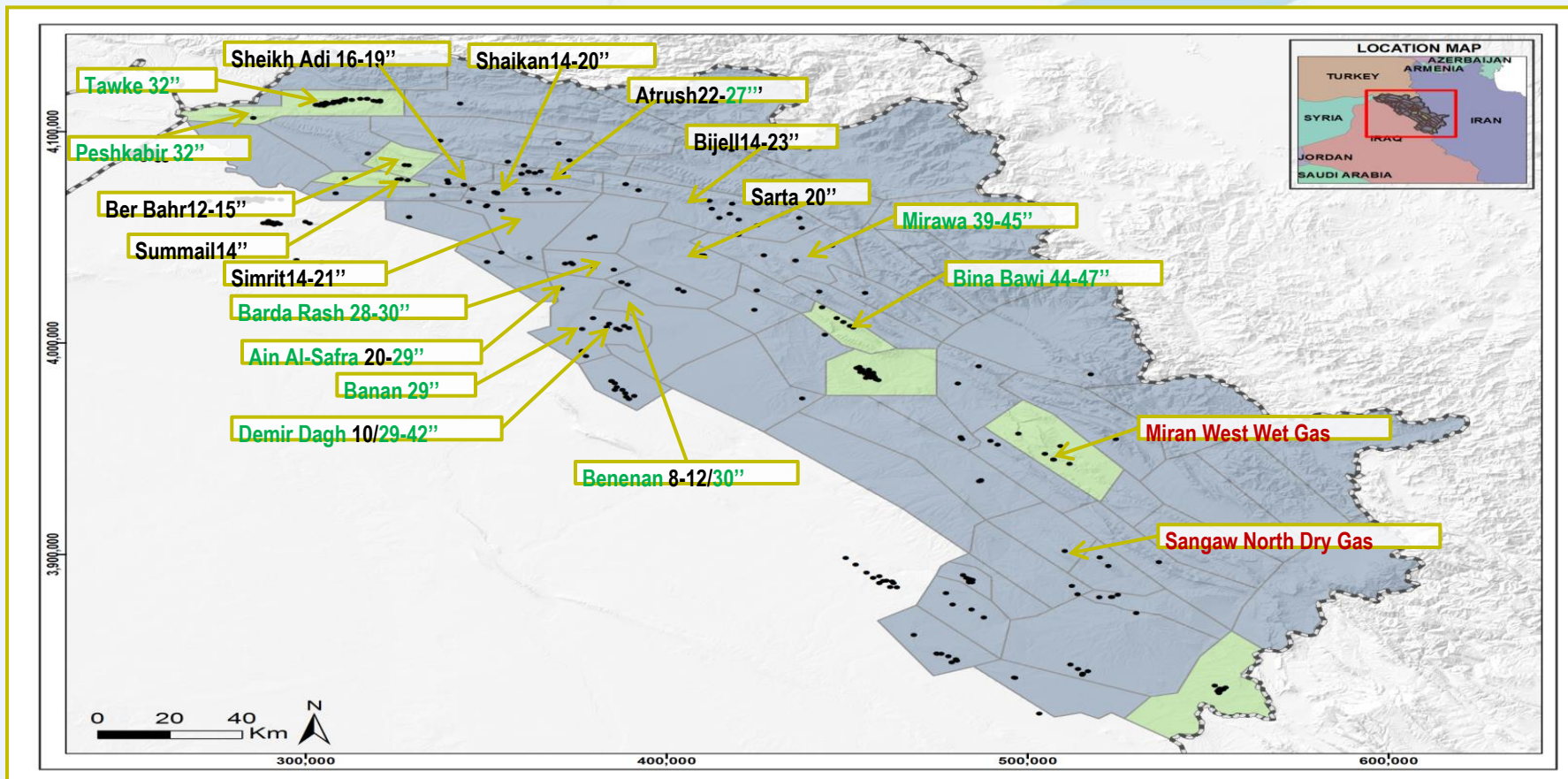
West to East production includes:

- **Infra-Cambrian Salt**
- **Silurian and Ordovician clastics – Unaizah**
- **Permian clastics & carbonates – Khuff**
- **Upper Jurassic Carbonates - Arab & Tuwaik Mt Group**
- **Lower Cretaceous Carbonates – Shuaiba & Thammama**
- **Middle Cretaceous – Mishrif**
- **Tertiary - Asmari**



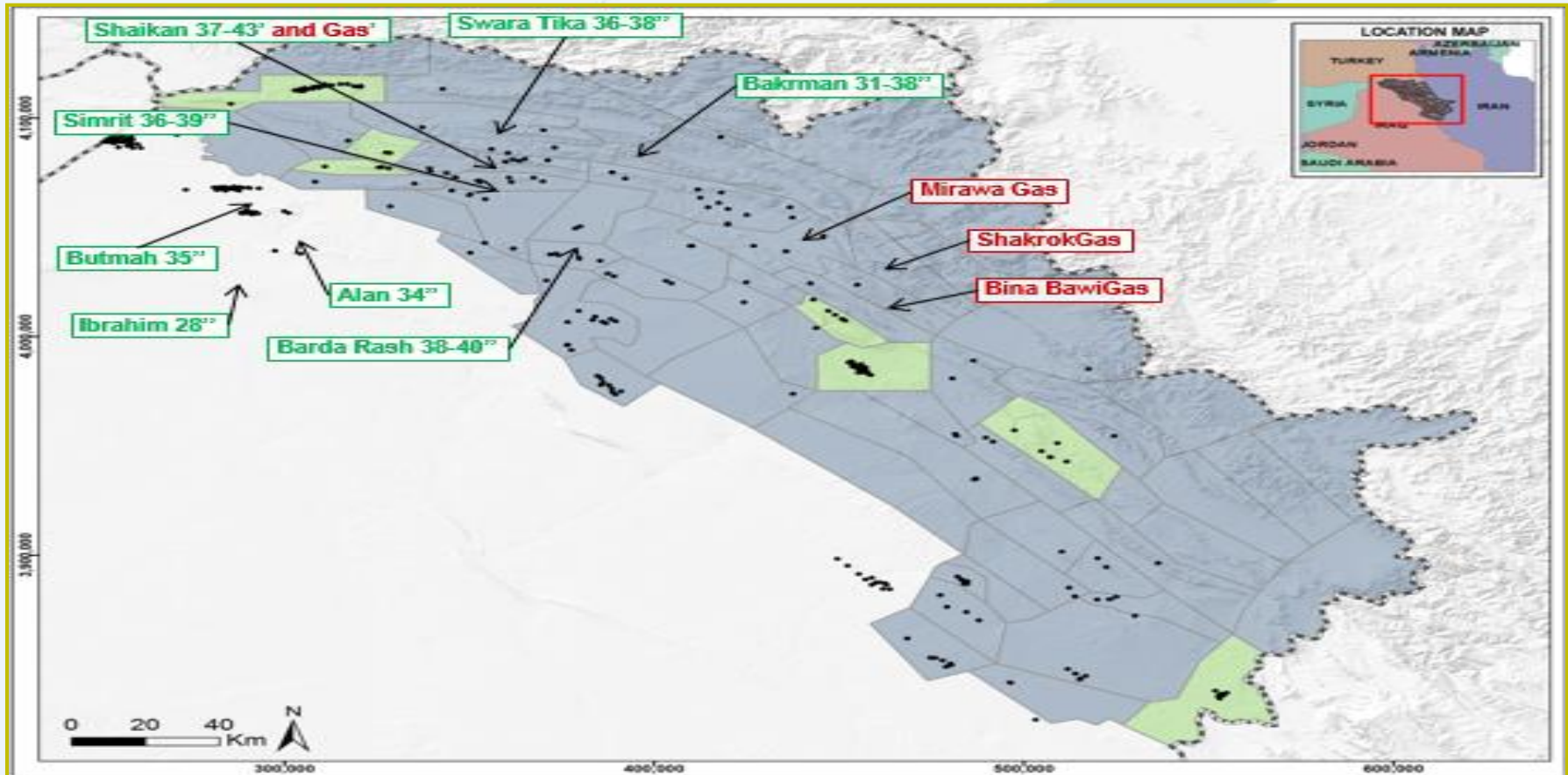
Oil Production Formation - Arabian Gulf versus SE Anatolia Stratigraphy

Solutions : Explore New Play Concepts



Map of Jurassic discoveries in the KRI and their associated hydrocarbon fluid phases. The API gravity of oils within the Jurassic reservoirs decreases progressively toward the northwest over the Mosul high and may start to increase again off the western flank of the Mosul high.

Solutions : Explore New Play Concepts

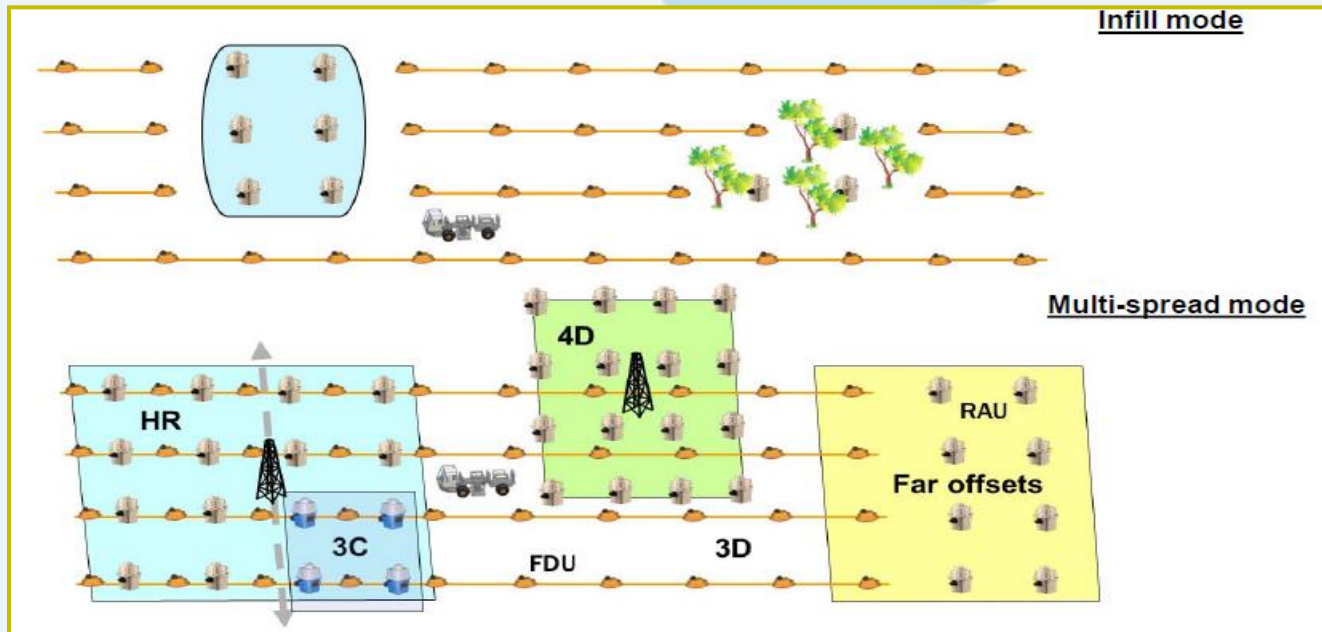


Map of Upper Triassic discoveries in KRI and their associated hydrocarbon fluid phases, it is predicted that the Triassic gas window covers a larger part of the KRI region than the Jurassic gas window), but a Triassic light oil fairway is still present on the Mosul high

Solutions : Usage of New Technology;

Seismic Surveys Without Cables

Towards new land acquisition architectures



Cable seismic systems require large numbers of personnel, known as 'juggies', so called because the original geophones were big cylindrical devices resembling jugs.



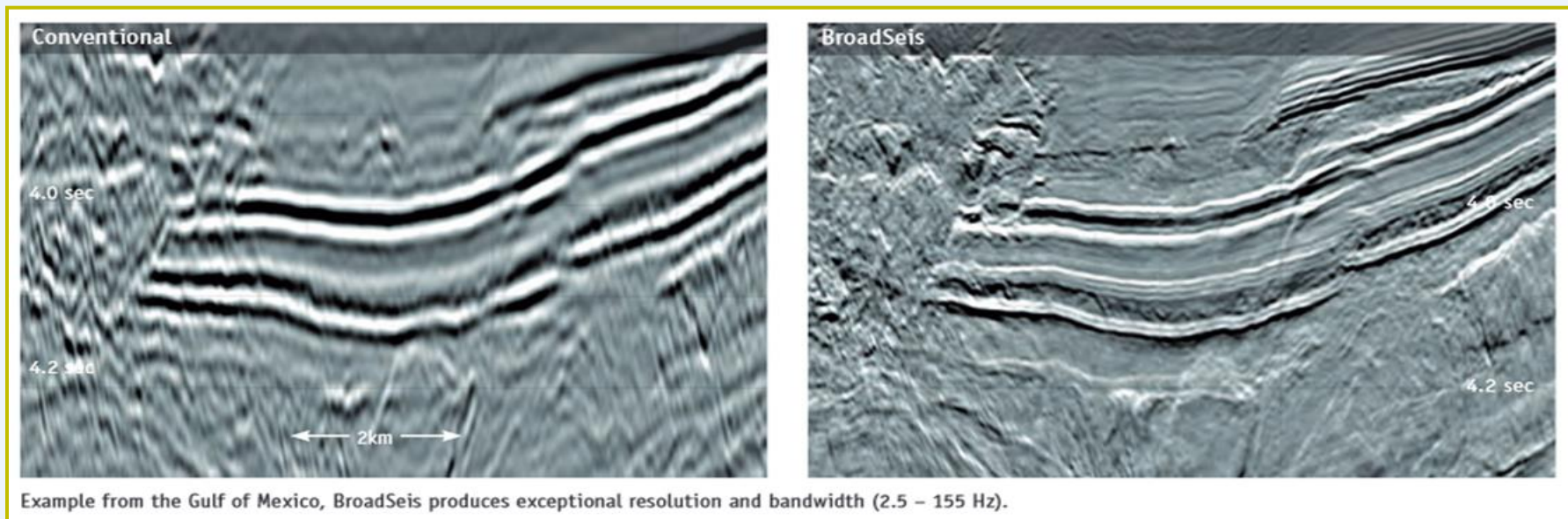
Today, more and more hybrid spreads including a mix of cable and cableless systems are used. They may be juxtaposed (infill mode, to be able to lay out continuous receiver lines even in obstructed areas) or superimposed (multi-spread mode to adapt receiver interval or sensor type to different target depths or reservoir studies).

Solutions : Usage of New Technology;



Advance Processing Techniques

Benefits of broadband seismic data for reservoir characterization



It will be attempted innovations not universally accepted, or find an idea not applied previously to a new or emergi

All these drilling rigs shutting down, why isn't oil production slowing?



Operational practices are an important element in the efficiency game. Multiple technologies and practices, each making a marginal contribution, together drive the continued improvement.



- Well defined contracting strategy
- Selection of competent personnel for planning and execution of the operations
- Use of managed pressure drilling
- Fit for Purpose Rig Selection
- Expandable Tubular technology
- High speed data transmission from wells (high speed well communication)
- Drilling with casing / Drilling with liner
- New plug and abandonment technologies

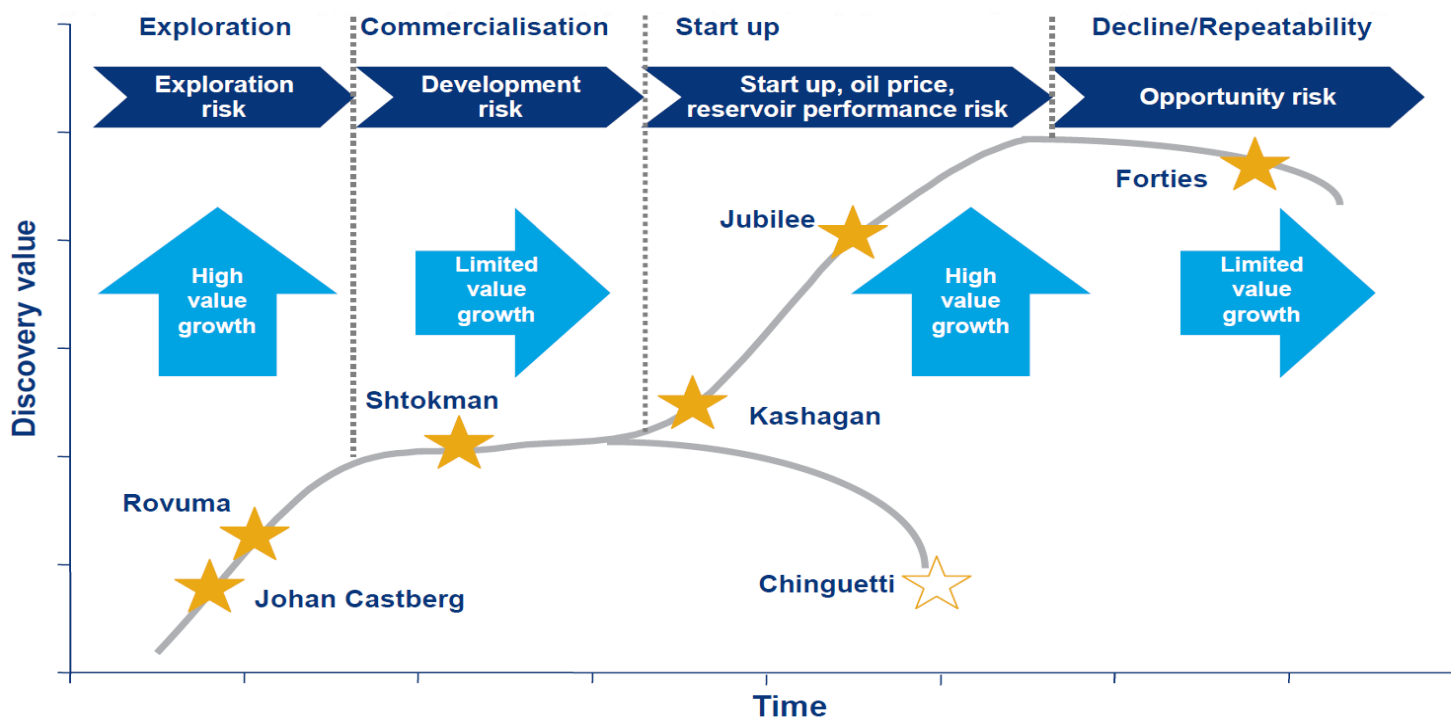
- Well performance: Lateral length, cluster spacing, artificial lift, well density, well placement/field development plans, choke size reduction

Exploration Returns are Higher Than Development Returns

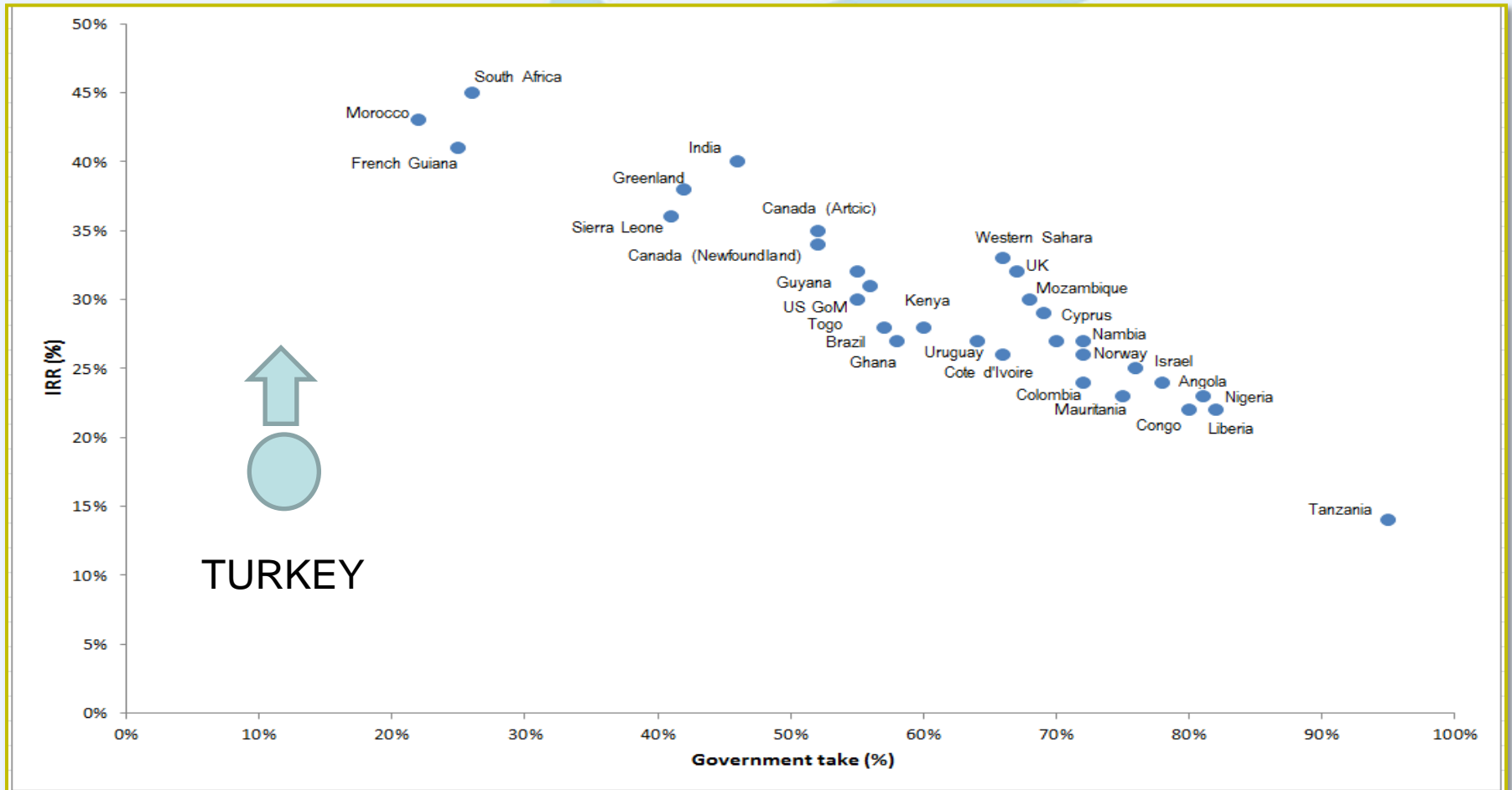


Selling new discoveries is one strategy for explorers to achieve high returns

Evolution of asset value and risk through exploration life cycle



Position of Turkey



Short-Termism Versus Opportunism



Explorers' tactics to balance short-term urgency with low cost moves for the longer term

Short-termism	Opportunism
↑ Infrastructure-led exploration	↑ Acreage capture
↑ Mature basins with production tax shelter	↑ Ground floor farm-ins
↑ Appraisal of promising recent discoveries	↑ Opportunistic hiring of top technical talent
↓ Deferral of wildcats	↑ Discounted spec seismic
↓ Retreat to the proven core of unconventional plays	↑ Regional geoscience
↓ De-emphasise frontiers – high costs, high risks, no tax shelter, long payback	↓ Avoidance of new ventures with tight contract periods
↓ Defer concept-stage and international unconventional	↓ Signature bonuses, high-cost work commitments, tough fiscal terms

Closing Remarks



- Even though Turkey has limited reserves compared to its neighbours, there are many planned and also on-going exploration activities that will allow Turkey to utilize its reserves more effectively.
- Turkey needs to diversify its gas supply sources for better security of supply and to achieve its goal in becoming a regional gas trading hub. A new supply channel - an Iraqi import pipeline-will provide opportunities in E&P sector
- Developments in the establishment of an organized energy market place including a gas market will provide opportunities in E&P sector
- Gas to liquids (GTL) is a refinery process to convert natural gas or other gaseous hydrocarbons into longer-chain hydrocarbons such as gasoline or diesel fuel. GTL production facilities intended to be posted at offshore oil fields too distant or deep to justify gas pipelines to onshore
- Importers have a legal liability to store 10% of their gas imports in storage facility. This creates for service companies working in E&P sector such as drilling and seismic data acquisition an investment opportunity in Turkey
- Opportunities exist in the upstream side with undiscovered resources of unconventional natural gas



THANK YOU...