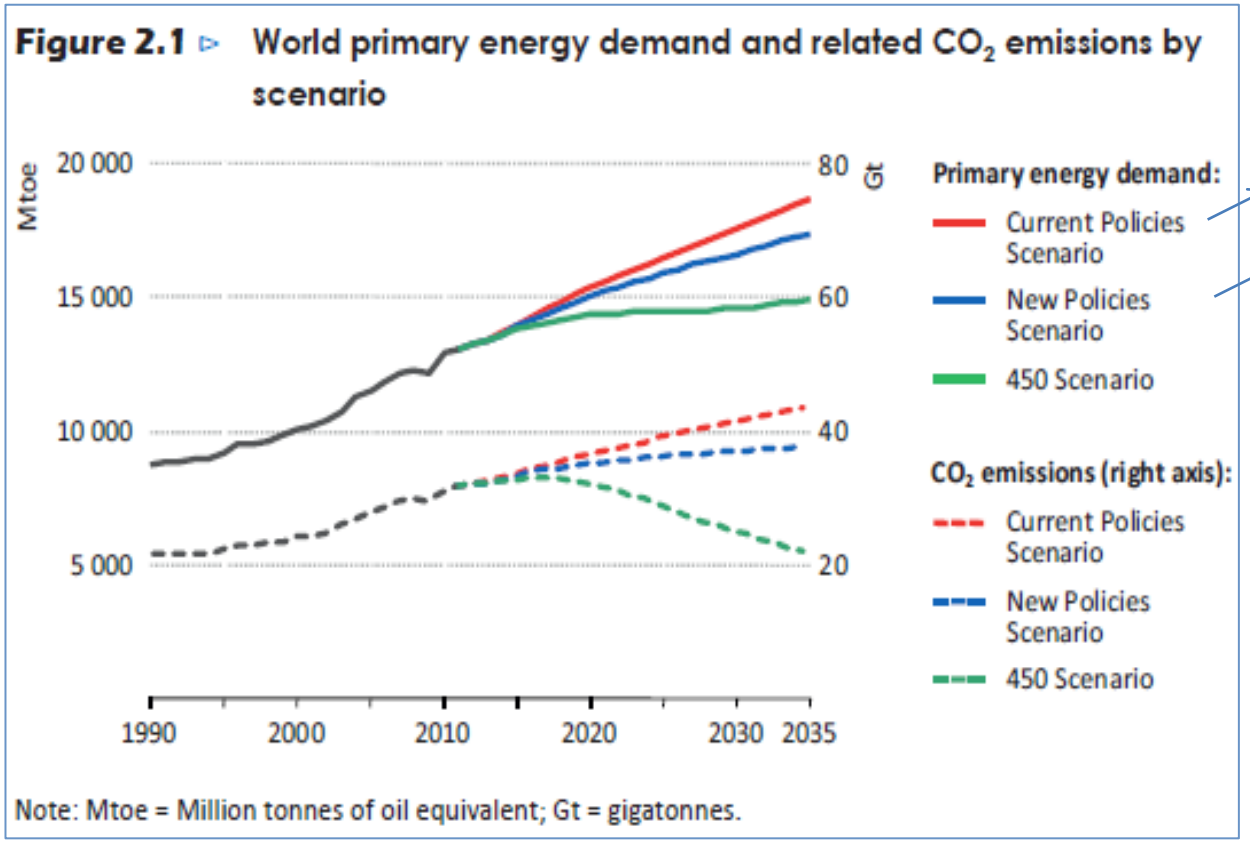
Resource management and energy sustainability

Michael D Lynch-Bell
Ex officio Chair, United Nations EGRC
Senior Independent Director, KAZ Minerals PLC

Panel on "The Role of Fossil Fuels in Delivering a Sustainable Energy Future"
Committee on Sustainable Energy, 23rd Session
Geneva, 20 November 2014

Demand for all types of energy is set to rise



Current Policies Scenario: reflects demand prospect to 2035 taking account of existing policies as at mid-2013.

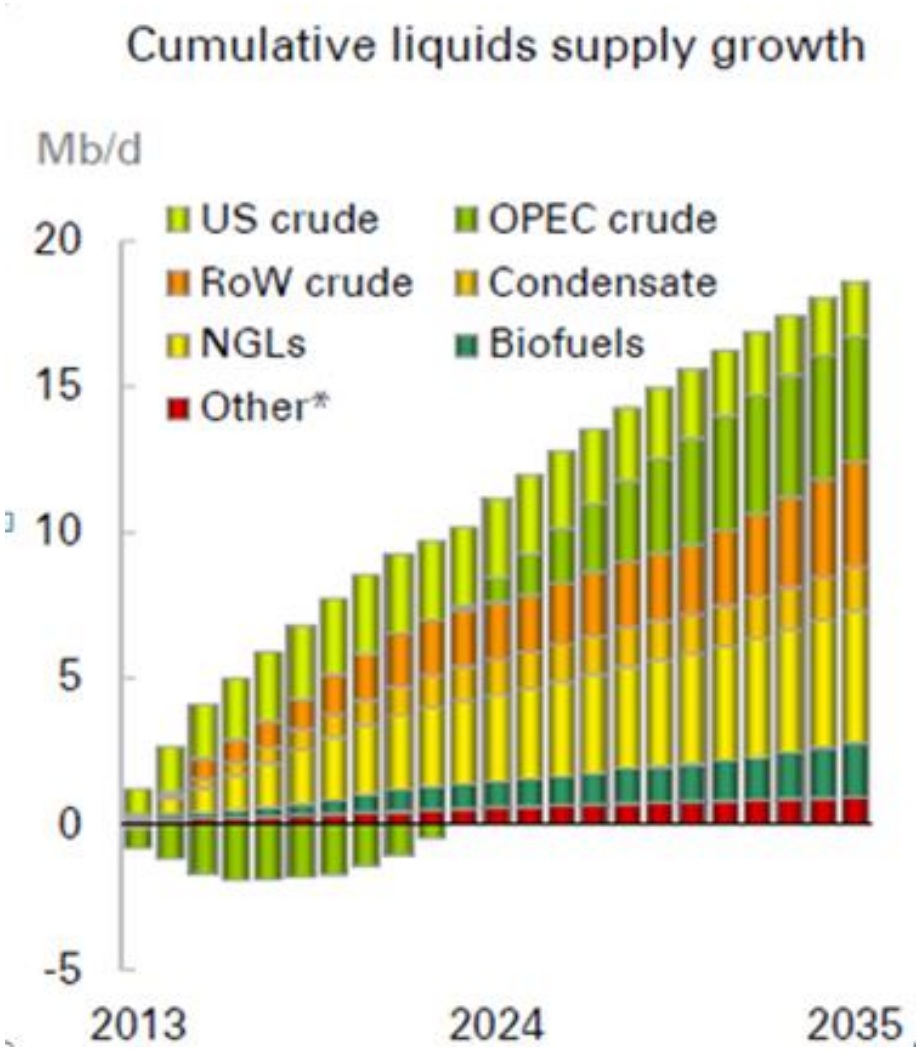
New Policies Scenario: indicates demand prospect to 2035 with existing policies together with the impact of declared policy intentions.

Source: IEA, World Energy Outlook, 2013

But on the supply side, major challenges have to be faced

- Issue prominent given International Energy Agency anticipate under their *New Policies Scenario*, demand to increase 33%, 2011-2035.
- Inadequate and ageing infrastructure
- Falling discovery rates
- Earlier under-investment in finding and developing new sources of supply
- Scale of finance and lead times needed to bring new projects into production
- Commercial viability of carbon capture and storage
- Managing diversification into development of alternative fuels and renewables
- Skills shortages

Technology is enabling the extraction of unconventionals at scale…



Source: BP, Annual Statistical Review, 2014

Nevertheless, future supply is typically more challenging and costly to develop

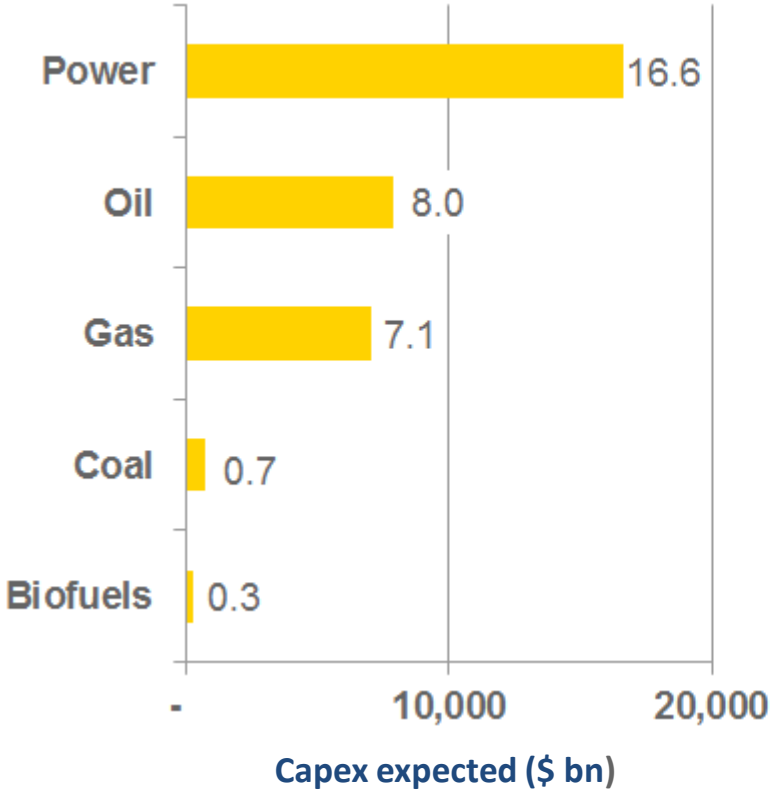
- This is despite the concerted shift in supply from West to East
- Exploration in new frontiers (i.e., Falkland Islands, Greenland) and potential being realised for significantly higher production from Northern Iraq and Libya
- Deepwater fields could account for 10% of total world oil output by 2020
  - Deep and ultra-deepwater potential in Gulf of Mexico, Nigeria and Angola
  - Brazil's new frontier: pre-salt and ultra-deepwater finds
- Complex supply chains
- More stringent environmental operating standards
- New technology often not yet tried and tested at scale (e.g. next generation nuclear) or at all (e.g. CCS)

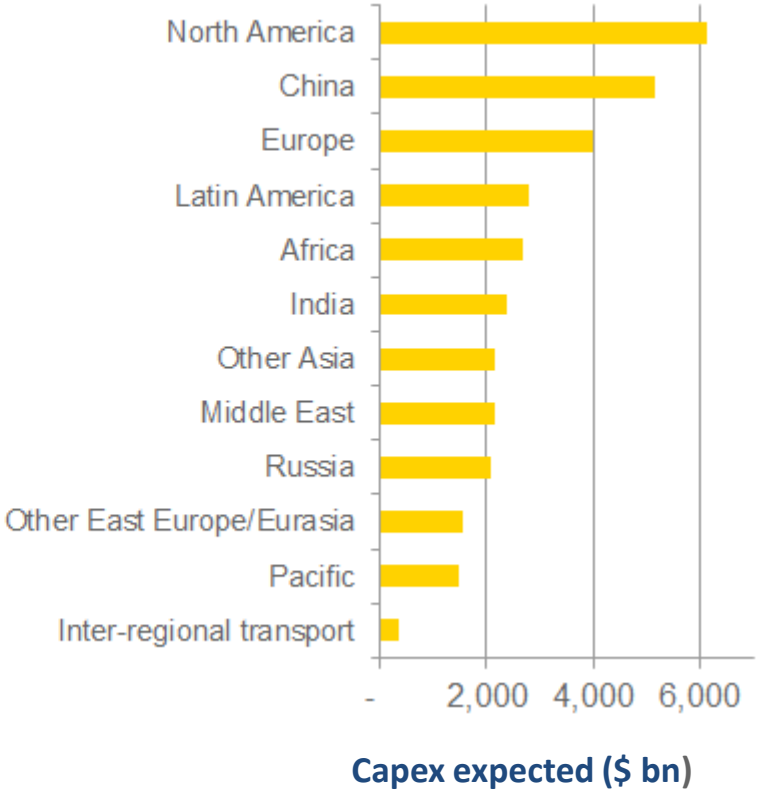
Likewise, new mineral resources lie in politically unstable geographies

- World-class deposits of the future lie in 'frontier' countries - perceived high risk of corruption
- Technical, political and geological challenges are high – leading to greater investment, financial and operating cost risks
- Supply growth continuing to override impact of geopolitical unrest
- Unstable investment, regulatory and political regimes and civil war are counteracting mineral attractiveness, deterring foreign investment and the benefits it could bring:
    - » Improved infrastructure (water, power, roads, rail, ports)
    - » Sustainable job creation and up-skilling
    - » Education and Community development
    - » Economic benefit through royalties and taxes

$33 trillion in capital investment needed for energy supply over the next 25 years

Cumulative investment required in energy-supply infrastructure, 2010-2035



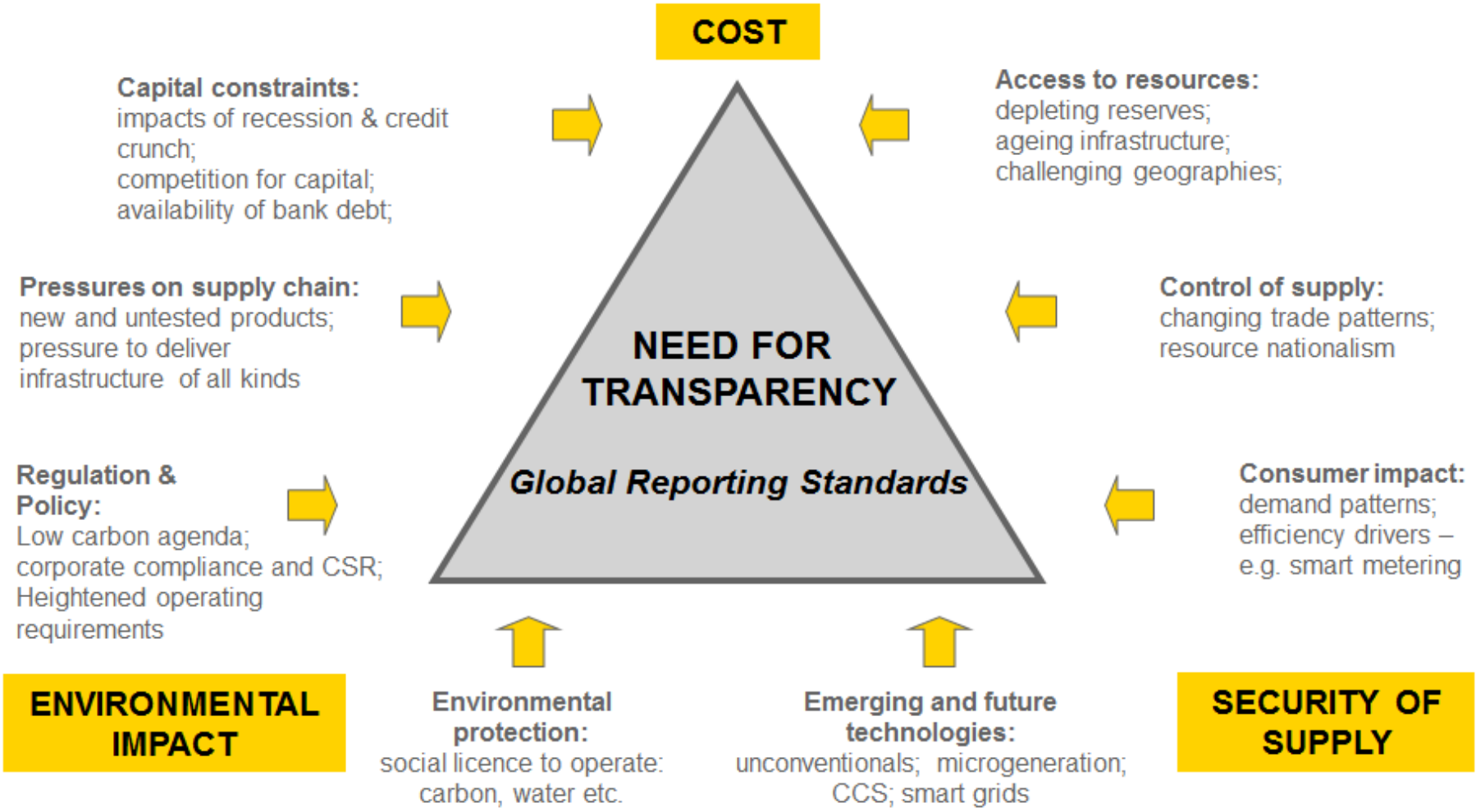


Source: IEA, World Energy Outlook, 2010

Post-Macondo, heightened oversight of extractive industries

- Greater compliance and regulatory burden
- Cross border complexity in operations
- Varying reserves/financial reporting standards
- Corporate governance structure
- The expectations of minority shareholders
- Health & safety, corporate social responsibility
- Need for greater transparency (especially if capital raising)
- Opposition from special interest groups
- These trends are likely to continue…….

The Energy & Natural Resources 'Trilemma'



Source: EY

Thank you

- Michael D Lynch-Bell
- Chair Ex officio, UN Expert Group on Resource Classification
- SID, KAZ Minerals PLC

- michael@lynch-bell.com