

Oil & Gas Reserves & E&P Performance Evaluation

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Market & Debt Rating Perspectives

Ryder Scott Reserves Conference

"Evaluation Challenges In a Changing World"

Houston - May 4, 2007



Moody's Investors Service

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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



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

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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



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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

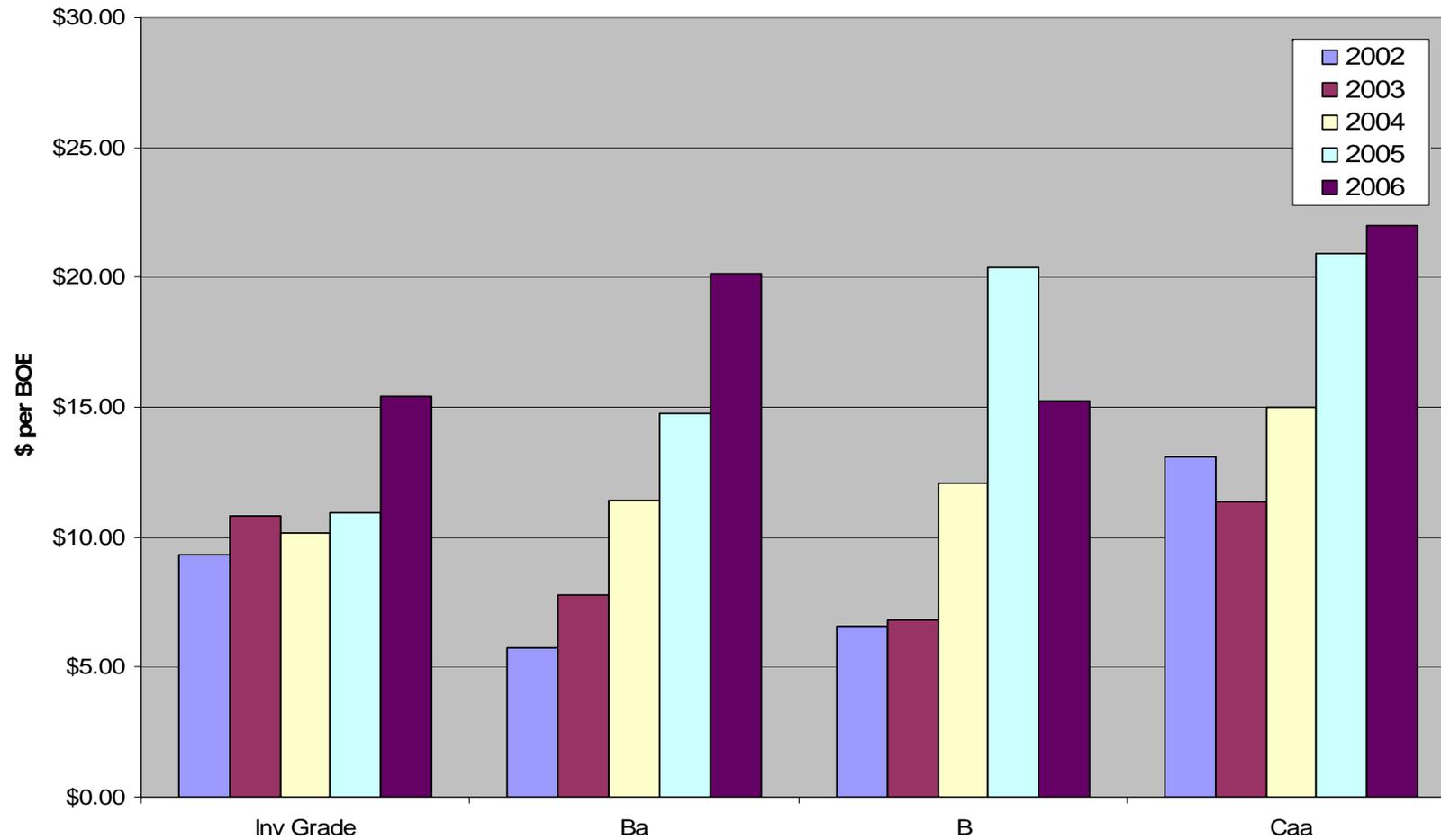
Replacing Reserves at Economic Costs

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

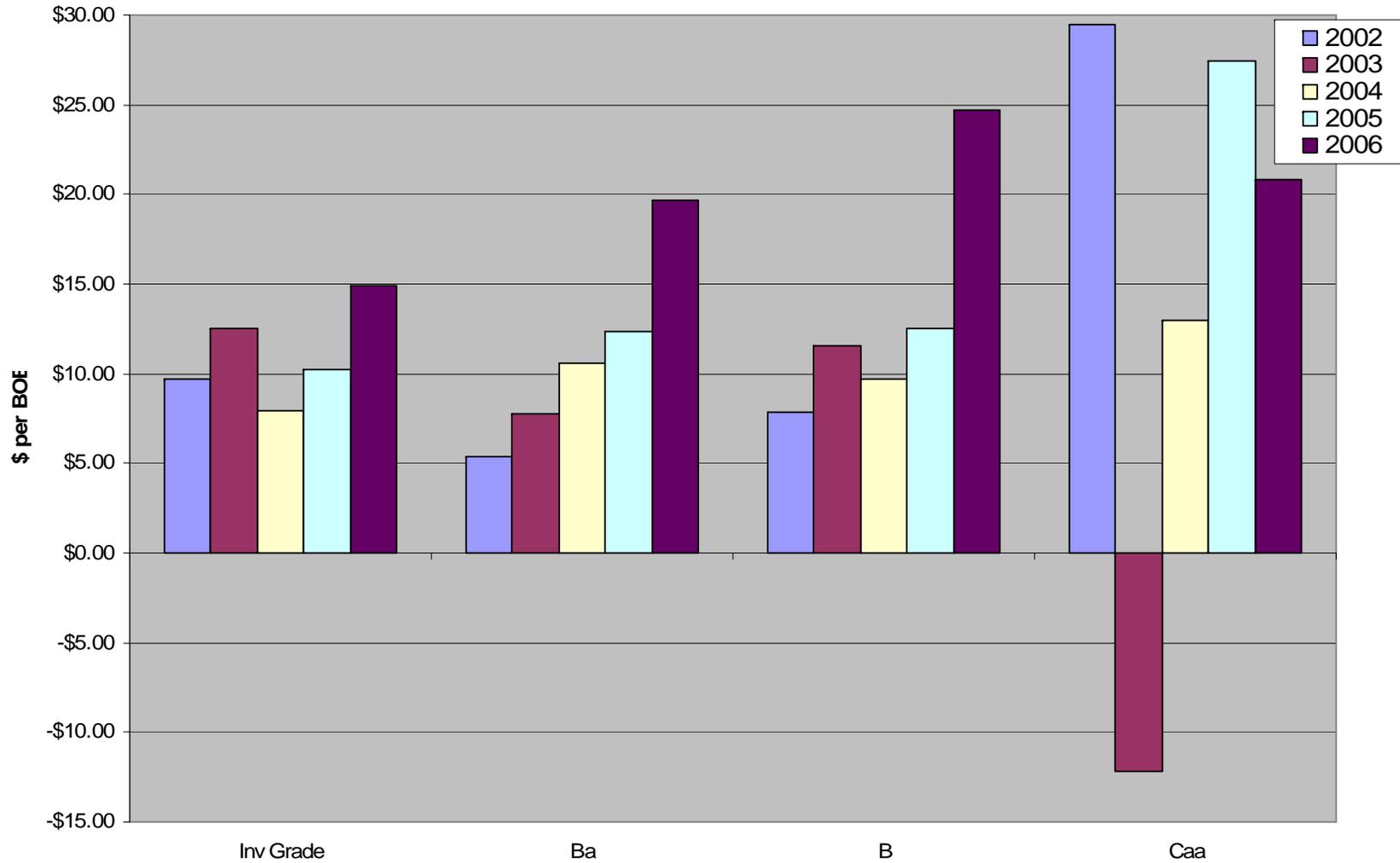
- Three-year All-Sources F&D Costs
- Three-year Drillbit F&D Costs
- Sensitize and/or weight trend for:
 - PUD distortion; one year drillbit F&D & all-sources F&D; expected drillbit F&D & all-sources F&D; PD reserve F&D
 - Goodwill add back
 - Calculate drillbit F&D with & without revisions; assess gross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



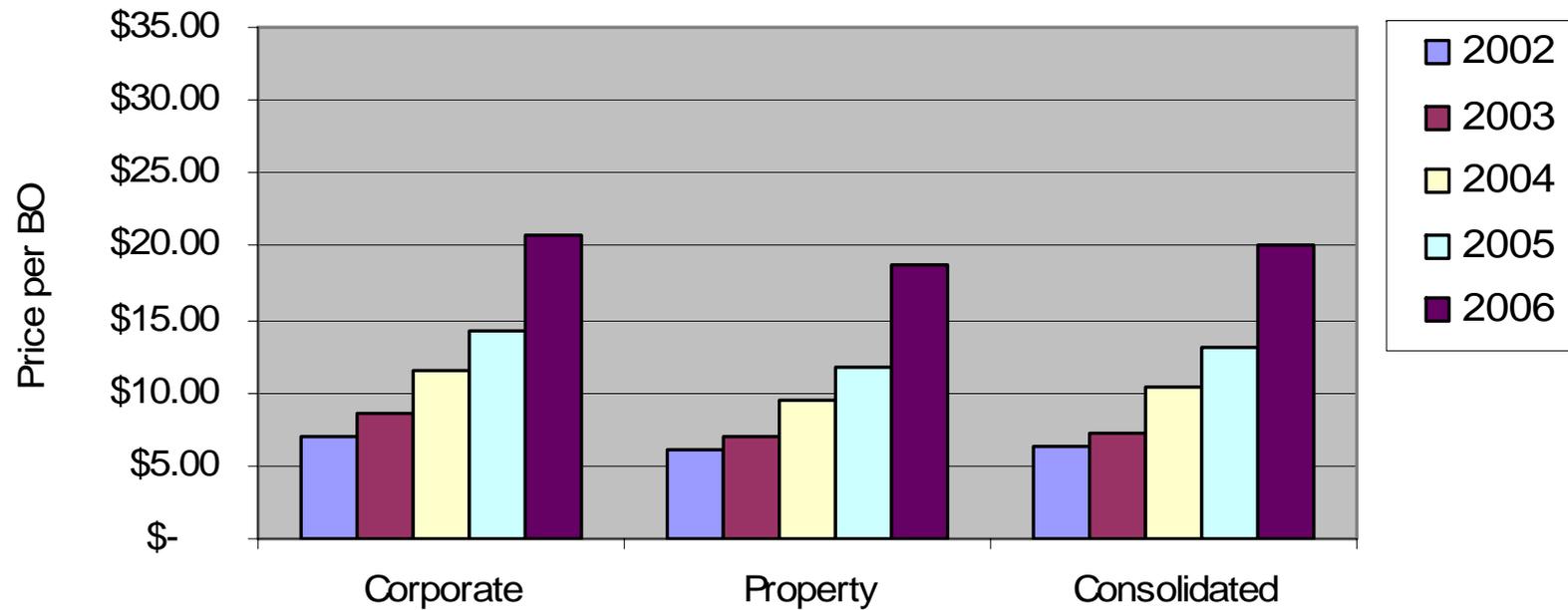
1 Year F&D Costs – All-Sources



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

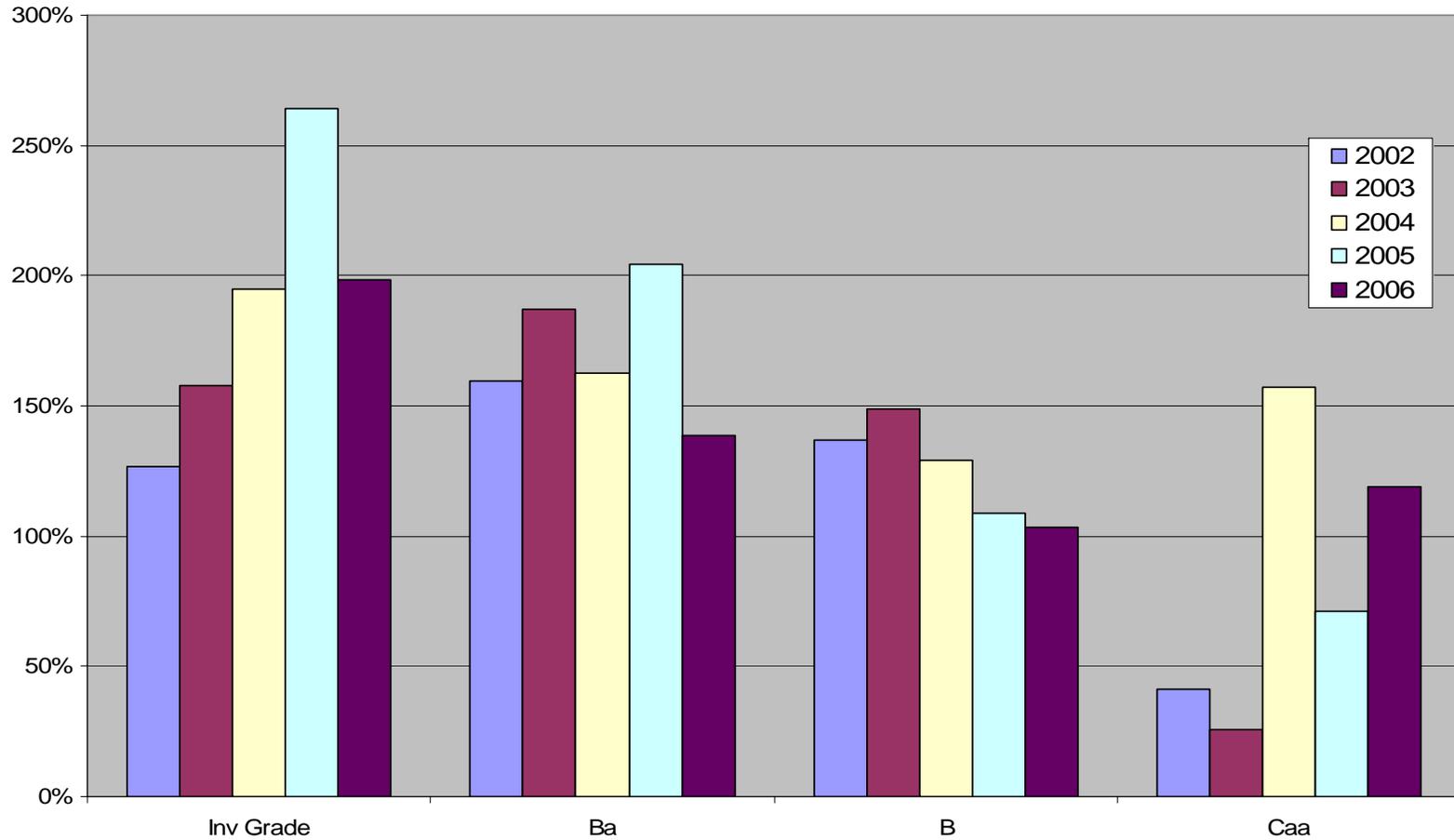
- Divided by: 3-yr. average all-sources F&D costs (then sensitize for expected F&D)

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

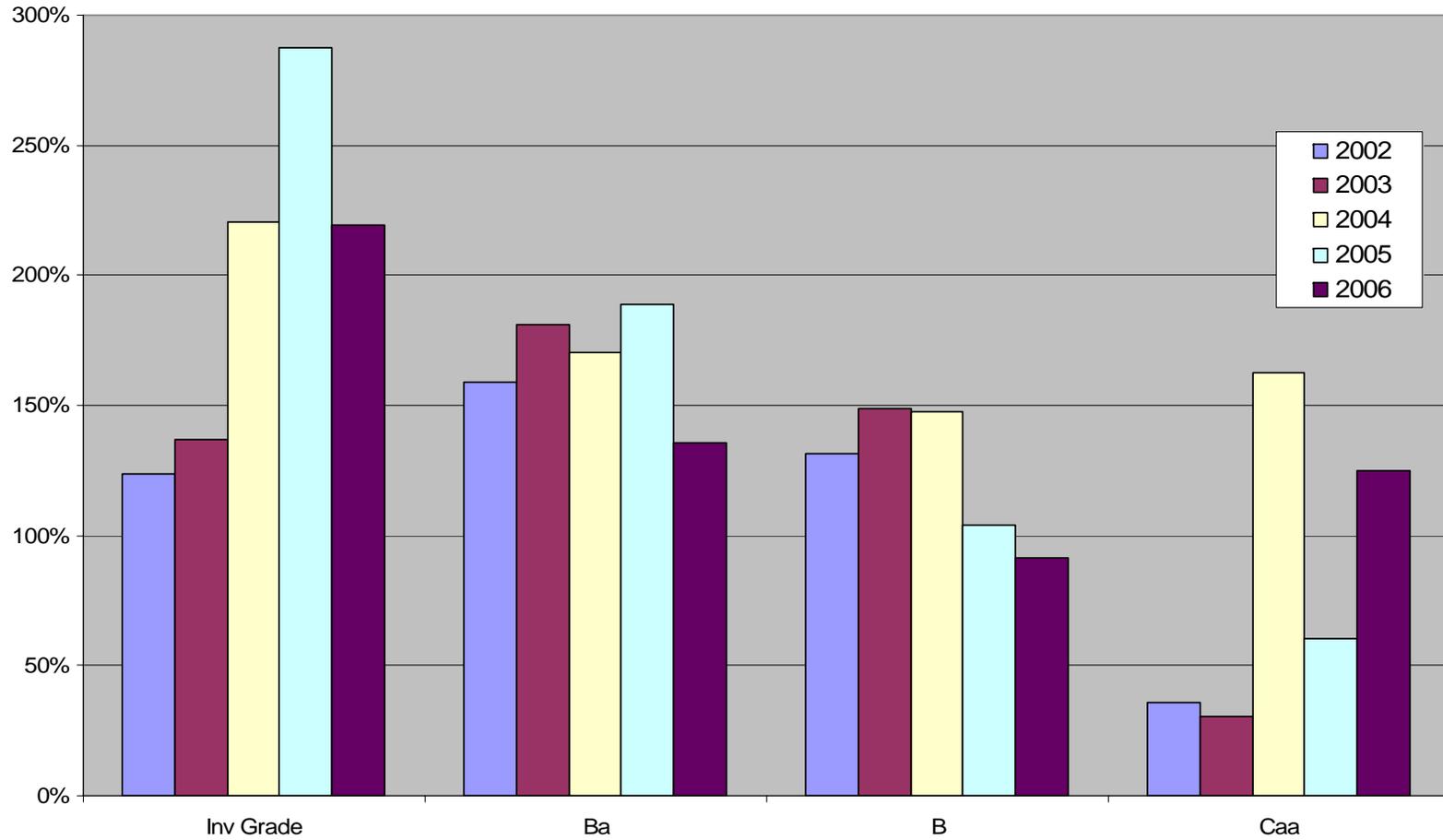
* *We sensitize all components for expected trends*



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



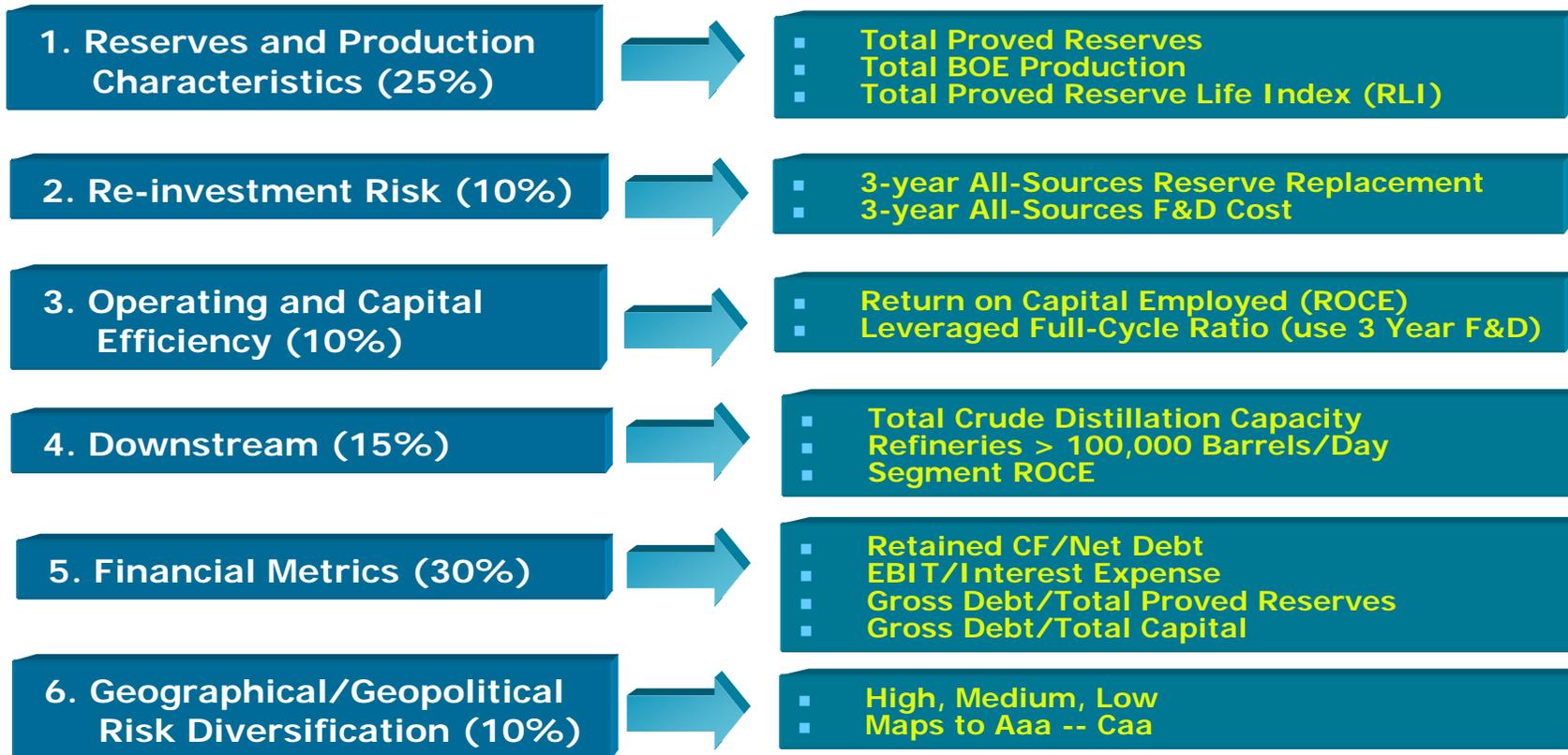
Mapping of "Average" Large Cap E&P Company

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

