

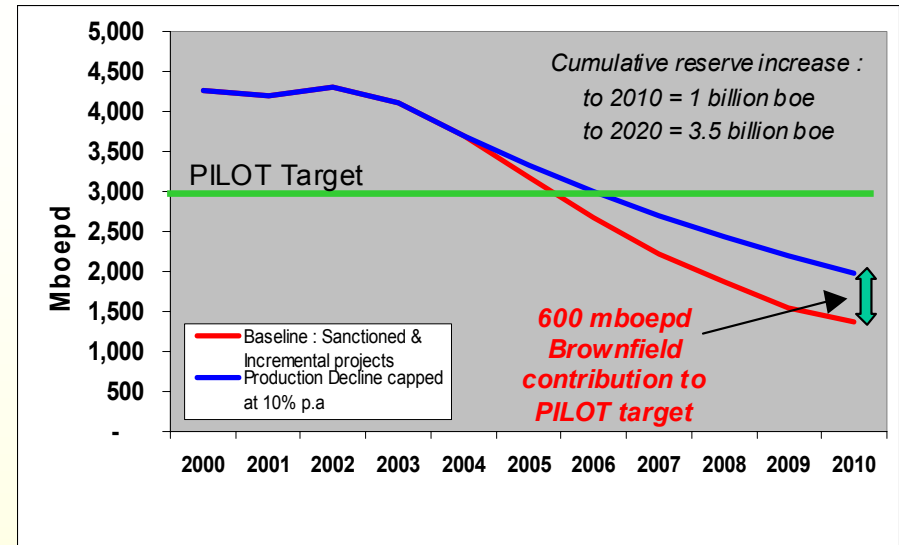
Brownfield Benchmark 2002

Industry Report
Supporting Charts

Introduction

Industry Context :

- PILOT goal of 3 million boepd production from the UKCS in 2010.
- The required Brownfield contribution to this target is an additional 600 mboed and 1 billion boe of reserves above the currently forecast baseline.



Industry Requirements :

- What is the potential value of the brownfield phase for the UK North Sea mature oil fields ?
- What is the present activity and investment level for the brownfield phase ?
- What changes in activity and investment are required to deliver this additional value ?

Field Requirements :

- How well does each field perform in creating and exploiting the brownfield portfolio.
- Where should investment focus – upon creation activities or on conversion spend.
- What are the best practices that facilitate brownfield exploitation.

Approach

Model :

- What is the potential size of the Brownfield reserves prize.

Brownfield Portfolio :

- How well are the Operators managing the reserves portfolio.

Development Options :

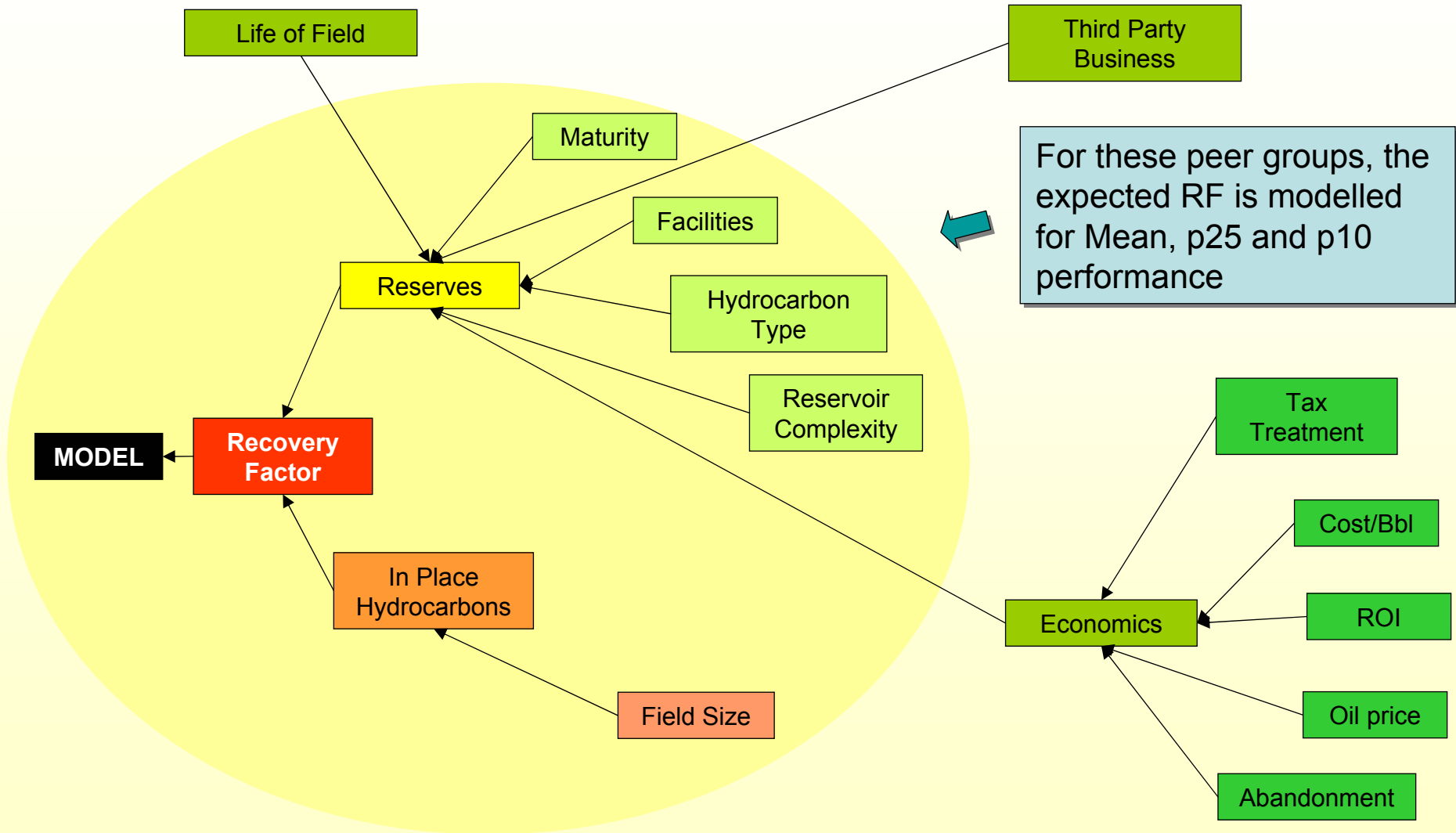
- Asset performance in development cost per barrel.

Comparison :

- What needs to change.

Relative Performance :

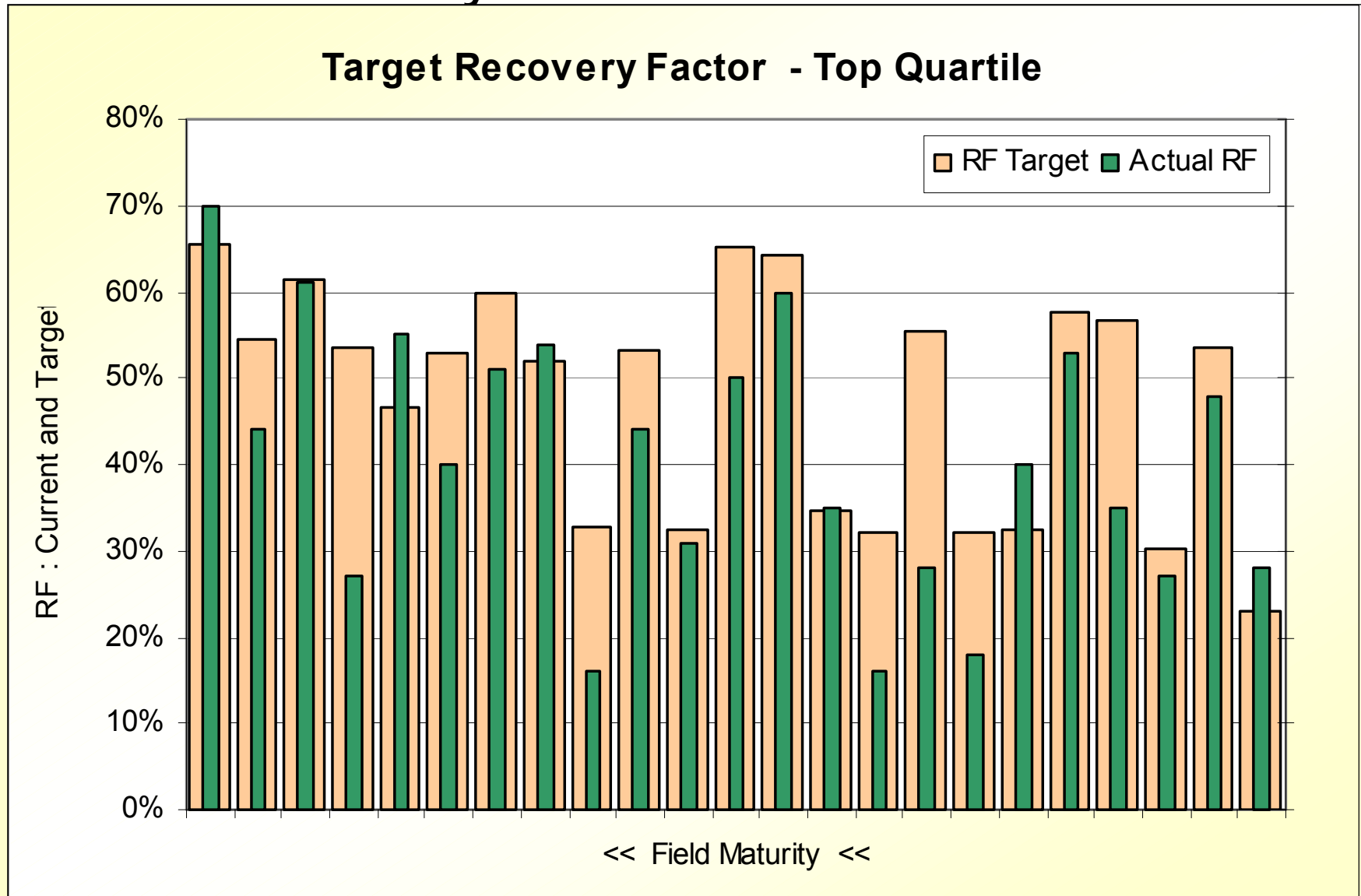
Recovery Factor Modelling



Brownfield Prize

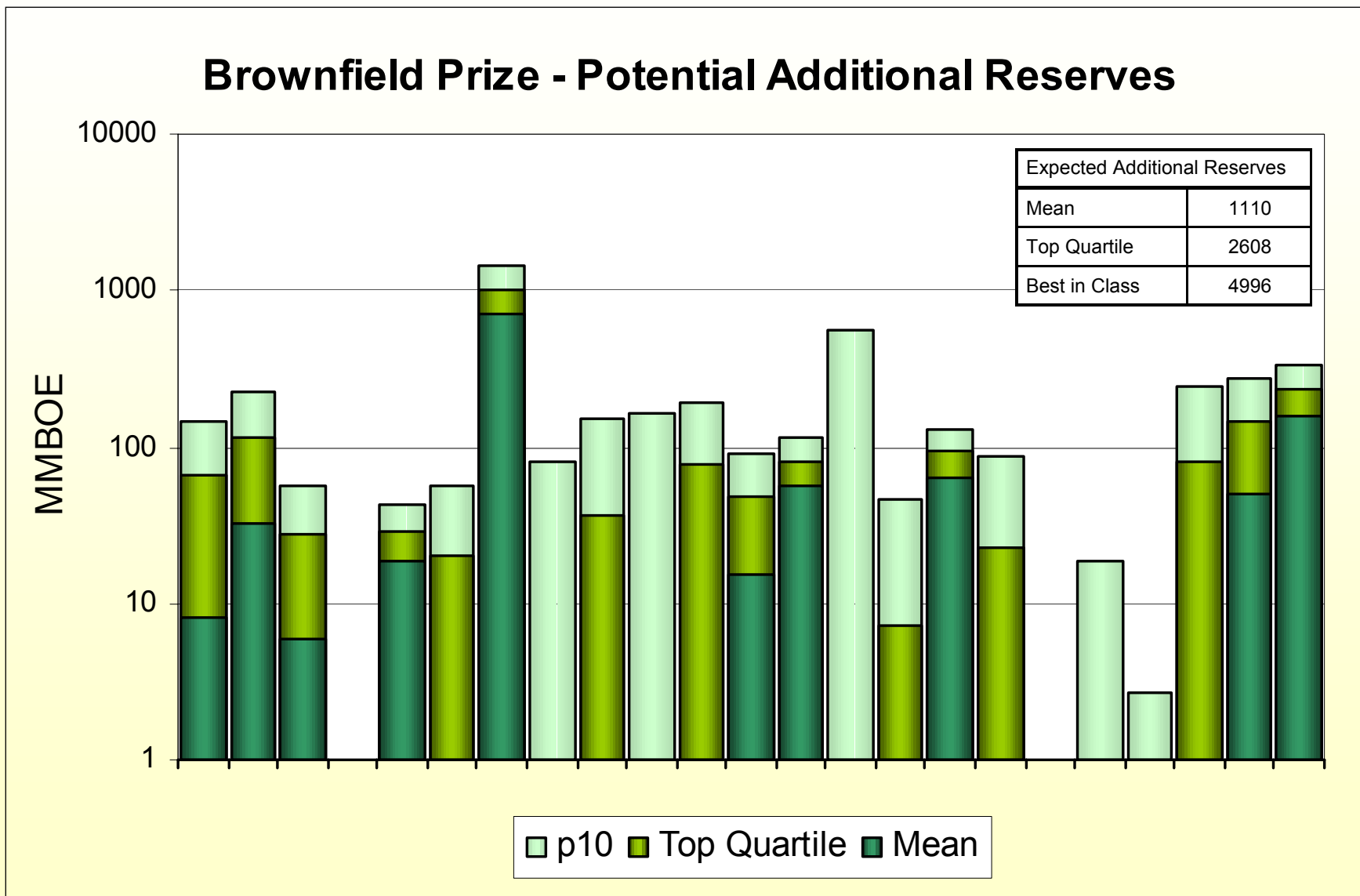
Modelled Recovery Factor

Brownfield Benchmark 2002



Brownfield Prize

Potential Additional Reserves



Reserve Management

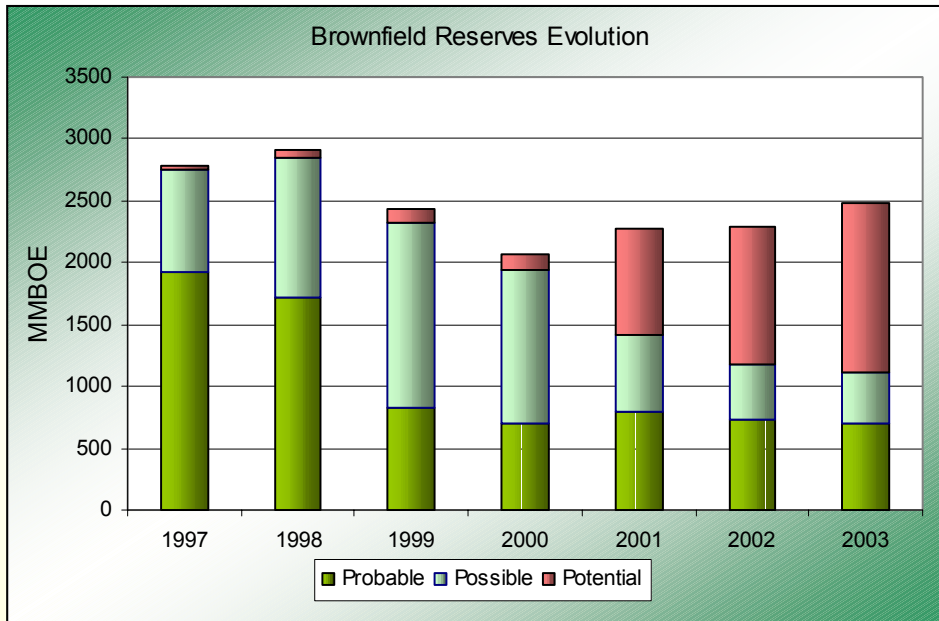
Industry Performance :

- What is the size of the Brownfield reserves portfolio and how is it changing:
 - Portfolio activity indicates understanding of the brownfield phase.

Industry Challenge :

- If a field performs as well as the top quartile of its peer group, what additional proven reserves can be expected ?
- Where does this come from ?
 - Portfolio conversion or Best Practice

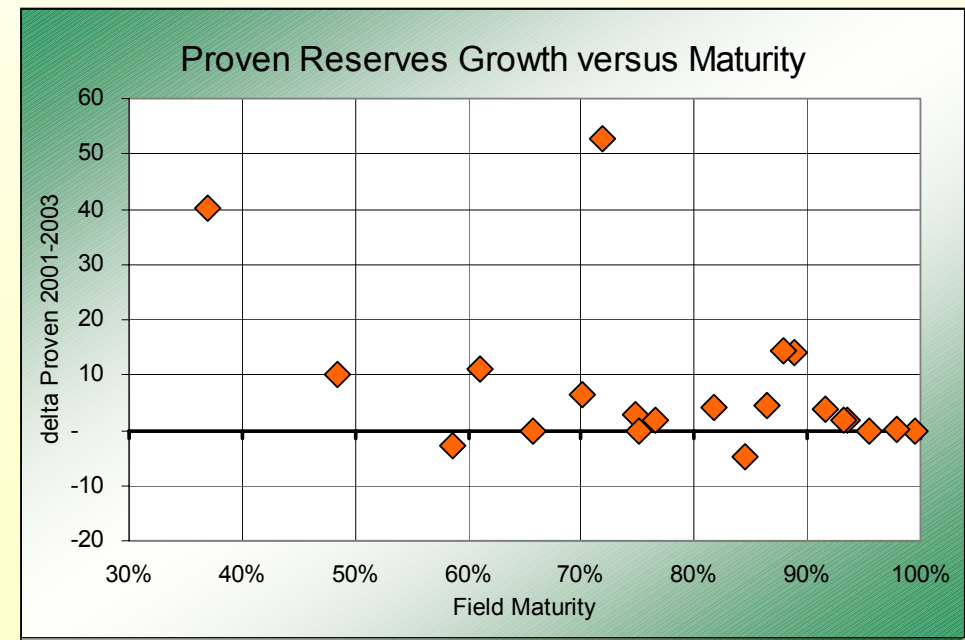
Brownfield Reserves Portfolio



- No significant change in total brownfield reserves.
- Work to understand barriers to development results in opportunities moving into higher risk categories.
- Good surveillance accelerates the conversion process - many options are moving directly from creation into the business plan.



- Majority of fields have less than 20 mmbo new proven reserves.
- Investment appears to target opportunities that deliver the already proven reserves.

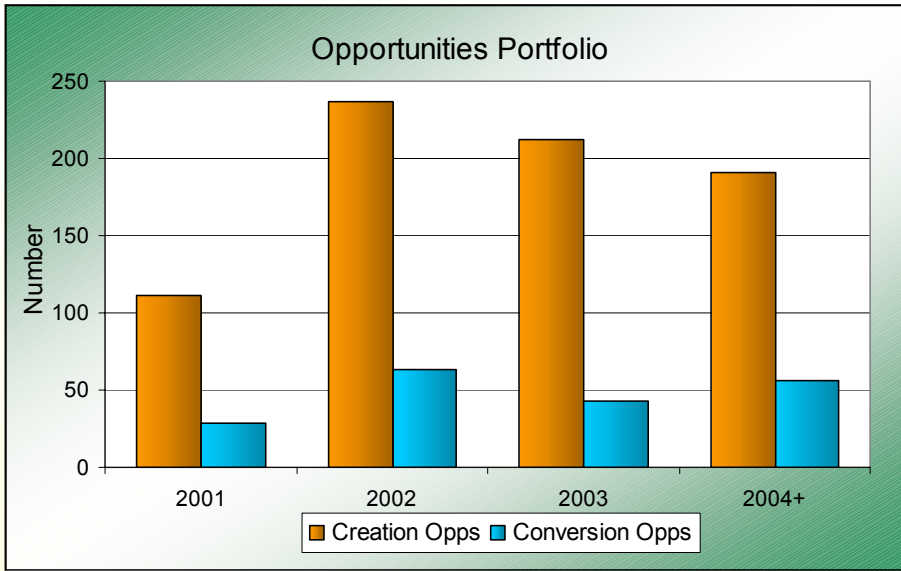


Messages from the Brownfield Portfolio

- For 23 fields, reserves in the brownfield portfolio total 2.4 billion boe – however, 1.8 billion boe (75%) of the reserves are assigned to the higher risk categories (possible and potential).
- There is capacity in the inventory to deliver the prize but there is a quality issue around the portfolio content.
- There is little drawdown from the brownfield portfolio and no significant growth in proven reserves – incremental investment is selecting opportunities that deliver the already proven reserves.
- The prize that can deliver the PILOT goal lies within the brownfield portfolio, and activity needs to focus upon moving brownfield reserves into the business plan for conversion.

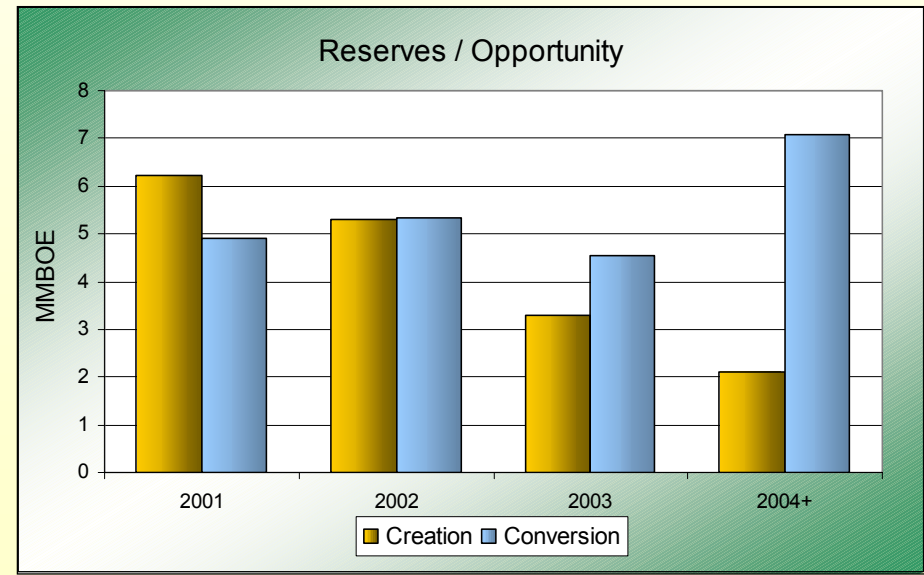
What is the activity level and can this deliver enough reserves in the time remaining?

Brownfield Activity



- Annually, industry is converting 50 opportunities from a hopper of 200.
- 670 mmboc was converted from 2001 to 2003 at an average of 223 mmboc per year.

- Converted opportunities are around 5 mmboc each.
- Creation opportunities are declining sharply in size from 6 mmboc to 2 mmboc.



Brownfield Activity

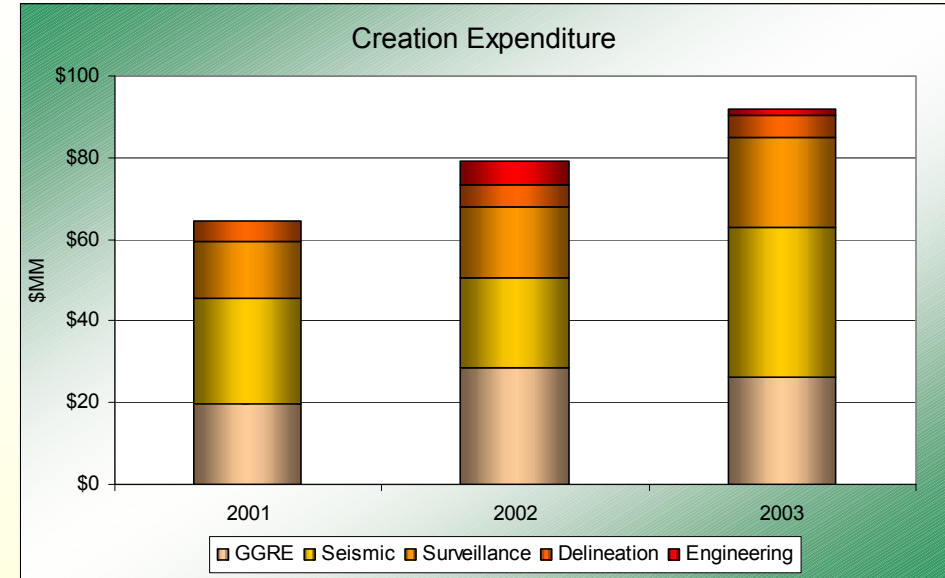
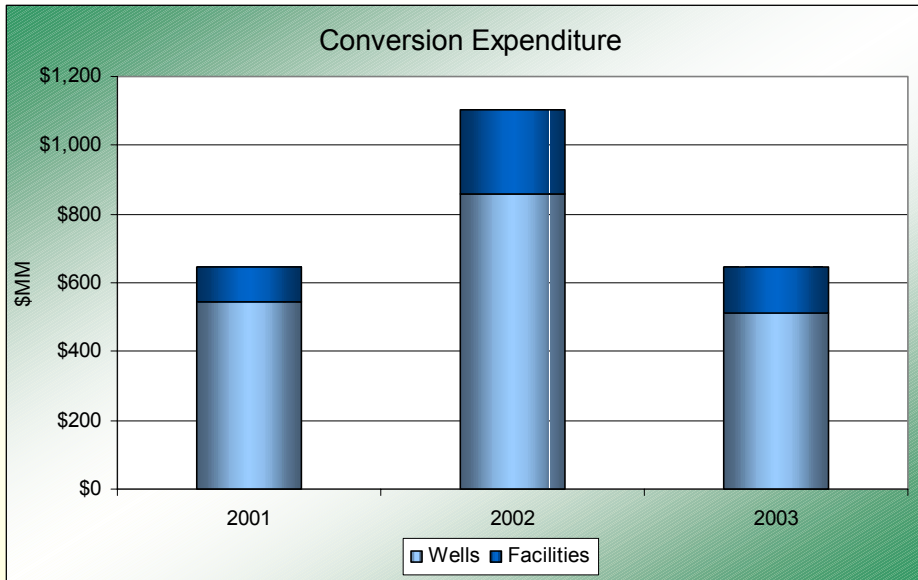
Industry Requirements :

- The current conversion rate of 223 million boe per year, for the 23 fields in this study, is capable of delivering 1.4 billion boe by 2010.
- But, based on this sample set, activity is not targeting brownfield reserves – an additional 170 million boe p.a. needs to be withdrawn from the UK brownfield portfolio to bridge the gap.
- Industry needs to overcome major technical and commercial challenges to deliver *new* reserves at the same time as we expect the average conversion opportunity size to decline.

What level of expenditure is required to deliver the goal?

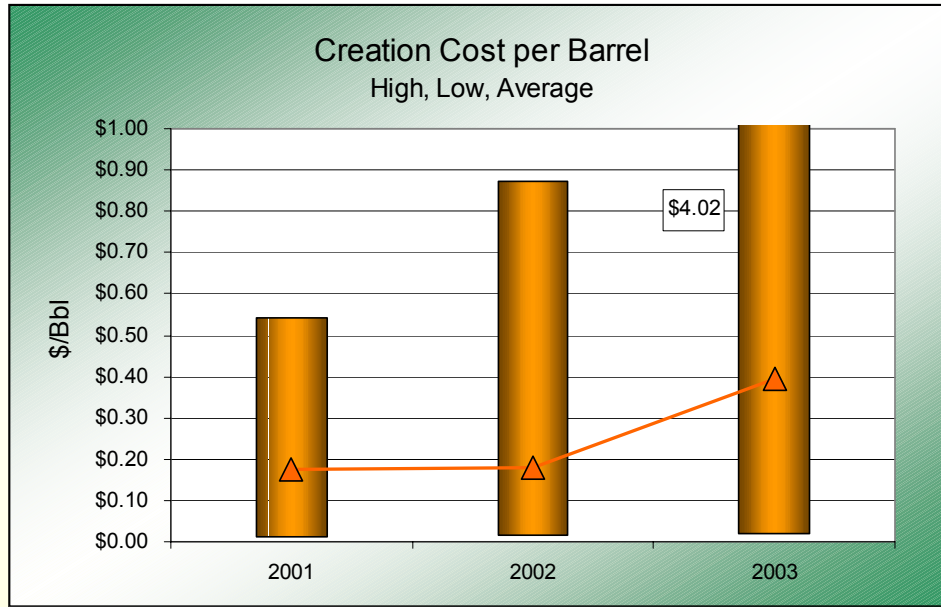
Brownfield Expenditure

Total by Year – NB 10x scale contrast between charts

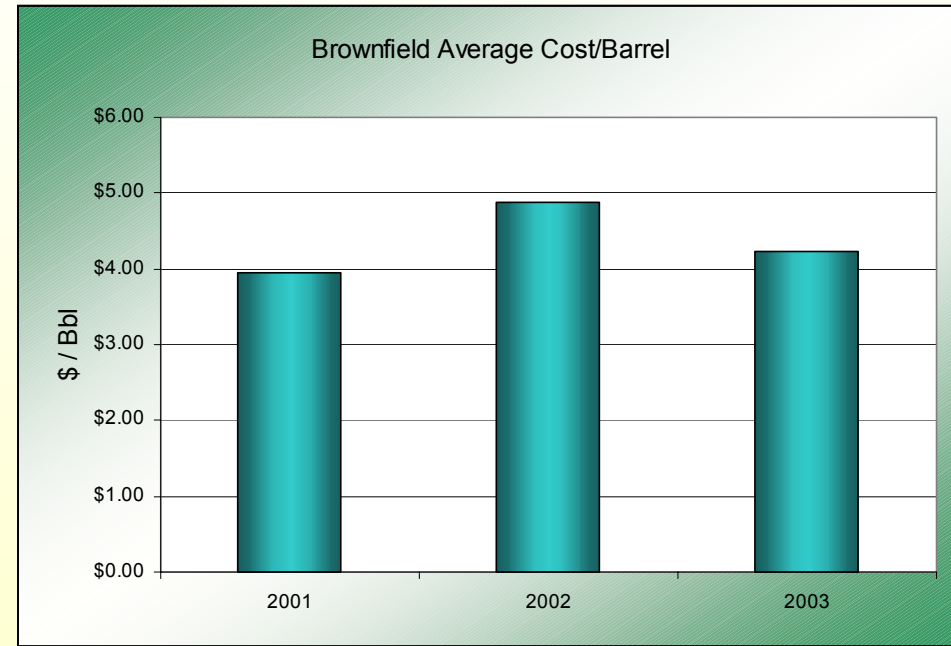


- Conversion spend peaks at \$1100 million in 2002.
- Creation spend is rising due to increasing amounts of Seismic & Surveillance activity and is expected to re-stock the portfolio.

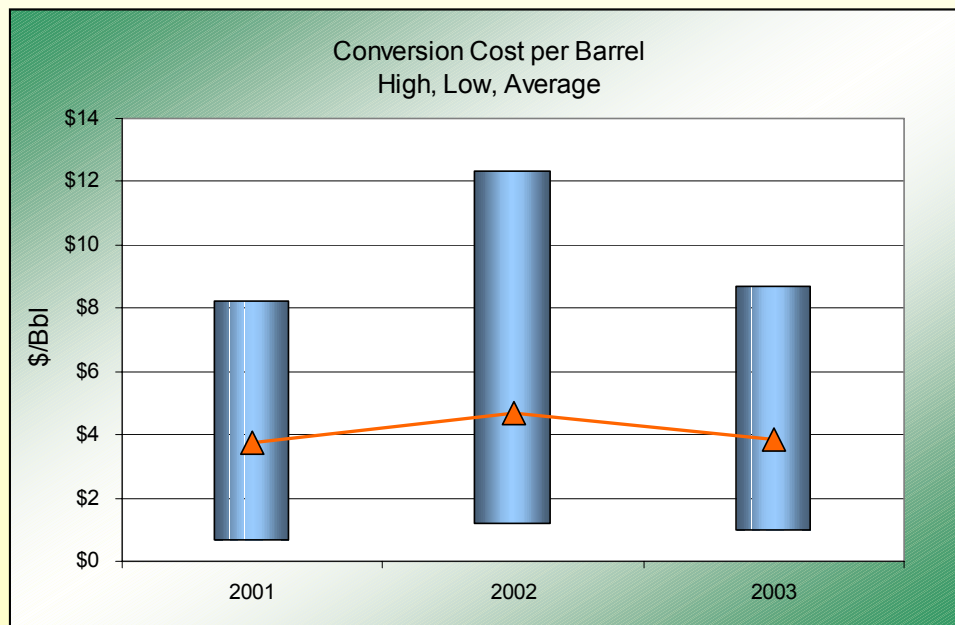
Brownfield Investment : Cost per Barrel



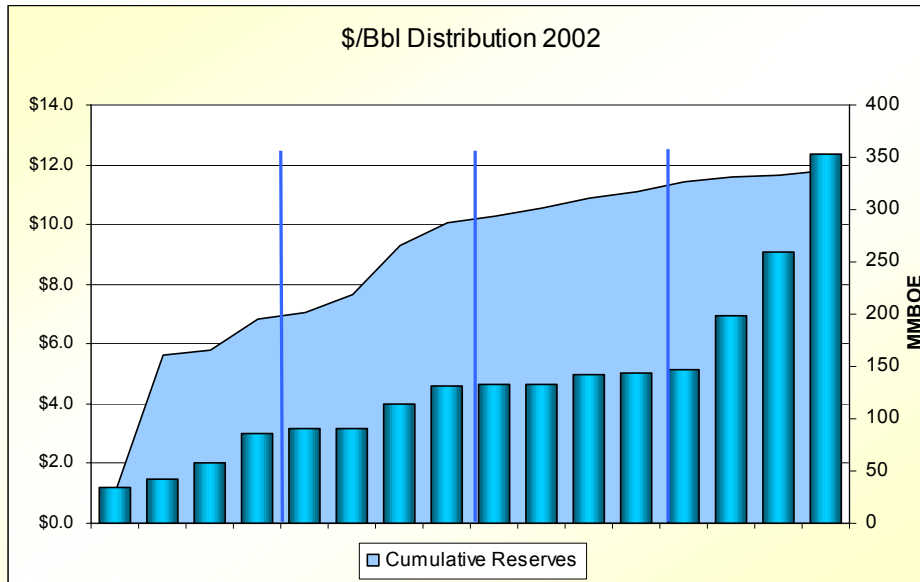
- Average Creation cost is 18 c/bbl rising to 40 c/bbl in 2003.
- Average Conversion expense is around \$4/bbl



- Average Development expense is between \$4/bbl and \$5/bbl



Incremental Projects: Reserves Distribution

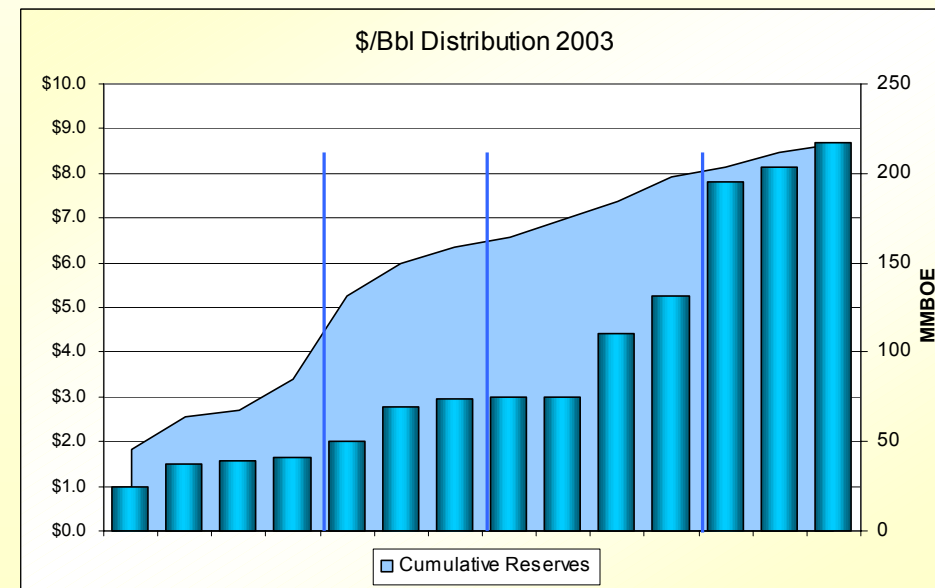


• For 2002, 60% of the incremental projects reserves lie in the four opportunities whose cost is \$3/bbl or less.

Quartile 1	199.8	\$3.00
Median	290.7	\$4.60
Quartile 3	319.4	\$5.10
Maximum	337.9	\$12.40

• In 2003, 80% of the incremental projects reserves lie in nine opportunities whose cost is \$3/bbl or less.
The budget is targeting smaller projects but with good cost/bbl

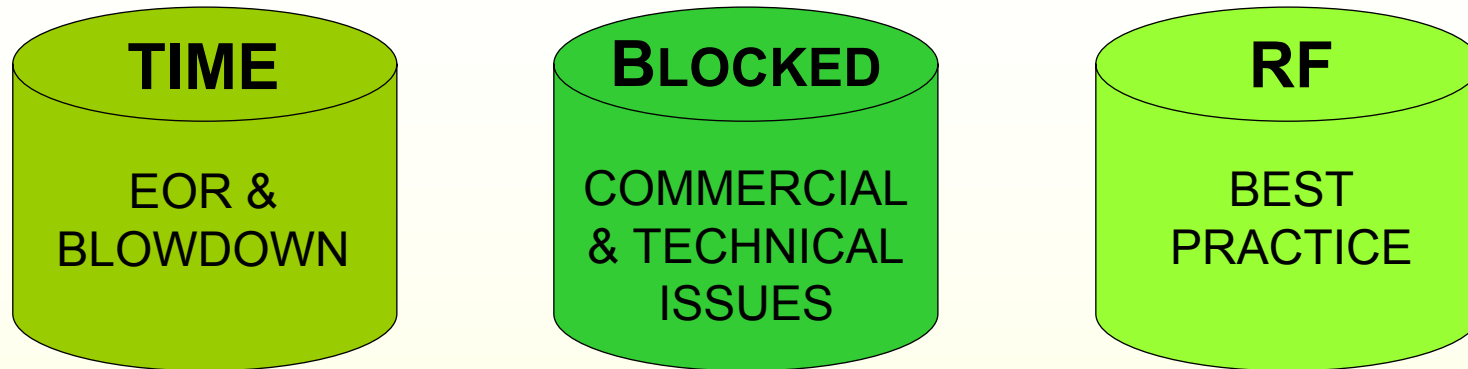
Quartile 1	96.7	\$1.75
Median	161.4	\$2.96
Quartile 3	194.9	\$5.10
Maximum	216.1	\$8.70



Brownfield Challenge

- At \$4/Bbl, the total spend to deliver the 1 billion boe target averages \$670 million per year across *all* brownfields. In 2003 these 23 fields are spending \$770 million for about 50% of the brownfield population so there is no apparent budget shortfall.
- But – the \$770mm is being spent to deliver the already booked proven reserves and consequently the annual target spend of \$670mm is in addition to incremental projects that deliver already proven reserves.
- The challenge is also to keep costs at \$4/bbl for the development of brownfield reserves as it gets more difficult technically and commercially.
- Additionally, there is a need to front end load the investment programme because loss of North Sea infrastructure will restrict future opportunities.
- Creation costs at 18c to 40c/bbl indicate that reducing risk in the brownfield portfolio to enable conversion of brownfield reserves is a low cost task.

Brownfield Portfolio Challenge



- How much of the current BF portfolio is in long term plans to be delivered when the time is right
- How much of the BF portfolio is blocked by Commercial and Technical issues
- How much is currently not recognised because better practices in reservoir management have not been applied.
- An examination the reserves distribution and modelled RF potential for all UKCS brownfields can give a definitive statement of the potential from brownfields and can point to the areas that require urgent investment.

Conclusions :

Brownfield reserves can close the gap to the PILOT target but....

- The window for exploiting the Brownfield Resource Base is short
- Focus should be given by Operators, Suppliers and Government to three key areas of access :
 - Investment to identify and exploit Brownfield developments with increased urgency so that the remaining potential is developed prior to abandonment of the infrastructure.
 - Innovation in order to reduce the costs and also to provide the next generation of technologies that will enable development of the increasingly difficult Brownfield Resource Base.
 - Incentivisation through provision of a fiscal regime which is stable and encourages investment in the continued development of our mature fields.