



Purpose of Resource Classification, Fundamental Principles and System Applications

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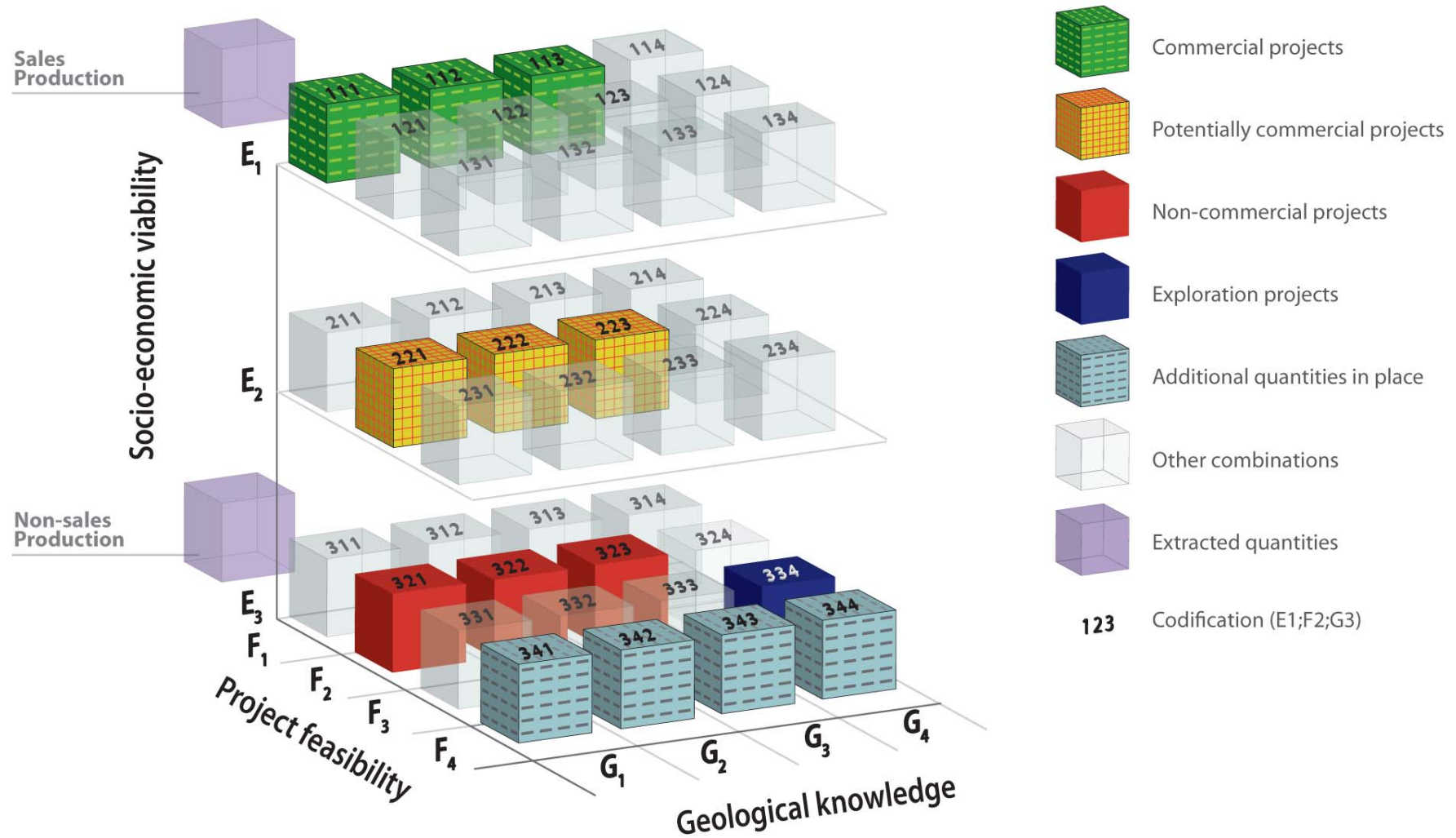
INTERNATIONAL WORKSHOP

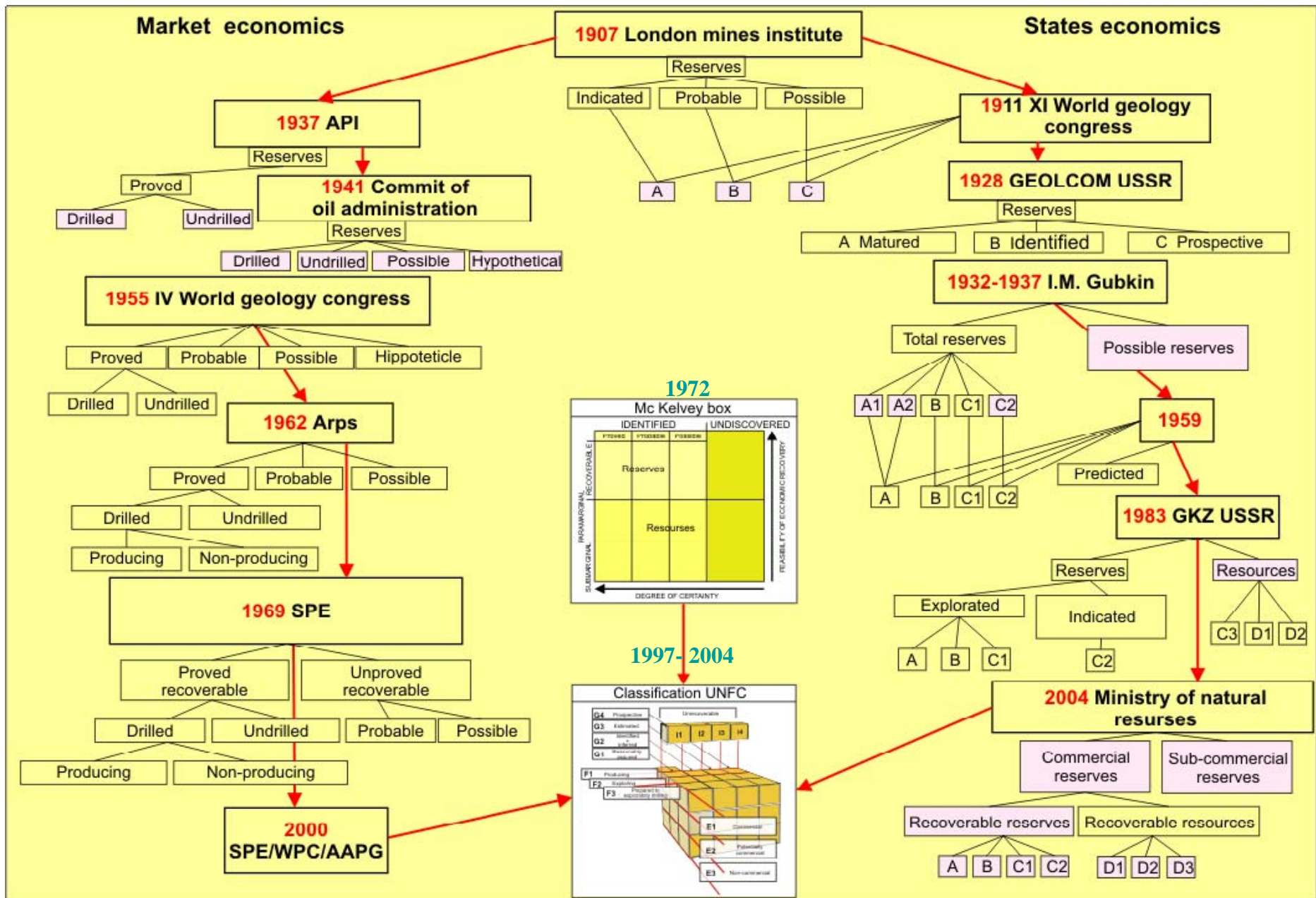
The United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources (UNFC-2009)

29-30 September 2011

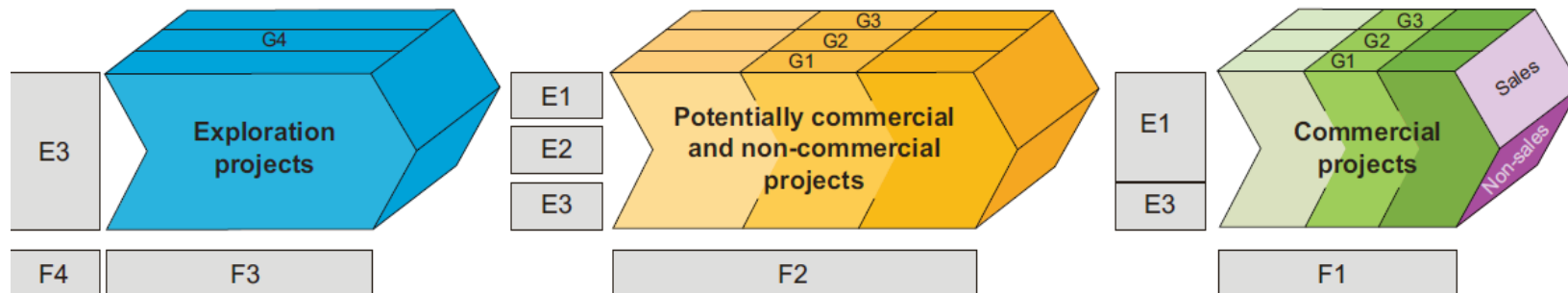
Ankara, Turkey

UNFC 2009

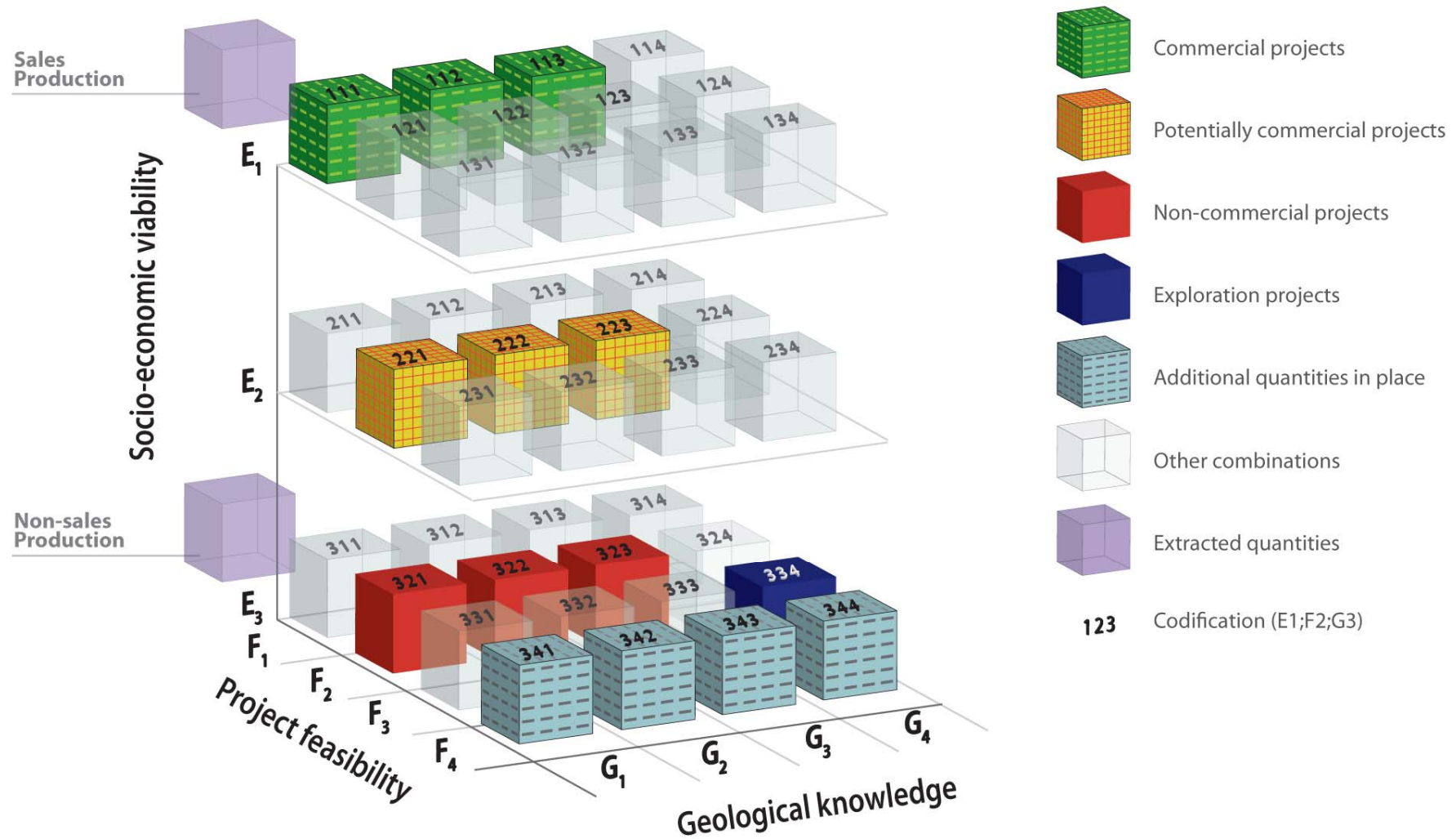




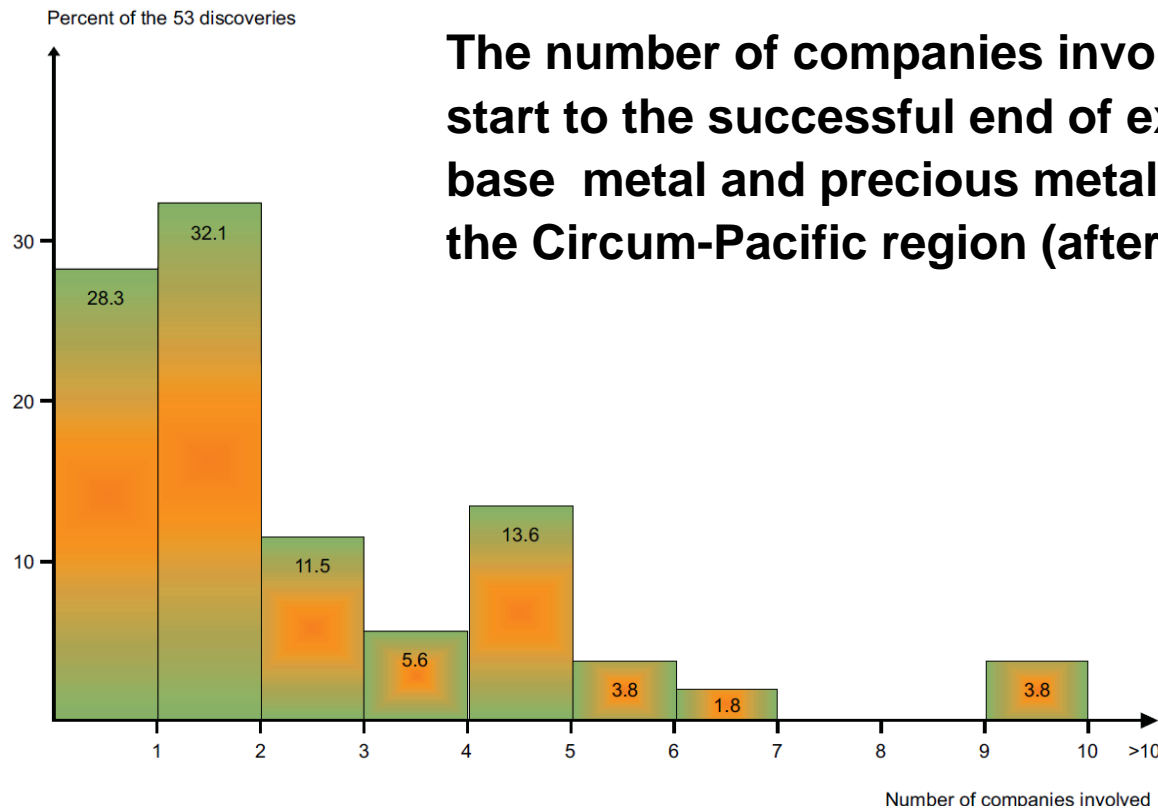
The value chain that became visible in the 1980's was followed by the balanced score card in the 1990's. This caused restatements of reserves



The project value chains are at the base of UNFC



To move quantities through the UNFC value chain may require the accumulation of substantial amounts of information



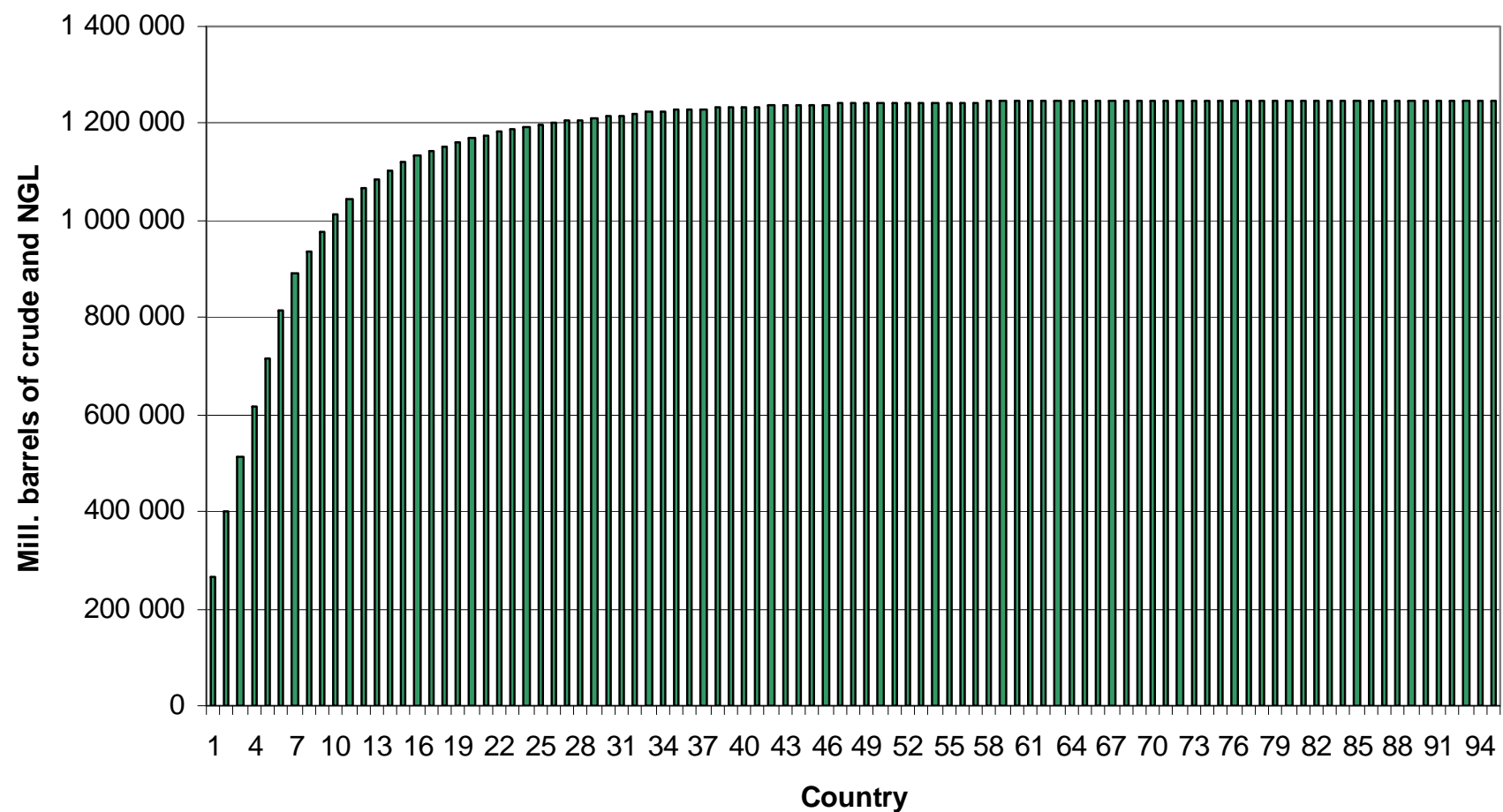
The number of companies involved from the start to the successful end of exploration for 53 base metal and precious metal discoveries in the Circum-Pacific region (after Sillitoe 1995)

Source: Heiberg, Sigurd; Wellmer, Friedrich-W.: "Stretching the availability of non-renewable resources".in: Sinding-Larsen, R. & Wellmer, F.-W. (eds): Non-renewable Resource Issues. Geoscientific and Societal Challenges. International Year of the Planet Earth-Series. Springer (Heidelberg, Berlin, New York) 2011, in print

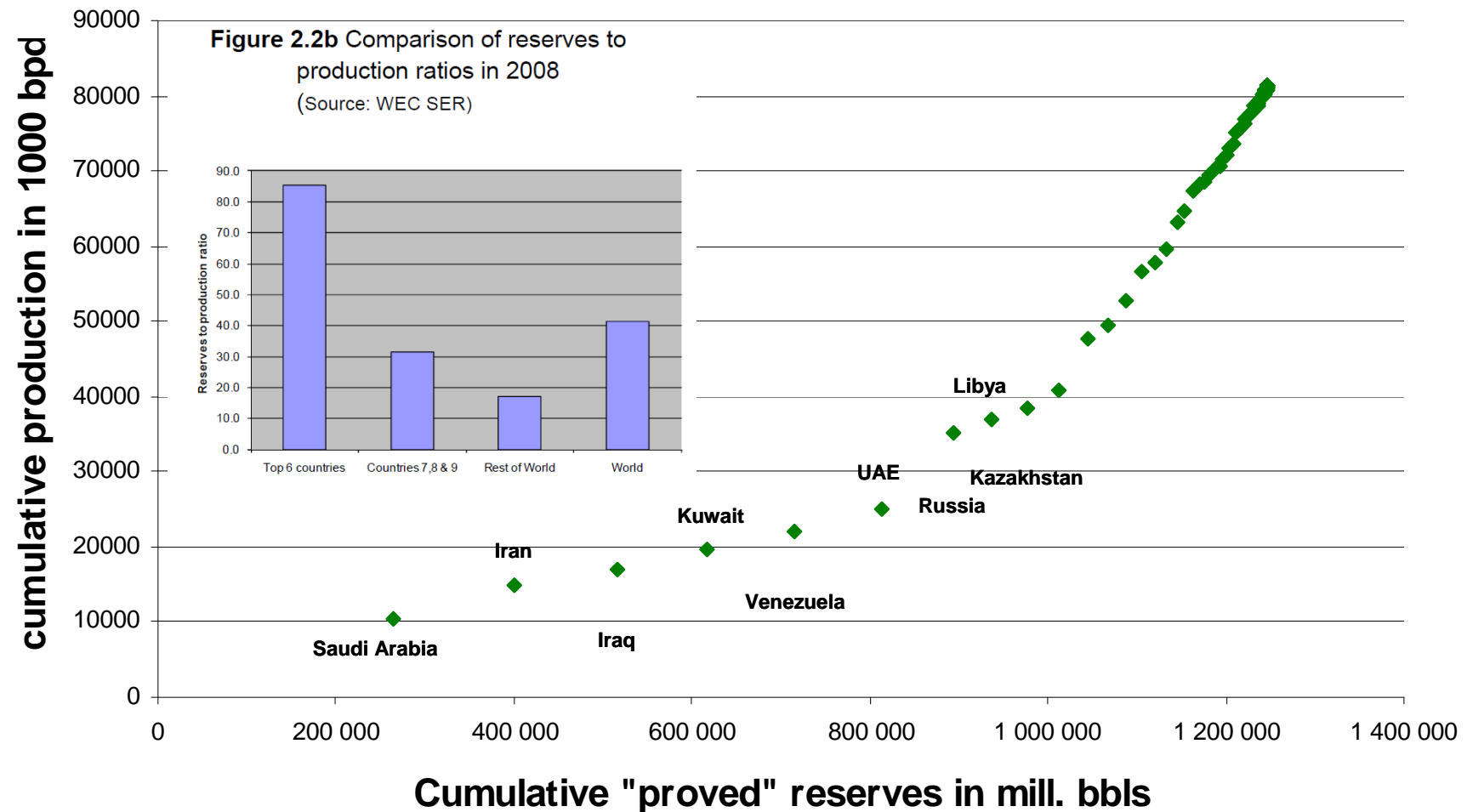
An important difference

- Fossil energy is gone once it is used, leaving products of the chemical decomposition that liberates the energy.
- Many minerals are not lost through use but moved from one place to accumulate in another as minable (?) waste or as a resource for further use.

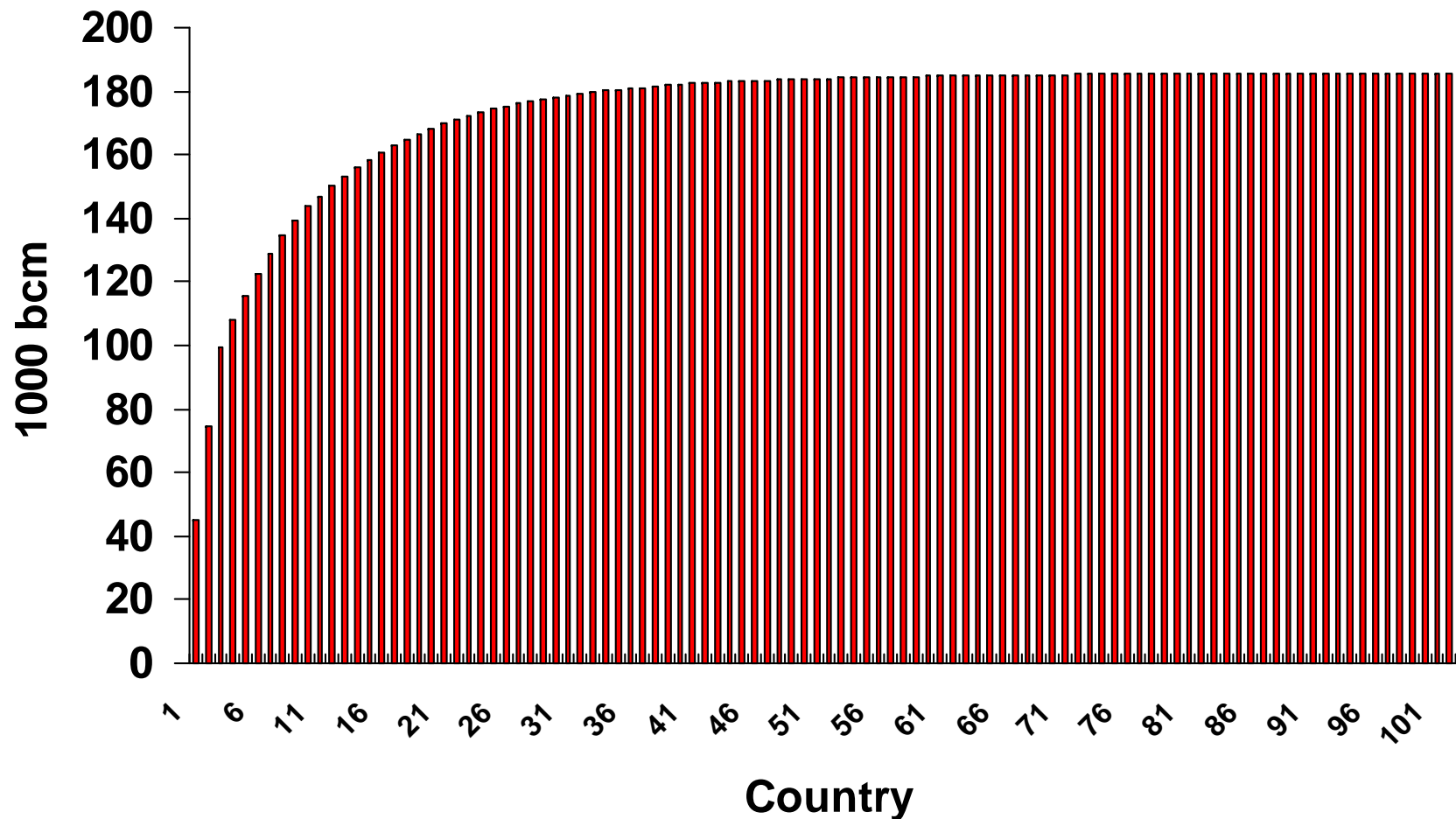
Cumulative “proved” reserves of oil and NGL at the end of 2008



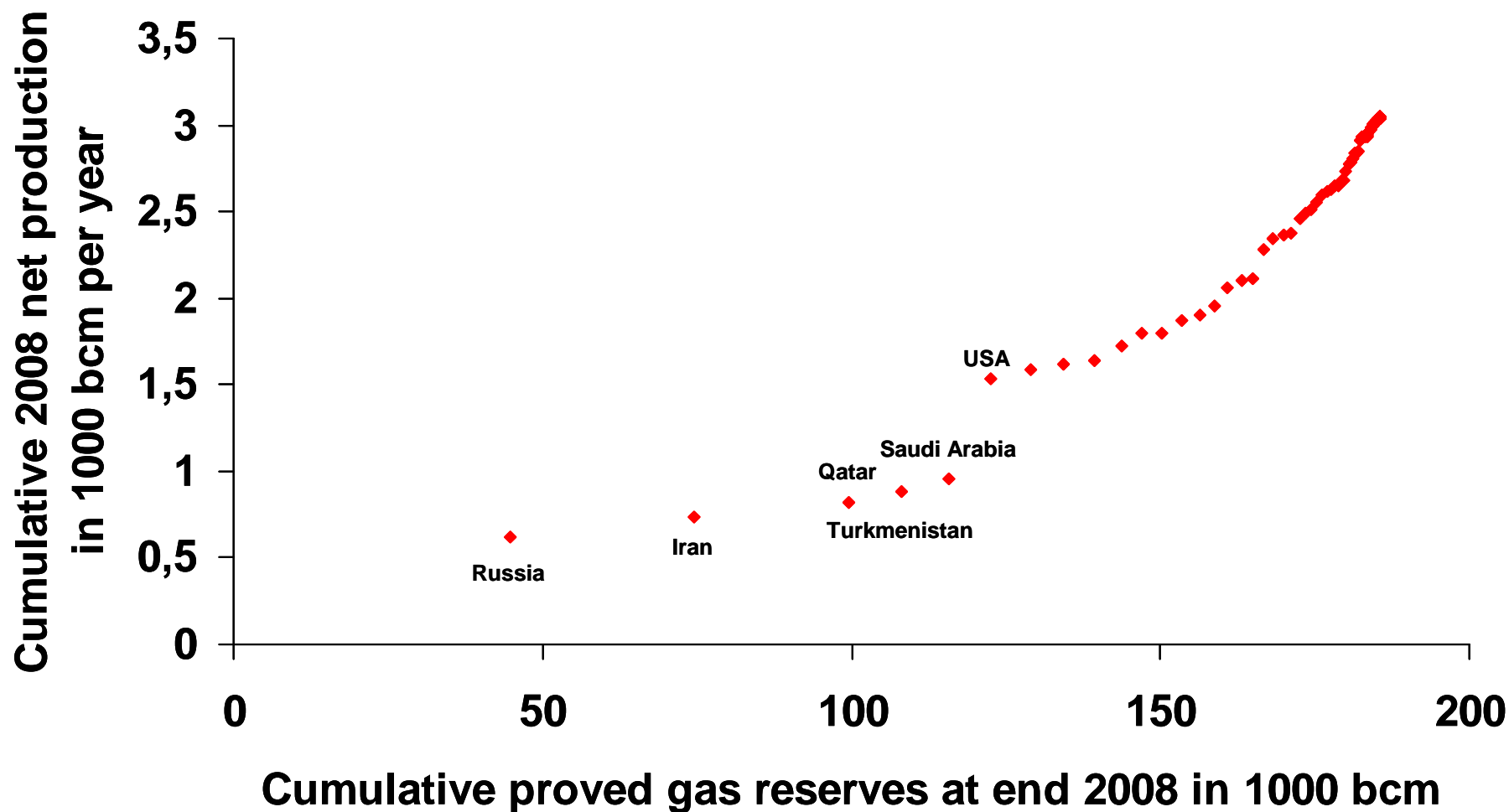
WEC shows two groups of countries with distinct reserves to production ratios



Cumulative “proved” reserves of gas by country at end 2008



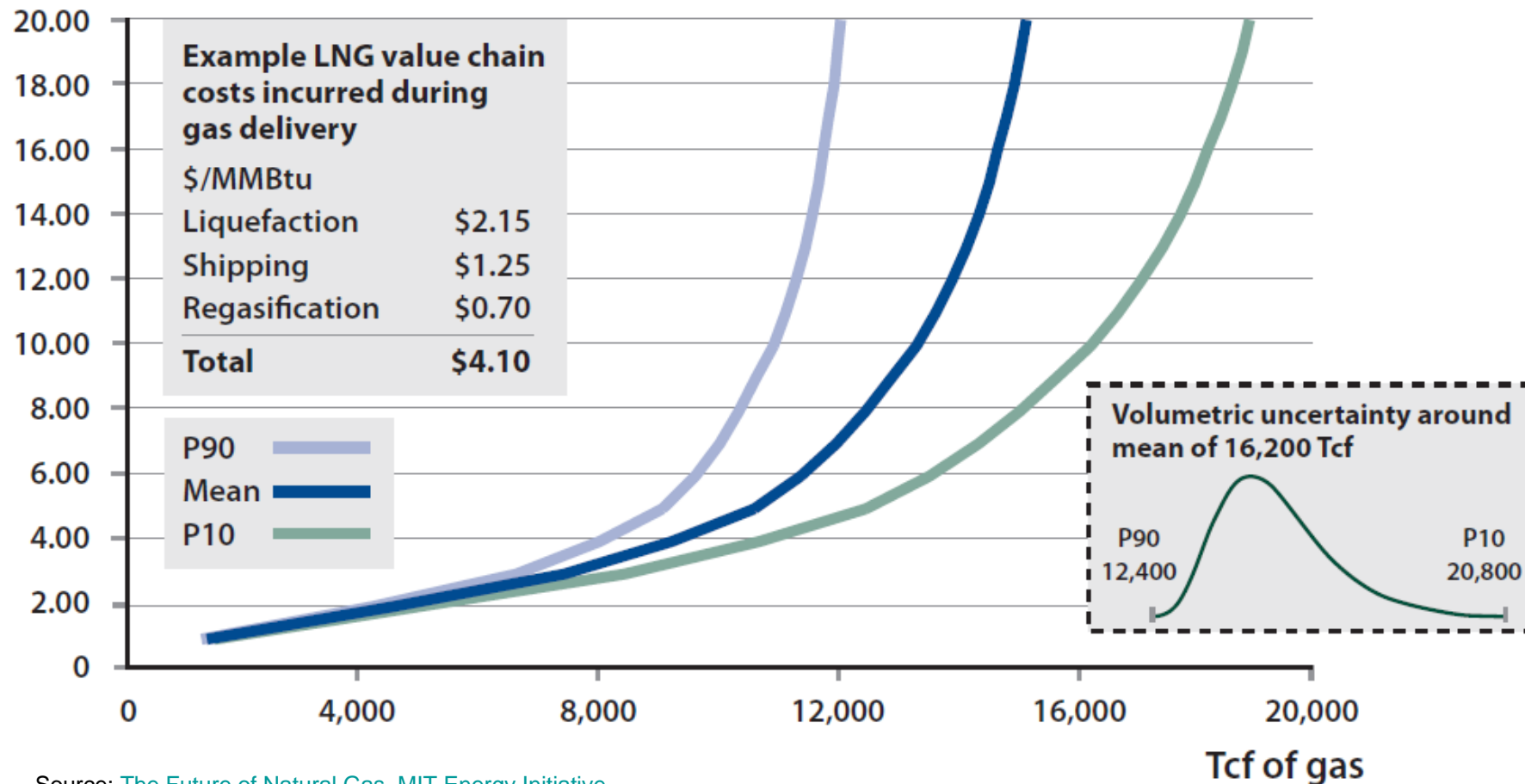
Gas production vs. reserves



Keep values high at the source

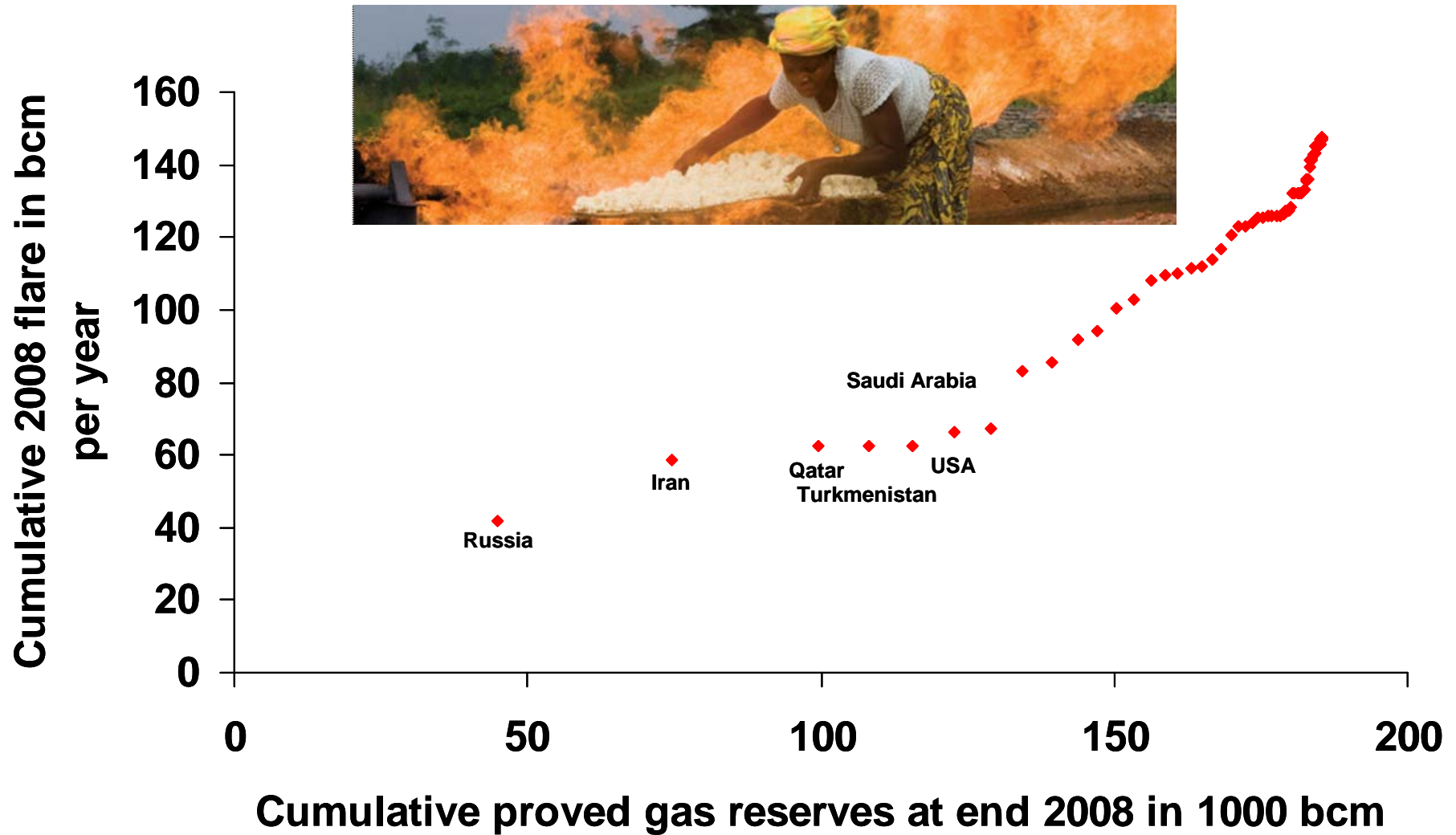
Breakeven gas price:
\$/MMBtu

The Global Gas Supply Cost Curve
with Uncertainty; 2007 Cost Base
(excludes unconventional gas
outside North America)

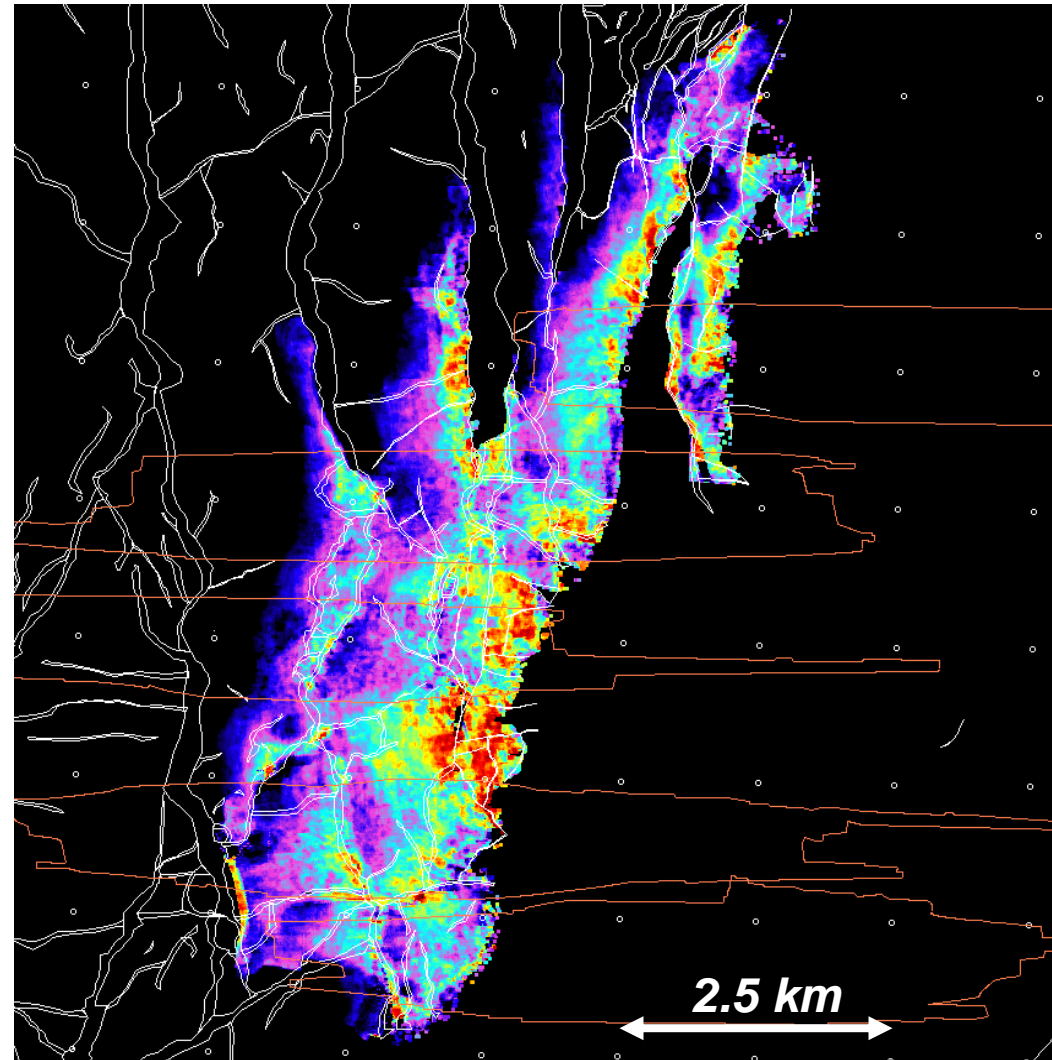
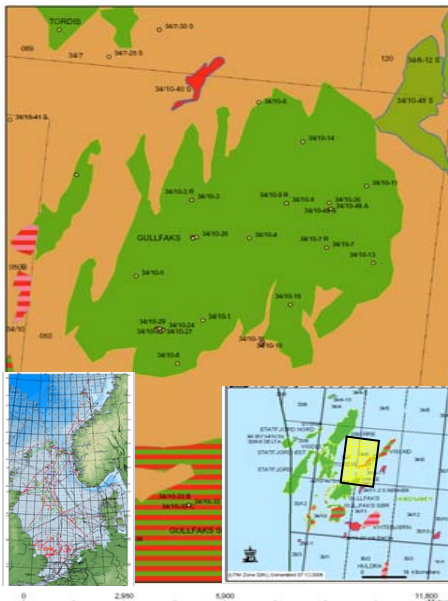


Source: [The Future of Natural Gas. MIT Energy Initiative](#)

Gas flared vs. reserves

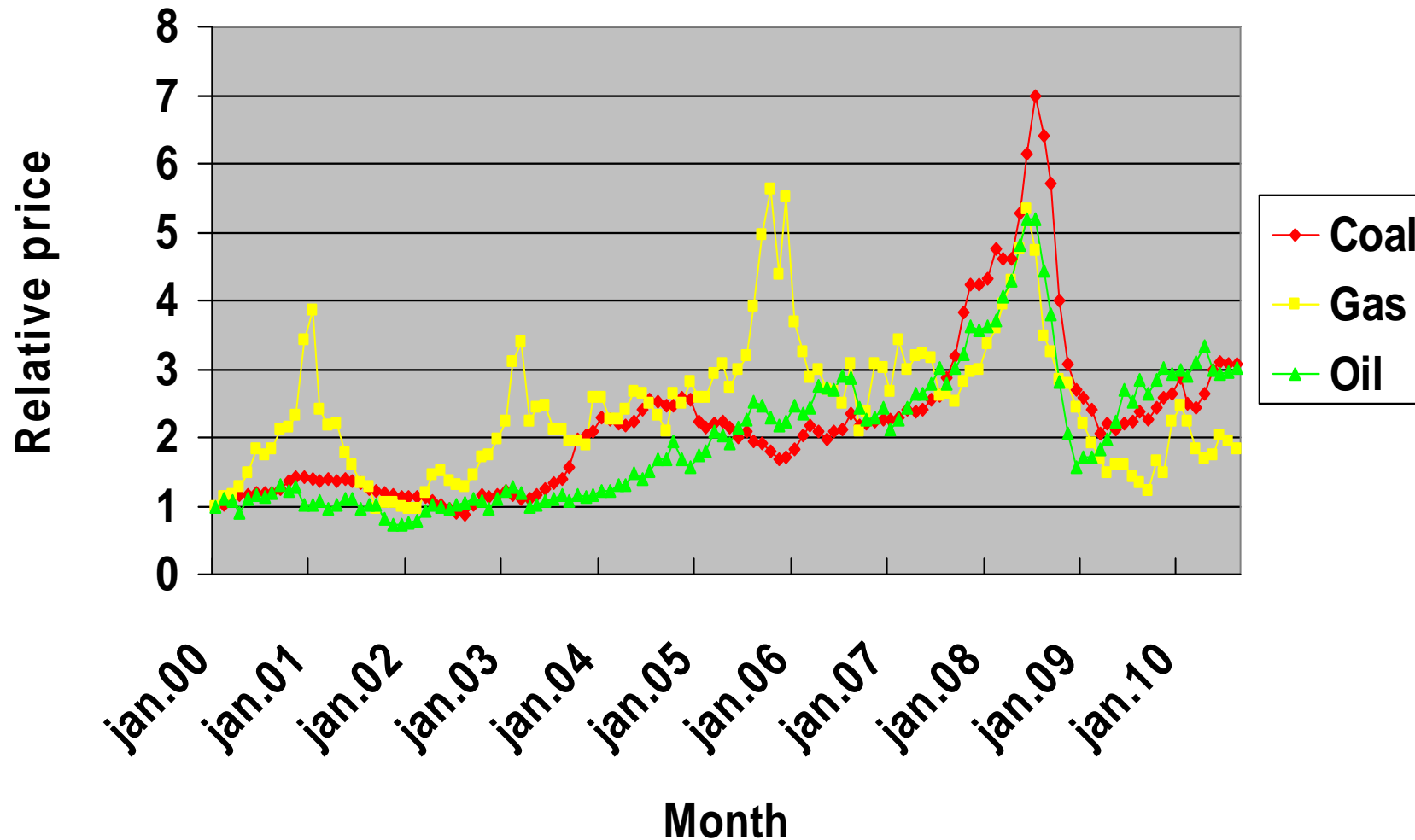


(Mapping) technology changed over the life of the Gullfaks Field, Norway

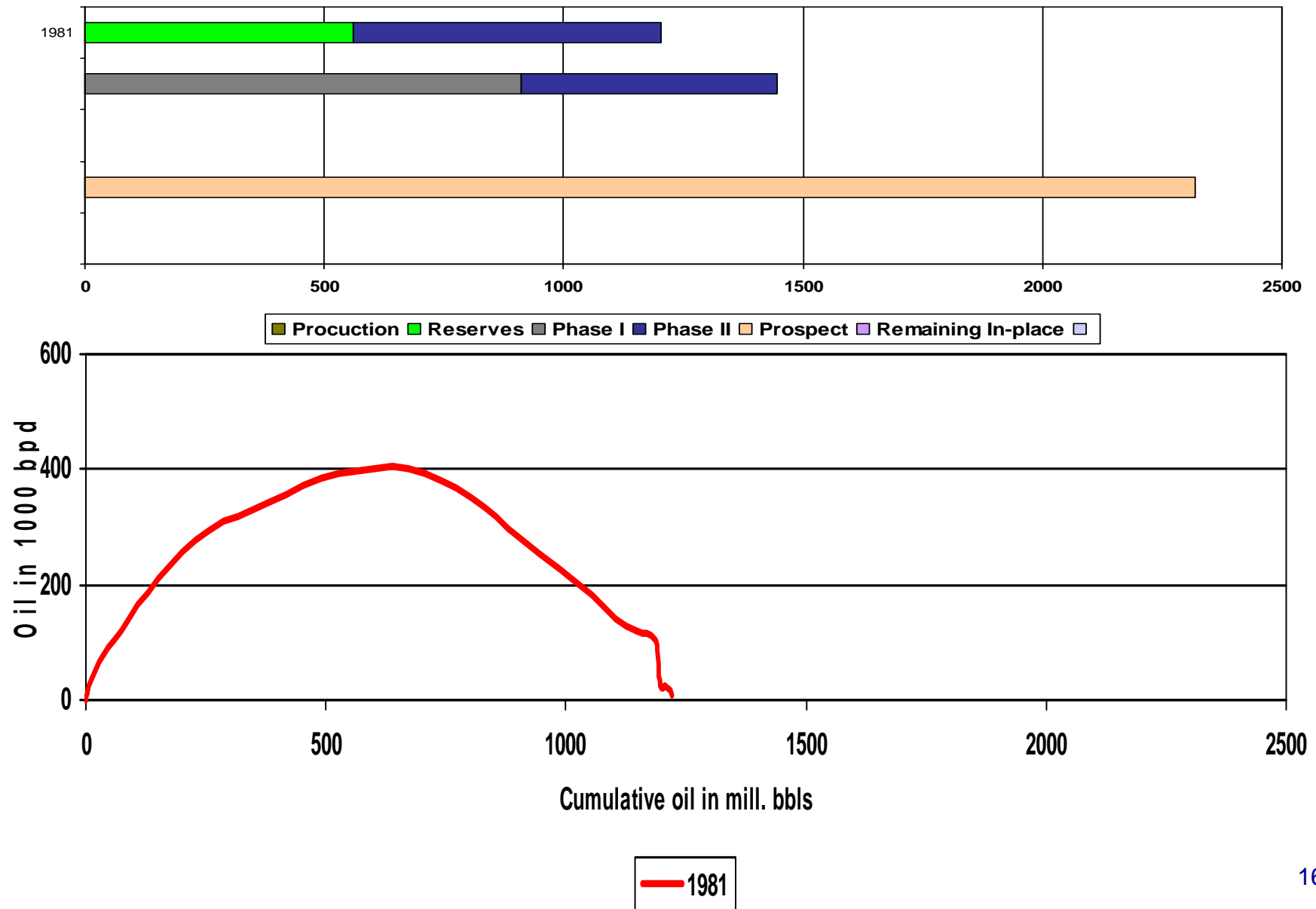


**Average Oil saturation - Tarbert Fm –
2005 (4D inversion)**

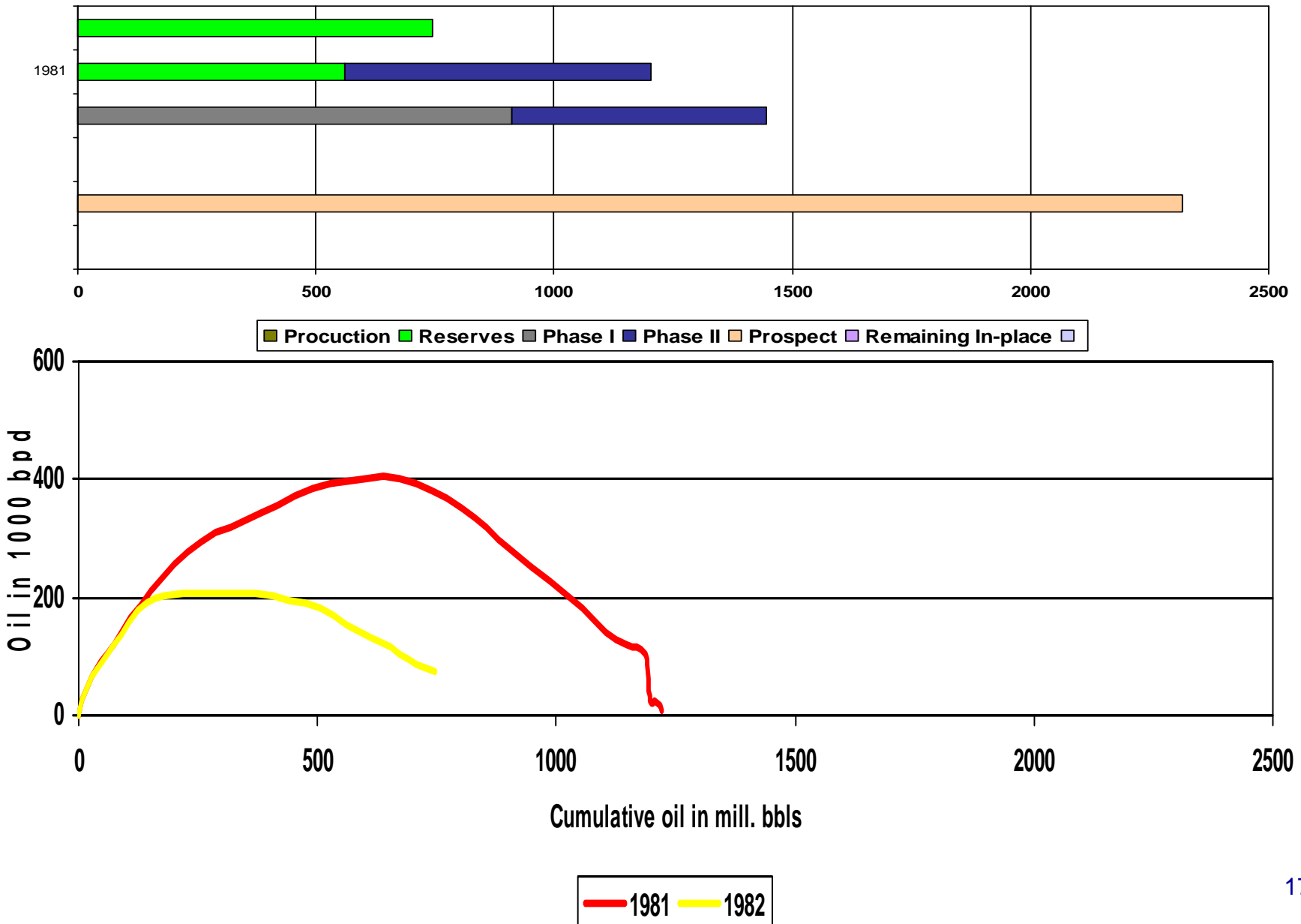
Prices of coal, gas and oil relative to January 2000 – Volatility adds risk, cost and reduces efficiency



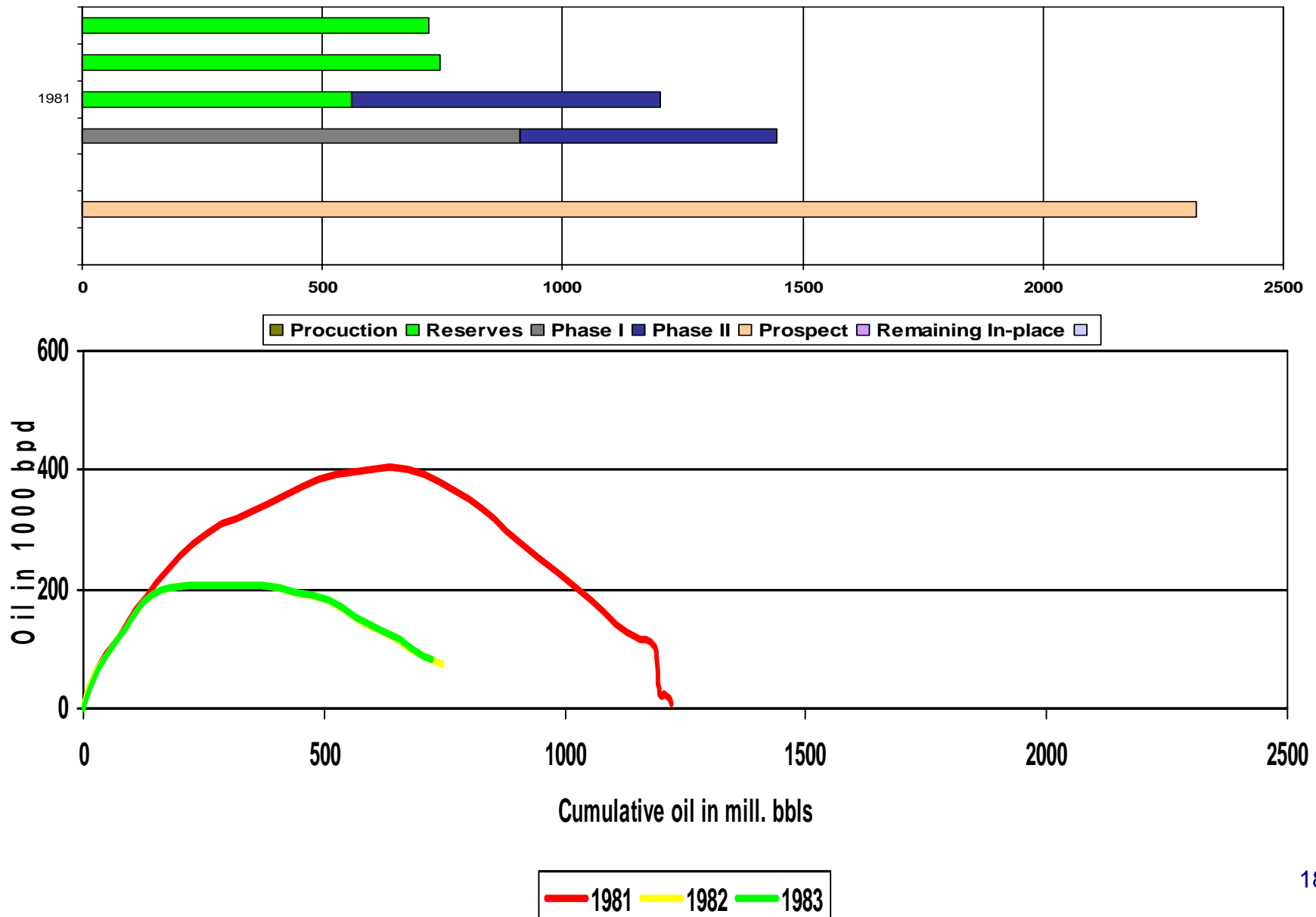
Gulfaks forecasts and production 1981 - 2005



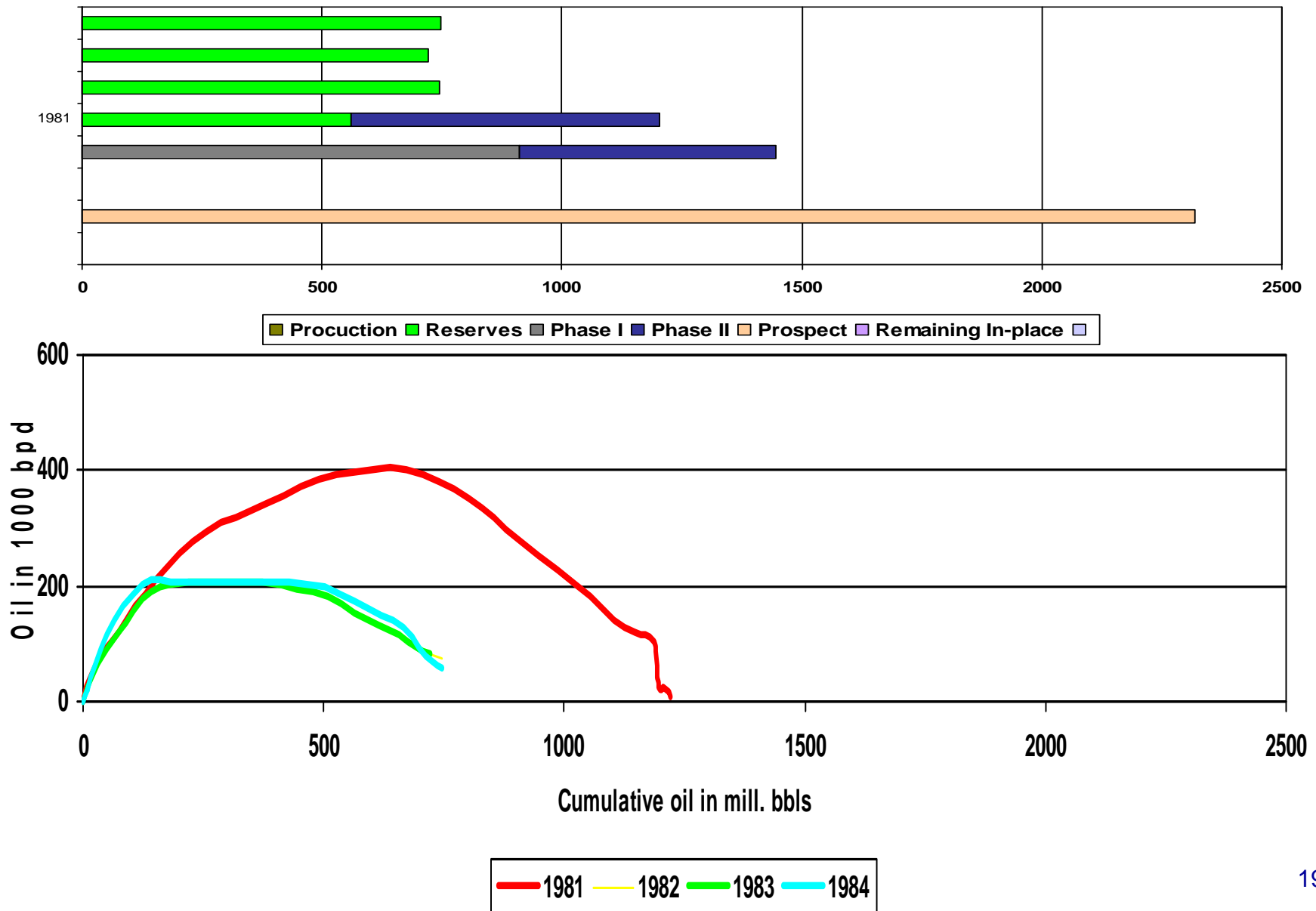
Gulfaks forecasts and production 1981 - 2005



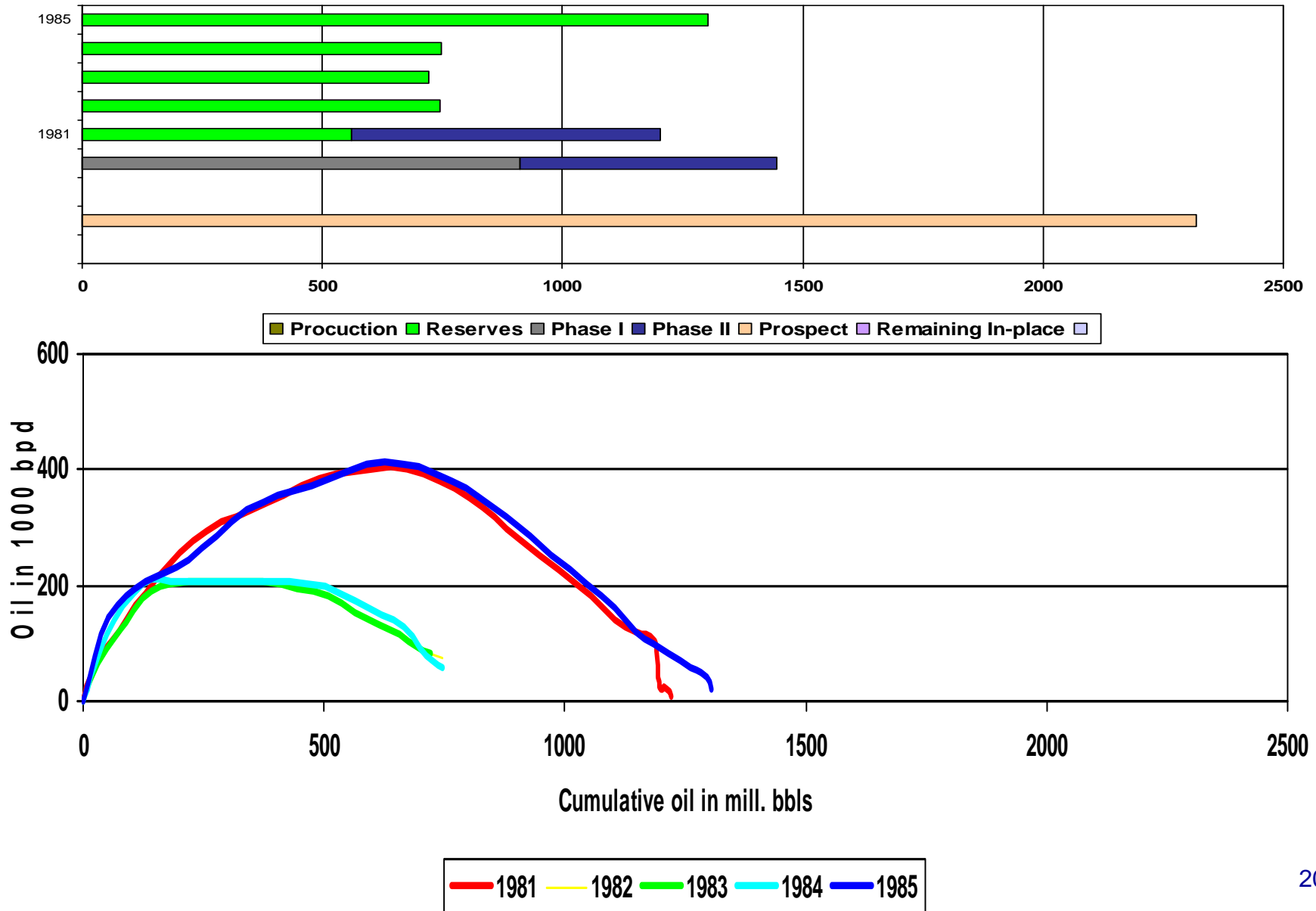
Gulfaks forecasts and production 1981 - 2005



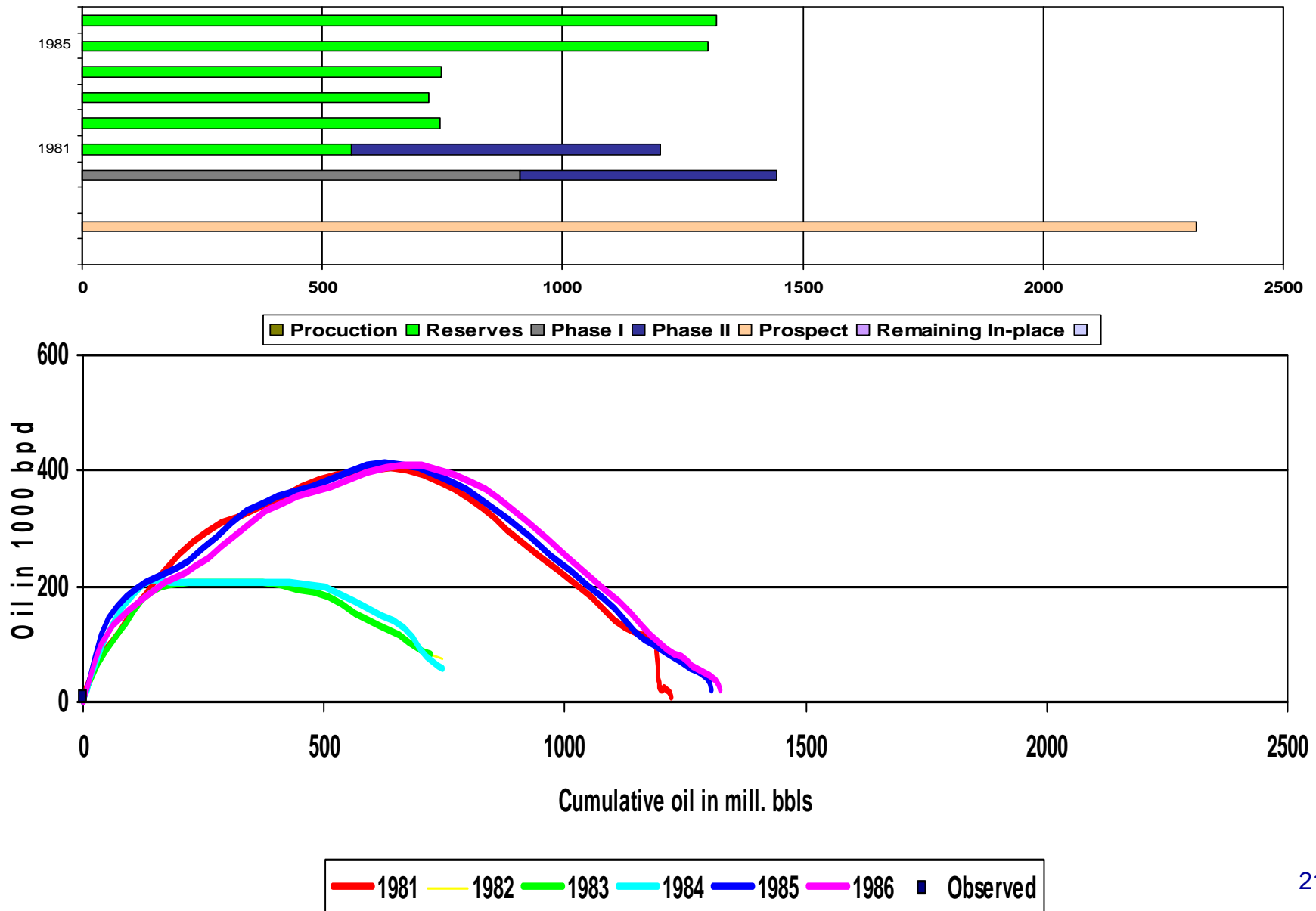
Gulfaks forecasts and production 1981 - 2005



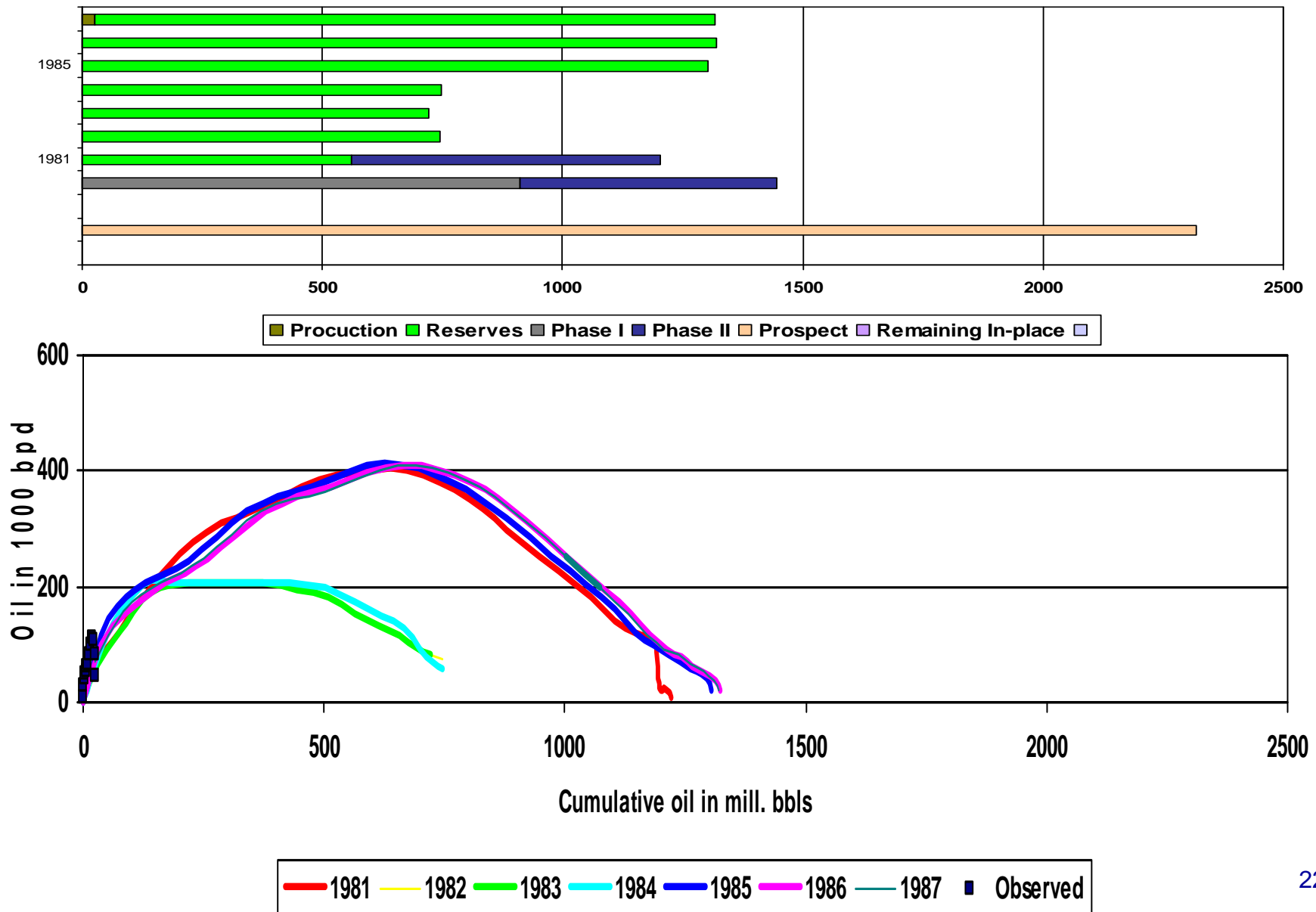
Gulfaks forecasts and production 1981 - 2005



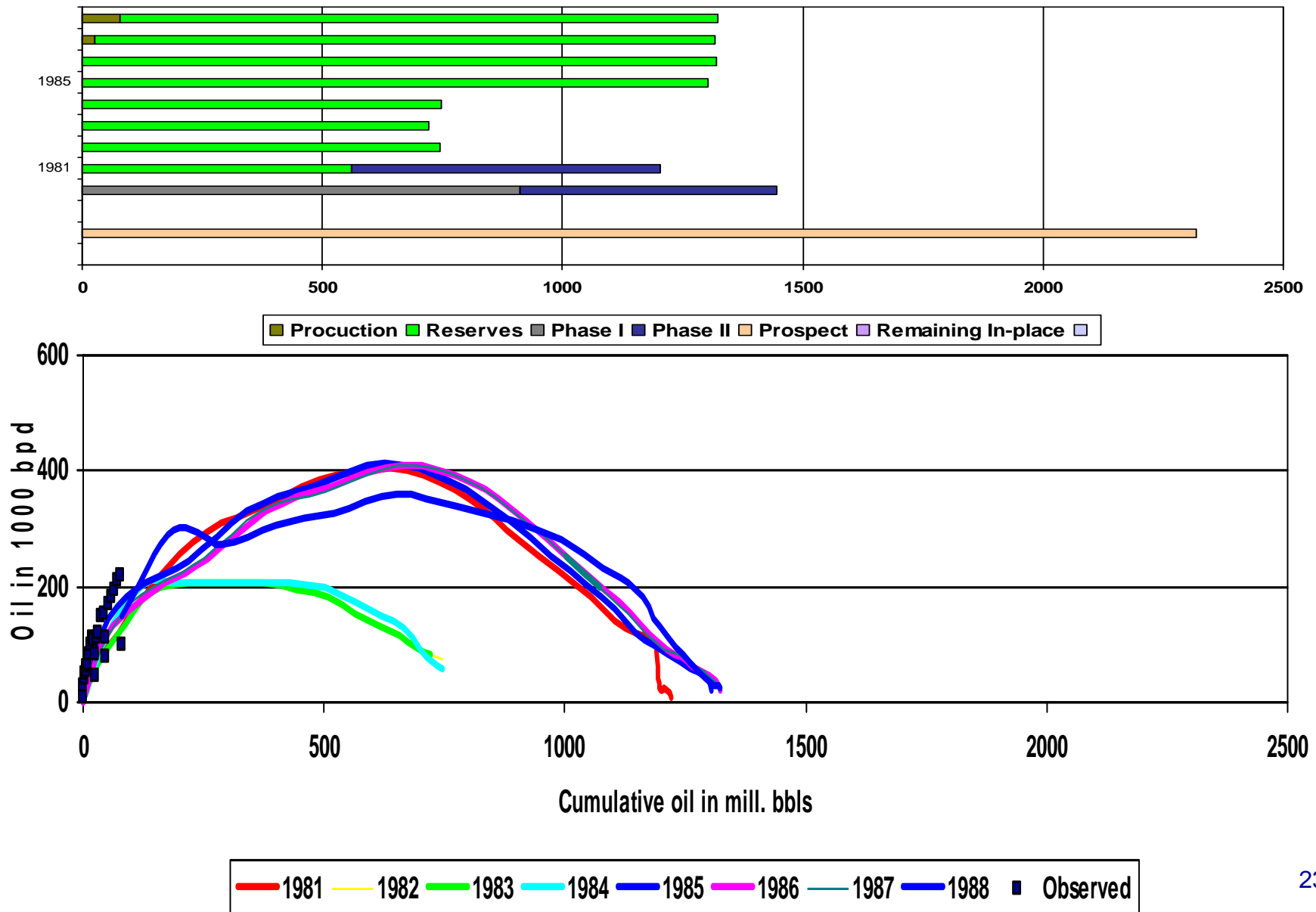
Gulfaks forecasts and production 1981 - 2005



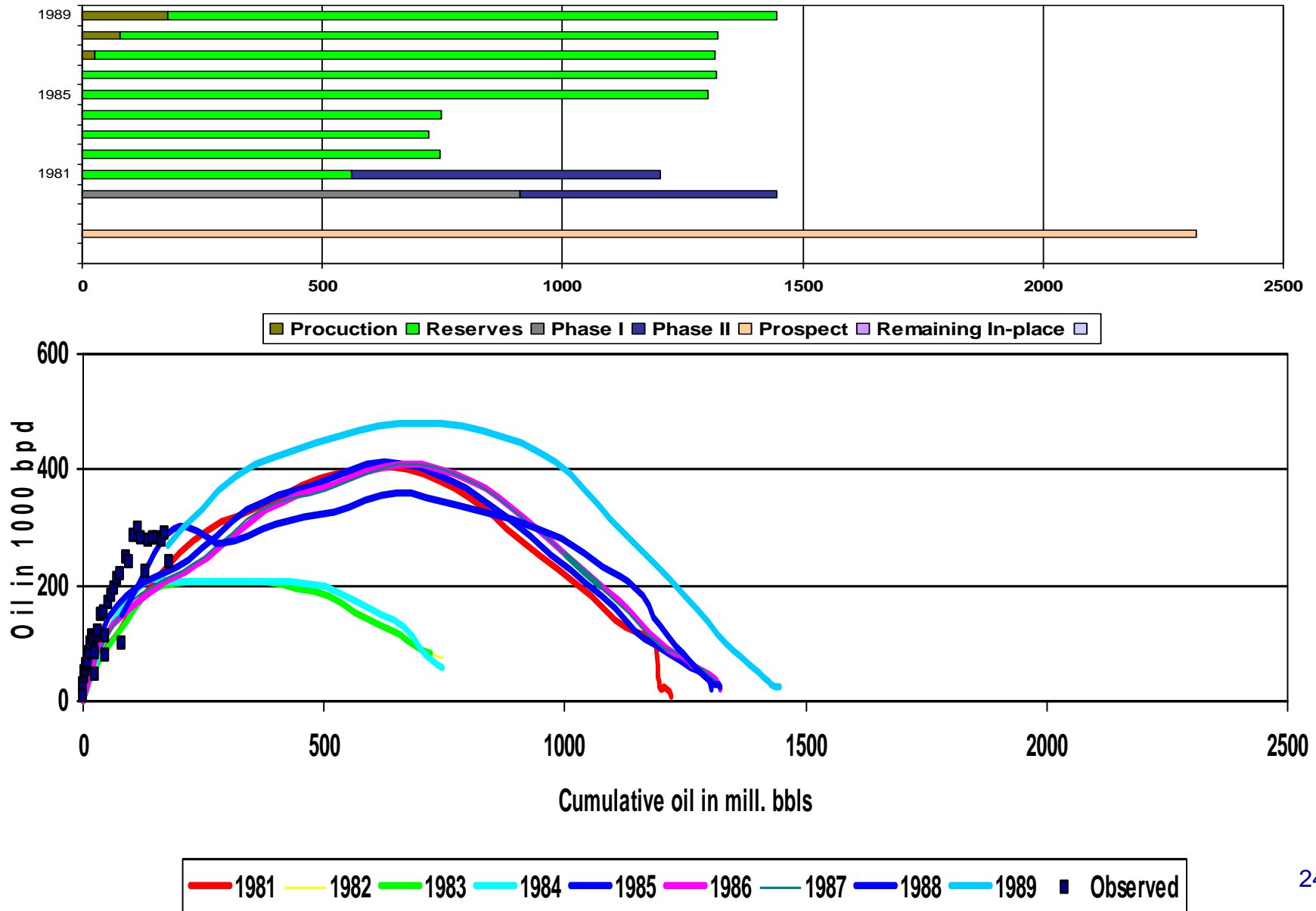
Gulfaks forecasts and production 1981 - 2005



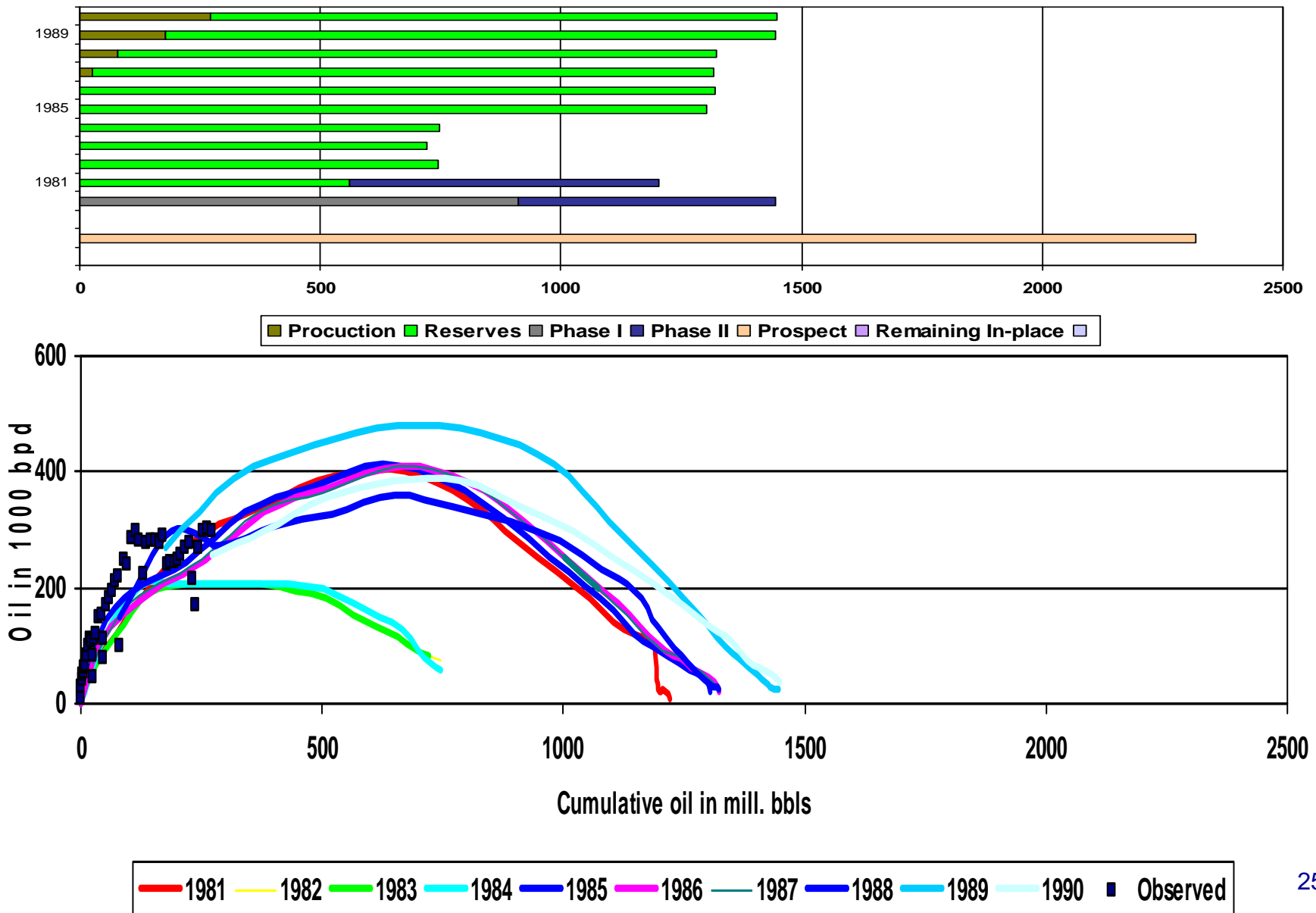
Gulfaks forecasts and production 1981 - 2005



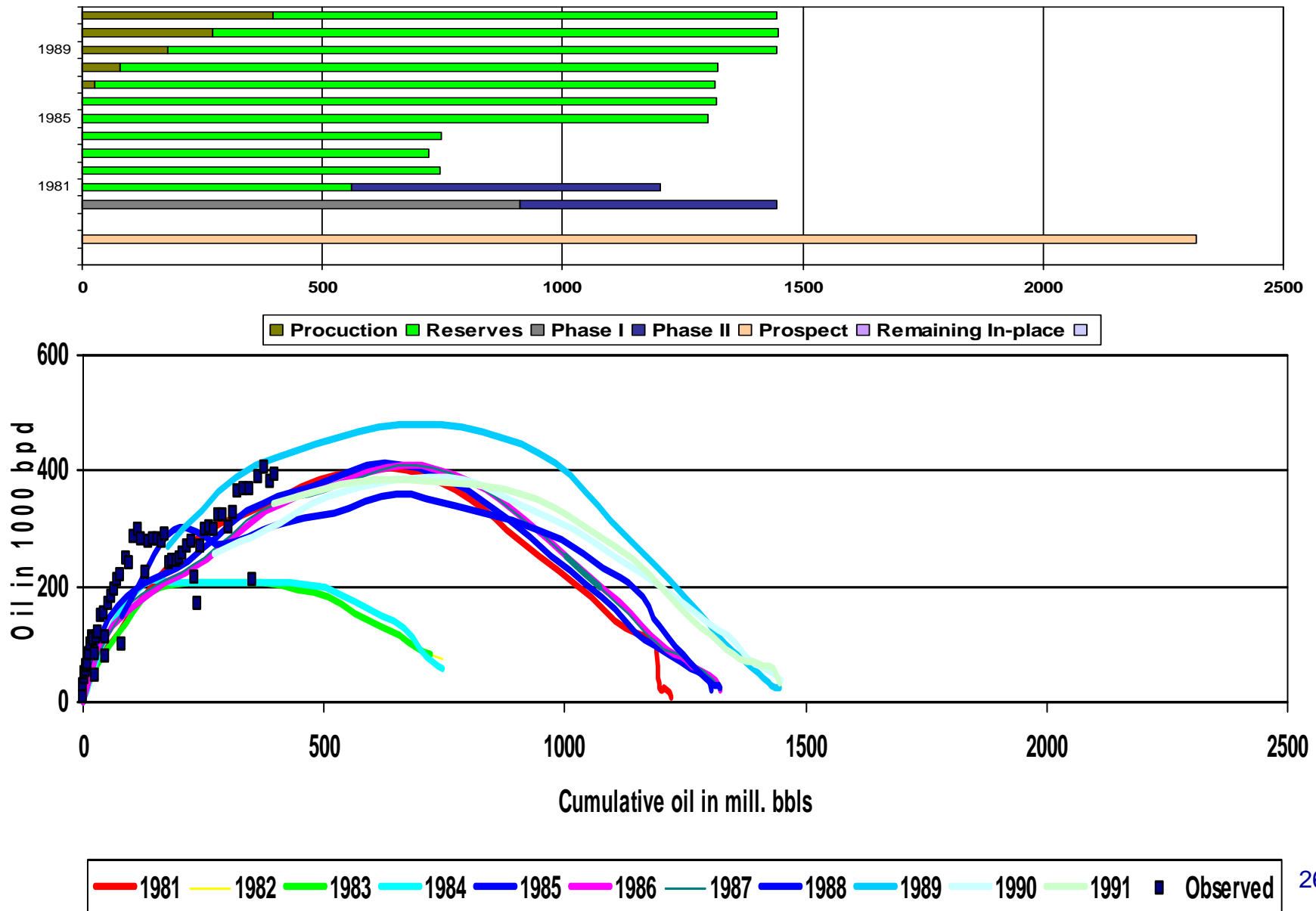
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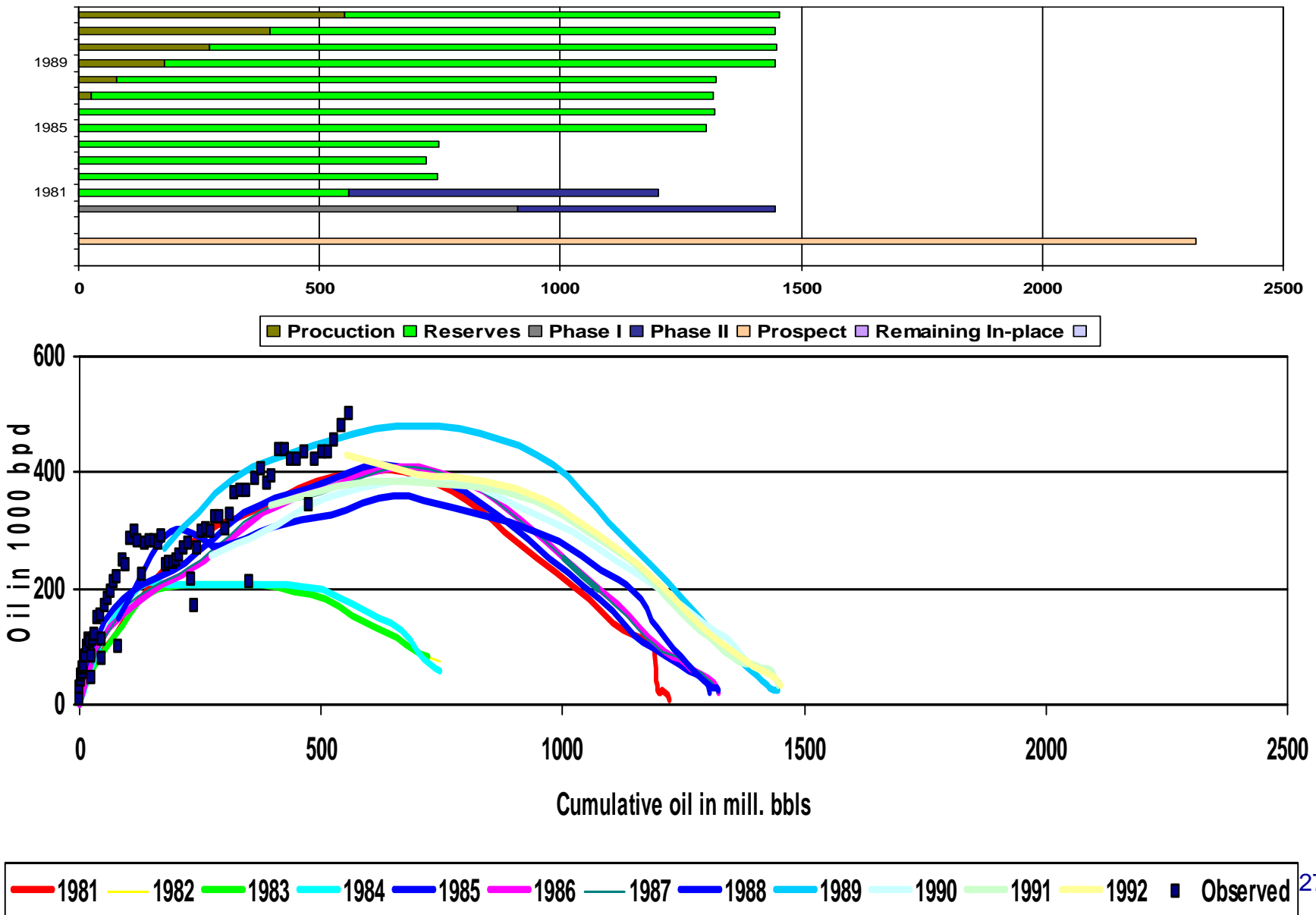
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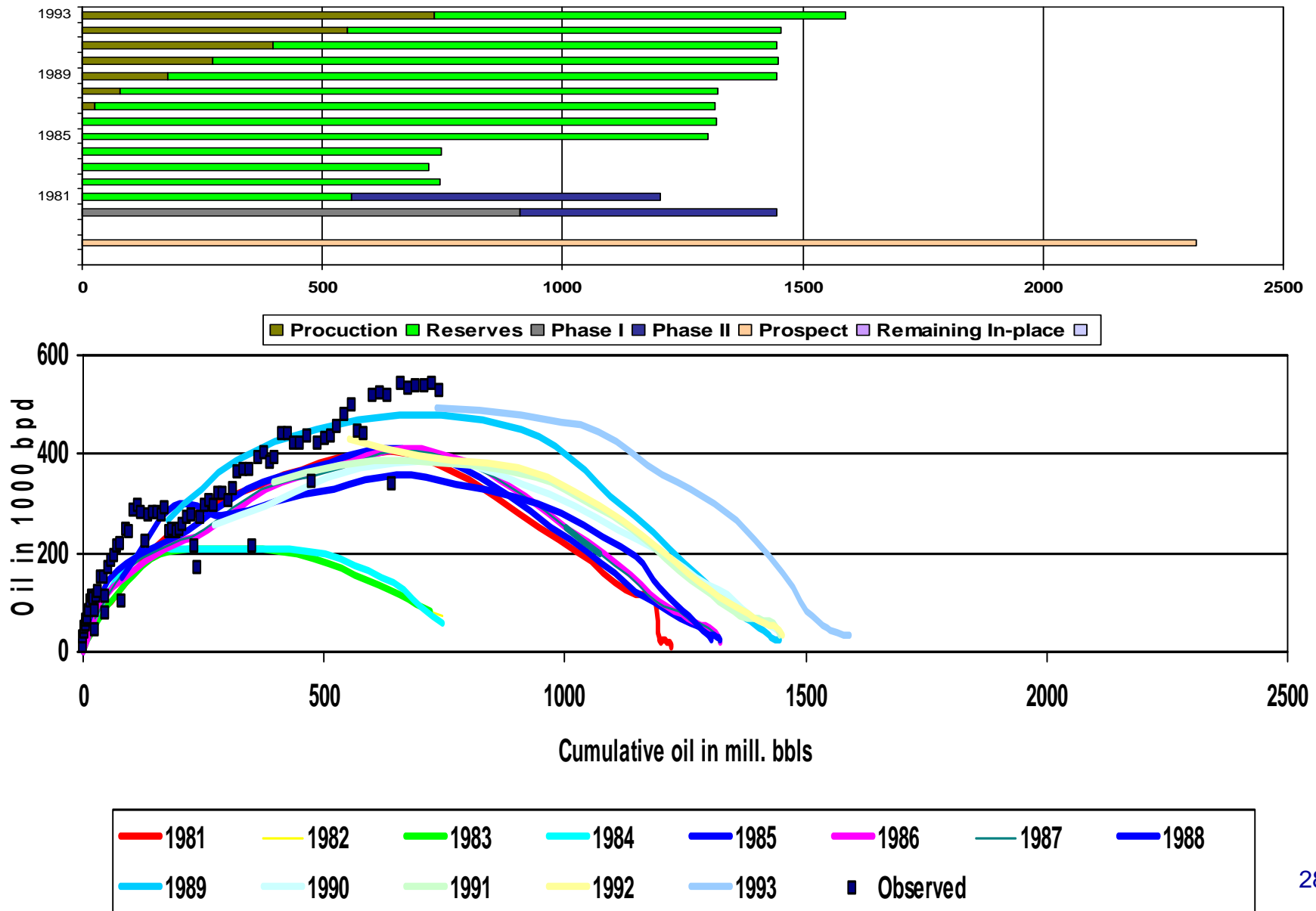
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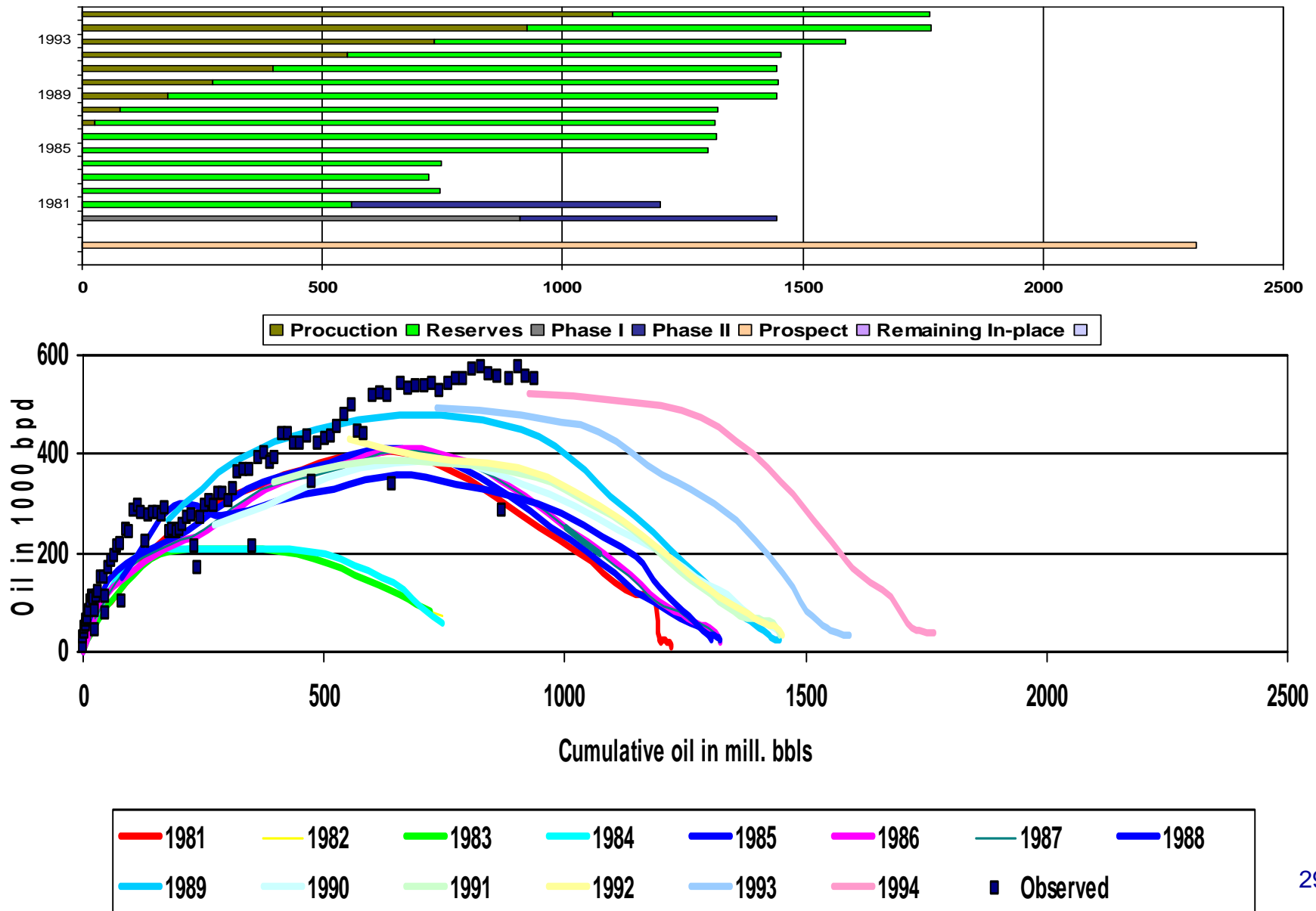
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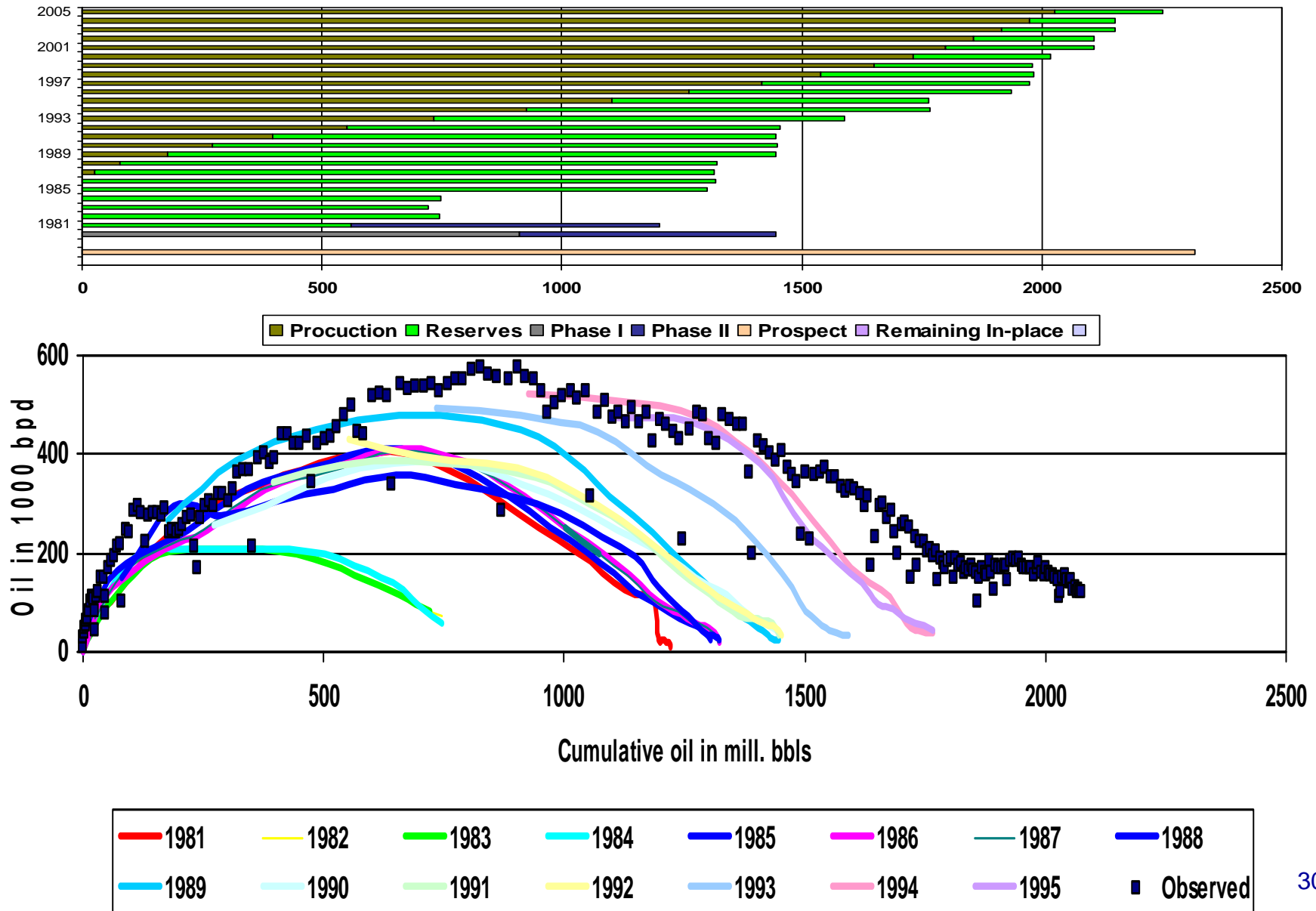
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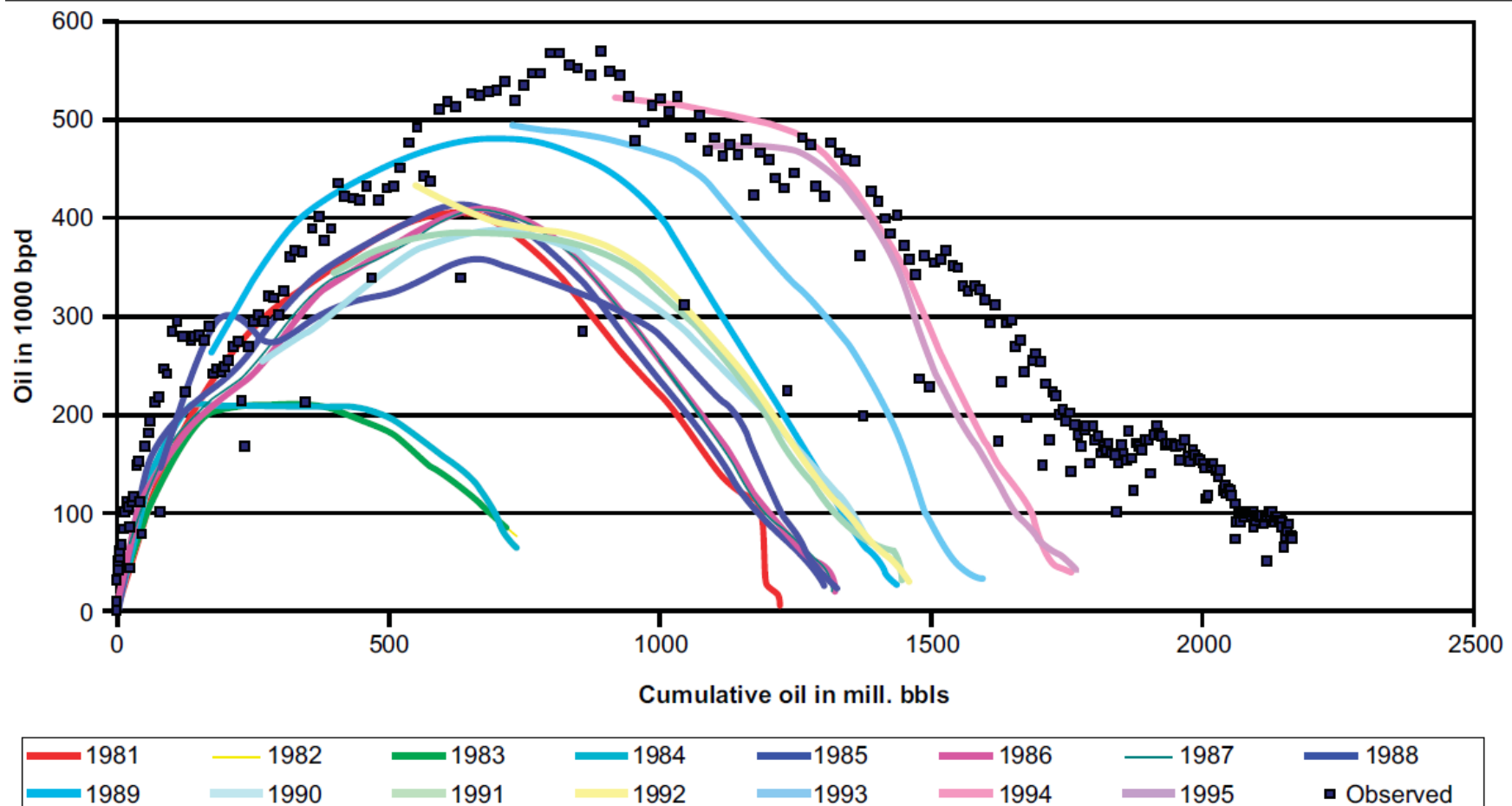
Gulfaks forecasts and production 1981 - 2005



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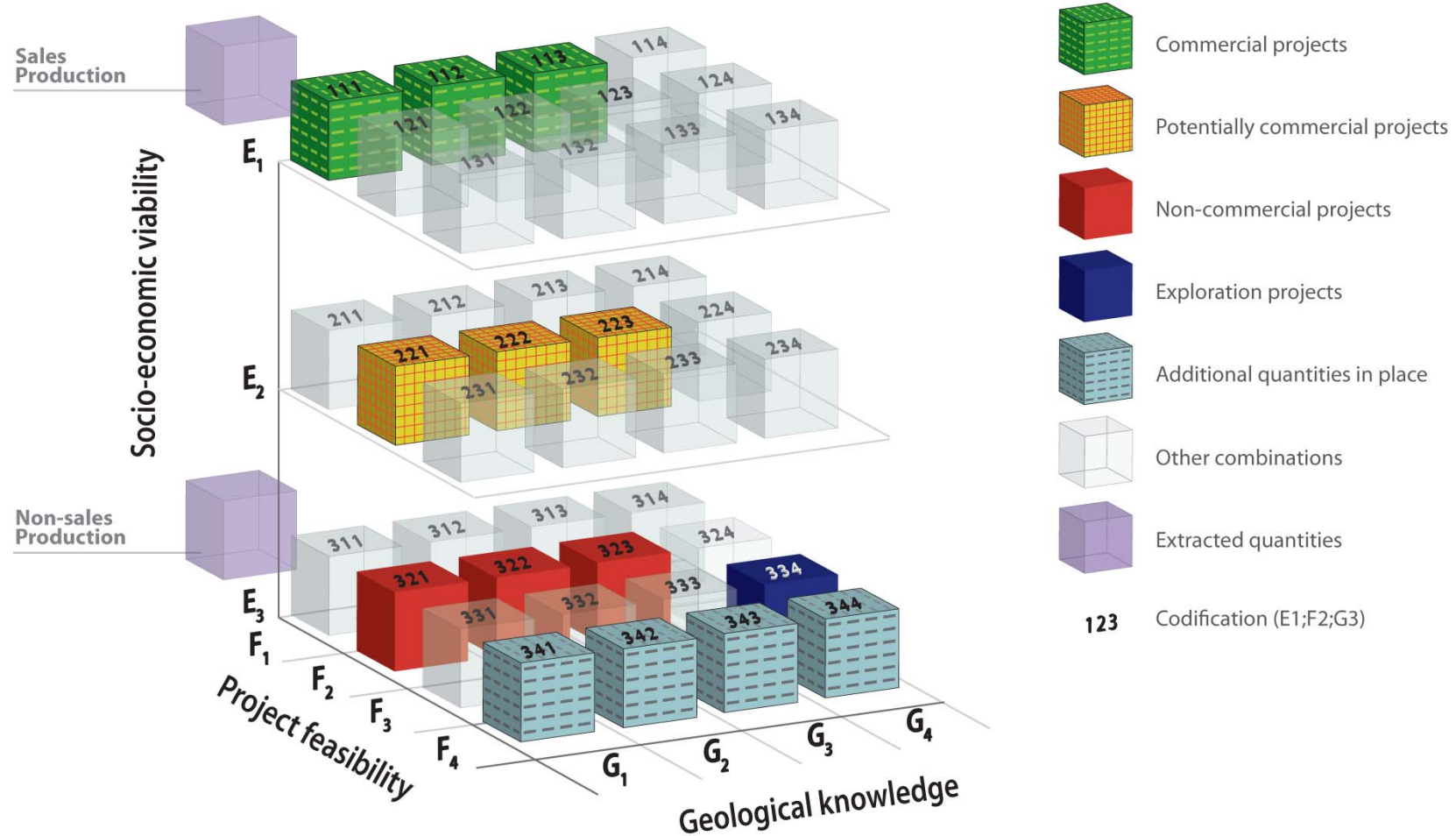


The Gullfaks development is a series of projects adapting to new information

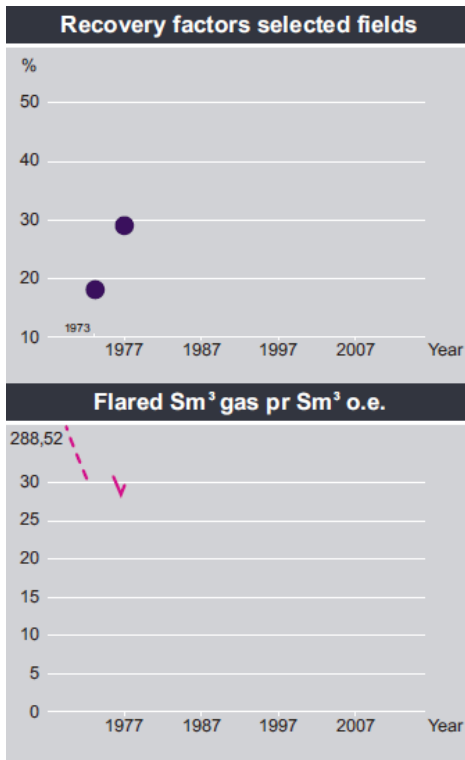


Production is a process, not a project

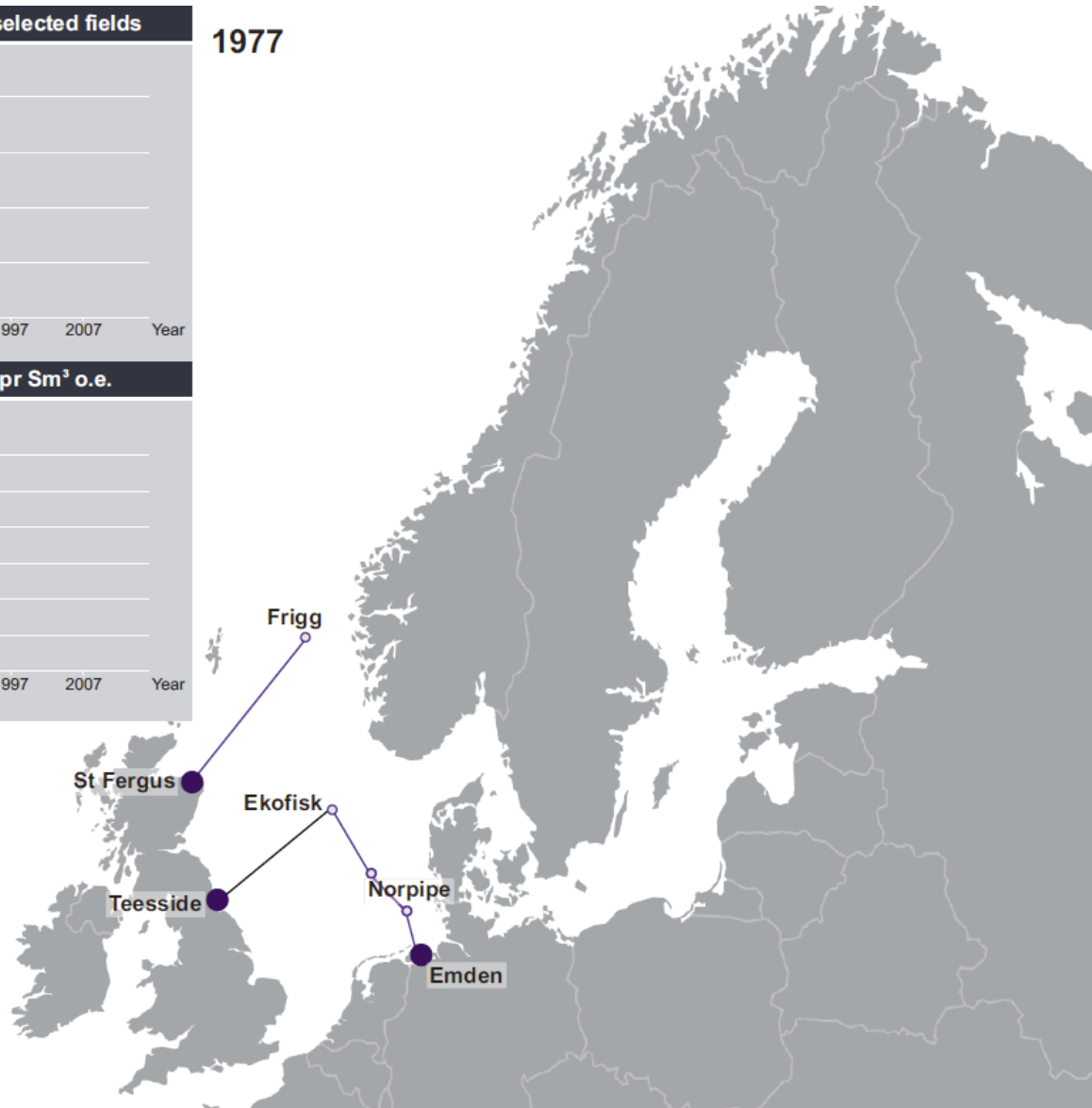
UNFC 2009 helps designing the process



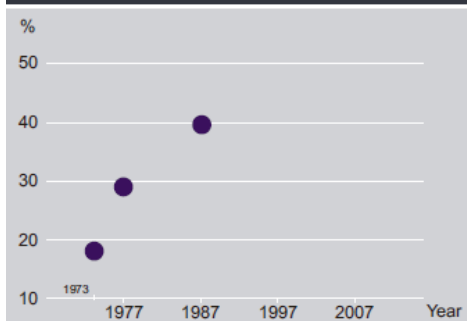
...so is the development of a country



1977

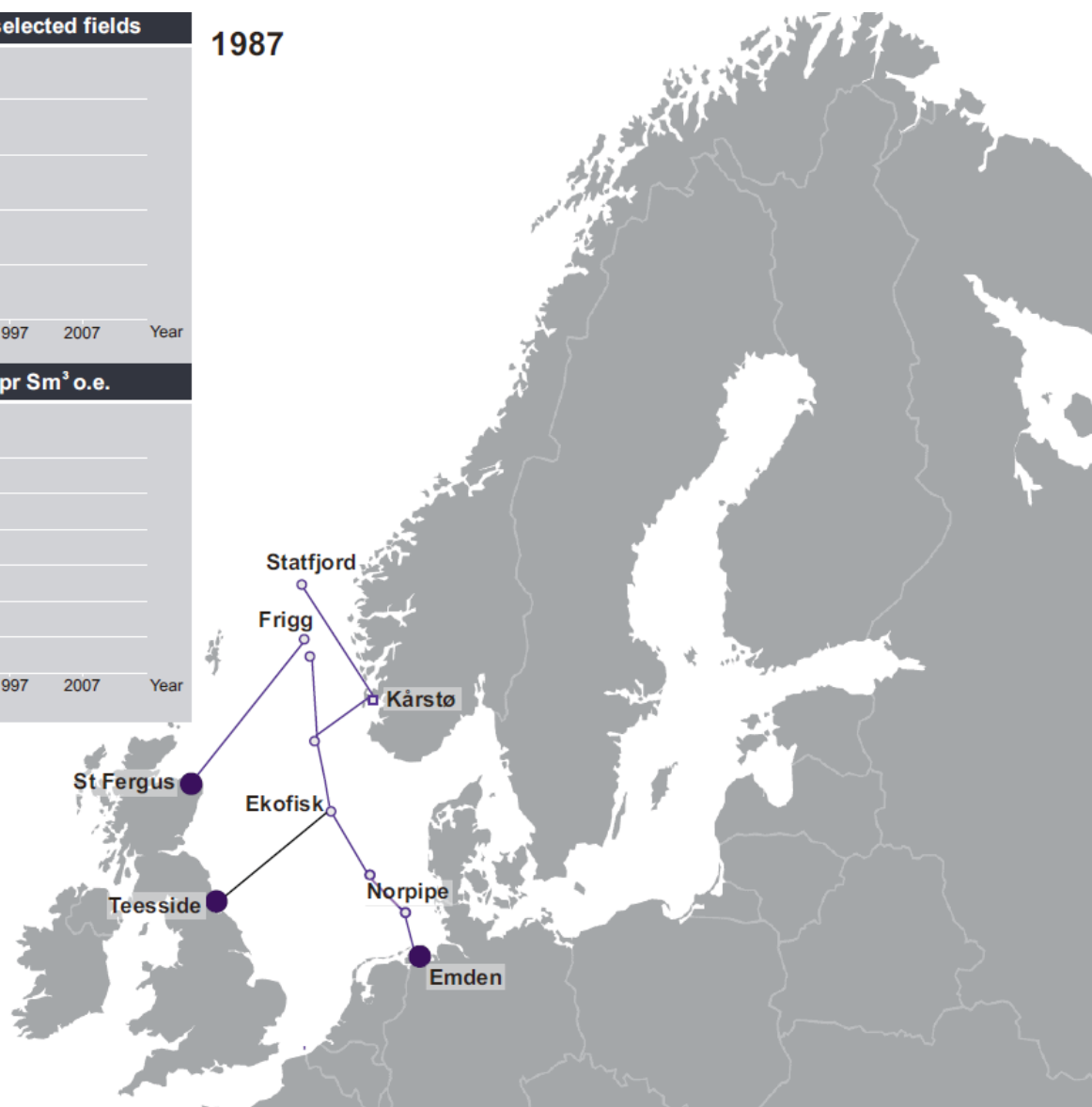


Recovery factors selected fields

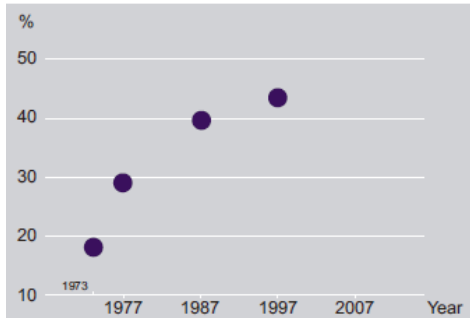


1987

Flared Sm^3 gas pr Sm^3 o.e.

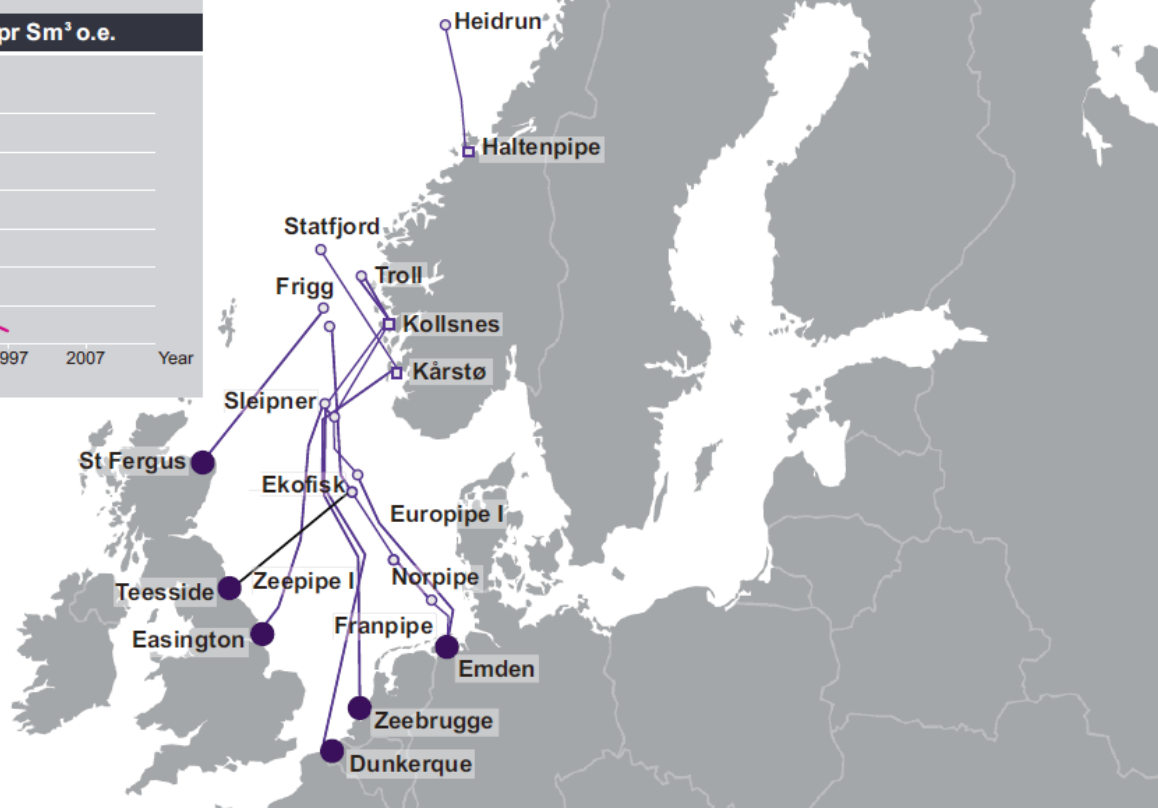


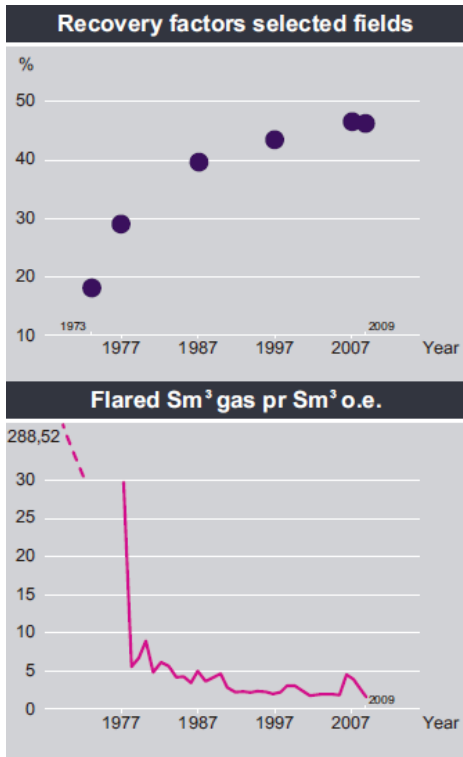
Recovery factors selected fields



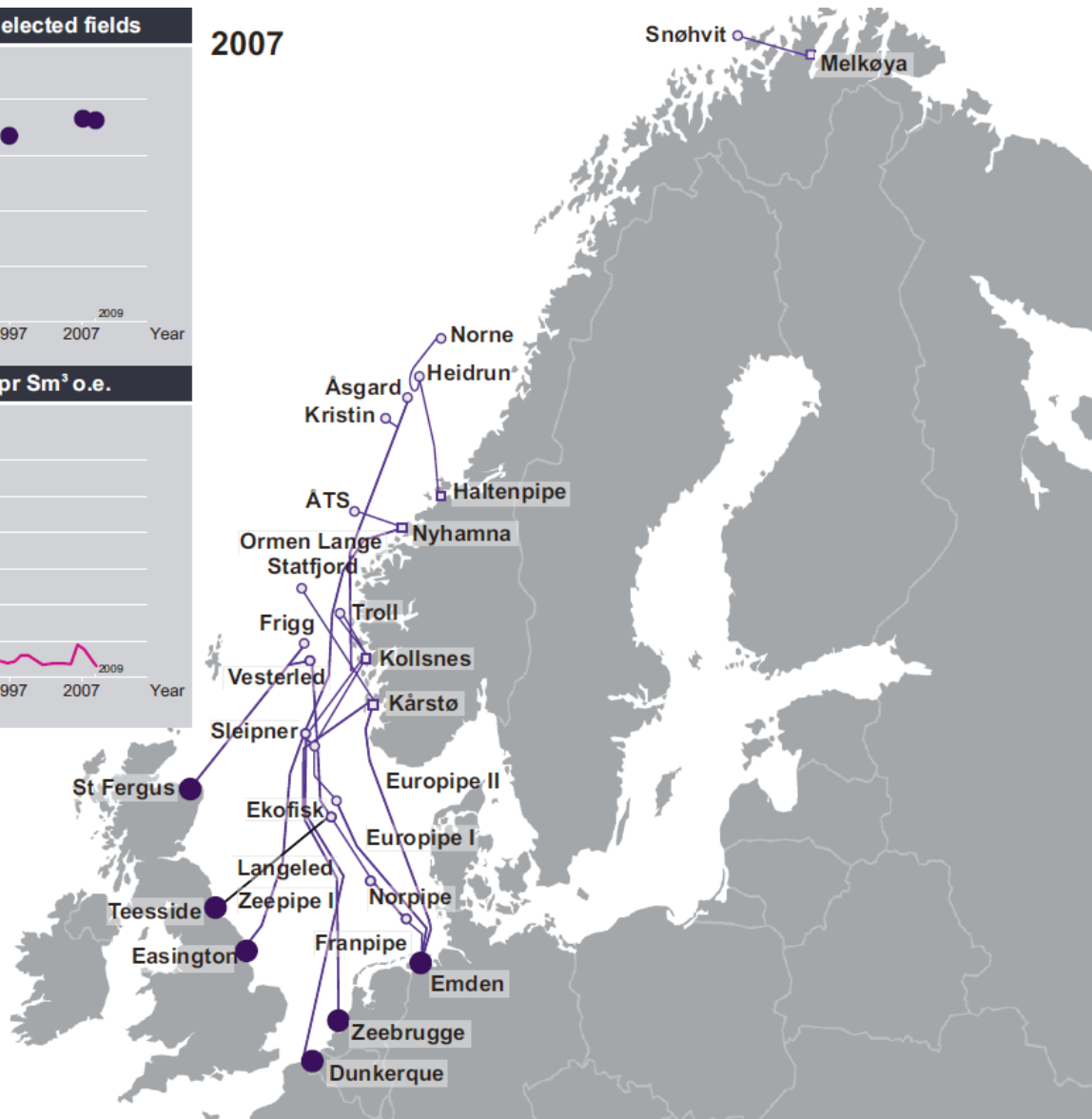
1997

Flared Sm^3 gas pr Sm^3 o.e.

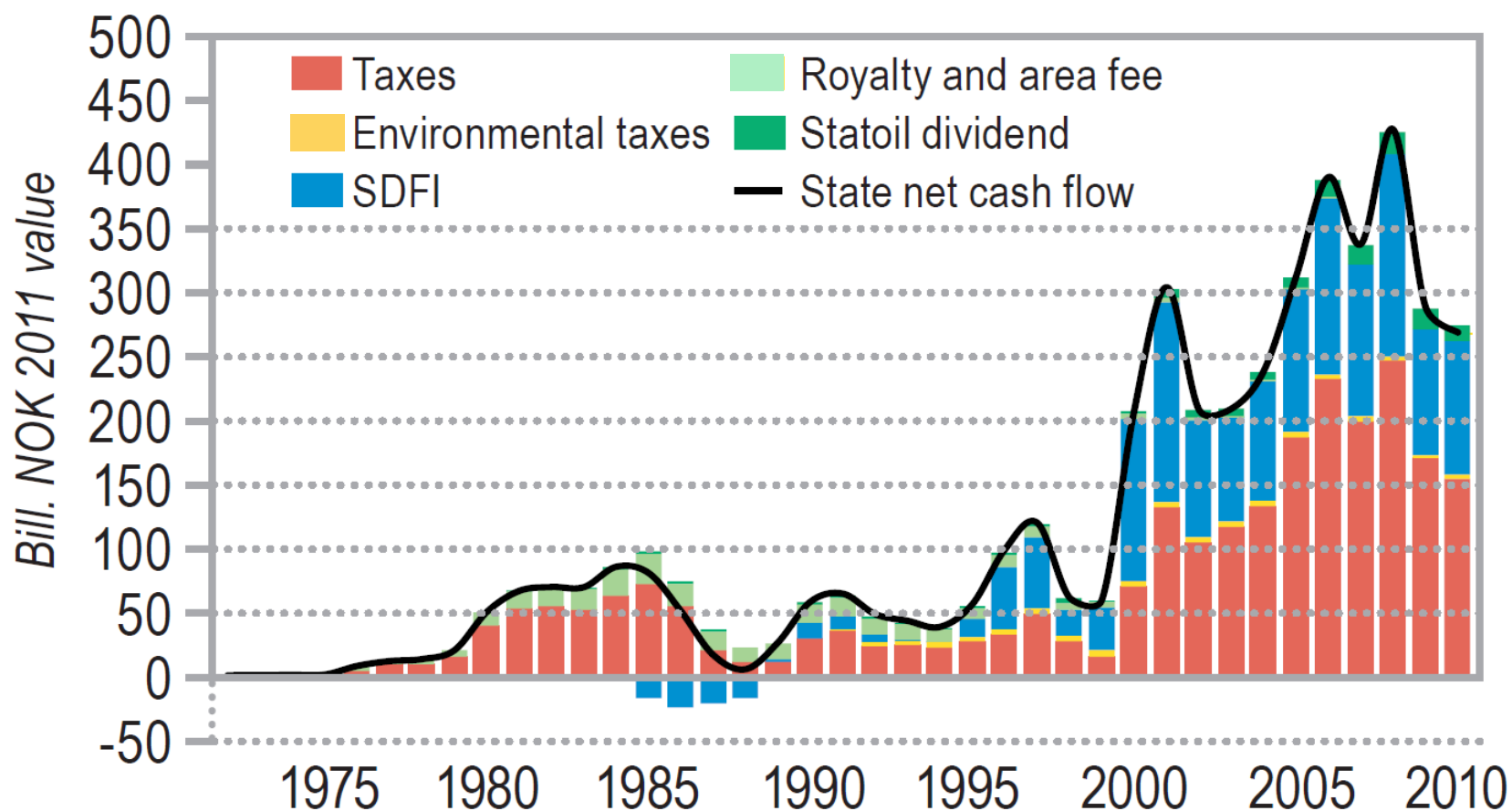




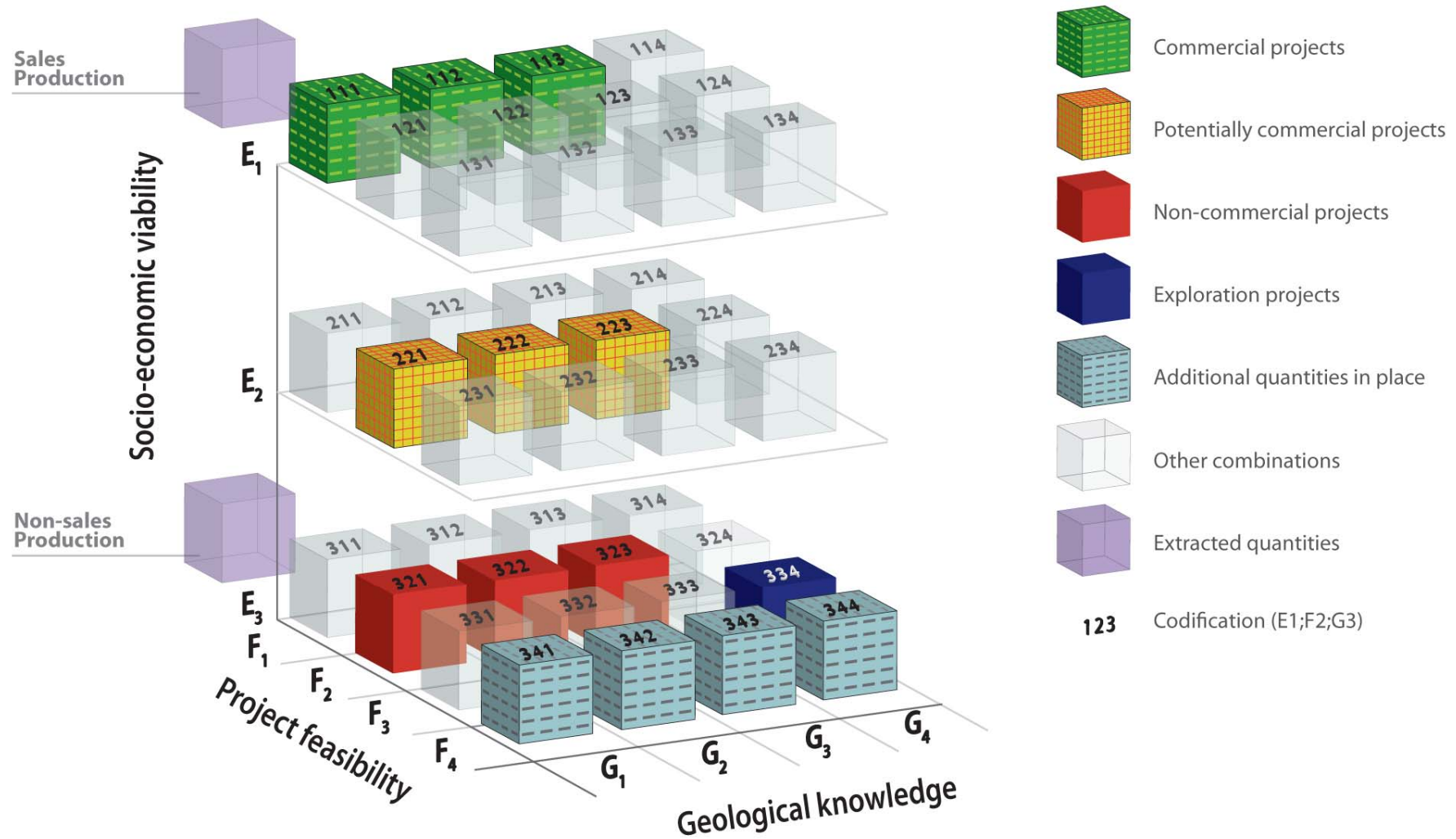
2007



The net government cash flow from petroleum activities shows improved fiscal efficiency

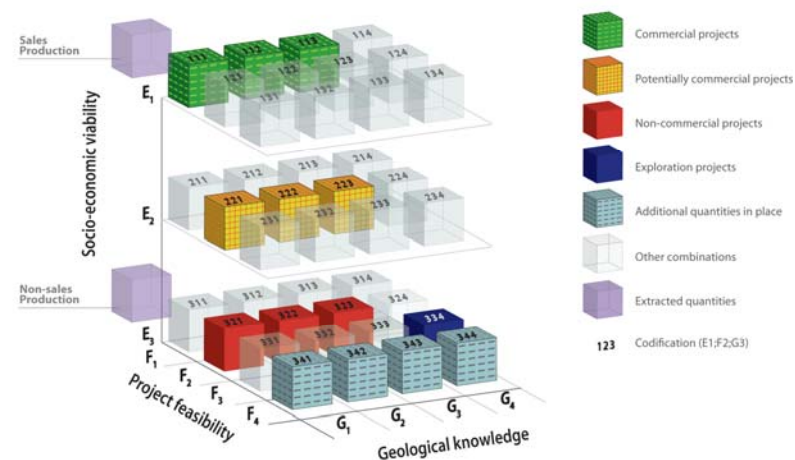


UNFC helps negotiating framework conditions in quantities gained or lost



Securing affordable and sustainable energy requires a common standard for developing:

- Long sighted policies for the global markets
- Government resources management for security and efficiency
- Industry processes to deploy technology, management and finance accordingly
- Appropriate cost effective allocation of financial resources



The UN has the required convening power

Thank you

**Purpose of Resource Classification,
Fundamental Principles and System
Applications**

Sigurd Heiberg

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Advisor Corporate Strategy

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