

Security of Supply: Operational Margins at the Wellhead and Natural Gas Reserve Maturation*

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Abstract

The early success in the development of unconventional natural gas plays pioneered in the US and Canada has many eager followers worldwide keen to enhance their natural gas resource base. Security of reserves is a cornerstone of every national energy policy. Essentially, the maturation of unconventional prospective resources into economic proved reserves is a task that must be executed by oil and gas companies. This study first reviews the critical steps and key issues that must be addressed when companies enter into emergent unconventional gas plays. The exploration process is no gamble--but a cost-conscious program with many decision stages aimed at identifying resources that may generate a profit when reserves are eventually developed. The resource inventory is classified according to strict rules mandated by the SEC and supported by SPE and UN resource classification schedules. Reserves inventory is a key asset of oil and gas companies and affects their balance sheets. Progressive investment in data acquisition and subsequent professional appraisal and modeling leads to reserve maturation. Changes in reserve inventory may positively affect the credit ratings of oil and gas companies, but any downgrading of reserves could increase their cost of capital. The risk of fluctuation in the asset inventory made up by gas reserves is much higher for unconventional operators than for conventional gas operators. The underlying causes: geological factors, technology issues, environmental concerns and economic constraints are analyzed, categorized and benchmarked in a sensitivity analysis. The model accounts for regional volatility in wellhead and wholesale prices and uses cost-effective well productivity data from three decades of accelerated US and Canadian unconventional gas development. For investors, it is crucial to understand sensitivities in the reserve maturation process, to better judge the risk involved in the unconventional gas sector. For operators, it is essential for rapidly building positive free cash flow in a highly competitive market. For governments, accelerated reserve growth with a low volatility is important for security of supply. Recommendations are formulated for optimum resource development, with a focus on seizing opportunities while mitigating the risks associated with uncertainty in the development of unconventional natural gas reserves.

Reference

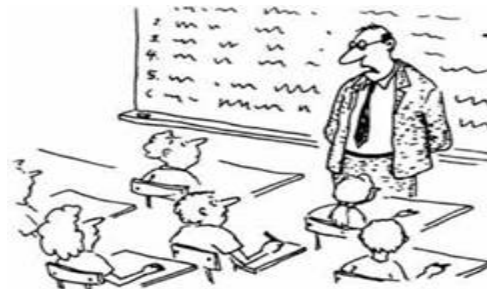
Weijermars, R., and S. Watson, 2011, Can technology R&D close the unconventional gas performance gap?: First Break, v. 29/5, p. 89-93.

Security of Supply: Operational Margins at the Wellhead and Natural Gas Reserve Maturation

Three decades of accelerated
US Unconventional Gas Development:
Lessons for reserve maturation in Europe

Ruud Weijermars

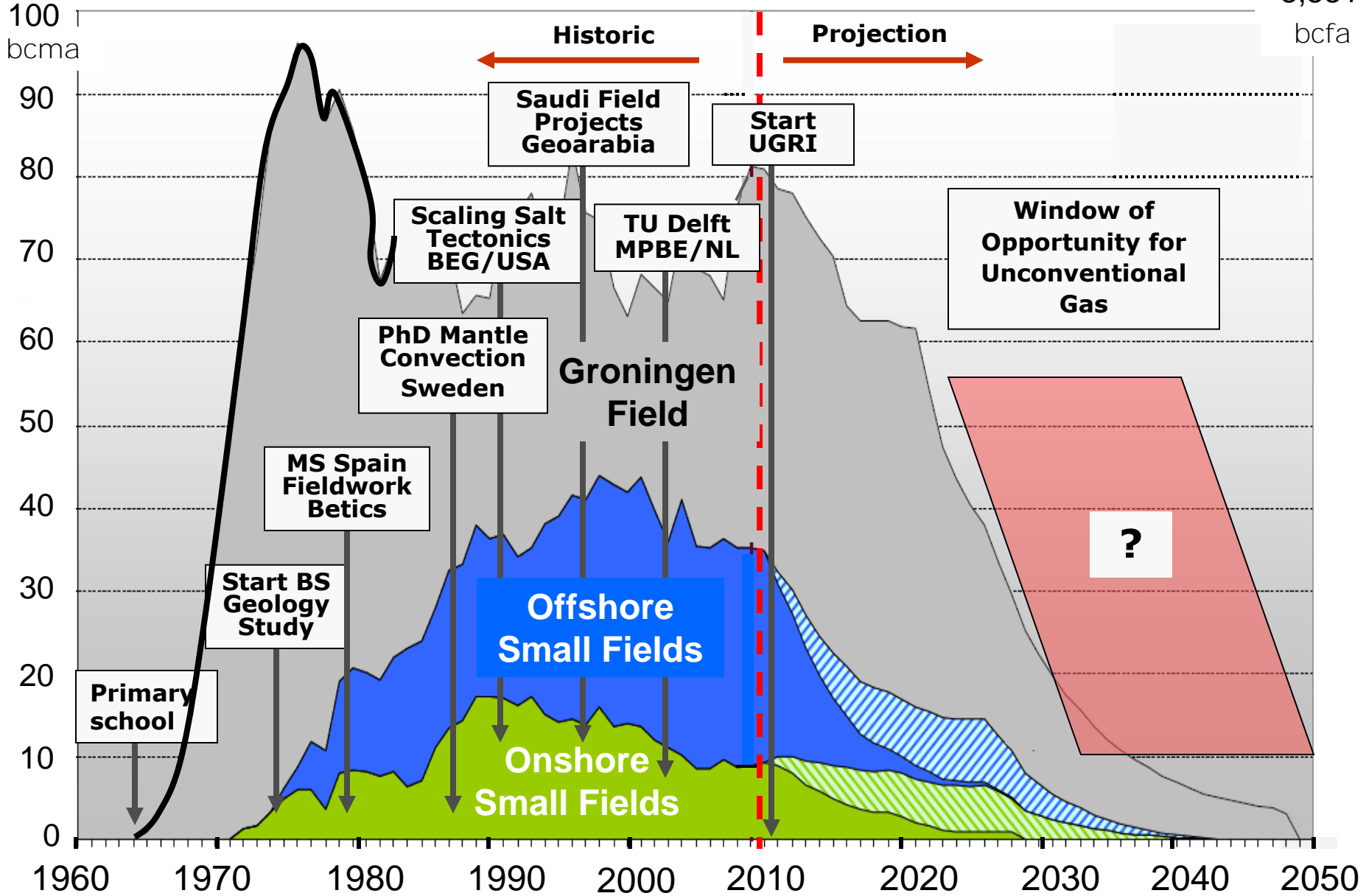
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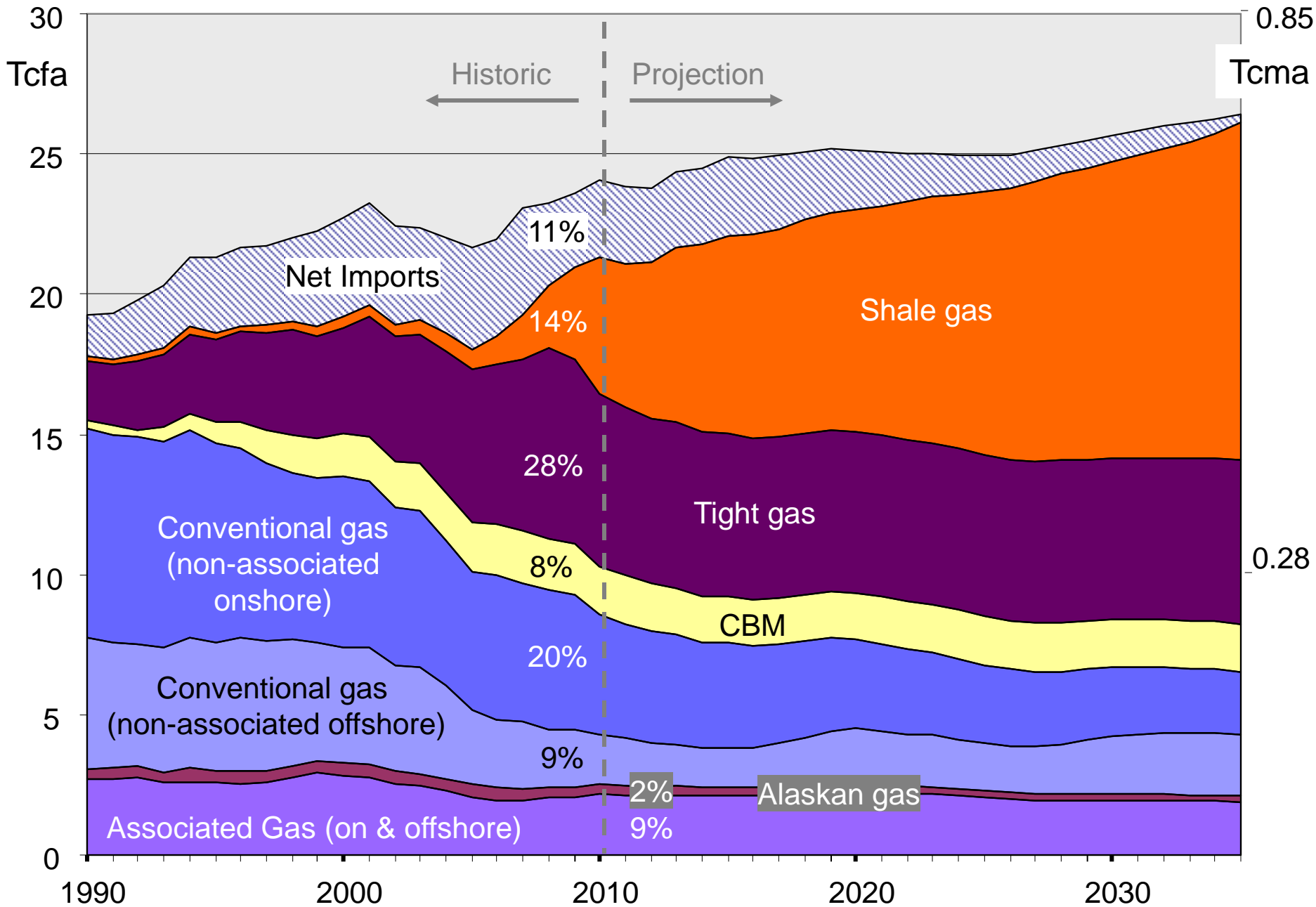
"I expect you all to be independent, innovative, critical thinkers who will do exactly as I say!"

NL natural gas production separated into reservoir type

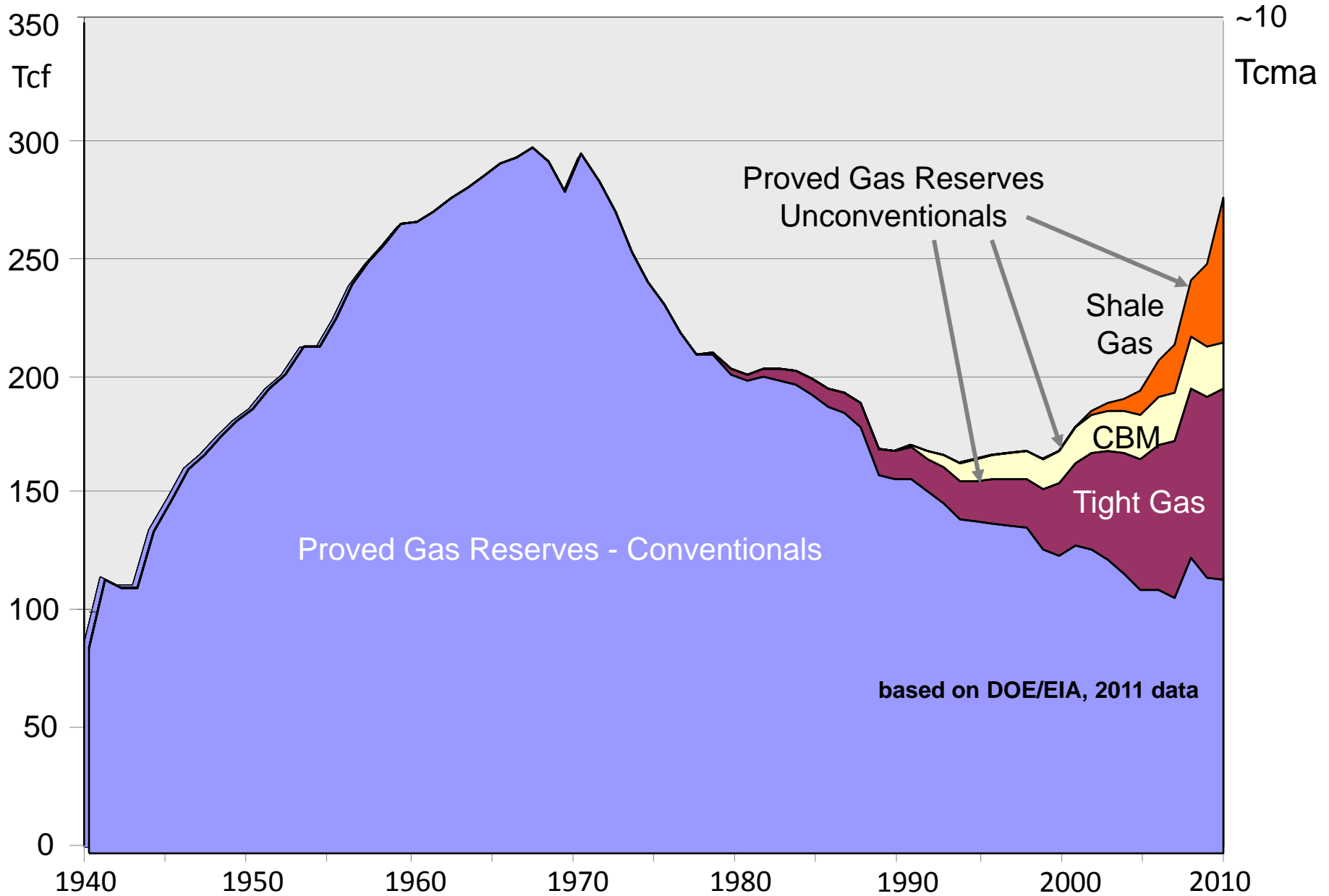
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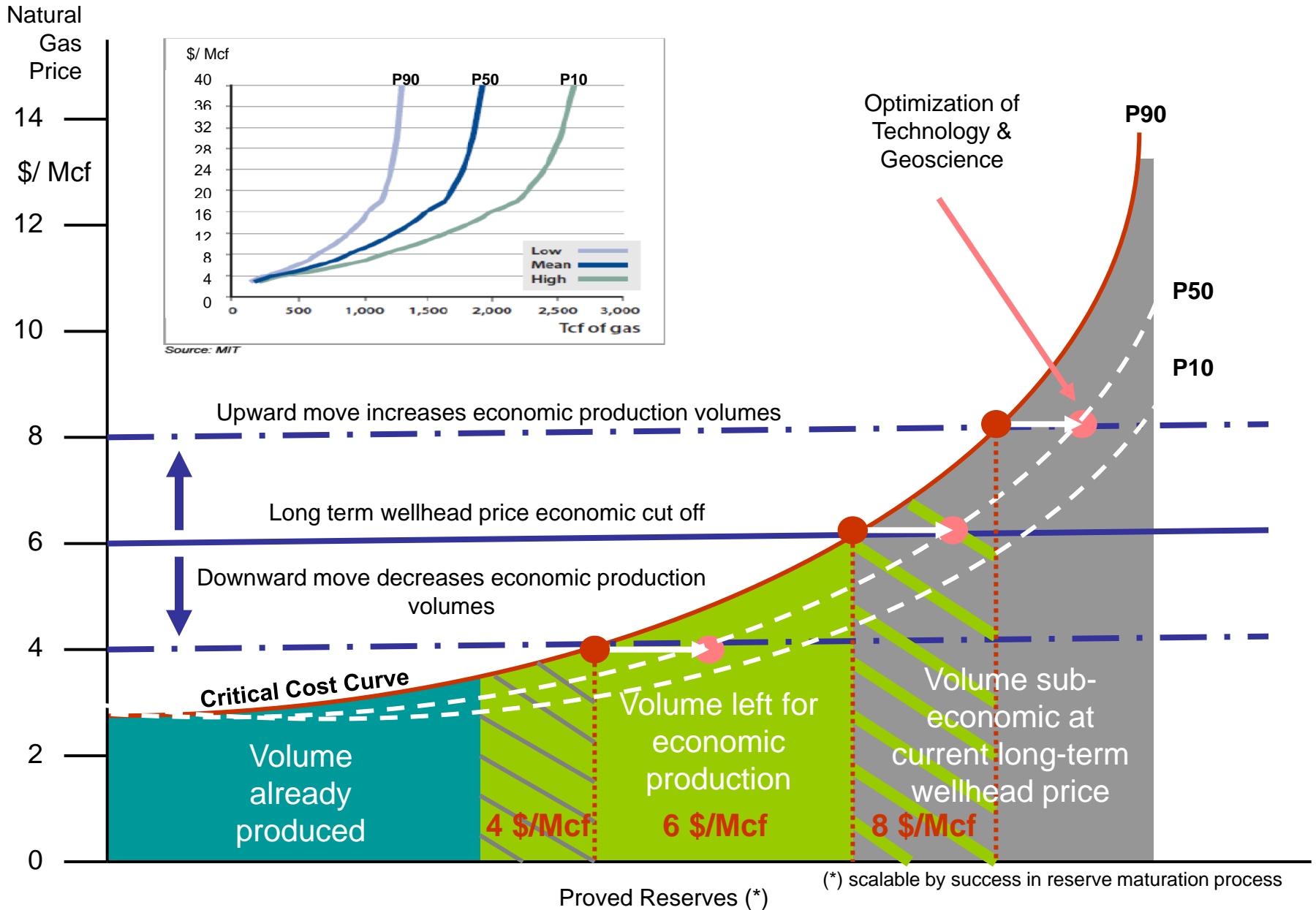
US natural gas production separated into reservoir type



Proved natural gas reserves for the US



Volume of economically producible proved reserves shifts with gas price



National reserve inventories are based on the annual filings

Company Reserves Aggregated

Companies report Reserves Inventory to SEC (K-10; F-20; F- 40) & to National Governments on annual basis

Addition of reserves

Impairment of reserves

Balance sheets show current Assets

National Reserves Updated

In the US
DOE receives the tally of companies
SEC filings

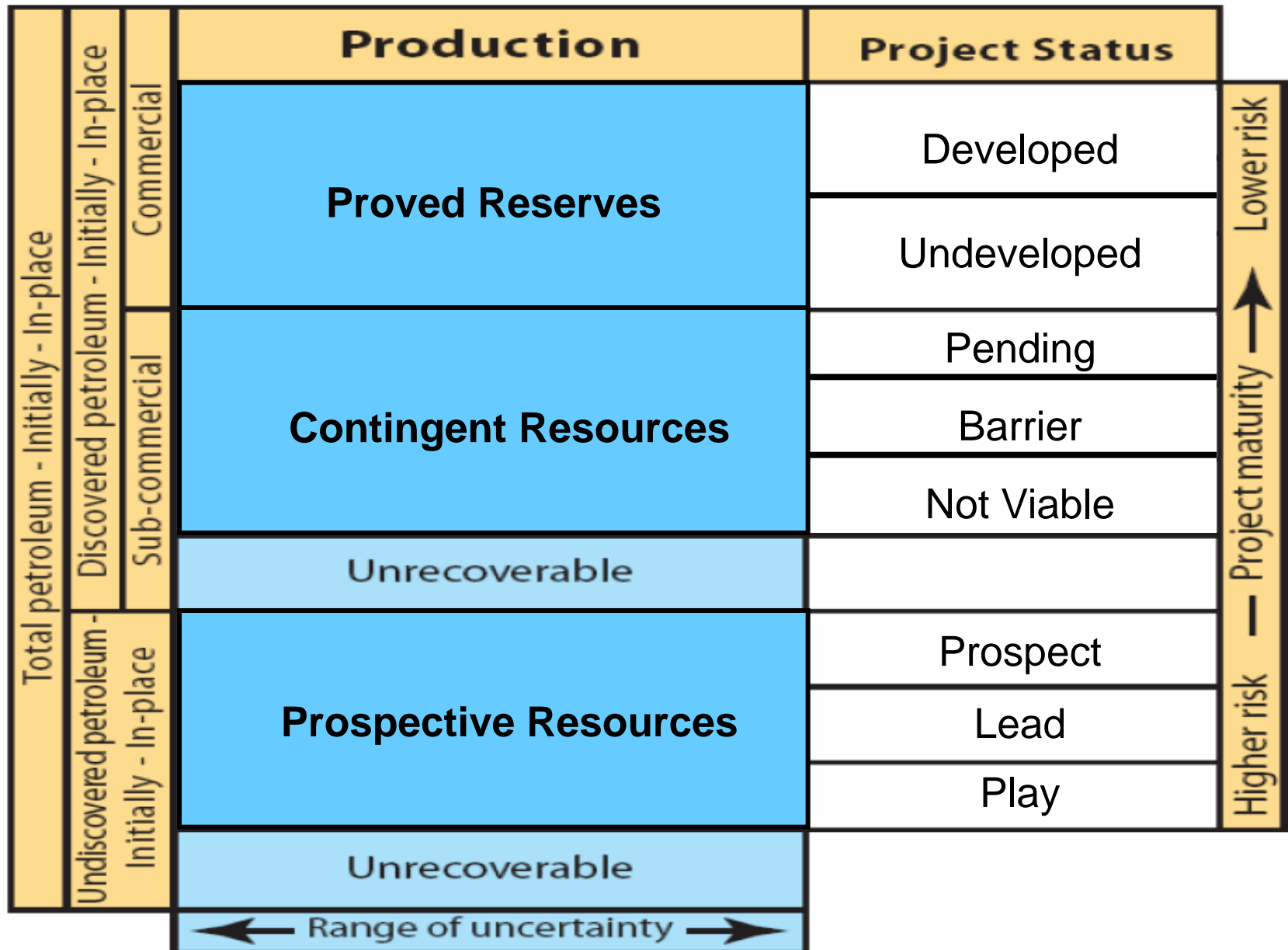
Most other countries have
a similar process

Addition of reserves

Impairment of reserves

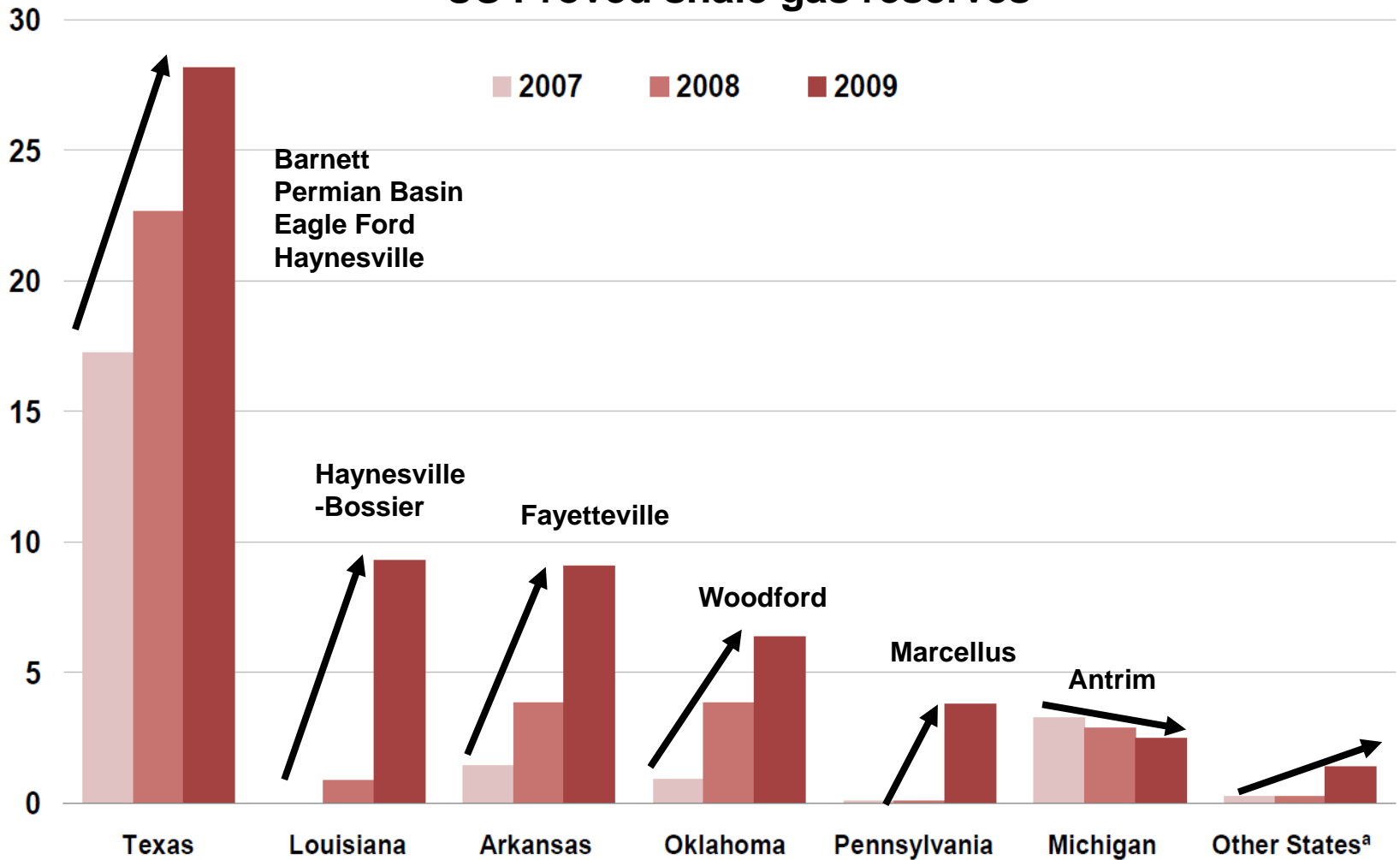
Annual review reveals Cumulative
Production & EUR based on
company reporting

Interpretation of SEC's New resource classification system (2009-onward)



trillion cubic feet

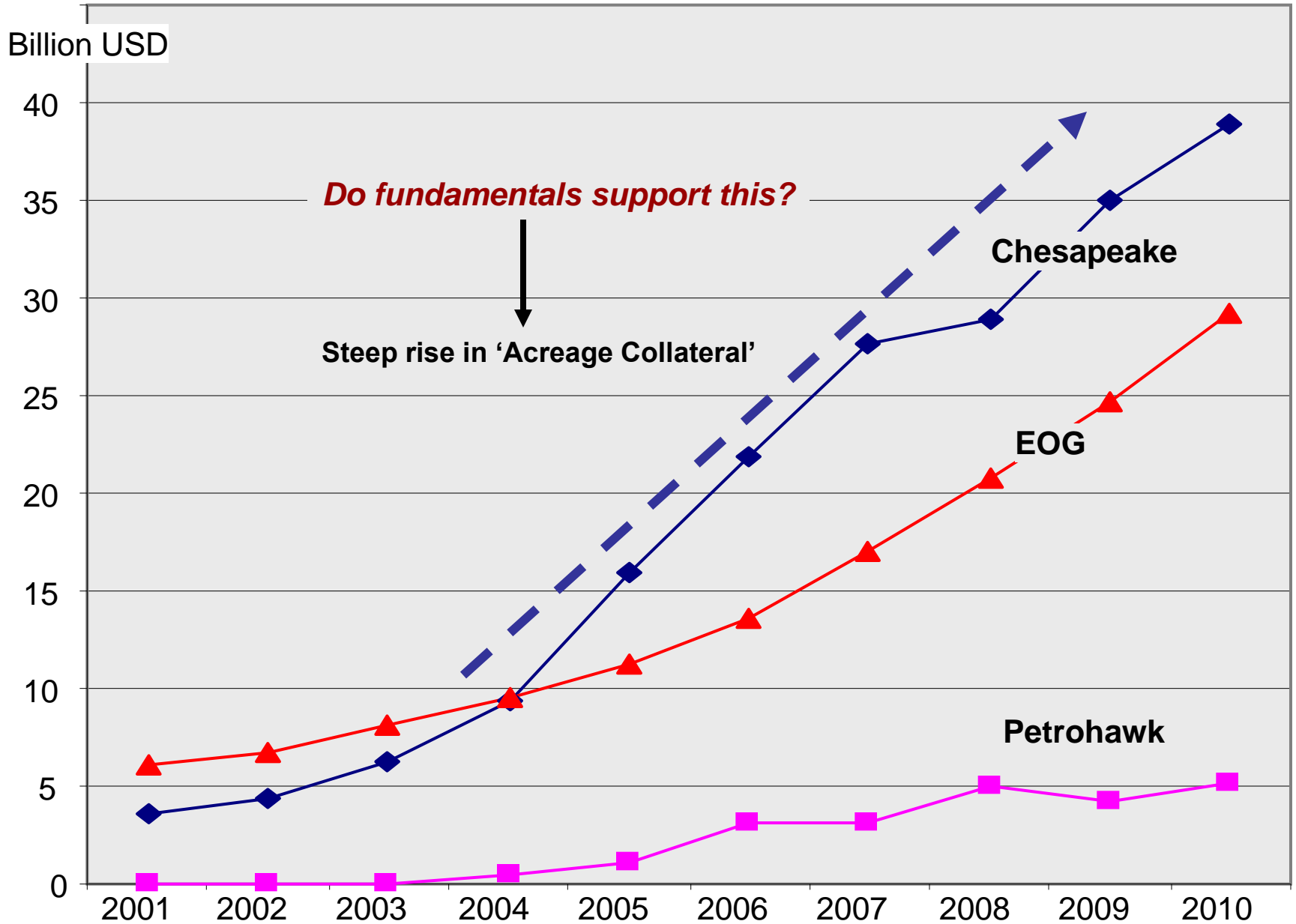
US Proved shale gas reserves



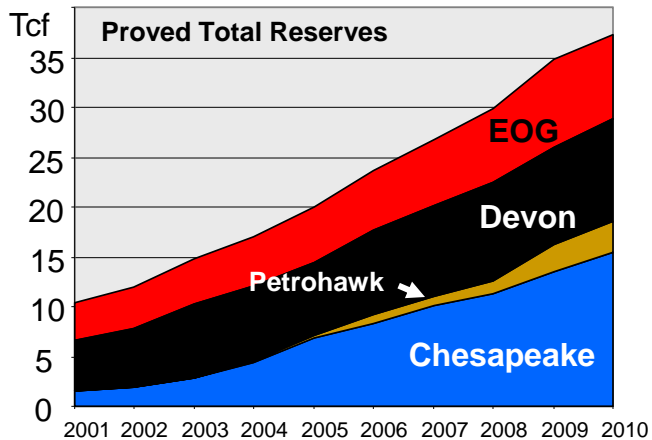
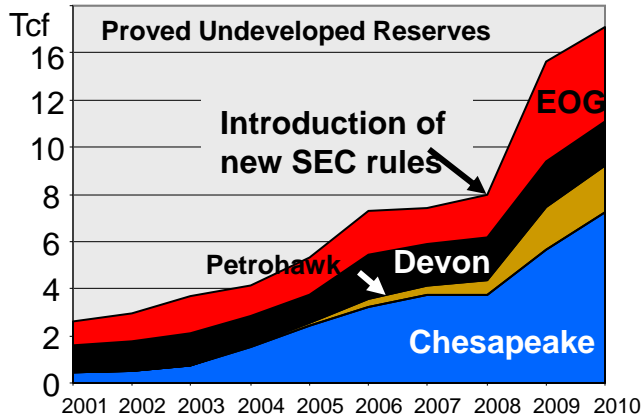
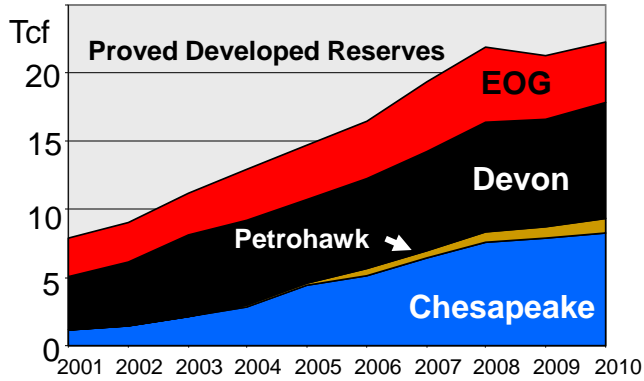
^a Other States include Indiana, Kentucky, Missouri, North Dakota, Tennessee, and West Virginia.

Source: U.S. Energy Information Administration.

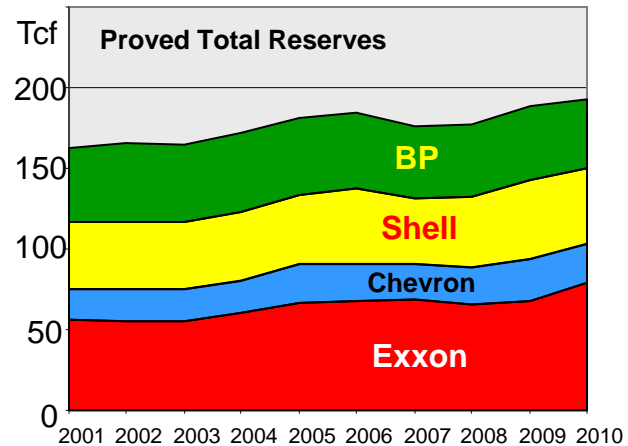
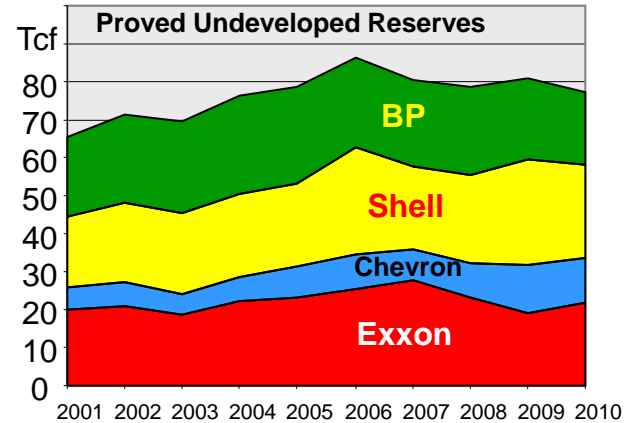
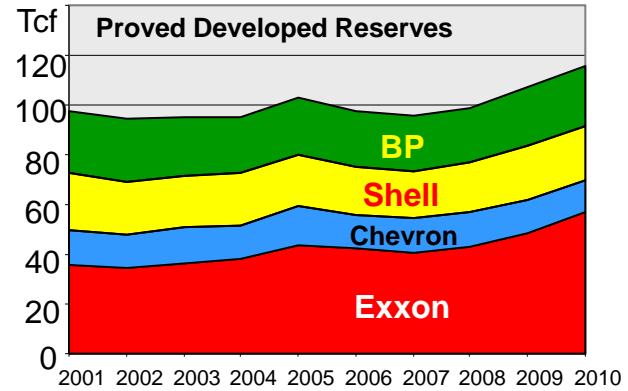
Net oil & gas properties valuations



Unconventional Gas

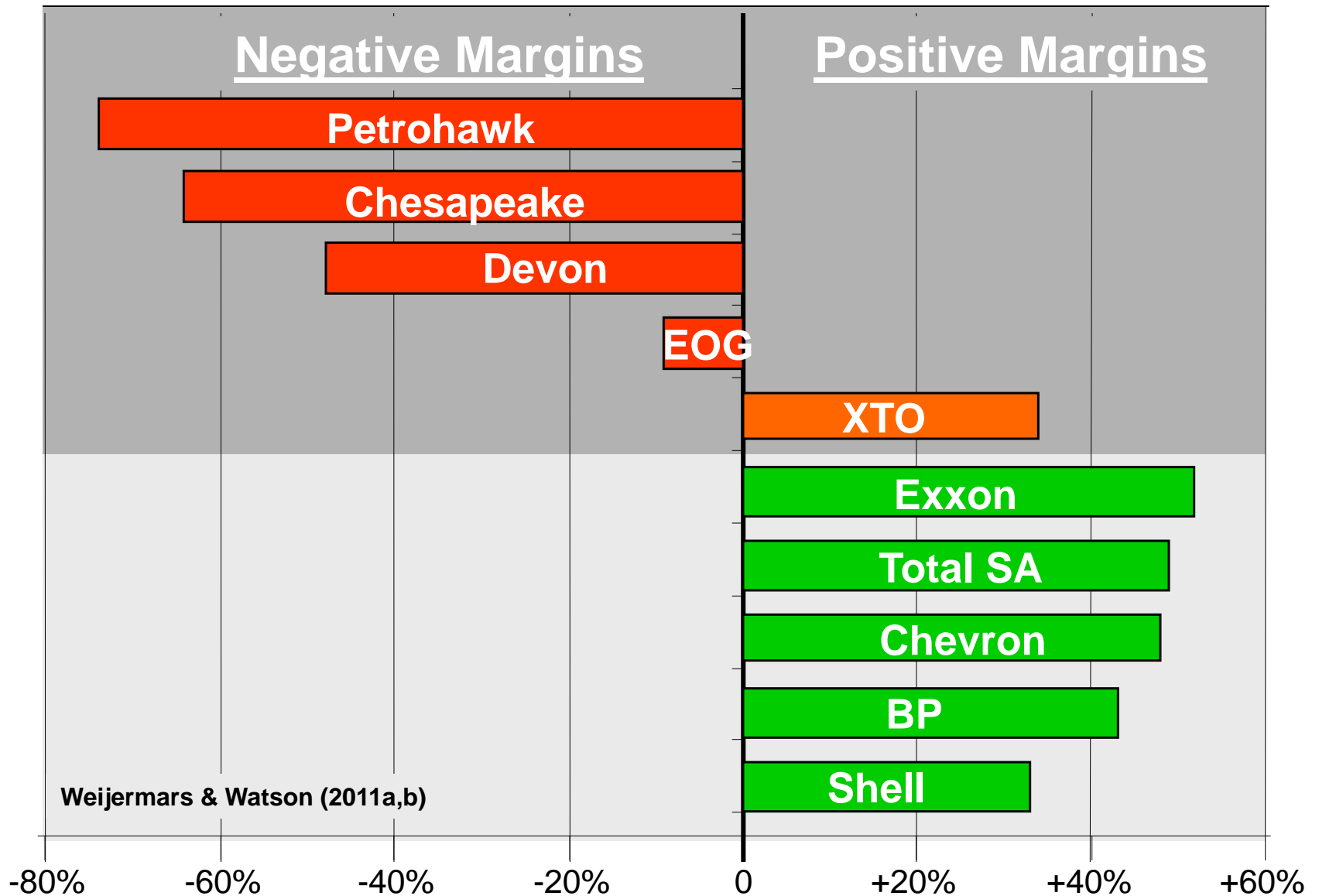


Conventional Gas



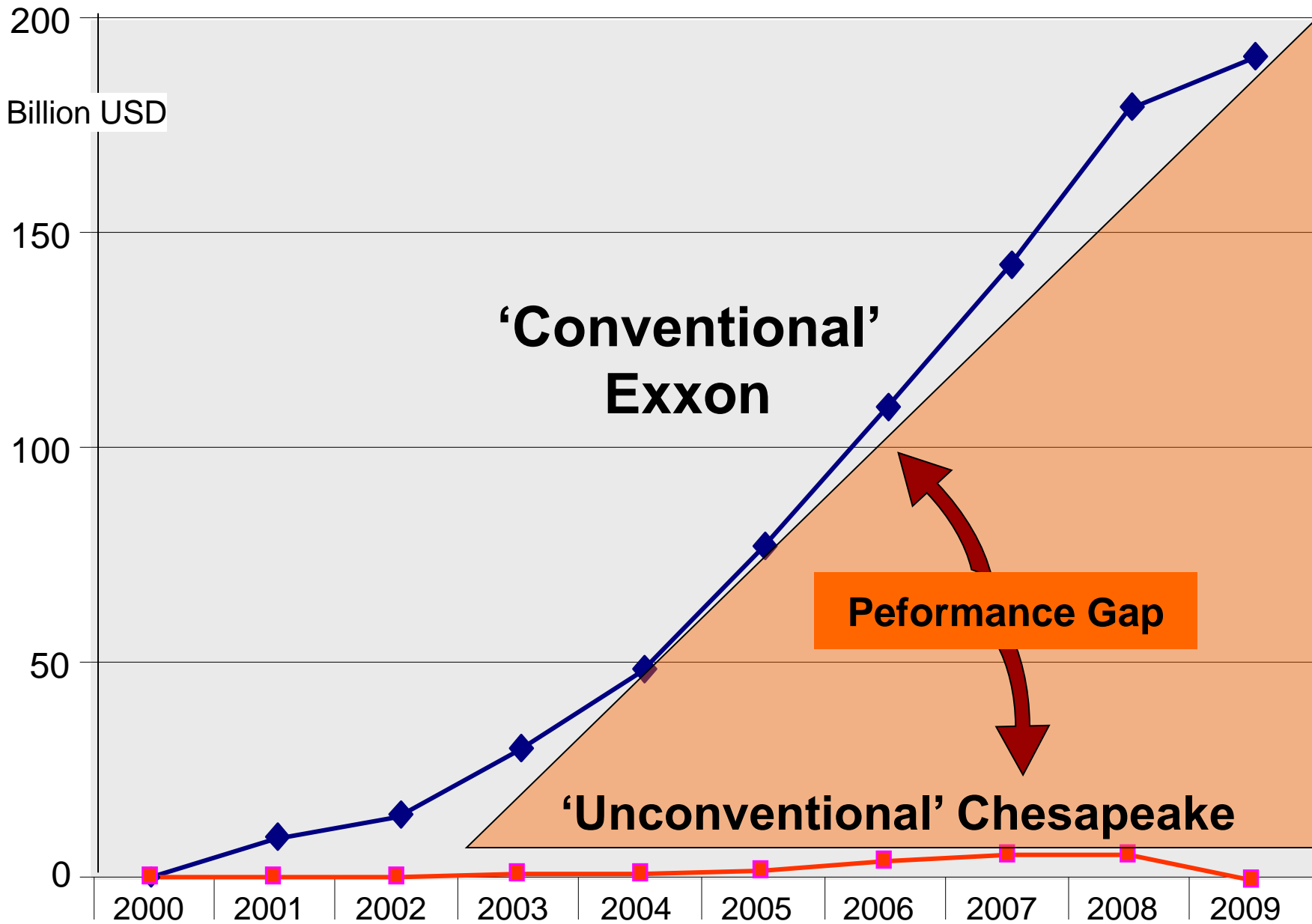
Unconventional Gas

Conventional Gas



Weijermars & Watson (2011a,b)

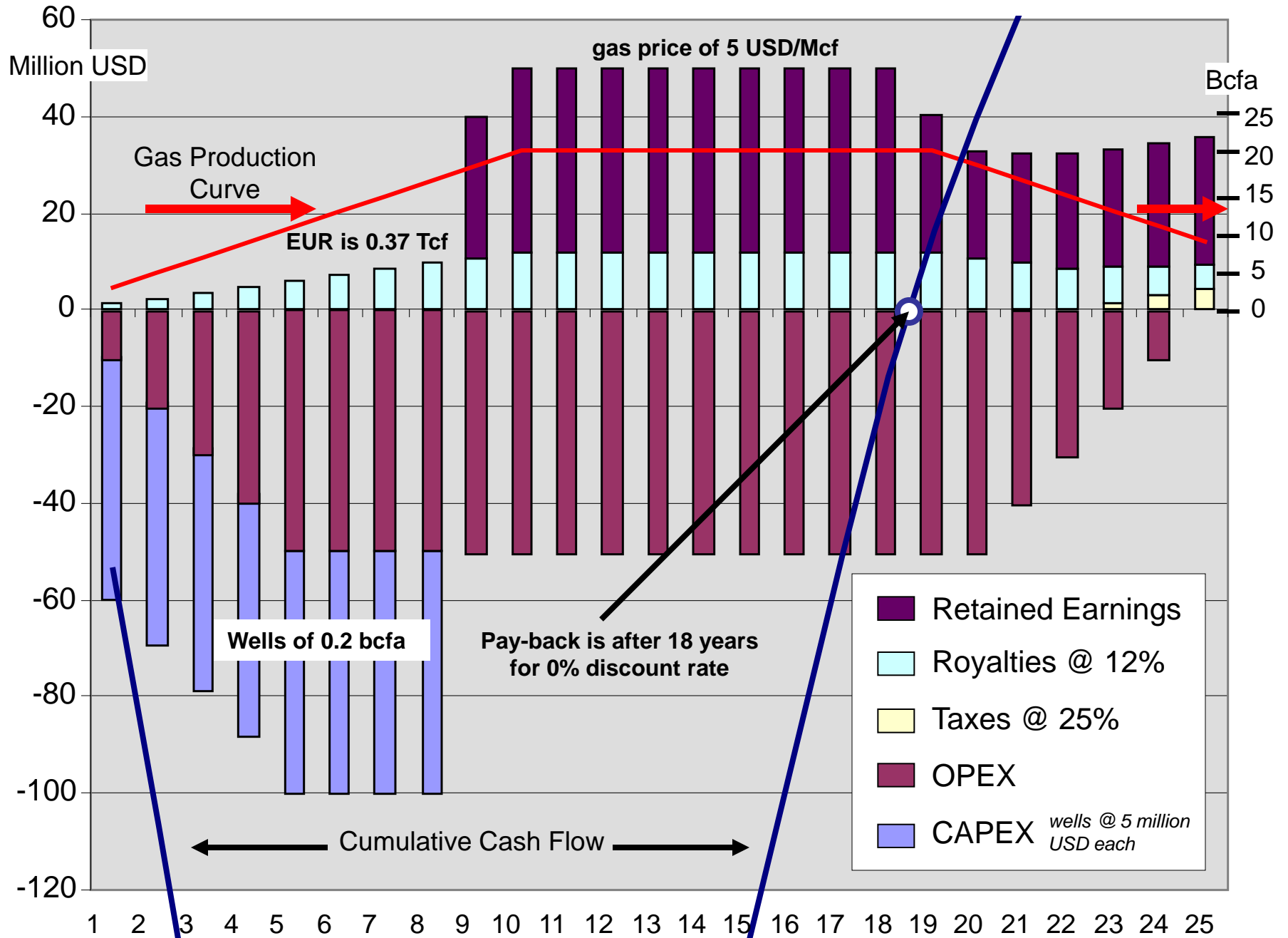
Retained Earnings



Where are we now?

- Pre-Tax margins of US Independents are marginal or negative for Unconventional gas
- If Art Berman is right – who is wrong? “Unconventional Gas Companies are in a dead spiral” (Karl Miller, analyst)
- The world needs a prolonged success of Tight Gas, CBM, Shale Gas.
- US gas Independents need a financial lift -> Gas price must go up (EU vs US).
- More transparency about performance needed.
- Volatile changes in reserves (up & down) must be avoided.
- Real-time economic models (cock-pit dials) need to be taken seriously

Better NPV Models Needed



Conclusions - Recommendations

1. Operational Performance: Improve the Unconventional Reservoir Model, real-time monitoring of the impact of gas price volatility, technology cost gains, and well productivity's connect to EUR – let's get real smart about unconventional oil & gas wells.
2. Corporate Governance: improve transparency and better accountability on performance – stop disinformation.
3. Reserves Reporting Compliance - with more than 430 billion dollars of combined market capitalization, any concurrent concerns about the business fundamentals of US shale gas operators need to be mitigated swiftly and decisively – a call for action on SEC leadership.

Once investors get burned on gas investments, shale gas exploration and production companies now emerging around the world will have a hard time to find venture capital - the reputation of the upstream gas business with the global investor community is at stake.