

Oil & Gas Reserves & E&P Performance Evaluation

--

Market & Debt Rating Perspectives

Ryder Scott Reserves Conference

"Evaluation Challenges In a Changing World"

Houston - May 4, 2007



Moody's Investors Service

**Andrew Oram
Vice President &
Senior Credit Officer**

Agenda

- I. Overview
- II. Moody's Framework for E&P Analysis & Debt Ratings
 - a. Prices, Rating Outlook, Sector Trends & Challenges
 - b. Methodology Model & Individual E&P Performance Drivers
- III. Reserve Booking Standards in a Market Context
 - a. Deterministic vs. Probabilistic
 - b. Expanded Disclosures & Other SEC Topics
- IV. Summary



I. Overview

- Moody's E&P methodology & thoughts on what market values
- Some balancing thoughts on the sector's drive to move SEC booking standards closer to the SPE's
 - SEC's goal: ensure comparable reporting; not necessarily optimal estimation worthy of E&P's use for internal reinvestment decisions
 - Is drive for booking flexibility matched quid pro quo by desire to provide compensating increased/more meaningful disclosures?
 - Already much interpretive latitude on how & when producers choose to book/revise reserves – would that bell curve widen?
 - How may Moody's methodology be affected/adapt to an SPE world?
- Would probabilistic bookings (presumably quicker or higher) boost valuations? Expectations & what drives equity multiples



II. Framework for E&P Analysis & Ratings



Summary Thoughts on E&P Success

When E&P's Consistently Meet/Exceed Expectations they Create

- Performance driven equity & net asset value creation
 - Propensity for internally funded production & reserve growth at competitive: all-in costs, capital intensity, cash-on-cash returns
 - Differential capital productivity & balanced allocation, differential access to properties, technical execution, separate E&P's over time
- Equity mkt. looks for comparative capital discipline & efficiency
 - Wants either strong growth at sound costs if spending all cash flow or modest growth from part of cash flow & returning cash to equity
 - Market fears capital dissipation & value destruction - heaviest drillers'/spenders' equities tend to under-perform
- Not singular unrepeatable achievements, production ramps; 1 new big play can overwhelm an E&P's decline curve



Some Further Thoughts on E&P Success

- Not setting / straining for unrealistic growth targets
 - Markets don't like volatile results; damage if aggressive bookings set expectations E&P can't meet or are reversed
- Consistent mitigation of risk of gambler's ruin
 - Scale, cost, risk, timing, decline curve of projects should be compatible with the capital base, productive scale, PDP R/P
- Avoid looking "tapped out": fund acquisitions with long-term view - issue equity when reasonably can to support growth
 - *The dinner mints don't always come around again*
- To assess propensity for success we interrelate: financial, volume, & property data; operating drivers; leading trends



Singularly, These Alone Would Not Signal Forward Success

- Reserve/PUD growth: not very predictive (ability to repeat, quality, risk mix, time-to-production, prod. rate, decline, cost, margin)
 - PUD growth w/o commensurate production growth is a red flag
- Record prices: driven by falling capital productivity & hard growth
- Record cash margin & EBITDAX: largely spoken for - value creating momentum is an after-capex function
 - Margin is simply how market allocates right amount of capital to sector for reinvestment so that supply balance market & meets demand → rising margin is a sign of rising capital intensity
 - EBITDAX is liquidation of prior capital investment in wasting asset produced into record prices → driver is how well it's reinvested
- Income & ROC: overstates ROC & depreciation understates RRC's



II a. Prices, Sector Trends, Rating Outlook

Our take on E&P commodity economics

- Prices still historically strong but no free lunch: prices, high pre-capex margins, surging capital intensity are interrelated
 - World price shift sustained by geology, surging capital intensity per unit of production, reduced Saudi spare capacity, demand
 - As before, high margin is how a tight market allocates sufficient capital so reinvestment balances market to meet demand
- Ever-harder to replace production with Boe's of comparable cost, productivity, life = capex intensity & growth restraint
 - Technology commercializes plays but increases decline
 - Intensive technology + smaller finds + steep decline = increasingly capital intensive production



Price Assumptions

- For Debt Ratings Purposes Only – Not a Forecast
 - Oil
 - \$45 – 50 WTI in 2007-2008
 - \$35 – 40 medium term
 - Still historically wide light/heavy differentials
 - Natural Gas
 - \$4 – 6 Henry Hub 2007-2008 (8x to 9x oil/gas ratio)
 - Regional differentials (Rockies especially)
- Continued normal high volatility
- Cash margin after sustaining capex is more important to us
- Expect actual 2007 to range \$55 to \$65 oil; \$5 to \$7 gas



Oil Price Factors

- Demand growth drivers: China, India, USA; weaker US\$
- OPEC discipline vs. Saudi effort to restore spare capacity
 - \$55 to \$65 seems to be a comfort zone: supports members' revenue needs & accommodates global growth
 - Rising non-OPEC supply, but world demand growth eases OPEC's supply management task
 - Weaker fundamentals but political risk price impact of war, volatile Nigeria, Venezuela, Iraq, Iran supply; Cantarell decline
- Light/heavy differentials move with OPEC cuts & increases
- Hedge funds & other financial players deepen forward curve



Natural Gas Price Factors

- Historically wide oil price differentials restrain nat. gas price
- Structural support for 2 to 4 years but naturally volatile
 - Declining North American well productivity
 - Balanced demand growth vs. demand destruction
 - Impact of high gas rig count muted by surging F&D cost & weak production response
 - Canada conventional decline; slow unconventional build
 - U.S. unconventional advancing but: lead times; complexity; capital, price & frac sensitivity; sharp 1st year decline curves
 - Storage; weather wildcard; seasonality
- Long-term new supply: LNG not major factor until end of decade; Alaska/Mackenzie post-2011; “gas OPEC”?



E&P Rating Outlook Stable – Positives

- High prices drive solid liquidity & pre-capex cash flow
- Residual benefit of 2003-05 capital discipline & balance sheet repair: cash flow & new equity exceeded capex
- Remarkably easy debt markets + active asset market = deals
- Prospect inventory benefits from high prices & technology
 - Price step change + drilling/completion technology & practices yield more from existing mature properties & commercializes:
 - Previously uneconomic, low quality rock: stratigraphic complexity, discontinuous, thin pay tight gas sands & shale source rock
 - Smaller conventional reservoirs; deep complex conventional plays



More Positives

- Larger issuer scale = internal flexibility & external deeper debt & equity access
- Generally stronger leverage relative to asset value
- Some still small enough for attractive organic growth
- Better practices & shorter cycle times aid big programs
- Deeper longer-term hedge markets cover near-term capital programs



E&P Rating Outlook Restraints

Rising Capital Intensity w/o Growth, Cost Surge, Windfall Cash Taken

- Some still making forward momentum, some stable, some not
 - Through 2005, E&P's strengthened profile with windfall cash
 - By 2006-07, more E&P's lacked properties/inventory for sound reinvestment unit economics; face growth, cost, equity issues
 - 2006-07: stock buybacks & capex exceed cash flow & new equity issued; some are well into secured borrowing bases
 - Problematic equity stories boost risk to debt of stock buybacks, especially given weak bond indentures & easy new debt terms
- Most ratings safe this year at expected prices, but 2007 trends (production, costs, & YE FAS 69) may pressure more ratings



Credit Cycle Has Likely Peaked

- Bubble? Issuer discipline critical now: bond & “Term Loan B” markets accepting uncompensated business & financial risk
- 2005-07 price plateau yet soaring 2006-07 full-cycle costs
 - 2006 cash-on-cash (recycle) returns plunged; flat-to-lower '07
 - Historic acquisition costs per flowing barrel & drillbit F&D
- E&P equities lagged S&P 500 in '06; same so far in '07
 - Total sector hasn't delivered growth solely with reinvested CF: some large E&P's can; others small enough to drive real growth
 - Great shareholder pressure to not spend into high costs = share buybacks, special dividends, MLP's, leveraged consolidations
- Increasingly tough fiscal terms & rising political risk



Maturity, Tough Growth, Costs

North America ever-higher on world cost curve

- Organic production growth is particularly hard; big is hard to grow with basin maturity & surging cost of incremental barrel
- Cash-on-cash return compression in spite of historically high prices: used to collapse only during down price-cycles
 - Fierce competition for properties, rigs, OFS, & smaller reserve adds per well
 - Faster 1st year decline & rising capital/operating intensity per well
 - Exacerbated by record rig & services inflation
- How much of the F&D surge & production response is due to rate acceleration drilling into historic prices? Unsustainable
 - How price elastic will LOE/boe & RRC's be?



Investor Uncertainty & Event Risk

- Direction of benchmark prices; they also can be misleading
- Issuer down-cycle stress often stems from up-cycle mistakes
- Concentrated equity market power/activism: whole debt market is vulnerable to shareholder “activism”
 - Pressure for financial engineering & value transfer from debt to equity
 - Leveraged stock buybacks
 - MLP's (a rationale to stop over-investing in mature properties)
- How many can grow both scale & shareholder value w/o resorting to leveraged value transfer from debt to equity?



Investor Uncertainty & Event Risk (cont.)

Capital Discipline vs. Growth Imperative & Strategic Needs

- Portfolio transformation risk; de-capitalizations; new basins; offshore moving onshore; conventional to unconventional
- Historic high cost leveraged acquisitions of properties with low production & mostly PUD, probable, possibles
 - Market seeks transparency on deal productivity/economics
 - Paid the strip for new-play 3P's; historic prices paid per flowing barrel; low discount rates used; big execution risk
 - Acquisition slowdown after 2004-06 surge as some E&P's shift focus to harvesting bought PUD's, probables, possibles
- Choose total asset scale or basin concentration (or buy both?): diversification versus economies of scale



Sector Challenges

Doing Business in Mature, Capital Intensive, Commodity Sector

- Strain of striving for growth amidst N. American decline
- Production growth targets molt to volume per share - stock buybacks reduce the denominator
- Production commensurate with capex & reserve growth: 100% reserve replacement rarely 100% production replacement
- Costly & limited access to prospective acreage; fierce competition for properties & inventory
- Driving for scale for flexibility of larger risk bearing base & larger share float boosts institutional investor demand



Challenges Amidst Stiff Sector Competition

- Maintaining capital discipline in face of intense competition amongst world's producers for quality properties
- Risk of up-cycle complacency amidst the battle against the decline curve; for some, acquisitions fill the breach
- Heavy subsequent drilling & development capex & field-level execution risk of PUD/Probable/Possible laden deals
- Are the majors returning to North Am. for certain plays?
- National oil companies becoming more active
- Evermore challenging, and sometimes tenuous, foreign terms -> but promising geology



Growth Strategies & Risk/Funding Implications

- Ongoing strategic consolidation – but buyer pays dearly
- Unconventional resource gold rush & uncertain development: shifting business formation risk & capital-at-risk mix:
 - From “big well” drillbit & reservoir risk to “big resource” field-level risk with “big cheap-well programs”, “big price sensitivity”
 - Play-level commercial risk: discontinuous, stratigraphic complexity, reservoir heterogeneity/productivity risks, ramp risk
 - Up-front costs/learning curve, logging challenges, frac sensitivity, infrastructure, surface access, risk of production ramp
 - Is expectation too high for the growth engine power of evolving plays? Also vulnerable to drilling/completion quality & shortages



Sources of Potential Growth & Implications

- Deep H2O & deep horizon GOM: time, big well risk/capex, risk of domination by too few big plays; capital dissipation risk
- Foreign participations/frontier exploration; natural gas for LNG: risk of capital dissipation, lost focus, domination by play
- Unconventional plays; Rockies: remarkable prices paid for potential, trend-wide, drilling locations
 - TGS/tight shales: all are different, wide quality range, benchmark & regional price risk, big non-stop capex to offset steep 1st year decline
 - CBM: all are different, dewatering time, Canada vs. U.S. coals
- Oil sands: up-front \$, lead time, cost-overruns (especially upgraders), SAGD SOR, production costs, margin & return risk
 - Price pressure until pipes take dilbit & synbit to Gulf Coast & West Coast plus bitumen & syncrude has an assay disadvantage



Other Issues

- Ratings should reflect the issuer's growth imperative, strategic needs & intentions, equity funding tendencies
- *Ancient Saga* of the battle for economic rent between producers & drillers/oilfield services
- Investor patience: their investment horizon is far shorter than producers'
- How often is infill drilling/down-spacing adding reserves or bad news due to incorrect drainage radius assumptions?
- Rate acceleration drilling: credit negative if CF not used for ample reinvestment to grow reserves relative to debt
- The practice of declaring completion success versus true success rates on total well costs recovery & target return



I Ib. Moody's Global Oil and Gas Methodologies

Ratings Incorporate Sector Risks & Take Forward View

- Objective: provide greater transparency to users of our ratings
- Focus on key qualitative and quantitative rating factors
- We exercise judgment on all factor inputs (forward looking)
- Map each factor to rating outcomes
- Factors weighted by proportional contribution to model outcome
- We aim to understand and explain variances and outliers
- Caveat: not an exhaustive treatment of all factors we analyze
 - Process involves a degree of judgment that can drive “outlier” outcomes; event risk, political/institutional, governance risks
- Sensitized model inputs yield a “mapped” Indicated Rating



Overview of the E&P Methodology

- Finite, depleting, resources needing constant reinvestment
- All metrics assessed in context of the probabilities & statistics of E&P; geopolitical risk; price volatility; basis risk; event risk
- Partially “immunizes” against reserves risk/subjectivity, quality, allocated costs, & GAAP “black box”
 - Cushion for band of error on reserves, conversion risk, production rate, prices, costs
- 70% driven by scale & unit economics; 30% by leverage on: PD reserves, total proven, prod., CF after sustaining capex
- Deconstruct portfolio risks, what’s driving current & expected operating performance; leverage; qualitative factors



Moody's Independent E&P Rating Methodology

Start Historical & Then Focus on Current & Expected Trends

Moody's Fundamental Analysis Focuses on these Four Key Factors

1. **Resource Platform:**
Reserves & Production
Characteristics (36%)



- * Proven Developed (PD) Reserves
- * Production Scale
- * Total Proven Reserves
- * Reserve & Production Diversification
- Consider overly Short/Long PDP & PD R/P's*

2. **Credit Accretion Catalysts:**
Re-investment Risk (16%)



- * 3-year all-sources F&D
- * 3-year drillbit F&D costs
- Sensitize, reserve add Subcomponents/mix*

3. **Credit Accretion Catalysts:**
Operating & Capital
Efficiency (18%)



- * Leveraged Full-Cycle Ratio (LFCR)
- * Leveraged Full-cycle Costs
- Unleveraged Full-Cycle Ratio*

4. Leverage on Reserves &
Cash flow (30%)



- * $\text{Adjusted Debt} \div \text{PD boe Reserves}$
- * $(\text{Adj. Debt} + \text{Future FAS 69 Capital Outlays}) \div \text{Total Proven Reserves}$
- * $(\text{Retained Cash Flow minus Sustaining Capex}) \div \text{Adjusted Debt}$
- Adj. Debt \div Boe Daily Production*



Quantitatively & qualitatively asset quality & durability, reinvestment risk, & leverage/financial risk

Moody's Investors Service

Methodology Process

- Metric inputs involve degree of analytical judgment; historical as starting point
- For each company, each of the 11 E&P factor metrics is “mapped” to a notional rating (Aaa, Aa, A, ... Caa)
- Factors weighted to reflect importance
- No single rated metric (e.g. Baa Debt/PD Boe) is likely to drive the Indicated Rating outcome
- Model yields a “mapped” rating – the Indicated Rating
- Compare Indicated Rating to actual rating
- Goal is for Indicated Rating to at, or within 2 rating levels, of the actual rating



Ad3
Ad4
Ad5
Ad6
Ad7
Ad8
Ad9
Ad10
Ad11
Ad12
Ad13
Ad14
Ad15
Ad16
Ad17
Ad18
Ad19
Ad20
Ad21
Ad22
Ad23
Ad24
Ad25
Ad26
Ad27
Ad28
Ad29
Ad30
Ad31
Ad32
Ad33
Ad34
Ad35
Ad36
Ad37
Ad38
Ad39
Ad40
Ad41
Ad42
Ad43
Ad44
Ad45
Ad46
Ad47
Ad48
Ad49
Ad50
Ad51
Ad52
Ad53
Ad54
Ad55
Ad56
Ad57
Ad58
Ad59
Ad60
Ad61
Ad62
Ad63
Ad64
Ad65
Ad66
Ad67
Ad68
Ad69
Ad70
Ad71
Ad72
Ad73
Ad74
Ad75
Ad76
Ad77
Ad78
Ad79
Ad80
Ad81
Ad82
Ad83
Ad84
Ad85
Ad86
Ad87
Ad88
Ad89
Ad90
Ad91
Ad92
Ad93
Ad94
Ad95
Ad96
Ad97
Ad98
Ad99
Ad100

Mapping Key Rating Factors to a Notional Rating

| Independent Exploration and Production Industry - Mapping Grid | | | | | | | | |
|--|----------|----------------|---------------|-------------|-------------|-------------|--------|----------------------|
| Rating Factors and Sub-factors | Aaa | Aa | A | Baa | Ba | B | Caa | Sub-factor Weighting |
| Factor 1: Reserves & Production Characteristics (36% weighting) | | | | | | | | |
| Production (Million boe/yr) | > 1,000 | 400 - 1,000 | 200 - 400 | 50 - 200 | 20 - 50 | 10 - 20 | < 10 | 10.0% |
| Proved Developed Reserves (Million boe) | > 8,000 | 4,000 - 8,000 | 1,500 - 4,000 | 300 - 1,500 | 100 - 300 | 20 - 100 | < 20 | 10.0% |
| Total Proved Reserves (Million boe) | > 10,000 | 5,000 - 10,000 | 2,000 - 5,000 | 500 - 2,000 | 100 - 500 | 30 - 100 | < 30 | 8.0% |
| Diversification | High | | | Medium | | Low | | 8.0% |
| Factor 2: Re-investment Risk (16% weighting) | | | | | | | | |
| 3-year all-sources F&D (\$/boe) | < \$5 | \$5 - \$6 | \$6 - \$8 | \$8 - \$10 | \$10 - \$12 | \$12 - \$15 | > \$15 | 8.0% |
| 3-year drillbit F&D costs including revisions (\$/boe) | < \$4 | \$4 - \$5 | \$5 - \$7 | \$7 - \$9 | \$9 - \$11 | \$11 - \$14 | > \$14 | 8.0% |
| Factor 3: Operating & Capital Efficiency (18% weighting) | | | | | | | | |
| Full-cycle cost (\$/boe) | < \$10 | \$10 - \$12 | \$12 - \$16 | \$16 - \$20 | \$20 - \$25 | \$25 - \$30 | > \$30 | 9.0% |
| Leveraged full-cycle ratio | > 6x | 4x - 6x | 3x - 4x | 2x - 3x | 1.5x - 2.5x | 1x - 2x | < 1x | 9.0% |
| Factor 4: Leverage & Cash Flow Coverage (30% weighting) | | | | | | | | |
| Debt / PD boe reserves | < \$1.0 | \$1 - \$2 | \$2 - \$3 | \$3 - \$5 | \$5 - \$6 | \$6 - \$8 | > \$8 | 10.0% |
| (Debt + Future Development Capex) / Total Reserves | < \$1.0 | \$1 - \$2.50 | \$2.50 - \$4 | \$4 - \$6 | \$6 - \$8 | \$8 - \$10 | > \$10 | 10.0% |
| (Retained Cash Flow - Sustaining Capex) / Debt | >100% | 80% - 100% | 50% - 80% | 30% - 50% | 10% - 30% | 0% - 10% | < 0% | 10.0% |



Scale, Diversification, & PD R/P

Durability, Repeatability, Risk Concentrations, Funding, Outlook

- PDP's (basically deterministic) are the keel of the ship
 - Does cash-producing base amply support cost, scale & risk mix of cash-consuming activity (mitigating risk of gambler's ruin)
 - Quality of production, PD reserve, total proven portfolios
 - Scale &, diversification, number of true core operating areas; risk mix; ditto for drilling program; big lead-time projects
 - Outlook: production, PUD/Probable conversion, reserve replacement capital efficiency
- PD R/P; PDP R/P; large short R/P concentrations; prod. ramps
- Management track record: growth strategy & pattern of compatible funding; methods & odds of repeatability



Re-investment Risk

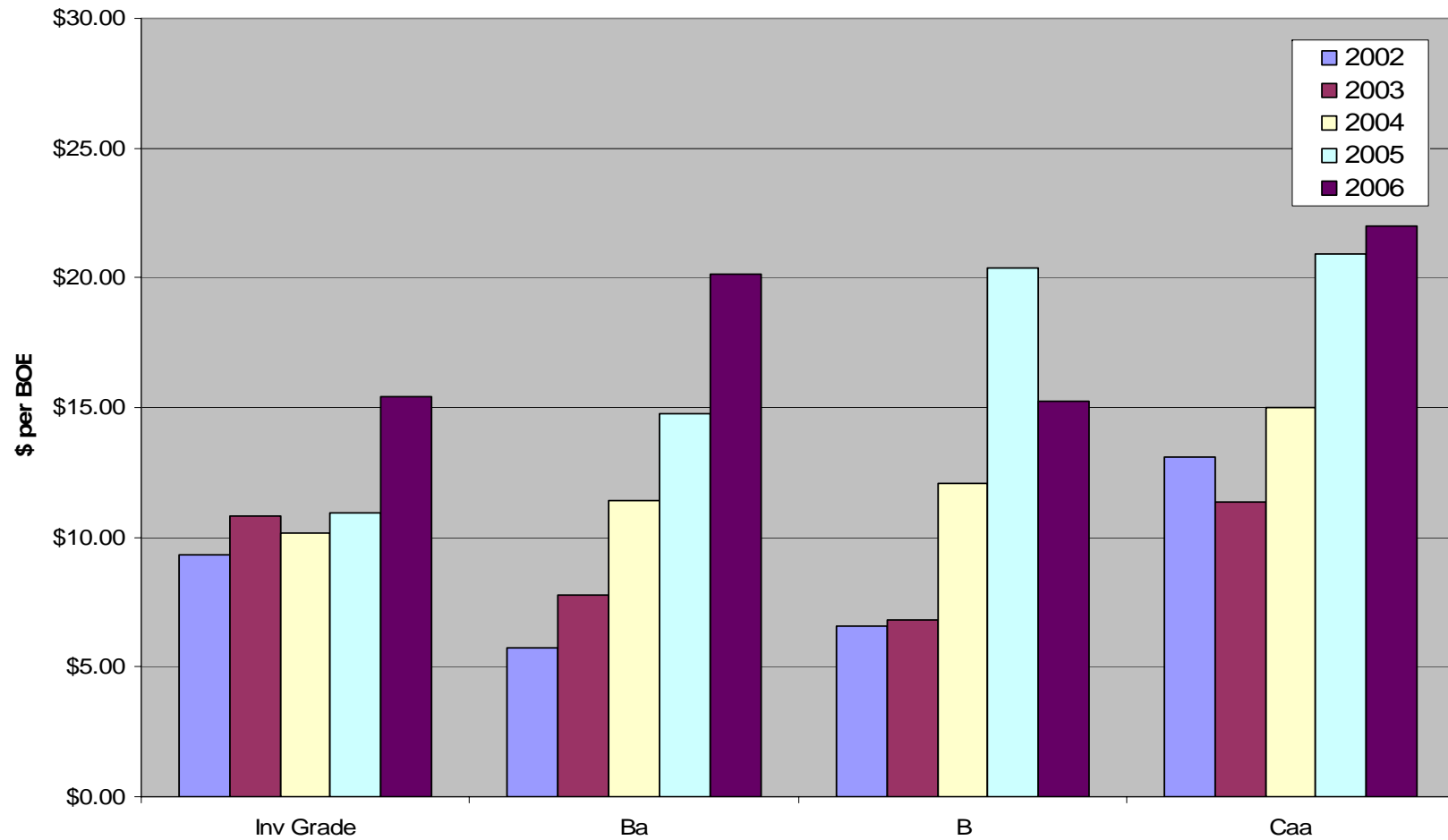
Replacing Reserves at Economic Costs

Capital productivity puts wind in the sails & drives momentum; portfolio durability & sustainability in a dynamic environment

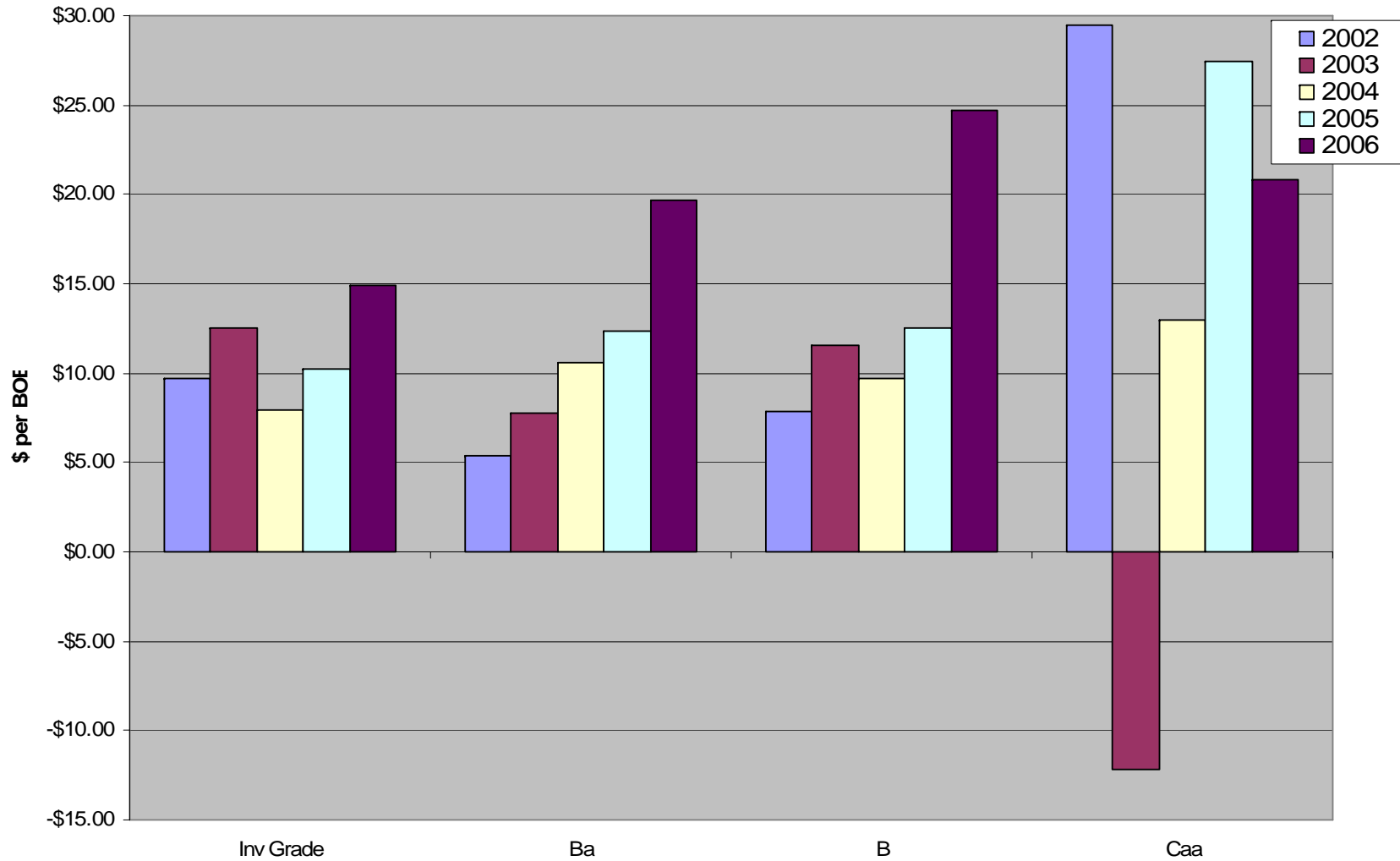
- Three-year All-Sources F&D Costs
- Three-year Drillbit F&D Costs
- Sensitize and/or weight trend for:
 - PUD distortion; one year drillbit F&D & all-sources F&D; expected drillbit F&D & all-sources F&D; PD reserve F&D
 - Goodwill add back
 - Calculate drillbit F&D with & without revisions; assess gross negative revisions & gross positives
 - Understand singular items impacting numbers



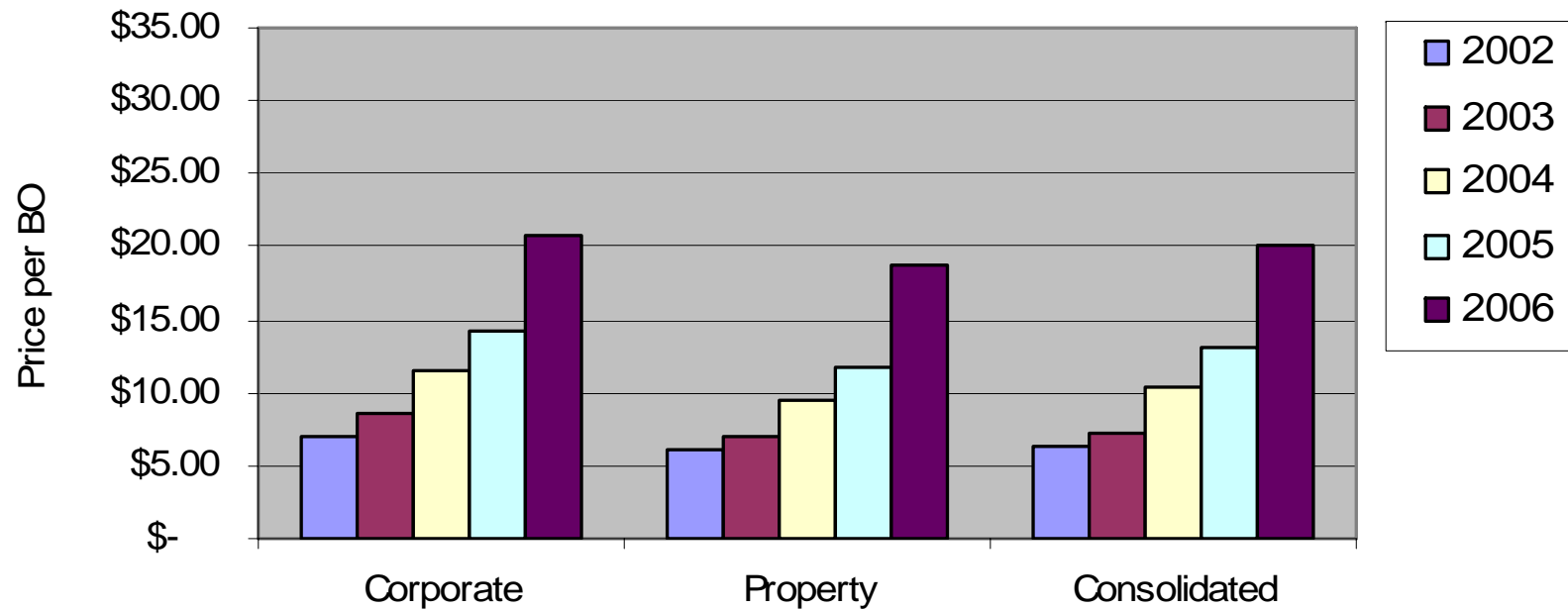
1 Year F&D Costs – All-Sources



1 Year F&D Costs – Drillbit



O&G Acquisitions - Median Price per BOE



Operating and Capital Reinvestment Efficiency

Leveraged Cash Flow Coverage of Sustaining Capital Reinvestment

- Total Unit Full-cycle Costs per boe
- Leveraged Full-cycle Ratio -> A Post-Capex Indicator of Propensity for Debt & Equity Accretion

Calculating The Leveraged Full-cycle Ratio *

Realized price per boe production (reflects basis differentials, transportation and hedging)

- Minus: Operating costs per boe production
- Minus: Total G & A expense per boe production (including capitalized portion)
- Minus: Total interest expense per boe production (including capitalized portion)

Equals: Pre-capex cash margin per boe production

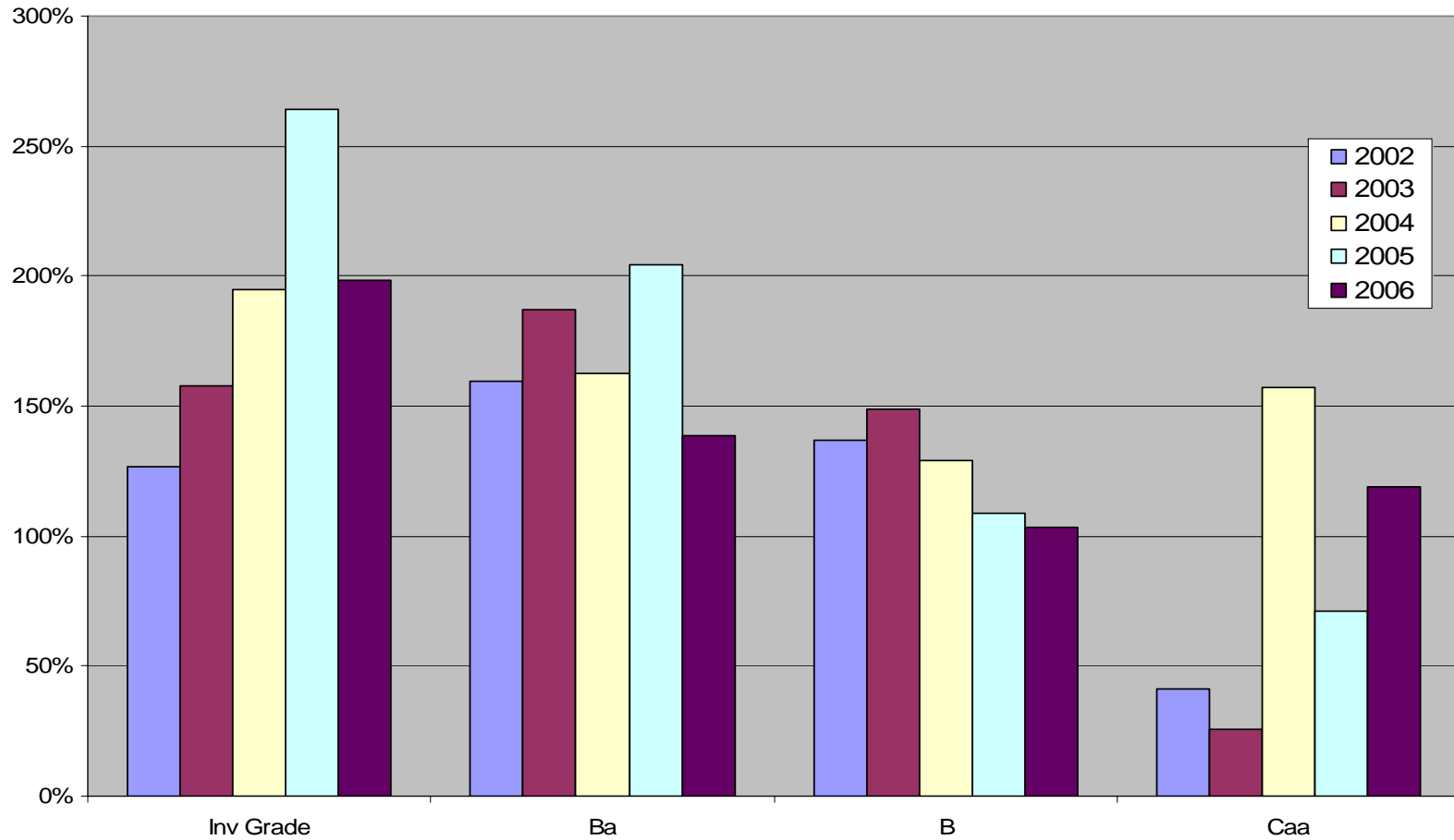
- Divided by: 3-yr. average all-sources F&D costs (then sensitize for expected F&D)

Equals: Leveraged full-cycle ratio (or leveraged cash-on-cash returns)

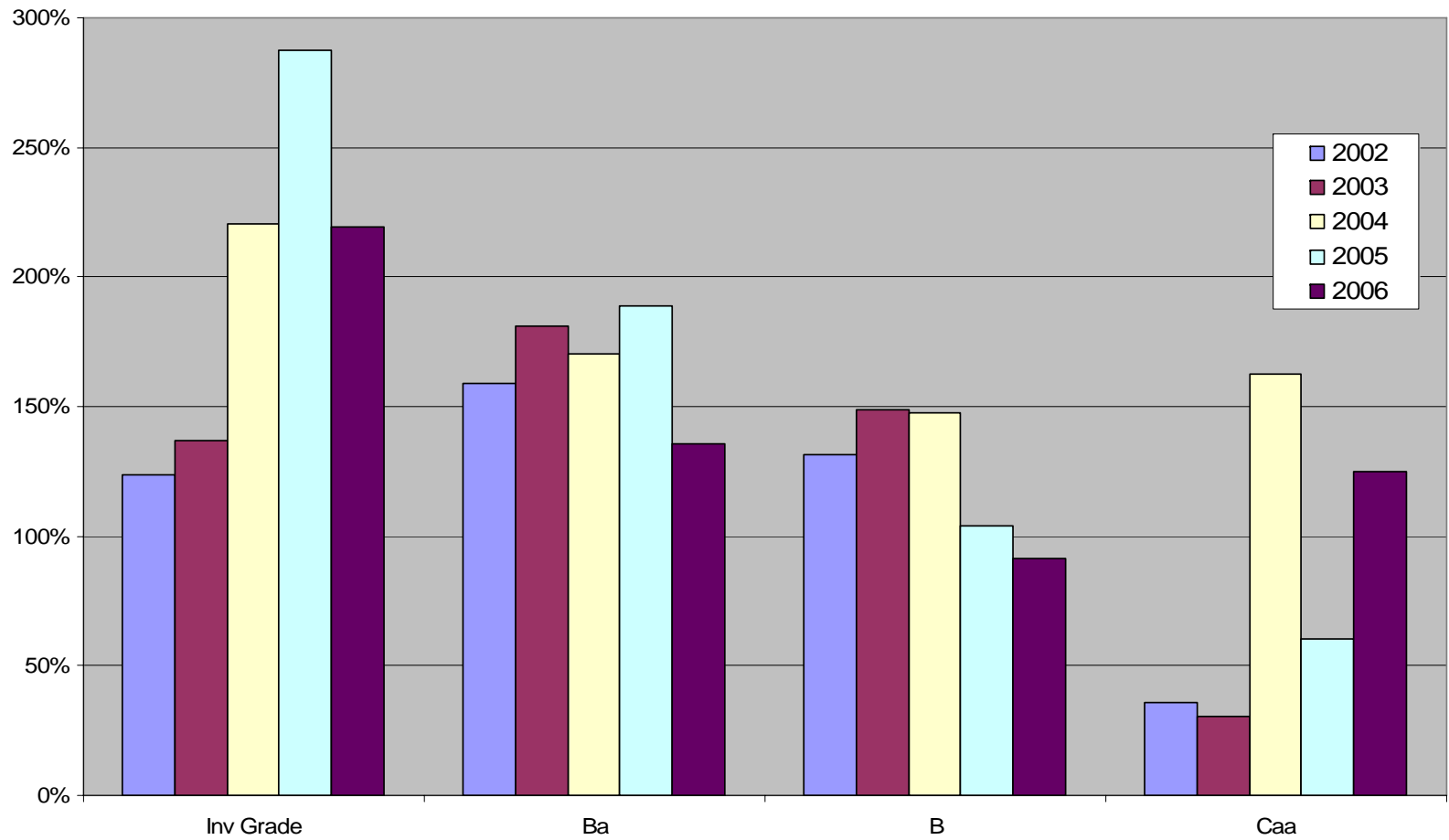
* *We sensitize all components for expected trends*



1 Year LFCR – All-Sources



1 Year LFCR – Drillbit



Leverage, Liquidity, Market Access, Trends

Compares Debt to Fully Funded/Cash Generating Assets

- Leverage on: reserves; production; & cash flow after sustaining capex → not Debt/EBITDA or Debt/Cap
 - Adjusted Debt / Boe PD Reserves
 - {Adj. Debt + (FAS 69 Devel. & P&A Capex)} / Boe Total Proven
 - (Retained Cash Flow – Sustaining Capex / Adjusted Debt
 - Total Adjusted Debt / Boe Production
- Strong reinvestment productivity tends to restrain or reduce leverage on PD's by internally funding PD reserve adds
- Lead time/cost of major projects; production & funding impact
- Underperformance & shareholder pressure: untimely or excessive buybacks; strategic portfolio needs/event risk



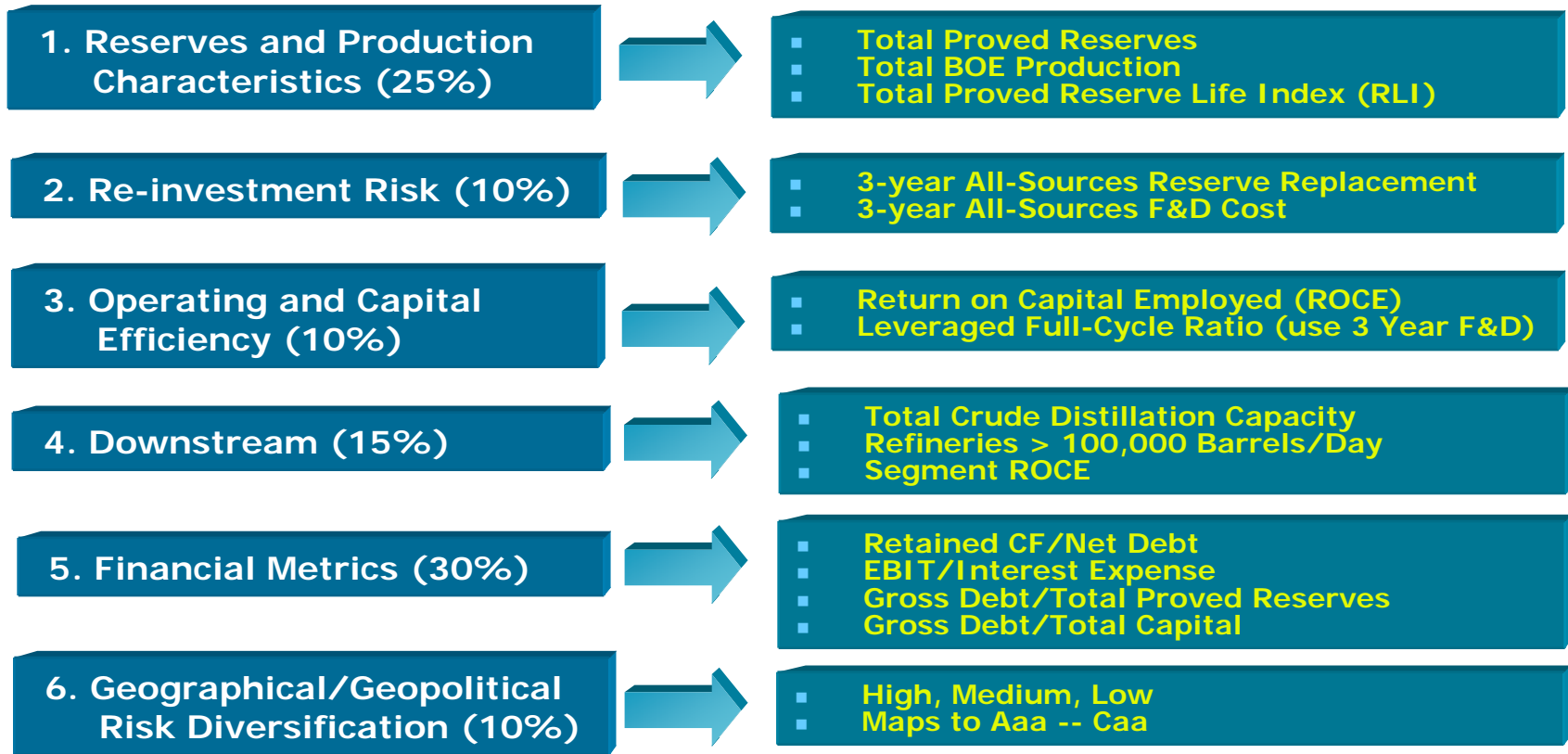
Mapping of "Average" Large Cap E&P Company

| Large Cap E&P Companies | | | | | | | | | | |
|---|---------------|---|------|-----|----|-----|-----|----|---|-----|
| Public Rating: | N/A | | | | | | | | | |
| Methodology Rating: | Baa3 | | | | | | | | | |
| Comment: Reflects average year end 2005 | | <table border="1"> <tr> <td>Aaa</td> <td>Aa</td> <td>A</td> <td>Baa</td> <td>Ba</td> <td>B</td> <td>Caa</td> </tr> </table> | | Aaa | Aa | A | Baa | Ba | B | Caa |
| Aaa | Aa | A | Baa | Ba | B | Caa | | | | |
| 1 - Reserve & Production Characteristics | Weight | Value | | | | | | | | |
| Production | 10% | 132,600 | Baa | | | | | | | |
| PD Reserves | 10% | 1,005,200 | Baa | | | | | | | |
| Total Proved Reserves | 8% | 1,501,000 | Baa | | | | | | | |
| Diversification | 8% | Medium | Baa | | | | | | | |
| 2 - Re-investment Risk | Weight | | | | | | | | | |
| 3-year avg. all sources F&D costs | 8% | \$10.85 | → Ba | | | | | | | |
| 3-year drillbit F&D costs (including revisions) | 8% | \$10.19 | Ba | | | | | | | |
| 3 - Operating & Capital Efficiency | Weight | | | | | | | | | |
| Full-cycle costs per boe | 9% | \$24.37 | Ba | | | | | | | |
| Leveraged full-cycle ratio | 9% | 2.7 x | Baa | | | | | | | |
| 4 - Leverage & cash flow coverage | Weight | | | | | | | | | |
| Debt / PD boe reserves | 10% | \$3.48 | Baa | | | | | | | |
| (Debt + future development capex / Total reserves) | 10% | \$6.09 | → Ba | | | | | | | |
| (RCF - sustaining capex) / Debt | 10% | 53% | A ← | | | | | | | |
| Total | 100% | | | | | | | | | |



Global Integrated Oil Rating Methodology

Moody's focuses on six key Rating Factors (Weightings)



Moody's Rating Analysis encompasses business risk and financial risk analysis



III. Reserve Bookings/Standards in Market Context

- Are U.S. SEC-reporting producers undervalued vs. foreign competitors in more flexible booking jurisdictions?
- “SEC rules are conservative because they’re rules (not principles)-based; & they’re rules-based due to lack of audit requirement”
- E&P sector’s had 147 yrs. to perfect the art of raising capital on something no one will ever see & too few deeply understand
 - Investor knowledge spans wide bell curve; how many have the time/need to “get” what’s going on “under the E&P hood”?
 - Big arbitrage between E&P’s operating knowledge & market’s; how are investors best protected?
- Parallel standards for probabilistic (internal use) & SEC public deterministic is similar to internal accounting vs. GAAP



A Bit of Caution

- Drive for SPE standards heated up as production gains got ever harder, reservoirs harder to characterize, properties more complex & uncertain, discontinuous, and/or long lead time
 - Major reserve gains mainly from subtle unconventional plays & higher risk, cost & long lead time frontier & deep H2O plays
 - Technology & probabilistic estimation: mitigate rising business risk or might it enable overconfidence & permit premature booking?
 - Does deterministic help hold gross overbooking at bay?
- Incremental probabilistic reserves added may add visibility but would not impact production trends the market values most
- Would bias for upside revisions move to bias to negative revisions (say, booking to LKW, skipping flow testing)



Would More Flexible Bookings Boost Valuation?

What Does Market Pay For?

- Market has running view of an E&P's propensities & management
- Management's past credibility & lack of negative surprises aids market's valuation of the E&P's play/prospect rhetoric
- Consistently meeting/beating expectations for good sequential quarter production trends at competitive costs & recycle ratios drives true profitable growth & increases NAV's faster
- Market wants good visibility w/o over-investment; strong inventory but not excessive; solid PD reserve life (not oddly long)
- One-time probabilistic catch-up would likely be seen in context of past record & competitors' catch-up adds



What Will the Market Pay For?

- Reserves are about risk, nearness to cash, & returns
- Would markets pay much more for higher risk reserve adds, heavy unfunded development costs, & distant timing?
- When is longer PDP tail moot & ever-bigger PDNP's/PUD's "enough" & counter productive?
- A big booking may only validate "old news" already in the shares
 - Market evaluated & baked much of the value of discovery & appraisal wells into the share price
 - Sifts through rhetoric on evolving plays & E&P's past credibility
 - The booking could actually be a sell signal to an investor that rode that particular theme and wants to rotate to another story



Risk, Return, Fairly Short Holding Period

Knowledge Base: Public, Private/Insider, Management

- Regardless of public reserve classification: embedded risk, production outcome & timing, cash flow, cash-on-cash returns will be the same --> *market wisdom*
- Public information base for public debt risk/return & public equity risk/return assessment
- Private debt risk/return, bank debt risk/return & info base
- Mezzanine & Private equity risk/return & information base
- Owner/management risk/return & superior inside knowledge



When Could More Liberal Provens be an Albatross?

The Dog that Caught the Fire truck?

- Market doesn't want volatile reserve data
 - Would relaxing LKH, analogy qualifications, flow test requirement, wider use of probabilistic further understate RRC's & increase frequency of negative revisions?
- Probability/statistics of "proven" evaluations needs law of large numbers to work; smaller population = greater risk
- Frequent negative revisions undermine confidence in an E&P's conservatism, booking culture, motives, skill set
- Equity hurt if production & costs don't match bookings & rhetoric
- Frequent acquisitions can bring caution if can't track trend
- Market notes mismatches of scale of capital & producing base relative to scale of PUD/probables, lead time, risk, cost



Should be Two-Way Street: More Disclosure

- Reserves already contain definitional compromise; human bias & judgment; major compounding quantitative & technical assumptions
- Is drive for flexibility matched quid pro quo by drive for more meaningful disclosure now regardless of new standards?
- Good to match any new booking standards w/ disclosures to put the results in perspective
- Is uncertainty reduced by broadening SEC rules, is it a non-issue, or might it fuel unrealistic expectations?



History Suggests Voluntary Disclosure isn't Optimal

- Much firm-to-firm inconsistency with existing standards; some consistently have negative revisions
- Would greater flexibility further widen gap between conservative & more aggressive bookers?
- E&P's haven't voluntarily disclosed all they're permitted to disclose to aid reserve assessment (is it for proprietary & competitive reasons?)
- Analogy assumptions for Canadian probables may be easier for mkt. to assess than U.S. - field data is public in Canada



If SEC Does Liberalize, This Data Would Help

- Narrative to investors: how SEC/deterministic volumes & mix differs from SPE/probabilistic volumes & mix & why
- Proven reserve breakout by both SEC & SPE standards
- SEC PV10 by year-end & average 4Q benchmark price
- More detailed geographic & basin breakdown; breakout PSC production & reserves
- Concentrations, location/nature of the play & rock, capex needs, timing, type curve & field production pattern
- FAS 69 development & P&A capex; what costs are not included (infrastructure, leased assets, compression, acquis. goodwill)?
- Top 5 positive & top 5 negative revisions on performance; top 5 positive & top 5 negative revisions on price



More Disclosures that Would Aid Investors

More Data to Gauge Character & Productivity of Provens & Properties

- PDP, PDBP, PDSI volumes; top 10 PDP, PDNP, PUD & if 3rd party engineered, reviewed, audited, or internal?
- PDNP/PUD:
 - Aging, development costs, timing & funding; is \$ committed?; analog narrative for volumetric & recovery factor estimates
 - Type curve, expected well count, % of prior wells in play that met or achieved type curve
- Top 5 PDP well count, drive, 3-5 yr. production history
- Record of migrating probables to PUD & PDP & revisions



More Disclosures to Aid Investors (cont.)

More Data to Gauge Character & Productivity of Provens & Properties

- Upon announcement, declare if proven reserves acquired are estimated on SEC, SPE, or internal standards
- Number & % of well completions that actually met or exceeded original production, cost to completion, & IRR estimates on total well costs to completion
- Proportionately large, long lead time, deepwater programs
- 5 largest internally engineered properties & revision history
- Reclassifications in & out of PUD & probable
- Permitting or regulatory issues affecting timing
- How are net profits interests handled?



Third Party Engineering – Yes Please

- Reportedly can be tough to audit probabilistic reserve estimates
- Third party engineering firms have their own reputation at stake
- Nationally recognized firms add comfort to public market; more familiar with larger firms
- Private market investor can do deeper due diligence; may be E&P specialized too & already know the smaller firms
- But relationship risks too - small engineering firms may need the producer more than the producer needs them



Summary - Our Take Overall

- Issuer down-cycle stress often stems from up-cycle mistakes
- Absent geopolitical risk/defensive inventory building we'd expect \$45-\$50 WTI now
- Strip not a good forecaster; absent a catalyst, '07 prices flat-to-down & costs still historically high
- Demand moderation & full inventories could become bearish but we expect OPEC & rapid 1st year natural gas declines to underpin supportive prices
- We too need to see unit economics of more of the new evolving unconventional plays – today's growth drivers

