

Rating Methodology

Moody's Global Corporate Finance

November 2009

Global Integrated Oil & Gas Industry

Summary

This rating methodology explains Moody's approach to assessing credit risk for companies in the global Integrated Oil and Gas industry. This publication is intended to provide a reference tool that can be used when evaluating credit profiles within the integrated oil industry, helping issuers, investors, and other interested market participants understand how key qualitative and quantitative risk characteristics are likely to affect rating outcomes. This methodology does not include an exhaustive treatment of all factors reflected in Moody's ratings

This report includes a detailed rating grid and illustrative mapping of each rated company against the factors in the grid. The purpose of the rating grid is to provide a reference tool that can be used to approximate credit profiles within the integrated oil sector. The grid provides summarized guidance for the factors that are generally most important in assigning ratings to integrated oil companies. The grid is a summary that does not include every rating consideration, and our illustrative mapping uses historical results while our ratings also consider forward-looking expectations. As a result, the grid-indicated rating is not expected to match the actual rating for each company.

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Analyst Contacts:

New York 1.212.553.1653

Thomas Coleman
Senior Vice President

Steven Wood
Senior Vice President

Sharon E. Roberts
Associate Analyst

London 44.20.7772.5454

Francois Lauras
Vice President - Senior Credit Officer

Paul Marty
Vice President - Senior Analyst

Moscow 7.495.228.6060

Victoria Maisuradze
Vice President - Senior Analyst



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The grid contains six key factors that are important in our assessments for ratings in the integrated oil and gas sector:

1. Reserve and production characteristics
2. Re-investment risk
3. Operating & capital efficiency
4. Downstream rating factors
5. Financial metrics
6. Government Fiscal Dependence

The first five factors also encompass a number of sub-factors or metrics, which we explain in detail. Since an issuer's scoring on a particular grid factor often will not match its overall rating, in the Appendix we include a discussion of "outliers" – companies whose grid-indicated rating for a specific factor differs significantly from the actual rating.

This rating methodology is not intended to be an exhaustive discussion of all factors that Moody's analysts consider in rating this sector, but it should enable the reader to understand the key considerations and financial ratios used to derive the ratings. We note that our ratings analysis covers factors that are common across all industries (such as ownership, management, liquidity, legal structure in the corporate organization, and corporate governance) as well as factors that can be meaningful on a company-specific basis.

Our ratings also consider qualitative issues and factors that do not lend themselves to a transparent presentation in a grid format. The grid represents a compromise between greater complexity, which would result in grid-indicated ratings that map more closely to actual ratings, and simplicity, which enhances a transparent presentation of the factors that are most important for ratings in this sector most of the time.

Highlights of this report include:

- An overview of the rated universe
- A description of the key factors that drive rating quality
- Comments on the rating methodology's assumptions and limitations, including a discussion of rating considerations that are not included in the grid.

The Appendices show the rating grid criteria on one page (Appendix A), tables that illustrate the application of the methodology grid to 22 representative rated integrated companies (Appendix B) with explanatory comments on some of the more significant differences between the grid-implied rating and our actual rating (Appendix C), a brief industry overview (Appendix D), and a discussion of key rating issues for the integrated sector over the intermediate term (Appendix E).

Industry Overview

About the Rated Universe

Moody's rates 22 companies classified as integrated oil and gas companies. These companies have integrated operations ranging from upstream (exploration and production) to downstream (refining and marketing), and in some cases midstream (pipelines and transportation, including LNG and oil shipping) and chemicals. While the average rating is A2, this in large part reflects the distorting effect of the national oil companies (NOCs) and other companies in developing markets, whose ratings are constrained by various sovereign-related factors.

More broadly, the universe is made up of (1) the large majors and super-majors, which are rated in the Aaa and Aa rating categories; (2) smaller and/or more aggressively leveraged players with some regional concentration, whose ratings commonly fall into the A and Baa rating categories; and (3) national oil companies or other regionally concentrated companies, often with significant scale and political position, but with ratings primarily driven by geopolitical or sovereign-linked factors.

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Integrated Oil & Gas Industry-Rated Companies

Issuer	Senior Unsecured or Corporate Family Rating	Baseline Credit Assessment Rating	Outlook	Domicile	Total Proved Reserves (million boe)	Total Production (million boe p.a.)	Adjusted Total Debt (in \$ millions)
ExxonMobil	Aaa		Stable	US	22,986	1,485	56,596
BP	Aa1		Stable	UK	17,888	1,416	58,471
Chevron	Aa1		Stable	US	11,196	917	31,917
Royal Dutch Shell	Aa1		Stable	NL/UK	10,666	1,142	54,141
Total	Aa1		Stable	France	10,065	828	42,278
ENI	Aa2*	2 - 4 (Aa1-Aa3)	Negative	Italy	6,757	646	40,783
Statoil	Aa2*	5 - 7 (A1-A3)	Stable	Norway	5,238	625	20,907
ConocoPhillips	A1		Stable	US	9,975	843	37,019
BG Energy	A2		Stable	UK	2,459	227	5,133
Petrobras	A3*	8 (Baa1)	Stable	Brazil	11,129	822	36,809
OJSC Gazprom	Baa1	11 (Ba1)	Stable	Russia	127,000	3,922	56,138
Marathon Oil	Baa1		Stable	US	1,195	137	9,761
Rosneft	Baa1*	11 (Ba1)	Stable	Russia	14,409	849	25,520
PEMEX	Baa1*	11 (Ba1)	Stable	Mexico	13,982	1,409	44,108
Repsol YPF	Baa1		Negative	Spain	2,126	336	19,783
Ecopetrol	Baa2*	10 (Baa3)	Stable	Columbia	1,115	134	758
LUKOIL	Baa2*		Stable	Russia	19,334	817	13,170
TNK BP	Baa2		Stable	Russia	8,752	670	8,132
OMV	A3*	9 (Baa2)	Stable	Austria	1,167	112	7,307
Gazprom Neft JSC	Baa3*		Stable	Russia	4,913	361	3,693
YPF Sociedad Anonima	Ba1*		Stable	Argentina	1,097	216	2,183
PDVSA	B1*	14 (B1)	Stable	Venezuela	201,659	1,413	21,267

* Reflects Global Local Currency rating or Foreign Currency rating in cases where there is no Global Local Currency rating. Numerical rating and rating in parenthesis reflect baseline credit assessment per Moody's Methodology for Government-Related Issuers. For an explanation of baseline credit assessment please refer to Moody's Special Comment entitled "The Application of Joint Default Analysis to Government-Related Issuers" (April 2005).

All Data as of December 31, 2008

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About This Rating Methodology

This report explains the rating methodology for integrated oil and gas companies in six sections, as follows:

1. Identification of Key Rating Factors

The methodology grid includes five key rating factors, which are in turn further broken down into 14 sub-factors. Factor 6 provides a notching adjustment to address government fiscal dependence on a company.

Rating Factor	Factor Weighting	Relevant Sub-factor	Sub-Factor Weighting
Reserves & Production Characteristics	25%	Average Daily Production (Mboe/d)	8%
		Proved Reserves (Million boe)	12%
		Total Proved Reserve Life (Yrs)	5%
Re-investment Risk	10%	3-year all-sources Reserve Replacement	5%
		3-year all-sources F&D (\$/boe)	5%
Operating & Capital Efficiency	10%	Return on Capital Employed (ROCE 3-year average)	5%
		Leveraged full-cycle ratio	5%
Downstream Rating Factors	15%	Total Crude Distillation Capacity ('000 bpd)	5%
		# of Refineries with Capacity > 100 M bpd	5%
		Segment ROCE (3-year average)	5%
Financial Metrics	40%	Retained Cash Flow/Net Debt (3-year average)	10.0%
		EBIT/Interest Expense (3-year average)	10.0%
		Gross Debt / Total Proved Reserves	10.0%
		Gross Debt/Capital	10.0%
Total	100%		100%

2. Measurement of the Key Rating Factors

We explain below how the sub-factors are calculated and their individual weightings. We also explain the rationale for specific rating metrics and the ways in which we apply them to ratings. Much of the information used in assessing performance for the sub-factors is found in or calculated using the company's financial statements; other information is derived from observations or estimates by Moody's analysts.

Moody's ratings are forward-looking and incorporate our expectations of future financial and operating performance. We use both historical and projected financial results in the rating process. Historical results help us to understand patterns and trends for a company's performance as well as for peer comparison. While the rating process includes both historical and anticipated results, this document makes use of historical data only to illustrate the application of the rating methodology. Specifically, the mapping examples use reported financials for the latest fiscal year, or the most recent interim period, if available. All of the quantitative credit metrics incorporate Moody's standard adjustments to income statement, cash flow statement and balance sheet amounts for (among others) off-balance sheet accounts, receivable securitization programs, under-funded pension obligations, and recurring operating leases.

3. Mapping to the Rating Categories

After identifying the measurements for each factor, the potential outcomes for each of the 14 sub-factors are mapped to a broad Moody's rating category. (Aaa, Aa, A, Baa, Ba, B, Caa).

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4. Mapping Issuers to the Grid and Discussion of Grid Outliers

In this section (Appendix C) we provide tables showing how each company maps to grid-indicated ratings for each rating sub-factor and factor. The weighted average of the sub-factor ratings produces a grid-indicated rating for each factor. We highlight companies whose grid-indicated performance on a specific sub-factor is two or more broad rating categories higher or lower than its actual rating and discuss general reasons for such positive outliers and negative outliers for a particular factor or sub-factor. For Government Related Issuers (GRIs) the mapping compares the grid-indicated rating to the Baseline Credit Assessment (BCA), which is an indication of credit strength in the absence of extraordinary government support. Consideration of the likelihood of such support generally results in a rating that is higher than the BCA. The table on page 4 shows the BCA and the rating for each of the GRI.

5. Assumptions and Limitations and Rating Considerations Not Included in the Grid

This section discusses limitations in the use of the grid to map against actual ratings, additional factors that are not included in the grid that can be important in determining ratings, and limitations and key assumptions that pertain to the overall rating methodology.

6. Determining the Overall Grid-Indicated Rating

To determine the overall rating, we convert each of the 14 sub-factor ratings into a numeric value based upon the scale below.

Aaa	Aa	A	Baa	Ba	B	Caa
1	3	6	9	12	15	18

The numerical score for each sub-factor is multiplied by the weight for that sub-factor with the results then summed to produce a composite weighted factor score. The composite weighted factor score is then mapped back to an alphanumeric rating based on the ranges in the grid below.

Grid-Indicated Rating	Aggregate Weighted Total Factor Score
Aaa	$x < 1.5$
Aa1	$1.5 \leq x < 2.5$
Aa2	$2.5 \leq x < 3.5$
Aa3	$3.5 \leq x < 4.5$
A1	$4.5 \leq x < 5.5$
A2	$5.5 \leq x < 6.5$
A3	$6.5 \leq x < 7.5$
Baa1	$7.5 \leq x < 8.5$
Baa2	$8.5 \leq x < 9.5$
Baa3	$9.5 \leq x < 10.5$
Ba1	$10.5 \leq x < 11.5$
Ba2	$11.5 \leq x < 12.5$
Ba3	$12.5 \leq x < 13.5$
B1	$13.5 \leq x < 14.5$
B2	$14.5 \leq x < 15.5$
B3	$15.5 \leq x < 16.5$
Caa1	$16.5 \leq x < 17.5$
Caa2	$17.5 \leq x \leq 18.0$

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For example, an issuer with a composite weighted factor score of 11.7 would have a Ba2 grid-indicated rating. We used a similar procedure to derive the grid-indicating ratings in the tables embedded in the discussion of each of the four broad rating factors.

The Key Rating Factors

Moody's analysis of integrated oil and gas companies focuses on six broad factors:

1. Reserve and production characteristics
2. Re-investment risk
3. Operating & capital efficiency
4. Downstream rating factors
5. Financial strength, measured in key credit metrics
6. Government Fiscal Dependence

Rating Factor 1: Reserve & Production Characteristics (25% Weight)

Why it Matters

An integrated oil company's petroleum reserves and production are its main source of cash flow and typically generate its highest capital returns. The reserve base drives most key credit metrics and is the company's greatest source of exposure to commodity price risk, capital re-investment, and market valuation. While financial results and ratios are important to credit rankings, reserves and production generally provide a better measure of a company's size, scale and competitive position than financial metrics such as assets, revenues and cash flow. Moreover, under GAAP accounting, the capitalized balance sheet values of oil and gas production assets capture only the invested cost in finding and developing reserves, not the current market value or replacement cost of reserves in the ground.

Reserves analysis focuses on the quantity and quality, or economic value, of the reserves, and on portfolio balance, cost structure, and the cash flow and value of production. It provides a company snapshot and helps pinpoint future production and cash flow trends, sensitivity to price declines, sources of poor returns, high cost acquisitions, and exposure to future writedowns of over-valued reserves. Analysis of reserves and production also points up significant company and industry trends, and provides the basis for further analysis of a company's operations.

Positive Rating Indicators

- A large and stable-to-growing portfolio of oil and gas reserves
- A large base of mature core production and stable-to-increasing production volumes
- Identified sources of future production growth
- Balance of oil and gas assets and diversification by geography, geological basins, and political regime
- Durable reserve portfolio with total proved reserve life in 10-12 year range

Measurement Criteria

- Total Proved Reserves
- Total Production
- Total Proved Reserve Life Index

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How We Measure It for the Grid

Size and Diversification: In mapping reserves and production, size is implicitly a major rating factor for evaluating the integrated companies and their reserve bases. Larger companies tend to be rated higher than smaller companies. They benefit from greater asset diversification, financial resources and liquidity, and economies of scale. They can withstand shocks or downturns better than smaller firms. Size also tends to strongly correlate with other positive characteristics such as operating success, longevity, and diversification, whether it is geographic, by commodity, by price realizations, etc.

The large integrated companies tend to operate in more geographic areas and geologic basins, providing significant protection from a range of industry conditions such as lower commodity prices, downstream margin squeezes, unexpected internal or political disruptions to operations, quality or basis (location) differentials that affect realized prices, rising oil field service or other cost inputs, and so on.

Large companies typically have evolved through many years of successful organic growth, often aided by mergers and acquisitions. Much of the impetus behind industry consolidation is the competitive advantage and ability of companies to partner and compete with host governments and national oil companies, with a larger capital base to support expensive multi-year projects. In analyzing reserves and production, size implicitly incorporates a degree of diversification, but our assessments also factor in a host of diversification characteristics on a qualitative basis.

Proved Reserves: Proved reserves represent a store of current and future value that can be quantified and compared among companies. For credit purposes, we rely only on proved reserves, in line with industry lending practices and conservatism in evaluating debt protection (as opposed to equity valuation, which focuses on upside growth potential). Proved reserves are estimated by petroleum engineers who are either company employees or external reserve engineers. For financial reporting, reserve estimates are generally prepared annually and disclosed as supplements to the financial statements.

Proved reserves come from known reservoirs and can be produced with "reasonable certainty" under current pricing and technological operating assumptions. They can be subdivided into proved developed (PD) and proved undeveloped (PUD) reserves, with the latter distinguished by differences in the timing, certainty of production, and required capital to bring undeveloped reserves into production.

Proved developed reserves (PDs) are produced from existing wells. As producing assets, they provide the greatest degree of certainty and cash flow protection for debt service and re-investment in existing production and new reserves. Proved undeveloped reserves (PUDs) provide a lesser degree of certainty and cash flow protection. They carry higher geological risks and require capital spending to become PD cash generating assets. PD reserves typically constitute upwards of 70% of proved reserves for integrated companies. A notable trend over the past decade is that PUDs have increased as a relative share of total proved reserves, particularly as a result of longer cycle times on large multi-year projects.

Because integrated companies generally have larger internal capital resources, balance sheets, and longer investment horizons than the independent E&P companies, an increase in the proportion of PUDs is a somewhat less critical issue, albeit still very germane. The inclusion of PD reserves in proved reserve analysis can distort or overstate a company's real reserve and production growth prospects, at least in the near-term.

Production Profile: Production is the source of current cash flow and, in contrast to reserves, can be measured very accurately via regular reporting of revenues and volumes in the financial statements. Assessing a company's production and sources of projected growth is essential to judging credit risk. As with reserves, large production is a distinguishing characteristic for the integrated companies. They typically have a mature and diversified base of stable cash generating fields that underpins drilling programs and capital investment. Companies usually can project production out three to five years with some degree of visibility based on current development projects and identified discoveries.

These profiles are typically disclosed publicly, albeit in varying degrees of detail by management. However, many variables and assumptions are involved, and the farther out a projection extends, the less certain the

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ultimate outcome. For the majors, production growth beyond 1% - 3% per year represents a significant challenge given the immense size of their asset bases.

The depletion profile of a producing property also needs to be well understood to assess cash flow coverage, reserve life, and re-investment risk. For example, a company could have a short-lived reservoir with a high decline rate (as is the case in much of the Gulf of Mexico or most unconventional gas), a longer-lived field with several years of plateau production and a long tail, or a heavy oil field with mature long-lived production and a lower present value. A balance of different production profiles can thus be an important form of diversification.

While familiarity with a company's reserves and production at a point in time is important, we evaluate companies dynamically and not from a static perspective. We are more focused on trends over a multi-year period, looking at the overall trends in reserves and production, whether they are generally increasing or decreasing and the reasons why, as well as the volatility of production and cash flow.

Reserve Life Index (RLI): The RLI measures a company's asset and cash flow durability based on its proved reserves and production. The RLI is measured in years. In theory, it measures how long a company can produce hydrocarbons at current rates, until reserves are depleted. RLI assumes no replacement of reserves. It can be measured on a BOE basis, or for either oil or natural gas, or on a total proved or PD basis. A longer proved reserve life generally indicates more capital investment flexibility and better production support for debt service. With a longer RLI, a company has more flexibility to reduce capital investment and ride out a period of low prices without seriously impairing its asset base.

For RLI, we look at the length of the reserve life and the trend in the RLI. In contrast to the independent E&Ps, where we focus on PD RLI, the integrated companies are mapped to total RLI, partly because they have larger capitalizations and longer investment cycles. They also have other sources of cash flow to support investment, such as free cash flow generated by the downstream and cash from periodic asset sales.

Nevertheless, the PD RLI is a valuable metric for a closer look at asset life and cash flow durability. PUDs require substantial future capital to develop. The PD RLI measures only the proved developed reserves and thus provides a clearer indication of true reserve durability absent further investment. The RLI does not address reserve quality and it needs to be analyzed in relation to other reserve characteristics. For example, a long total proved RLI could indicate increasing PUD bookings, which effectively lengthens reported total RLI, since total current production is measured against undeveloped reserves that are not producing.

Factor 1 Mapping: Reserves & Production Characteristics

	Aaa	Aa	A	Baa	Ba	B	Caa
Average Daily Production (Mboe/d)	> 2,750	1,100 to 2,750	550 to 1,100	140 to 550	55 to 140	27 to 55	< 27
Proved Reserves (Million boe)	> 10,000	5,000 to 10,000	2,000 to 5,000	500 to 2,000	100 to 500	30 to 100	< 30
Total Proved Reserve Life (Yrs)	>13	11 to 13	9 to 11	7 to 9	5 to 7	3 to 5	0 to 3

Rating Factor 2: Re-Investment Risk (10% Weight)

Why it Matters

A petroleum company's oil and gas reserves are finite and deplete with every barrel produced. To survive, a company must reinvest substantial capital consistently and successfully over a long period of time to discover new reserves and to replace and increase production. Otherwise, its reserves and market value will dwindle and the company will eventually liquidate. This ties in directly with the use of RLI as a mapped metric.

Re-investment risk focuses on the consistency and repeatability of a company's reserves replacement and how economically it can replace production, as measured by unit finding and development (F&D) costs. A company that consistently replaces oil and gas production with fresh reserves and can do so at competitive costs will be more likely to survive commodity downcycles and service its debt over long periods of time. For

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cost structure, unit F&D costs have a significant impact on a company's future profitability, competitive position, and ability to function throughout high and low commodity price scenarios. Unit F&D costs also become a key input to capital efficiency measures, as discussed in the next section.

Positive Rating Indicators

- Consistent reserve replacement from all sources in excess of 100%
- Competitive F&D costs at or below industry averages
- Successful execution of reserve replacement strategies and integration of acquired reserves
- Reserves acquisitions at competitive prices and successful integration into upstream strategy

Measurement Criteria

- Three-year all sources reserve replacement
- Three-year all sources finding and development (F&D) cost

How We Measure it for the Grid

Reserve Replacement Ratio: Reserve replacement measures drilling or operating success. It is the ratio of reserves added in a given year to that year's production. At the highest level, reserve replacement starts with all of the potential sources of replacement ("all sources"), which include extensions and discoveries (E&D), revisions (both upward and downward), and acquisitions. All-sources reserve replacement can be further deconstructed into organic or "drill-bit" replacement, which includes only E&D and revisions and excludes acquisitions. In mapping ratings, we view 100% replacement from all sources as a minimum cut-off point for investment grade, since a company is liquidating if it is not replacing reserves.

Looking at the sources of replacement can help pinpoint the quality and success of a company's drilling efforts over time and can shed light on key reserve attributes and the effectiveness of capital invested. It is important to understand the nature of the reserve changes and management's underlying assumptions, which are not always clear from public disclosures. A pattern of extensions and upward revisions could mean that exploration and development are progressing as planned and point to conservatism in reserve booking practices. Frequent downward revisions could indicate liberal booking practices, reservoir performance issues, unduly optimistic development assumptions, or changing economic conditions.

Price-driven revisions also need to be assessed. The standard practice in the past was to estimate year-end reserves based on year-end commodity prices, held constant for the life of the reserves. Effective for the 2009 reporting year, under revised SEC guidelines, companies will begin to use the 12-month average price in calculating reserves for a given year. Moody's looks at the sensitivity of a company's reserves to changes in commodity prices, especially if prices are unusually high at the calculation date. International reserves are often subject to a production sharing agreements (PSA) or contracts (PSC). These contracts are structured to return more barrels to the host country when oil and gas prices increase, resulting in negative reserve revisions (and reduced production volumes), even though cash flows may not be affected. The contracts also provide a floor or recovery mechanism when oil prices are low, resulting in positive reserve revisions.

While acquisitions add to reserves and bear particular risks, organic replacement is generally viewed as a more reliable indicator of reserve success. Companies that develop their own properties are often perceived as better able to "control their destiny" since they do not depend on acquisitions at any given time. Acquisitions also introduce a level of event risk, which is reflected in financing methods and the price paid for reserves, with their impact on cost structure and asset returns. For most of the integrated oil companies, niche and corporate acquisitions have typically played a major role in reserve replacement, reflecting myriad opportunities. Reliance on acquisitions also reflects the increasingly difficult challenge of replacing reserves. Ultimately, whether a company follows organic or acquisition strategies, the key issue is whether it create a durable oil and gas portfolio at reasonable cost.

Analysis of reserve replacement also involves qualitative factors such as the geographic and geologic fit in the portfolio, the level of developed and undeveloped reserves, and the economic value of the new reserves. Most

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of the major integrations have built large legacy land or field positions that provide economies of scale and require greater technical knowledge. Adding reserves in the same area can play to these advantages, while step-outs into an entirely new area can increase operating, technical and competitive risks. For creditors, developed reserves represent more value than undeveloped reserves, which require capital investment and typically a longer time horizon. Factors such as reserve life, basis differentials, price realizations, and operating costs also affect field valuations. Replacing light sweet oil production with lower value heavier or sour oil reserves is not as good as adding reserves of a similar or higher quality.

Finding & Development Costs (Replacement Costs) per BOE: F&D cost is a unit measure of the total costs invested or incurred to add and develop a barrel of new reserves to the point of production. The lower a company's F&D costs, the more profitable its operations will be in a wider range of price environments. F&D costs are subject to numerous variables, including the complexity and size of the reservoir, reserve booking practices, timing issues such as development approvals, and the length of the development cycle. "All Sources" unit F&D costs are calculated by dividing total costs incurred (acquisitions + exploration + development + goodwill booked in corporate E&P acquisitions) by total BOE reserve additions. Costs incurred are disclosed as part of the FAS 69 supplementary information, while acquisition goodwill is generally disclosed in the financial statements. "Drill-bit" replacement is a more stringent cost measure limited to exploration and field extensions and excluding acquisitions. We map F&D costs from all sources on a three-year average, as with reserve replacement, which is more representative of longer lead-times and the development cycle, the "lumpiness" of reserves bookings, and the large mergers and acquisitions undertaken to address organic growth challenges.

Factor 2 Mapping: Re-investment Risk

	Aaa	Aa	A	Baa	Ba	B	Caa
3-year all-sources Reserve Replacement	> 150%	130% to 150%	110% to 130%	100% to 110%	80% to 100%	60% to 80%	< 60%
3-year all-sources F&D (\$/boe)	< \$9	\$9 to \$11	\$11 to \$13	\$13 to \$15	\$15 to \$18	\$18 to \$22	> \$22

Rating Factor 3: Operating & Capital Efficiency (15% Weight)

Why it Matters

Operating and capital efficiency measures are key both to management and to investors in the petroleum industry, which is fundamentally a commodity business. No single company controls the price for the crude oil and natural gas it sells or, for that matter, the margins on its refined products. To achieve competitive returns, a company has to maintain a lean cost structure and control both its cash operating and capital costs, while optimizing the capital invested. The petroleum industry is also highly capital-intensive, so strong returns are critical to attracting low-cost debt and equity capital. While many of the integrated companies have the cash flow and the financial wherewithal to fund capital spending internally, they frequently need to rely on external debt and equity capital, particularly to finance larger acquisitions and mergers.

The methodology maps two factors to measure capital efficiency: one for the consolidated operations and one that focuses only on the upstream. A company's total return is captured by pre-tax consolidated return on capital employed (ROCE). ROCE remains a useful consolidated return measure since both upstream and downstream operations contribute to earnings but have very different return characteristics. Total ROCE reflects the impact of capital structure and the debt and equity elements of financing for the entire enterprise, and encompasses the large amounts of capital invested not only in the upstream, but also in refining, marketing, pipelines, chemicals and other businesses.

However, given the predominant concentration of value in exploration and production, we also look at a company's full-cycle costs and the leveraged full-cycle ratio to measure upstream cost structure and capital efficiency. The full-cycle ratio links cash operating costs to the ongoing capital invested in replacing reserves. It shows the cash margin generated for each dollar invested over a cycle in the development effort. Put another way, the full-cycle ratio measures the cash-on-cash return produced by each barrel, or how much

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cash a company generates in excess of its cost of replacing reserves. The leveraged full-cycle ratio is especially meaningful when analyzed at different points in the industry commodity price cycle, and is useful in assessing company's capital efficiency relative to its peers'.

Positive Rating Indicators

- Competitive Full-Cycle cost structure
- Leveraged Full-Cycle Ratio at 2x and even higher in a robust commodity price environment

Measurement Criteria

- Consolidated ROCE
- Leveraged Full-Cycle Ratio (Cash Margin per BOE/Three-Year Avg. F&D)

How We Measure it for the Grid

ROCE: Pre-tax ROCE is a consolidated (rather than segment) return measure earned on all of a company's sources of capital. EBIT (the numerator) is divided into total capital employed. EBIT is adjusted to exclude minority interest expense and extraordinary or non-recurring items. Total capital employed (the denominator) includes total debt and equity sources such as minority interests, deferred taxes and cumulative foreign exchange translation adjustments. Debt includes Moody's standard adjustments such as operating leases, debt guarantees, unfunded pension liabilities, and other items. Capital employed is an average of the current and prior year to attempt to reflect flow items that change the balance sheet during the year.

Leveraged Full-Cycle Ratio: The leveraged full-cycle ratio encompasses the company's current cash operating margin and its 3-year-average F&D costs, capturing the operating and capital elements over a multi-year investment cycle. The company's cash margin per BOE (production revenues less production and other cash costs including interest expense) is divided by its 3-year all-sources average F&D costs. Unit production costs include operating, gathering and processing, well maintenance, facility and equipment costs, direct administrative expenses and production taxes. Production costs determine the ability to operate profitably in a given price environment and can vary significantly depending on the type of reserves being produced and a company's inherent efficiency. The lower a company's embedded production and F&D costs, the more profitable and cash generative it will be in different price environments, allowing for reinvestment in growth.

Because production revenues generate the cash margin component, the ratio is also highly sensitive to increasing and decreasing commodity prices and oil and gas quality differentials. In general, a full-cycle ratio that remains above 1.0X during periods of weak commodity prices would be viewed positively, because the company is generating at least \$1.00 for every dollar spent over the cycle. In more robust pricing environments the cash return should be significantly higher, reflecting higher cash margin realizations.

The full-cycle ratio for an integrated company is not directly comparable to those of independent E&Ps. For the integrations, we allocate to the upstream operations all of the interest, selling, general and administrative expenses (SG&A), and other costs of the full enterprise. In reality, other business segments such as refining, marketing and chemicals can bear leverage and could be allocated a portion of the costs. This unallocated approach is punitive relative to the pure E&P approach since it overstates the upstream cost burden. As a result, mapping ranges for the integrated companies are lower than for the E&Ps. It does, however, point up the robustness of the integrations' cash margins, since these fully burdened production barrels still generate very solid full-cycle ratios.

Factor 3 Mapping: Operating & Capital Efficiency

	Aaa	Aa	A	Baa	Ba	B	Caa
*Return on Capital Employed (ROCE 3-year average)	>30%	25% to 30%	20% to 25%	15% to 20%	15% to 10%	5% to 10%	<5%
Leveraged full-cycle ratio	>4x	2.5x to 4.0x	1.75x to 2.5x	1.0x to 1.75x	0.5x to 1.0x	0.25x to 0.5x	<0.25x

Note:

* EBIT/Average Capitalization (incl. debt)

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Rating Factor 4: Downstream Rating Factors (15% Weight)**Why it Matters**

We generally view a stand-alone refining company as having high business risk since it is dependent on highly volatile refining margins, with marketing activities usually providing a degree of offset and somewhat greater stability to the downstream profile. However, on an integrated basis, we consider downstream activities as supportive to an integrated petroleum company's business risk profile. They provide diversification and, to some degree, a hedge against crude oil price movements; economies of scales; and the opportunity to capture the complete value chain via integration of upstream production with downstream refining, distribution and marketing. Therefore, the scale and efficiency of refining and marketing assets are essential to our credit assessment of integrated oil companies.

Positive Rating Indicators

- Large-scale downstream operations
- Limited dependence on a small number of facilities
- Strong operating efficiency

Measurement Criteria

- Total crude distillation capacity (thousands of barrels per day, or bpd)
- Number of refineries with capacity greater than 100,000 bpd
- Segment Return on Capital Employed

How We Measure it for the Grid

Crude distillation capacity is a good proxy for the scale of the overall downstream operations. Most of the integrated companies also have sizable retail marketing operations that are closely integrated with their refining systems. Size is critically important since it typically implies economies of scale in a business with high fixed costs, and provides opportunities to leverage critical mass to benefit from supply synergies. Scale also tends to imply diversification for companies with a number of large refineries and an extensive chain of retail outlets. Conversely, other measures such as market share, while sometimes useful, may not adequately reflect a company's bargaining clout in highly commoditized markets.

We map the number of refineries with a capacity over 100,000 bpd as a proxy for the point at which refining facilities demonstrate greater efficiency. We count each refinery that is greater than 100,000 bpd, whether wholly or partly owned. The operating resilience afforded by a large number of facilities with good geographic distribution is an important factor in determining a company's ratings, as it mitigates the impact of potential temporary disruptions caused by shutdowns for maintenance, upgrading or accidents.

Downstream ROCE measures the company's ability to generate consistent profits from its asset base through industry cycles. Downstream ROCE therefore provides valuable insight into operating efficiency as well as the quality of the refining and marketing assets. However, the downstream ROCE assessment can be affected by different accounting standards or reporting measures, thus reducing comparability.

Factor 4 Mapping: Downstream Rating Factors

	Aaa	Aa	A	Baa	Ba	B	Caa
Total Crude Distillation Capacity ('000 bpd)	> 3,000	2,000 to 3,000	1,000 to 2,000	500 to 1,000	250 to 500	50 to 250	< 50
# of Refineries with Capacity > 100 M bpd	> 15	9 to 15	6 to 8	3 to 5	2	1	0
*Segment ROCE (3-year average)	> 25 %	20% to 25%	15% to 20%	12% to 15%	7% to 12%	5% to 7	<5%

Note:

*Downstream EBIT/Average Downstream Capital Employed

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Rating Factor 5: Financial Metrics (Weight 40%)

Why it Matters

Financial ratios measure a company's existing debt burden, its capacity to incur additional debt and its balance sheet flexibility. Because integrated companies are in essence a portfolio of medium- to long-term projects, their fundamental business risk profiles tend to be more favorable than many other rated industries. Excluding the potential impact of event risk, credit metrics for investment-grade issuers are therefore unlikely to change very rapidly.

A key focus is the company's ability to generate cash to service its debt. Another consideration is how conservative is the capital structure. Low or moderate financial leverage provides a company with flexibility to absorb shocks or credit events, such as a sharp decline in crude oil prices or refining margins, production disruptions, or M&A activity. M&A has been a common feature for the petroleum industry, with companies prone to enter into corporate transactions to offset declining reserves and to spur production growth. The credit impact of an acquisition will depend on the company's existing capital structure, the size of the target, its asset quality and cash flow characteristics, and funding structure used.

Positive Rating Indicators

- Strong cash flow in relation to the amount of debt outstanding
- High interest coverage
- Lower indebtedness relative to the level of reserves
- Conservative capital structure

Measurement Criteria

- Retained cash flow / Net debt
- EBIT/ Interest Expense
- Gross debt / Total proved reserves
- Gross debt / Total capital

How We Measure it for the Grid

The RCF to net debt ratio is a key measure of a company's ability to repay debt from internal cash flow. It measures cash flow generation before working capital movements but after dividends. Integrated companies in general pay generous dividends and rarely reduce them except in cases of significant stress. This metric also does not take into account share repurchases, which must be factored in separately in relation to the company's overall capital needs and free cash flow generation.

The EBIT/ Interest Expense coverage ratio assesses a company's current earnings and cash flow protection by measuring its ability to pay ongoing interest and other fixed charges such as rental expenses. It is a key element of default probability.

The gross debt to total proved reserves ratio measures both financial leverage and asset protection, based on the company's reserves as a principal store of value. It is useful in capturing a company's likely future ability to generate revenues out of its current asset base to cover its indebtedness. An alternative metric that takes in the cost of extracting those reserves (i.e. looking at the proper value of the assets) would be a debt to standardized measure of discounted future net cash flow ratio, as disclosed in the supplemental oil and gas information in the financial statements.

Although gross debt to capital is not an ideal metric, since it can be affected by accounting differences, it does provide a straightforward measure of financial leverage to compare the capital structure of companies operating within a sector. Managements frequently use it to track targeted leverage and as such it can be an indicator of management's financial policies, including its tolerance for debt.

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Some of the financial ratios used in this methodology are presented on a gross debt basis and some others on a net debt basis (i.e. gross debt less cash and cash equivalents). In fact, we take both measures into consideration. Many of the integrated oil companies carry large cash balances, some arising from free cash generation and managed in tandem capital need and shareholder returns. Other companies, as in Europe, tend to hold considerable liquidity rather than rely on bank lines. In addition, many European companies with large US dollar-denominated assets and revenues prefer to fund in foreign currency to hedge foreign currency exposures, despite having surplus local currency cash. In such cases, we will also consider net debt.

Factor 5 Mapping: Financial Metrics

	Aaa	Aa	A	Baa	Ba	B	Caa
Retained Cash Flow/Net Debt (3-year average)	> 60%	40% to 60%	30% to 40%	20% to 30%	10% to 20%	5% to 10%	< 5%
EBIT/Interest Expense (3-year average)	>20x	15x to 20x	8x to 15x	3x to 8x	2x to 3x	1x to 2x	<1x
Gross Debt / Total Proved Reserves	<\$3.50	\$3.50 to \$4.50	\$4.50 to \$5.50	\$5.50 to \$6.50	\$6.50 to \$7.50	\$7.50 to \$10.00	> \$10.00
Gross Debt/Capital	<25%	25% to 35%	35% to 45%	45% to 55%	55% to 65%	65% to 75%	> 75%

For illustrative purposes, this methodology report maps historical ratios. In our actual rating assessment, we consider both historical and, more importantly, projected ratios. The weighting between management target ratios and actual financials will reflect our confidence in management's capacity to deliver on the planned projects and the assumptions on which a company's business plan is built. Moody's rates through periods of low and high commodity prices and seeks to assess the sustainability of a company's financial profile in a range of conservative commodity price margin environments.

Rating Factor 6: Government Fiscal Dependence

Why It Matters

Oil and natural gas companies are almost unique in the role they play as very large dependable cash flow generators for governments in both low and high commodity price environments. This is particularly true in some emerging countries where the government depends heavily on the petroleum sector as its primary or only significant source of fiscal revenues and where highly favorable reserve characteristics result in lower F&D costs and generally lower production costs, in contrast to more mature basins where the most attractive hydrocarbon prospects have already been drilled and produced. The integrated peer group includes a number of NOCs that are the primary generators of fiscal revenues and hard currency for their governments. These companies tend to map very highly on most grid factors due to their enormous oil and gas reserves, low geological risk and finding costs, or low financial leverage.

However, a key credit offset is that these companies pay out large portions of their cash flow via royalties, dividends, special taxes, and direct contributions to government development funds. Often these companies are a major source of employment and play a key role in providing social services or carrying out government social policies and subsidies for key products such as gasoline or heating oil. In some emerging market countries, private companies can share many of the characteristics noted above for national oil companies, with the same result: high grid scores on factors 1-5 that are offset to some degree by factor 6.

The ratings of such companies factor in the government's heavy fiscal dependence and the social role the company plays, often to the detriment of its ability to reinvest internally and preserve its financial flexibility. Usually, the government does not have any ready alternatives to heavy dependence on the company, since the economy is not sufficiently diversified, or tax collections from the non-oil sector are limited.

To capture some of these considerations that arise from the unique role of the petroleum sector in some countries, we include an additional rating factor, Government Fiscal Dependence. This factor is not weighted, but is applied as a notching down of the grid-indicated outcome generated by Factors 1-5. While all companies are evaluated under Factor 6, the result is no down notching for many companies and the greatest

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impact occurs for state-owned companies that are key sources of funding for government activities and/or which are directed to spend on social policies that do not directly support the company's business activities.

Many of the companies in this sector have no down notching for Factor 6. Such companies may provide significant royalties, income or petroleum taxes but are not differentially singled out and do not dominate the government's tax revenues. Their fiscal contributions are limited to royalties, income and certain petroleum taxes, and are subject to an established and transparent fiscal regime that rarely changes and is consistently applied. Their contributions are generally not critical for government revenues, as is the case within a large diversified economy.

At the other end of the spectrum are national oil companies such as PEMEX or PDVSA, which are notched down by six and nine notches, respectively. In both cases, the government depends on the state oil company for a large share (PEMEX) or almost all of its fiscal revenues (PDVSA) to fund its budget and social spending programs. The companies are also called on to advance social programs and services outside the oil sector.

It is important to note that Factor 6 focuses only on the negative impact of government fiscal policies and practices, including reliance upon the oil and gas sector for funding government activities. The methodology grid factors 1-6 do not attempt to capture all risks. The grid does not directly incorporate country risk factors such as the behavior of political regimes, the stability, predictability and reliability of legal systems, and the strength or weakness of protections for private property rights. Our ratings do incorporate these considerations, which can have an impact of several rating notches in some cases,

Factor 6: Government Fiscal Dependence	Zero to Three Notch Shading	Four to Six Notch Shading	Seven to Nine Notch Shading
Government Fiscal Dependence	Standard tax mechanisms (royalties/income) are consistently applied; generally benign government involvement. Mature and predictable governance.	Government relies heavily upon the petroleum sector as a source of funding or as a spending vehicle to pursue social policy goals. High taxation or other mechanisms for government to drain substantial funds from the oil company. There may be some risk of unpredictable government actions that have a negative credit impact on oil companies.	Government relies very heavily upon the petroleum sector as a source of funding or as a spending vehicle to pursue social policy goals. High taxation or other mechanisms for government to drain substantial funds from the oil company with likelihood that funds will be extracted even in periods in which the oil company's free cash flow is diminished. There may be significant risk of unpredictable government actions that have a negative credit impact on oil companies.

Other Considerations and Qualitative Factors

Geographic/Geopolitical Risk Diversification

Why it Matters

Geographic and geopolitical risk diversification considerations are crucial in assessing a company's credit risk and are primary areas of focus in our analysis. However, given the broad range of factors and ways of assessing diversification and the extent to which it is implicitly encompassed in size and scale, we have not included it as a weighted factor in the methodology grid.

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The degree to which an integrated oil company's assets are geographically diversified can have a significant impact on its rating. Considering the huge investments required to develop remote oil and gas reserves, the political stability of a region can be an overriding factor in assessing a company's financial health. Generally speaking, the greater an issuer's exposure to a particular region (in terms of both producing assets and reserves), the more important that region becomes in the overall analytical process.

Due to the complexity and variety of factors that determine a company's geopolitical risk exposure, we make geopolitical risk assessments on a case-by-case basis, which will have varied effects on different companies operating in the same region. There is also no readily quantifiable method to determine the degree of rating discount arising from over-exposure to a particular region. One company's relations to a particular government may be superior or inferior to those of another. Another company may be more concentrated in a particular region through a long-term investment program that will require longer pay-back periods than a company that is already reaping the rewards of past investments.

Positive Rating Indicators

- A well balanced, geographically diversified portfolio of producing and developing assets
- Clear and transparent concession and ownership regimes, preferably with a dominance of direct equity ownership in concessions and production sharing agreements (PSAs)
- A solid track record of uninterrupted activities in various core regions

Notes on Measurement Criteria

Factoring country-specific risk exposure into oil and gas credit ratings examines a wide range of factors, including the following:

- Large regional or single country exposures (high, medium or low) or asset concentration by production, reserves and investments
- Mitigation via a well-diversified portfolio of producing and growth regions
- Issuer-specific factors that could increase or decrease regional risk such as established track record in the region, whether assets are predominantly offshore or onshore, the region or governments reliance on international oil companies for resource development
- Factors inherent to a region that add an element of credit risk to the issuer (e.g. lack of liquidity due to undeveloped domestic banking market, limitations on corporate governance and transparency of specific funding structures and corporate ownership structures)
- Moody's view of the risks inherent to a specific country

Event Risk

Another important rating factor is the possibility that an unexpected event could lead to a sudden and sharp decline in an issuer's fundamental creditworthiness. Event risk can include corporate mergers and large asset acquisitions, capital restructuring programs such as large share repurchases, and litigation. The most significant event risk among integrated oil and gas companies has been mergers and acquisitions activity since the mid-1990s, which has resulted in consolidation of the sector and the creation of the large international super-majors. Such transactions do not necessarily result in ratings downgrades. In fact most were neutral-to-positive for the surviving entities, as the transactions were financed with equity and created more diversified companies with larger reserve bases and more global reach. While the sector has engaged in aggressive share repurchases during periods of flush free cash flow, these actions have not tended to affect ratings, although they can crimp financial flexibility when the industry cycle turns. Adverse litigation impacts also arise periodically as a result of industrial accidents, environmental contamination and other events. We review these on a case by case basis and tend to react and reflect them in company ratings only when there is a good deal of certainty around timing and potentially adverse results.

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Assumptions, Limitations and Rating Considerations not included in the Grid

The rating methodology grid incorporates a trade-off between simplicity that enhances transparency and greater complexity that would enable the grid to map more closely to actual ratings. The six rating factors we have identified do not constitute an exhaustive treatment of all the considerations important for ratings of global integrated oil and gas companies.

In choosing metrics for the methodology grid, we did not include certain qualitative factors that are important for companies in any industry, such as the quality and experience of management, assessments of corporate governance, and the quality of financial reporting and information disclosure. Because the assessment of these factors can be highly subjective, placing them by rating category in a grid would suggest too much precision in the relative ranking of a particular issuer.

Ratings may also take into consideration other factors such as regulatory and litigation risk that are difficult to quantify or that are only relevant in differentiating credit quality in some cases. While these are important considerations, it is not possible to precisely express them in a methodology grid without making it excessively complex and less transparent.

Ratings may also reflect circumstances in which a particular factor is weighted more heavily than is suggested by the grid. For example, financial leverage could take on more importance, particularly in the wake of a large acquisition. This variation in weighting can also apply to factors that we chose not to include in the grid. For example, liquidity considerations could be critical in discriminating between two issuers with a similar credit profile. Ratings can be heavily affected by extremely weak liquidity that magnifies default risk. However, two similar companies might be rated the same if their only differentiating feature is that one has a good liquidity position while the other has an extremely good liquidity position. This illustrates some of the limitations in relying solely on grid-indicated ratings to predict rating outcomes.

In addition, our ratings incorporate expectations for future performance, while the financial information used to illustrate the grid mapping is mainly historical. In some cases, our expectations for future performance may be informed by confidential information that we cannot publish. In other cases, we estimate future results based upon past performance, industry trends, demand and price outlook, competitor actions and other factors. In either case, predicting the future is subject to the risk of substantial inaccuracy. Assumptions that can cause our forward looking expectations to be incorrect include unanticipated changes in the macroeconomic environment and general financial market conditions, industry competition, new technology, and regulatory actions.

Conclusion: Summary of the Grid-Indicated Rating Outcomes

The methodology grid-indicated ratings, including the impact of Factor 6, based on last twelve month financial data as of December 31, 2008, map to current assigned ratings as follows (see Appendix B for the details):

- 3 companies map to their assigned rating
- 8 companies are within 1 notch and 9 are within two alpha-numeric notches of their assigned rating
- 2 company has a grid-indicated rating that is three notches from its assigned rating

Overall, the framework indicates that there are more companies whose grid-indicated rating is above their actual rating (11) than below their actual rating (7). This can be attributed to a variety of factors including: (a) expectations that a weaker global economy will create downward pressure on certain ratings that have not yet been reflected in historical metrics; (b) grid metrics do not capture our expectation of higher leverage associated with acquisition or other event risk related factors; (c) sovereign risk considerations; and (d) liquidity concerns are not fully captured by the grid.

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Appendix A: Global Integrated Oil & Gas Methodology Factor Grid

Global Integrated Oil & Gas Industry - Mapping Grid

Rating Factors and Sub-factors	Aaa	Aa	A	Baa	Ba	B	Caa	Sub-factor Weighting
Factor 1: Reserves & Production Characteristics								
Average Daily Production (Mboe/d)	> 2,750	1,100 to 2,750	550 to 1,100	140 to 550	55 to 140	27 to 55	< 27	8.0%
Proved Reserves (Million boe)	> 10,000	5,000 to 10,000	2,000 to 5,000	500 to 2,000	100 to 500	30 to 100	< 30	12.0%
Total Proved Reserve Life (Yrs)	>13	11 to 13	9 to 11	7 to 9	5 to 7	3 to 5	0 to 3	5.0%
						Total Weighting		25.0%
Factor 2: Re-investment Risk								
3-year all-sources Reserve Replacement	> 150%	130% to 150%	110% to 130%	100% to 110%	80% to 100%	60% to 80%	< 60%	5.0%
3-year all-sources F&D (\$/boe)	< \$9	\$9 to \$11	\$11 to \$13	\$13 to \$15	\$15 to \$18	\$18 to \$22	> \$22	5.0%
						Total Weighting		10.0%
Factor 3: Operating & Capital Efficiency								
*Return on Capital Employed (ROCE 3-year average)	>30%	25% to 30%	20% to 25%	15% to 20%	15% to 10%	5% to 10%	<5%	5.0%
Leveraged full-cycle ratio	>4x	2.5x to 4.0x	1.75x to 2.5x	1.0x to 1.75x	0.5x to 1.0x	0.25x to 0.5x	<0.25x	5.0%
						Total Weighting		10.0%
Factor 4: Downstream Rating Factors								
Total Crude Distillation Capacity ('000 bpd)	> 3,000	2,000 to 3,000	1,000 to 2,000	500 to 1,000	250 to 500	50 to 250	< 50	5.0%
# of Refineries with Capacity > 100 M bpd	> 15	9 to 15	6 to 8	3 to 5	2	1	0	5.0%
**Segment ROCE (3-year average)	> 25%	20% to 25%	15% to 20%	12% to 15%	7% to 12%	5% to 7%	<7%	5.0%
						Total Weighting		15.0%
Factor 5: Financial Metrics								
Retained Cash Flow/Net Debt (3-year average)	> 60%	40% to 60%	30% to 40%	20% to 30%	10% to 20%	5% to 10%	< 5%	10.0%
EBIT/Interest Expense (3-year average)	>20x	15x to 20x	8x to 15x	3x to 8x	2x to 3x	1x to 2x	<1x	10.0%
Gross Debt / Total Proved Reserves	<\$3.50	\$3.50 to \$4.50	\$4.50 to \$5.50	\$5.50 to \$6.50	\$6.50 to \$7.50	\$7.50 to \$10.00	> \$10.00	10.0%
Gross Debt/Capital	<25%	25% to 35%	35% to 45%	45% to 55%	55% to 65%	65% to 75%	> 75%	10.0%
						Total Weighting		40.0%

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Global Integrated Oil & Gas Industry - Mapping Grid

Rating Factors and Sub-factors	Aaa	Aa	A	Baa	Ba	B	Caa	Sub-factor Weighting
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Factor 6: Government Fiscal Dependence

	Zero to Three Notch Shading	Four to Six Notch Shading	Seven to Nine Notch Shading
Government Fiscal Dependence	Standard tax mechanisms (royalties/income) are consistently applied; generally benign government involvement. Mature and predictable governance.	Government relies heavily upon the petroleum sector as a source of funding or as a spending vehicle to pursue social policy goals. High taxation or other mechanisms for government to drain substantial funds from the oil company. There may be some risk of unpredictable government actions that have a negative credit impact on oil companies.	Government relies very heavily upon the petroleum sector as a source of funding or as a spending vehicle to pursue social policy goals. High taxation or other mechanisms for government to drain substantial funds from the oil company with likelihood that funds will be extracted even in periods in which the oil company's free cash flow is diminished. There may be significant risk of unpredictable government actions that have a negative credit impact on oil companies.

Note:

* EBIT/Average Capitalization (incl. debt)

** Downstream EBIT/Average Downstream Capital Employed

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Appendix B: Methodology Grid-Indicated Ratings

Issuer	Senior Unsecured or Corporate Family Rating	Grid-Indicated Rating (Factors 1 to 5)	Grid-Indicated Rating (Factors 1 to 6)	Factor 1: RESERVE AND PRODUCTION CHARACTERISTICS (25%)		Factor 2: RE-INVESTMENT RISK (10%)		Factor 3: OPERATING & CAPITAL EFFICIENCY (10%)		Factor 4: DOWNSTREAM RATING FACTORS (15%)			Factor 5: FINANCIAL METRICS (40%)				Factor 6:	
				Total Proved Reserves (12%)	Avg Daily Production (8%)	Total Proved Reserve Life (5%)	3-Year All-Sources Reserve Replacement (5%)	3-Year All-Sources F & D Cost (5%)	Return on Capital Employed (ROCE) (5%)	Leveraged Full-Cycle Ratio on 3-year All-Sources F&D Cost (5%)	Total Crude Distillation Capacity (5%)	# Refineries with Capacity > 100 M bpd (5%)	Segment ROCE (5%)	Retained Cash Flow / Net Debt (10%)	EBIT / Interest Expense (10%)	Debt / Total Proved Reserves (10%)	Debt / Total Capital (10%)	Government Fiscal Dependence
Exxon Mobil Corporation	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	A	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	0
BP plc	Aa1	Aa2	Aa2	Aaa	Aaa	Aa	A	Aa	A	Aa	Aa	Aa	Ba	Aa	A	Aaa	Aa	0
Chevron Corporation	Aa1	Aa2	Aa2	Aaa	Aa	Aa	Ba	B	Aa	Aa	Aa	A	A	Aaa	Aaa	Aaa	Aaa	0
Royal Dutch Shell Plc	Aa1	Aa3	Aa3	Aaa	Aaa	A	A	Ba	Aa	A	Aaa	Aaa	A	Aaa	Aa	A	Aa	0
TOTAL S.A.	Aa1	Aa3	Aa3	Aaa	Aa	Aa	Baa	Baa	Aaa	A	Aa	Aa	Aa	Aaa	Aa	Aa	A	0
ENI S.p.A.	2 - 4 (Aa1-Aa3)*	A1	A1	Aa	Aa	A	A	B	Aaa	A	Baa	Aa	Ba	Aaa	Aaa	Baa	A	0
ConocoPhillips	A1	Aa2	Aa2	Aa	Aa	Aa	Aaa	B	Aa	A	Aa	Aa	Aaa	Aaa	Aa	Aa	Aa	0
BG Energy Holdings Ltd	A2	A1	A1	A	A	A	Aa	Ba	Aaa	A	Ba	B	Aaa	Aaa	Aa	Aaa	Aaa	0
Statoil	5 - 7 (A1-A3)*	A1	A1	Aa	Aa	Baa	B	Caa	Aaa	A	Ba	Baa	N/A	Aaa	Aaa	Aa	Aa	0
Marathon Oil Corporation	Baa1	A3	A3	Baa	Baa	Baa	Ba	Caa	Aaa	Baa	A	Baa	A	Aaa	Aaa	B	Aa	0
Petroleo Brasileiro S.A. - PETROBRAS	8 (Baa1)*	A1	Baa1	Aaa	Aa	Aaa	B	B	Aa	A	Aa	A	Caa	Aaa	A	Aaa	A	3
Repsol YPF S.A.	Baa1	Baa2	Baa3	A	A	Ba	Caa	Caa	Baa	Caa	A	A	Aa	Aa	Baa	B	A	1
OAD LUKOIL	Baa2	Aa2	A3	Aaa	Aa	Aaa	Baa	Aaa	Aa	Baa	A	A	A	Aaa	Aaa	Aaa	Aaa	4
TNK-BP International Ltd.	Baa2	Aa2	A3	Aa	Aa	Aaa	Aa	Aaa	Aaa	Baa	Baa	Baa	Aaa	Aa	Aa	Aaa	Aa	4
OMV AG	9 (Baa2)*	Baa2	Baa2	Baa	Baa	A	Caa	Caa	Baa	Ba	Baa	Ba	Caa	Aa	A	Baa	Aa	0
Ecopetrol S.A.	10 (Baa3)*	A2	Baa1	Baa	Baa	Baa	B	Ba	Aaa	Aa	Ba	B	A	Aaa	Aaa	Aaa	Aaa	2
Gazprom Neft JSC	Baa3	Aa2	A3	A	A	Aaa	Aa	Aa	Aaa	Baa	Baa	Baa	Aaa	Aaa	Aaa	Aaa	Aaa	4
OJSC Oil Company Rosneft	11 (Ba1)*	A1	Baa2	Aaa	Aa	Aaa	Aaa	Aaa	Baa	Aa	A	A	B	A	Baa	Aaa	A	4
Petroleos Mexicanos	11 (Ba1)*	A2	Ba2	Aaa	Aaa	A	Caa	A	Aaa	Aaa	A	A	Caa	Aaa	A	Aaa	Caa	6
OJSC Gazprom	11 (Ba1)*	Aa3	Baa2	Aaa	Aaa	Aaa	Baa	Aaa	Baa	Baa	Baa	Baa	Aaa	Aaa	A	Aaa	Aa	5
YPF Sociedad Anonima	Ba1	A3	Baa3	Baa	A	Ba	Caa	Caa	Aa	Caa	Ba	Ba	A	Aaa	Aa	Aaa	Aa	3
Petroleos de Venezuela, S.A. (PDVSA)	14 (B1)*	Aa1	Ba1	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aaa	Aa	Caa	Aaa	Aaa	Aaa	Aaa	9

Notes:

* Numerical rating and rating in parenthesis reflect baseline credit assessment per Moody's Methodology for Government-Related Issuers.

Data as of December 31, 2008

Ratings at November 2009

Green: Positive Outliers - grid-indicated outcome on a specific sub-factor is at least two broad rating categories higher than the actual rating assigned.

Red: Negative Outliers - grid indicated outcome on a specific sub-factor is at least two broad rating categories lower than the actual rating assigned.

Global Integrated Oil & Gas Industry

Appendix C: Observations and Outliers for Grid Mapping

Factor 1: Reserves & Production Characteristics (25%)					
Issuer	Senior Unsecured or Corporate Family Rating	Outlook	Total Proved Reserves (12%)	Avg Daily Production (8%)	Total Proved Reserve Life (5%)
Exxon Mobil Corporation	Aaa	Stable	Aaa	Aaa	Aaa
BP plc	Aa1	Stable	Aaa	Aaa	Aa
Chevron Corporation	Aa1	Stable	Aaa	Aa	Aa
Royal Dutch Shell Plc	Aa1	Stable	Aaa	Aaa	A
TOTAL S.A.	Aa1	Stable	Aaa	Aa	Aa
ENI S.p.A.	2 - 4 (Aa1-Aa3)*	Negative	Aa	Aa	A
ConocoPhillips	A1	Stable	Aa	Aa	Aa
BG Energy Holdings Ltd	A2	Stable	A	A	A
Statoil	5 - 7 (A1-A3)*	Stable	Aa	Aa	Baa
Marathon Oil Corporation	Baa1	Stable	Baa	Baa	Baa
Petroleo Brasileiro S.A. - PETROBRAS	8 (Baa1)*	Stable	Aaa	Aa	Aaa
Repsol YPF S.A.	Baa1	Negative	A	A	Ba
OAo LUKOIL	Baa2	Stable	Aaa	Aa	Aaa
TNK-BP International Ltd.	Baa2	Stable	Aa	Aa	Aaa
OMV AG	9 (Baa2)*	Stable	Baa	Baa	A
Ecopetrol S.A.	10 (Baa3)*	Stable	Baa	Baa	Baa
Gazprom Neft JSC	Baa3	Stable	A	A	Aaa
OJSC Oil Company Rosneft	11 (Ba1)*	Stable	Aaa	Aa	Aaa
Petroleos Mexicanos	11 (Ba1)*	Stable	Aaa	Aaa	A
OJSC Gazprom	11 (Ba1)*	Stable	Aaa	Aaa	Aaa
YPF Sociedad Anonima	Ba1	Stable	Baa	A	Ba
Petroleos de Venezuela, S.A. (PDVSA)	14 (B1)*	Stable	Aaa	Aaa	Aaa

Notes:

* Numerical rating and rating in parenthesis reflect baseline credit assessment per Moody's Methodology for Government-Related Issuers.

Data as of December 31, 2008

Ratings as November 2009

Green: Positive Outliers - grid-indicated outcome on a specific sub-factor is at least two broad rating categories higher than the actual rating assigned.

Red: Negative Outliers - grid indicated outcome on a specific sub-factor is at least two broad rating categories lower than the actual rating assigned.

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Factor 1: Observations and Outliers

The mapped ratings for reserves and production correlate strongly with the credit ratings of the integrated oil peer group. A substantial proportion of the industry's reserves are concentrated with the majors and NOCs, reinforcing the benefits of scale, asset and cash flow durability, and geographical and basin diversification. This trend has only intensified with the industry consolidation that has taken place over the past decade. The most notable positive outliers are virtually all the NOCs or partly privatized state companies, including PEMEX, Rosneft, PDVSA, Petrobras, and Gazprom, as well as LUKOIL and TNK BP. Their large reserve bases and long RLIs almost all map to Aaa or Aa, reflecting the unmatched national resources under their control, but also sizable "immature" reserves in need of capital investment and development expertise. The main source of ratings divergence for these companies, of course, is the downward pull of political and other sovereign-related issues that affect their actual ratings.

Factor 2: Re-Investment Risk (10%)

Issuer	Senior Unsecured or Corporate Family Rating	Outlook	3-Year All-Sources Reserve Replacement (5%)	3-Year All-Sources F & D Cost (5%)
Exxon Mobil Corporation	Aaa	Stable	A	Aaa
BP plc	Aa1	Stable	A	Aa
Chevron Corporation	Aa1	Stable	Ba	B
Royal Dutch Shell Plc	Aa1	Stable	A	Ba
TOTAL S.A.	Aa1	Stable	Baa	Baa
ENI S.p.A.	2 - 4 (Aa1-Aa3)*	Negative	A	B
ConocoPhillips	A1	Stable	Aaa	B
BG Energy Holdings Ltd	A2	Stable	Aa	Ba
Statoil	5 - 7 (A1-A3)*	Stable	B	Caa
Marathon Oil Corporation	Baa1	Stable	Ba	Caa
Petroleo Brasileiro S.A. - PETROBRAS	8 (Baa1)*	Stable	B	B
Repsol YPF S.A.	Baa1	Negative	Caa	Caa
OAO LUKOIL	Baa2	Stable	Baa	Aaa
TNK-BP International Ltd.	Baa2	Stable	Aa	Aaa
OMV AG	9 (Baa2)*	Stable	Caa	Caa
Ecopetrol S.A.	10 (Baa3)*	Stable	B	Ba
Gazprom Neft JSC	Baa3*	Stable	Aa	Aa
OJSC Oil Company Rosneft	11 (Ba1)*	Stable	Aaa	Aaa
Petroleos Mexicanos	11 (Ba1)*	Stable	Caa	A
OJSC Gazprom	11 (Ba1)*	Stable	Baa	Aaa
YPF Sociedad Anonima	Ba1	Stable	Caa	Caa
Petroleos de Venezuela, S.A. (PDVSA)	14 (B1)*	Stable	Aaa	Aaa

Notes:

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Data as of December 31, 2008

Ratings at November 2009

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Factor 2: Observations and Outliers

For re-investment risk, as measured by all-sources reserve replacement and F&D costs, most of the integrated peer companies show a moderate to significant negative divergence between mapped and actual company ratings. This reflects two of the larger themes affecting the integrations, namely the increasing difficulty of replacing and growing reserves, and the higher costs arising both from inflationary pressures and the challenging long cycle projects.

To an extent it can be argued that 100% replacement is sufficient to maintain a company's reserve and production profile, especially for the large integrated and NOCs, with the upper ranges of the metric only accomplished via mergers and acquisition. In fact, reserve replacement is a metric for which size, diversification and large unbooked or undeveloped resources mitigate cycle time and depletion risk. On an all-sources basis, most of the peer companies have maintained or even grown reserves, largely supported by mergers and reserve acquisitions. However, organic replacement results are much less favorable. Core production for many of the companies is concentrated in mature older basins in North America and the North Sea. The key challenge is to maintain or even grow production at competitive unit costs. Furthermore, while technological advances have led to improved recovery rates, depletion rates have also increased and exacerbated the reserve replacement challenge. In addition, the industry has faced ever-increasing costs from inflationary pressures in tight energy markets.

The closest correlation on reserve replacement and F&D costs for the mapped ratings are ExxonMobil and BP, the latter having benefited from significant reserve additions from its TNK-BP joint venture, which also enjoys low capital costs. Most of the remaining companies show poor correlation between mapped and actual ratings, reflecting the reserve access challenge and the long-cycle projects with "lumpy" reserve additions. In addition, these metrics are measured in three-year cycles, while the industry reality is closer to seven years for large complex projects. The notable positive outliers are some of the NOCs such as Gazprom, Rosneft and PDVSA, reflecting large untapped resources with relatively low geological risk, which means that reserves can be added at low cost, while government fiscal dependence and negative sovereign risk weigh on their actual ratings.

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Factor 3: Operating & Capital Efficiency (10%)

Issuer	Senior Unsecured or Corporate Family Rating	Outlook	Return on Capital Employed (ROCE) (5%)	Leveraged Full-Cycle Ratio on 3-year All-Sources F&D Cost (5%)
Exxon Mobil Corporation	Aaa	Stable	Aaa	Aaa
BP plc	Aa1	Stable	A	Aa
Chevron Corporation	Aa1	Stable	Aa	Aa
Royal Dutch Shell Plc	Aa1	Stable	Aa	A
TOTAL S.A.	Aa1	Stable	Aaa	A
ENI S.p.A.	2 - 4 (Aa1-Aa3)*	Negative	Aaa	A
ConocoPhillips	A1	Stable	Aa	A
BG Energy Holdings Ltd	A2	Stable	Aaa	A
Statoil	5 - 7 (A1-A3)*	Stable	Aaa	A
Marathon Oil Corporation	Baa1	Stable	Aaa	Baa
Petroleo Brasileiro S.A. - PETROBRAS	8 (Baa1)*	Stable	Aa	A
Repsol YPF S.A.	Baa1	Negative	Baa	Caa
OAO LUKOIL	Baa2	Stable	Aa	Baa
TNK-BP International Ltd.	Baa2	Stable	Aaa	Baa
OMV AG	9 (Baa2)*	Stable	Baa	Ba
Ecopetrol S.A.	10 (Baa3)*	Stable	Aaa	Aa
Gazprom Neft JSC	Baa3*	Stable	Aaa	Baa
OJSC Oil Company Rosneft	11 (Ba1)*	Stable	Baa	Aa
Petroleos Mexicanos	11 (Ba1)*	Stable	Aaa	Aaa
OJSC Gazprom	11 (Ba1)*	Stable	Baa	Baa
YPF Sociedad Anonima	Ba1	Stable	Aa	Caa
Petroleos de Venezuela, S.A. (PDVSA)	14 (B1)*	Stable	Aaa	Aaa

Notes:

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Data as of December 31, 2008

Ratings at November 2009

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Factor 3: Observations and Outliers

Capital return metrics generally map closely to the actual ratings. We note that ROCE is measured on a three-year average. The historical results benefited from the recent upcycle with robust upstream pricing and refining margins, and also from a period of extensive asset restructuring, both upstream and downstream. BP, with ROCE mapping to Baa, is one notable negative outlier to its Aa long-term rating, reflecting the downward pull of operating problems and low refining and marketing returns (this is also true for mapping on downstream ROCE), which the company has been addressing via extensive restructuring. RepsolYPF also remains a large negative outlier as it seeks to streamline and reposition its upstream operations, which are highly exposed to Latin America and mature low-yielding resources there.

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The leveraged full cycle ratio does not strongly correlate, given rising industry cost structures and longer project life cycles. While it maps mainly in line with the larger private integrations Royal Dutch Shell, and RepsolYPF are significant negative outliers. RepsolYPF's upstream returns have been affected by significant downward reserve revisions in 2006, compounded by low realization prices in Argentina. In the case of Royal Dutch Shell, upstream capital efficiency has been constrained by the company's recent strategic efforts to strengthen its reserve base by focusing on long cycle large scale projects, (e.g. unconventional and LNG) characterized by lumpy reserve bookings. Most of the positive outliers are the state-owned (or formerly state-owned) companies that benefit from low geological risk, higher cash margins and low F&D costs. It should be noted that inconsistencies in reporting and classification of unit costs such as production and SG&A costs can affect peer comparability.

Factor 4: Downstream Rating Factors (15%)

Issuer	Senior Unsecured or Corporate Family Rating	Outlook	Total Crude Distillation Capacity (5%)	# Refineries with Capacity > 100 M bpd (5%)	Segment ROCE (5%)
Exxon Mobil Corporation	Aaa	Stable	Aaa	Aaa	Aaa
BP plc	Aa1	Stable	Aa	Aa	Ba
Chevron Corporation	Aa1	Stable	Aa	A	A
Royal Dutch Shell Plc	Aa1	Stable	Aaa	Aaa	A
TOTAL S.A.	Aa1	Stable	Aa	Aa	Aa
ENI S.p.A.	2 - 4 (Aa1-Aa3)*	Negative	Baa	Aa	Ba
ConocoPhillips	A1	Stable	Aa	Aa	Aaa
BG Energy Holdings Ltd	A2	Stable	Ba	B	Aaa
Statoil	5 - 7 (A1-A3)*	Stable	Ba	Baa	N/A
Marathon Oil Corporation	Baa1	Stable	A	Baa	A
Petroleo Brasileiro S.A. -	8 (Baa1)*	Stable	Aa	A	Caa
Repsol YPF S.A.	Baa1	Negative	A	A	Aa
OAo LUKOIL	Baa2	Stable	A	A	A
TNK-BP International Ltd.	Baa2	Stable	Baa	Baa	Aaa
OMV AG	9 (Baa2)*	Stable	Baa	Ba	Caa
Ecopetrol S.A.	10 (Baa3)*	Stable	Ba	B	A
Gazprom Neft JSC	Baa3*	Stable	Baa	Baa	Aaa
OJSC Oil Company Rosneft	11 (Ba1)*	Stable	A	A	B
Petroleos Mexicanos	11 (Ba1)*	Stable	A	A	Caa
OJSC Gazprom	11 (Ba1)*	Stable	Baa	Baa	Aaa
YPF Sociedad Anonima	Ba1	Stable	Ba	Ba	A
Petroleos de Venezuela, S.A.	14 (B1)*	Stable	Aaa	Aa	Caa

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Global Integrated Oil & Gas Industry

Factor 4: Observations and Outliers

Total crude distillation capacity/Refineries with capacity > 100,000 bpd: Both of these scale-related metrics show relatively good correlation with the overall ratings for the public integrated and NOCs. Generally, the companies with the largest refining capacity are also the highest-rated. ENI and Statoil are negative outliers, while LUKOIL and PDVSA are positive outliers. ENI's low level of integration between upstream and downstream is partly offset by its involvement in regulated activities via Snam Rete Gas and its position as Italy's incumbent gas supplier. Statoil's small-scale downstream business is mitigated by its strong operating efficiency and financial metrics.

Segment ROCE: Downstream ROCE correlates or is a positive outlier for about half of the peer group, primarily among the private integrated companies during a strong refining upcycle. BP and ENI, however, are significant negative outliers. While the latter has a relatively smaller scale refining system, BP's significant underperformance reflects the major operational issues that have affected its U.S. refining capacity in 2005-2007. The NOCs – PEMEX, PDVSA, Rosneft and Petrobras - also register as significant negative outliers, in part reflecting the impact of price caps and other negative forms of regulation and taxation.

Factor 5: Financial Metrics Factors (40%)

Issuer	Senior Unsecured or Corporate Family Rating	Outlook	Retained Cash Flow / Net Debt (10%)	EBIT / Interest Expense (10%)	Debt / Total Proved Reserves (10%)	Debt / Total Capital (10%)
Exxon Mobil Corporation	Aaa	Stable	Aaa	Aaa	Aaa	Aaa
BP plc	Aa1	Stable	Aa	A	Aaa	Aa
Chevron Corporation	Aa1	Stable	Aaa	Aaa	Aaa	Aaa
Royal Dutch Shell Plc	Aa1	Stable	Aaa	Aa	A	Aa
TOTAL S.A.	Aa1	Stable	Aaa	Aa	Aa	A
ENI S.p.A.	2 - 4 (Aa1-Aa3)*	Negative	Aaa	Aaa	Baa	A
ConocoPhillips	A1	Stable	Aaa	Aa	Aa	Aa
BG Energy Holdings Ltd	A2	Stable	Aaa	Aa	Aaa	Aaa
Statoil	5 - 7 (A1-A3)*	Stable	Aaa	Aaa	Aa	Aa
Marathon Oil Corporation	Baa1	Stable	Aaa	Aaa	B	Aa
Petroleo Brasileiro S.A. - PETROBRAS	8 (Baa1)*	Stable	Aaa	A	Aaa	A
Repsol YPF S.A.	Baa1	Negative	Aa	Baa	B	A
OAO LUKOIL	Baa2	Stable	Aaa	Aaa	Aaa	Aaa
TNK-BP International Ltd.	Baa2	Stable	Aa	Aa	Aaa	Aa
OMV AG	9 (Baa2)*	Stable	Aa	A	Baa	Aa
Ecopetrol S.A.	10 (Baa3)*	Stable	Aaa	Aaa	Aaa	Aaa
Gazprom Neft JSC	Baa3*	Stable	Aaa	Aaa	Aaa	Aaa
OJSC Oil Company Rosneft	11 (Ba1)*	Stable	A	Baa	Aaa	A
Petroleos Mexicanos	11 (Ba1)*	Stable	Aaa	A	Aaa	Caa
OJSC Gazprom	11 (Ba1)*	Stable	Aaa	A	Aaa	Aa
YPF Sociedad Anonima	Ba1	Stable	Aaa	Aa	Aaa	Aa
Petroleos de Venezuela, S.A. (PDVSA)	14 (B1)*	Stable	Aaa	Aaa	Aaa	Aaa

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Factor 5: Observations and Outliers

In general, financial metrics tend to be closely correlated with actual ratings but are showing as positive outliers as a result of strong cash flow and earnings protection in the recent industry upcycle.

Retained Cash Flow/Net Debt as a measure of debt protection is strongly correlated with actual ratings but also ranks as a positive outlier for 12 of the companies, most notably for the NOCs because of their lower ratings and the impact of sovereign risk on actual ratings. The only notable negative outlier is Ecopetrol with an indicated Caa, resulting from large special dividends tied to its restructuring and public float. Gross Debt/Total Proved Reserves maps closely to actual ratings in a few cases but comes out as a positive outlier for most of the companies, particularly given the large reserve bases and low actual ratings of the NOCs. However, RepsolYPF shows up as a clear outlier mainly as a result of the large downward reserve revisions reported in 2006. Gross Debt/Total Capital is not the most relevant metric we look at in measuring leverage, but it is useful in gauging leverage and often is how companies define their own leverage targets for investors. It shows a relatively good correlation with overall ratings, as the highest-rated companies have the lowest debt to capital ratios. PEMEX is a negative outlier, driven by low cash flow retention due to taxes, which results in negative or minimal book shareholders equity.

Global Integrated Oil & Gas Industry

Appendix D: Global Integrated Oil Industry Overview

The integrated oil and gas industry encompasses the full range of activities from exploration for reserves through refining and product marketing. The “upstream,” involves exploration, development and production of oil, natural gas and gas liquids. Along the integrated chain, the companies put their oil and gas production through the downstream, which involves refining, distribution, trading and wholesale and retail marketing of refined products. Many of the companies also engage in “mid-stream” businesses such as natural gas gathering and processing of gas liquids, petrochemical manufacturing, and energy marketing.

The industry has high barriers to entry in terms of capital, technological and drilling expertise, and required international skills. The major integrated companies are long-established players, and, in an industry characterized by mergers and consolidations over the last two decades, the only significant new players been national oil companies, who are able to parlay a country's resources into joint ventures with experienced explorers and developers. The NOCs have become savvy participants as well as head-to-head competitors in both the upstream and downstream

The oil and gas industry is exposed to commodity price risk. Crude oil and refined products are commodities priced and traded in US dollars on a global basis. Producers and refiners are “price takers” due to conditions of oversupply, lack of OPEC discipline, and industry competition. Consequently, economies of scale and cost competitiveness are critical to profitability. Natural gas, in contrast, is more regionalized in its production (except in liquefied form) and sales patterns and market penetration are limited by pipeline access and physical proximity. The industry is also highly cyclical, following global and regional patterns of economic growth and product demand. We aim, as much as possible, to rate companies “through the cycle,” which means that at any given point in time, a company's rating could look too high or low or might not correlate closely with its financial measures.

In general, the upstream operations have the greatest store of value and highest returns, with cash flow and earnings primarily exposed to commodity price swings and a continuing need to re-invest substantial amounts to replace depleting reserves. A company must spend consistently and successfully over a long-period of time to replace and grow its production base. Otherwise, its reserves and market value will dwindle and the company will eventually liquidate.

The downstream is also a capital intensive, high volume and revenue generating business but is a lower return thin-margin segment, subject to thin margins, volatile price swings on crude inventories, and competitive pressures that rarely support high prices at the pump for very long. However, as the industry periodically emerges from elevated spending cycles, the downstream can generate sizable cash flows, as was the case in 2006-2008. The retail part of the business includes service stations networks and, increasingly, convenience stores and fast food outlets.

Public scrutiny of the downstream is intense on both the pricing and environmental fronts, with refining and marketing the source of most of the industry's costliest environmental problems. Environmental regulation is also subject to change, and the mandated spending cycles the industry faces are crucial to staying in business but rarely make any capital return. For these reasons, most downstream participants, large and small, have restructured to reduce capital employed or to joint-venture these operations.

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Appendix E: Key Rating Issues Over the Intermediate Term

Sustainability of Higher Oil and Gas Prices

Historically, oil and gas prices have been cyclical, rising and falling with economic activity and shifting supply and demand. Crude oil and natural gas prices reached near record levels in mid-2008 leading to strong, often record, earnings and cash flow for the integrated companies, but have since sharply corrected in line with the downturn in the global economy. In spite of these cycles, prices over time have tended to revert to mean levels. The key question with this recent cycle is whether prices have made a structural upward shift, especially given the role played by financial players in commodity markets and the run-up in natural gas supplies and new gas sources. This is critical to the profitability and cash returns of higher-cost long-cycle projects and the investments undertaken, and to the sustainability of higher capital spending levels. In line with the recent upcycle and higher planning prices used by the major oil companies, we are evaluating companies using somewhat higher prices than we have historically used; however, it is not clear whether the industry's fundamental credit quality has improved.

Ability to Replace Reserves and Grow Production

The integrated oil & gas companies are finding it increasingly challenging to replace reserves and grow production, especially via the drill-bit, or organic replacement. The larger the companies become, the more difficult it is to replace existing reserves organically. The oil and gas industry, particularly in North America and the North Sea, is largely mature, with virtually all major basins in decline. As conventional oil and gas opportunities become scarcer, companies are drilling in ever deeper waters offshore, expanding exploration and development activities internationally, and focusing more on unconventional natural gas reservoirs, gas-to-liquids (GTL) and oil sands, all of which introduce geological, technology and execution risk. In the process, the cycle time and costs for projects are lengthening.

Reserves Access and Resource Nationalism

Resource nationalism, which has restricted access for the private oil companies to equity reserves in the Middle East, Russia and Mexico, among other locales, is exacerbating the reserves replacement challenge. Governments have reserved some of the most prospective resource areas for the benefit of their populations and national oil companies, and in other cases increased taxes and royalties and renegotiated the terms of oil and gas licenses. These pressures and events increase in periods of rising prices. However, many of these countries and state companies need the capital and technology provided by the private integrated companies. The recent commodity price collapse is likely to improve the bargaining position of the majors with the NOCs and host governments, although resource nationalism will remain a challenge as the companies seek to maintain a role in these countries.

Increasing Cost Structures

As commodity prices have increased, companies' capital and operating cost structures have come under considerable pressure. On the operating side, they are drilling deeper and longer wells, often horizontally, and employing more technically complex completion techniques, all of which are adding to higher capital costs. Higher acquisition costs have increased costs, many made at historically high prices, and capital costs inflated because of increased competition among producers for drilling rigs, workover and completion rigs, and other oilfield services. Cash operating costs also escalated, including production and severance taxes, electricity, gas compression and supplemental recovery such as thermal and carbon dioxide flooding. When commodity prices decline significantly, the returns and investment plans for companies with higher cost structures and investments in plays such as oil sands and non-conventional gas are pressured. However, industry cost structures also tend to deflate in a lower price environment as activity levels and composition for resources and labor abates. Another longer term issue will be increasing decommissioning costs as companies will be faced with larger bills when exiting mature or depleted basins.

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More Difficult Refining Cycle

Until the economic collapse in 2008, global economic growth increased the demand for refined products to historically high levels, but without commensurate increases in refining capacity. Most of the growth in demand was driven by China, India and other developing economies. As a result, refining margins trended up on average. In addition, as oil and gas prices increased, the spread between light and heavy crudes widened because of the relative scarcity of lighter oils as global oil production has become heavier. Refiners able to process heavy sour crudes also benefited from the shortage of capacity to convert the heavier oils into light products such as gasoline. These trends were undone, or at least repressed by the economic collapse. While economic growth in Asia, Latin America and the Middle East is expected to support demand growth as the global economy emerges from the downturn, supply overhangs and refinery expansion that includes conversion capacity in the U.S., Asia and the Middle East will continue to pressure industry margins and returns in the years ahead.

Industry Consolidation

Despite the mega-mergers that have taken place since the late 1990s, (e.g. Exxon and Mobil, BP and Amoco, Total, Fina and Elf, Chevron and Texaco, Conoco and Phillips), we expect to see continued consolidation in the industry, driven primarily by reserve replacement pressures and the need to diversify geographically. Event risk, particularly around acquisitions, will continue to be a ratings consideration. Furthermore, the industry is likely to show an increased level of co-operation between the private integrated companies and the NOCs in the form of joint-ventures and developments, although tempered by resource nationalism and political risk considerations.

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Related Research

Rating Methodologies:

- Global Independent Exploration and Production (E&P) Industry, December 2008 (113606)
- Revised Policy with Respect to Country Ceilings, November 2005 (95051)
- Piercing the Country Ceiling: An Update, January 2005 (91215)

Industry Outlook:

- Global Integrated Oil, June 2009 (118297)

Company Analyses:

- BP Plc, October 2009 (120389)
- OAO LUKOIL, October 2009 (120537)
- OJSC Gazprom, September 2009 (120357)
- ENI S.p.A., July 2009 (118928)
- Gazprom Neft JSc, February 2009 (114434)
- TNK-BP, February 2009 (114660)
- ConocoPhillips, October 2008 (111883)
- OMV AG, September 2008 (109338)

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Author(s)

Thomas Coleman

Production Specialist

Cassina Brooks

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