

## NYT Shale Gas Allegations Seem Exaggerated

27 June 2011

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### ■ NYT article makes harsh allegations toward shale gas E&P companies

Citing industry emails, public statements & analyst reports, an NYT article alleges that natural gas producers are 1) running a “Ponzi Scheme” as shale gas economics do not work; 2) overstating EURs and understating decline rates; & 3) exaggerating shale gas resource potential. While we agree shale gas economics are certainly challenged due to low prices, we believe the story is unduly harsh, and does not address the enormous supply growth in shale gas the last few years.

### ■ We believe the article’s allegations are overstated and misleading

The article did not address how shale gas development has contributed to extraordinary production and reserve growth over the past few years. In addition, we highlight that 1) the material resource potential from the gas shales are supported by studies from several independent organizations; 2) proved reserve growth is audited by independent reservoir engineers; and 3) surge in M&A in US shale gas plays attest to viability of the resource potential.

### ■ Challenged shale gas economics at current gas price levels...nothing new

The allegation that shale gas economics are challenged at current price levels is certainly not new and we largely agree. With perhaps the exception of the Marcellus & core Haynesville & Fayetteville, we believe prices of \$5.50-\$6.00/Mcfe are required to earn attractive returns. The decline in shale gas rig count (ex- Marcellus) & shift to oily plays over the last 18 months supports this view.

### ■ We prefer oil-weighted E&Ps: Discounting \$5.05/MMBtu and mid-\$70/Bbl

Our top E&P picks are oil-weighted APC, NBL, OXY, & APA.

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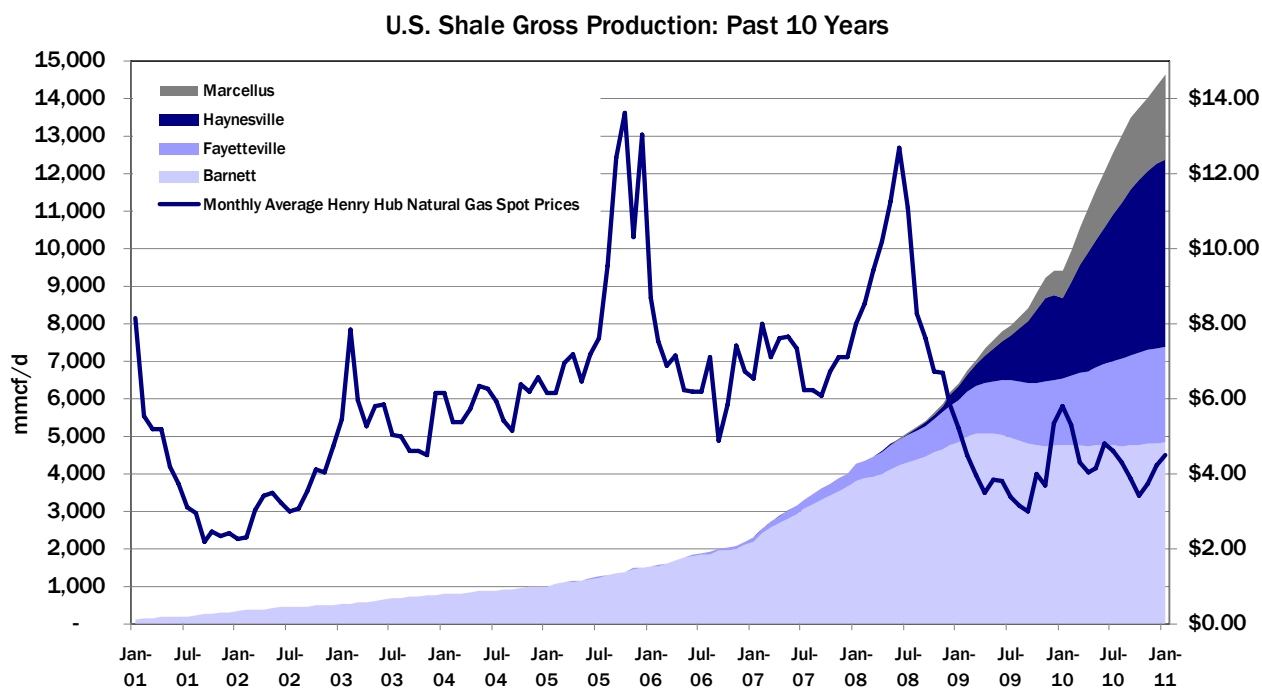
## Why we believe the allegations and inferences made in the NYT article are overstated and misleading

**The front page Sunday New York Times article posed harsh allegations regarding E&P companies with natural gas unconventional shale resources citing sources from hundreds of industry emails, internal documents and research analyst reports.** The article cites a source who alleges that natural gas companies are running a “Ponzi Scheme” by overstating well production and understating steeper than expected decline rates. In one of the supporting documents to the article, the natural gas companies were compared to Enron in that they mislead the investment community in per well reserve recovery (EUR) and hide the lower EURs by drilling more wells. In addition, numerous testimonials made by individual geologists questioning the viability of shale gas plays were also included. Amongst publications written by research analysts, the article included findings made in a study done by Art Berman, who alleged that shale producers overstated recoverable resources per well. We do not consider research from Mr. Berman new as he has been crusading against data supporting vast shale gas resources for years, despite supply and productivity continuing to exceed expectations.

**We believe the allegations and inferences made in the NYT article were exaggerated and offer no specific or credible source and context.** We believe the article ignored the substantial growth in proved reserves and production as verified by independent reservoir engineers, Energy Information Administration data, and numerous independent organizations outlined below. Moreover, the article does not address how the rise of shale gas reversed the trend of last decade’s sharply rising natural gas price, sending gas prices plummeting in 2008-10 under the weight of much greater than expected production growth . . . despite a lower than expected rig count. We offer our views on some of the allegations made in the article below:

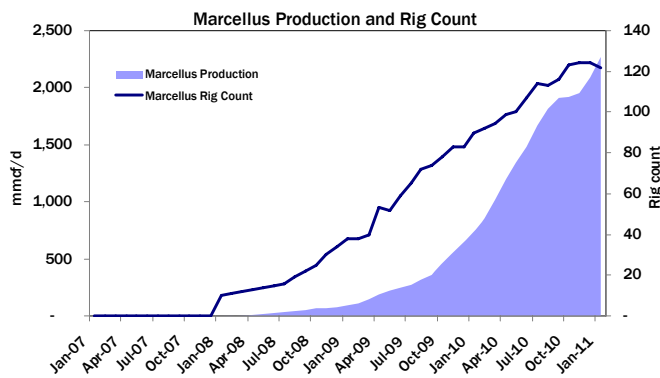
- (1) The article did not address the extraordinary amount of reserve and production growth driven by shale gas development since 2004.** US natural gas production was flat to declining before more widespread use of hydraulic fracturing and horizontal drilling unlocked significant shale gas resource potential starting in the Barnett Shale in 2004. Since then, the industry has discovered/unlocked vast shale gas resources in a number of very large shale plays, including the Haynesville, Fayetteville and Marcellus Shales. Virtually unheard of at the turn of the millennium, a surge in shale gas development has enabled production from shales to account for ~20% of total domestic production from less than 1% in 2000. Notably, production growth continues to surge despite low natural gas prices (as a result of oversupply) and a reduced gas rig count. In the Haynesville, production has continued to trend up (as inferred from Louisiana state production data) despite a rig count in the play that has roughly halved from its peak level in May 2010, underscoring improved efficiency and well productivity. This is obviously quite a contrast from comments in the NYT article stating producers have overstated per well EURs and understated depletions rates.

Exhibit 1: US Shale Gas Production – Past Ten Years



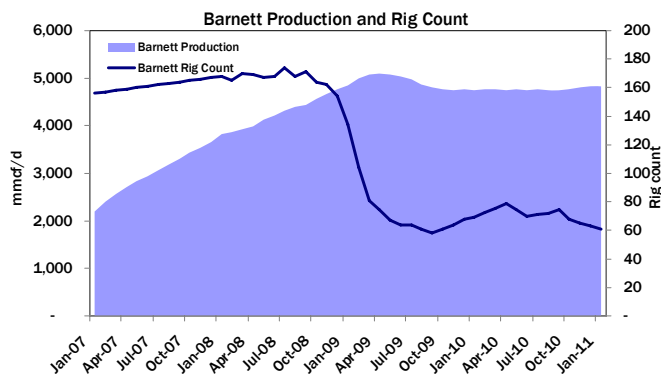
Source: IHS Data, Company data, and UBSe

Exhibit 2: Marcellus Production vs. Rig Count



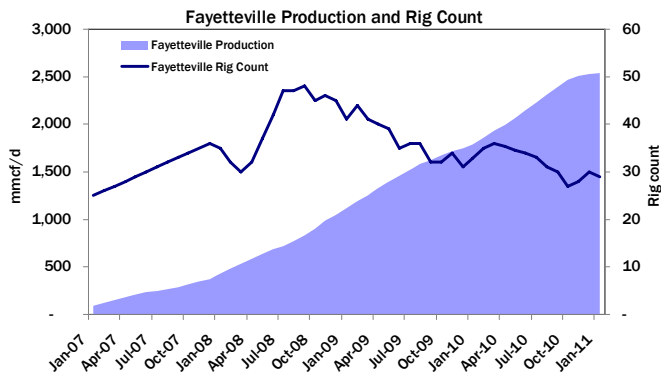
Source: IHS Data, Company data, and UBSe

Exhibit 3: Barnett Production vs. Rig Count



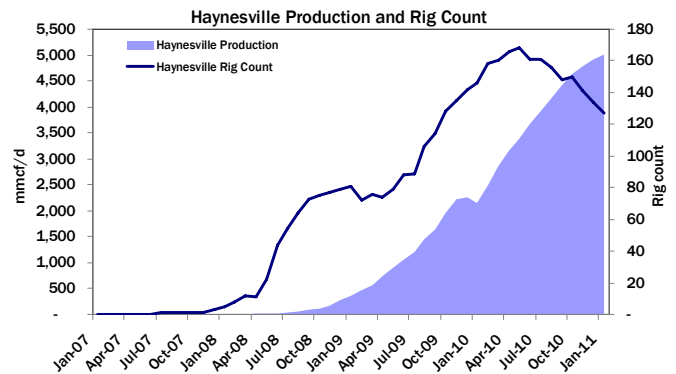
Source: IHS Data, Company data, and UBSe

Exhibit 4: Fayetteville Production vs. Rig Count



Source: IHS Data, Company data, and UBSe

Exhibit 5: Haynesville Production vs. Rig Count



Source: IHS Data, Company data, and UBSe

- (2) While no one disputes that shale gas economics and reserve life certainly vary from trend-to-trend, county-to-county, and well-to-well, overall shale gas reserve growth in the EIA's annual reserve report has grown nearly three-fold since 2007 to over 60.6 Tcf as of year end 2009. In fact, we have been seeing consistent upward revisions to natural gas reserves since 2006 when the shale gas drilling boom began to accelerate in earnest outside of the Barnett. *The most recent report in 2009, the first year the EIA provided a separate breakout of shale gas reserves, included a net upward revision of +2.7 Tcf, implying better than expected well performance. This is notable as the upward revision occurred despite materially lower natural gas prices which are used to calculate year end reserves...implying that per well EURs and productivity actually exceeded the expectations of company managements and independent reservoir engineers. This is in direct contrast to the NYT article.*
- (3) Several independent organizations have published studies on US natural gas shale resources, and have separately come to the conclusion that US shale gas plays contain substantial resource potential. Amongst numerous independent studies, Cambridge Energy Research Associates (CERA) estimates shale gas production could account for 50% of US natural gas supply by 2035. Massachusetts Institute of Technology, in "The Future of Natural Gas" report published in June 2010, estimates the mean recoverable shale gas resource in the US at 650 Tcf, with low and high projections of 420 Tcf and 870 Tcf, respectively. Of the mean projection, approximately 400 Tcf could be economically developed with a gas price at or below \$6/MMBtu at the well-head. To put this number into prospective, 650 Tcf of recoverable resources from unconventional resources is alone ~2.4x current US proved natural gas reserves at year-end 2009 and could supply the US at current demand level for more than 25 years.
- (4) The E&P company annual reserve reports are generally audited or evaluated by independent reservoir engineering firms, such as

**DeGolyer and McNaughton, Netherland, Sewell, or Ryder Scott.** While the NYT articles imply companies are overstating per well reserves in gas shale plays, one could argue the article is also inferring that third-party independent reserve engineers are also signing off on misleading reserve data. Notably, the NYT article does not cite any independent reservoir engineering firms questioning the resource in gas shale plays.

- (5) **The industry has experienced a substantial amount of M&A activity over the last 2-3 years from very large sophisticated buyers, which should support the resource potential estimates and value creation from gas shale plays.** The international oil companies paid premiums to enter the US “Shale Rush” through either joint ventures with independent producers or more recently, outright asset purchases. Since 2008, asset sales through joint venture agreements have totaled \$23.2 billion and outright asset sale deals have totaled \$31.7 billion. Notably, this figure does not even include XOM’s ~\$40 billion purchase of XTO in 2010. We believe the sheer size of the deal volumes over the past 2-3 years underscores these well heeled buyers’ confidence in the resource potential in these US Shale gas plays.

#### Exhibit 6: Shale Gas Aggregate Transaction Value Since 2008

	Transaction Value (\$MM)					
	Marcellus Shale	Eagle Ford Shale	Haynesville Shale	Barnett Shale	Woodford Shale	Fayetteville Shale
Joint Ventures	\$8,013	\$5,064	\$4,205	\$2,250	\$1,750	\$1,900
Asset Sales	17,039	7,357	801	1,180	0	5,325
<b>Subtotal</b>	<b>\$25,053</b>	<b>\$12,421</b>	<b>\$5,006</b>	<b>\$3,430</b>	<b>\$1,750</b>	<b>\$7,225</b>

Source: company documents, IHS Herold

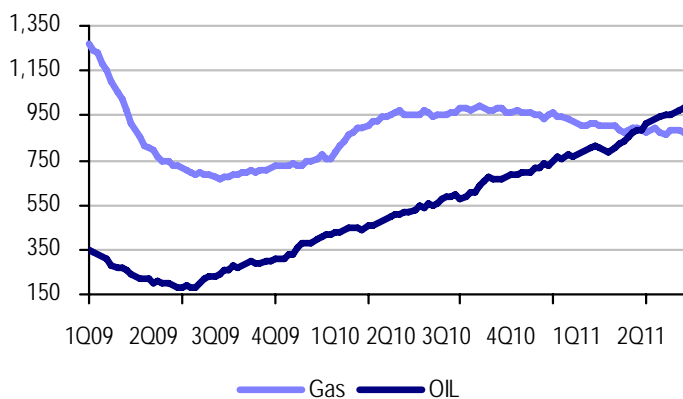
#### US natural gas shale economics: company actions highlight challenged returns

- **We agree with the NYT article that the economics of shale gas drilling are challenged at current price levels, but note that this view is a widespread commonly held belief amongst industry and the energy focused financial community.** In general, we believe the industry requires NYMEX natural gas prices at \$5.50-\$6.00/MMBtu to earn cost of capital returns. Company presentations that cite attractive rates of returns in shale (or other) plays at ~\$3.00/MMBtu level typically exclude the upfront cost of land/leasehold acquisition, midstream costs, as well as corporate G&A and overhead expenses. We believe the most economic U.S shale dry gas play at current price levels is the Marcellus, and note that much of the Fayetteville earns cost of capital returns as long as prices remain above \$4/MMBtu. Notably, recent M&A activity appears to back up the attractiveness of Marcellus economics. The only meaningful shale dry gas M&A activity YTD, aside from BHP’s acquisition of CHK’s Fayetteville stake, has been driven by Majors entering the Marcellus, specifically: 1) XOM’s 317,000 acre acquisition from Phillips earlier this month, and 2) CVX’s addition of ~714,000 net acres through the acquisitions of Atlas Energy which closed in 1Q and assets from Chief Oil and Gas which was announced in May.

■ **The trend in Lower-48 drilling activity over the past 3 years supports operators' and the market's view that oil plays offer more attractive returns than gas plays despite the abundance of low cost shale resources.**

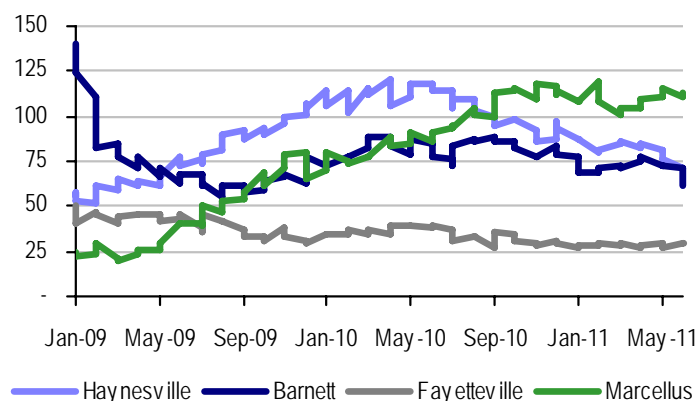
While certain operators continue to run rigs in plays economically challenged at current US natural gas price levels (notably the Haynesville) in order to hold acreage by production prior to lease expiry, the overall trend shows gas drilling levelling off throughout 2010 while the oil rig count continues to surge. This trend is likely to continue throughout 2011 and into next year as E&Ps continue to shift capital toward more economic oil and liquids-rich plays. In fact, in April of this year, the Lower-48 oil rig count surpassed the gas count for the first time in 16 years. Exhibit 7 below compares the Baker Hughes Lower 48 onshore oil rig count versus the gas rig count since 2009. The oil count stood at 1003 rigs as of Friday, while the natural gas count stood at 873, which aside from lower drilling activity in 2009 due to the price collapse brought on by the credit crisis, is the lowest seasonal level for late June since 2002. Furthermore, Exhibit 8 below shows the rig count for the four major shale gas plays. While the overall count is roughly flat since the beginning of 2009, the Marcellus rig count has increased over four-fold as E&Ps attempt to capture the superior economics while shifting capital away from the Haynesville, Barnett, and Fayetteville. This trend supports our belief that the Marcellus is the shale gas play which offers the best returns in the current depressed natural gas price environment, while the declining rig counts in the Haynesville and Barnett outline the relative unattractiveness of returns at current natural gas price levels.

Exhibit 7: Baker Hughes Lower-48 Onshore Gas vs. Oil Rig Count



Source: Baker Hughes

## Exhibit 8: Rig Count in the Big Four Shale Gas Plays



Source: Land Rig Newsletter and UBS estimates

## Who are the leading shale gas players?

With the high profile status of the NYT article, we would not be surprised to see a negative short term reaction in share prices of companies levered toward shale natural gas plays. Given our view that the most harsh allegations may be misleading and our view that the market is already well aware that dry gas shale economics are quite challenged with gas prices below \$4/MMBtu, we believe any material stock weakness resulting from the article could present a buying opportunity.

Although not exhaustive, Exhibit 9 below highlights companies with meaningful leverage to each of the major natural gas shale plays:

## Exhibit 9: Domestic Shale Gas Acreage Exposure – Big Four Plays

Barnett Shale	Acreage	Fayetteville Shale	Acreage	Haynesville Shale	Acreage	Marcellus Shale	Acreage
EOG	990,000	SWN	915,884	DVN	570,000	CHK	1,730,000
DVN	610,000	BHP	487,000	CHK	515,000	RRC	790,000
XOM	265,000	XOM	380,000	ECA	429,000	CVX	714,000
CHK	220,000	HK	142,000	HK	368,000	CNX/CONSOL	742,000
KWK	155,000	BP	135,000	BP	340,000	NFG	738,000
COP	110,000			RDS	300,000	RDS	650,000
PXD	70,000			XOM	215,000	Statoil	649,000
ECA	76,000			RDS	300,000	XOM	742,000
CRZO	52,000			EOG	183,000	UPL	260,200
				FST	169,000	APC	260,000
				APC	80,000	EOG	210,000
						SWN	173,009
						NFX	35,000

Source: Company documents and UBS estimates

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E&P companies are subject to risks associated with unexpected movements in volatile natural gas and crude oil prices, as well as the impact that political, economic, and meteorological events could impart. Moreover, E&P companies are subject to geologic risk (i.e., exploration risk).

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Buy	Buy	52%	41%
Neutral	Hold/Neutral	40%	37%
Sell	Sell	8%	20%
UBS Short-Term Rating	Rating Category	Coverage <sup>3</sup>	IB Services <sup>4</sup>
Buy	Buy	less than 1%	30%
Sell	Sell	less than 1%	17%

1:Percentage of companies under coverage globally within the 12-month rating category.

2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.

3:Percentage of companies under coverage globally within the Short-Term rating category.

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Source: UBS. Rating allocations are as of 31 March 2011.

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UBS 12-Month Rating	Definition
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Neutral	FSR is between -6% and 6% of the MRA.
Sell	FSR is > 6% below the MRA.
UBS Short-Term Rating	Definition
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<b>Apache Corporation</b> <sup>2, 4, 5, 6a, 16</sup>	APA.N	Buy	N/A	US\$115.98	24 Jun 2011
<b>Noble Energy, Inc.</b> <sup>2, 4, 5, 6a, 6b, 7, 16</sup>	NBL.N	Buy	N/A	US\$85.32	24 Jun 2011
<b>Occidental Petroleum Corp.</b> <sup>2, 4, 6a, 16, 18</sup>	OXY.N	Buy	N/A	US\$98.46	24 Jun 2011

Source: UBS. All prices as of local market close.

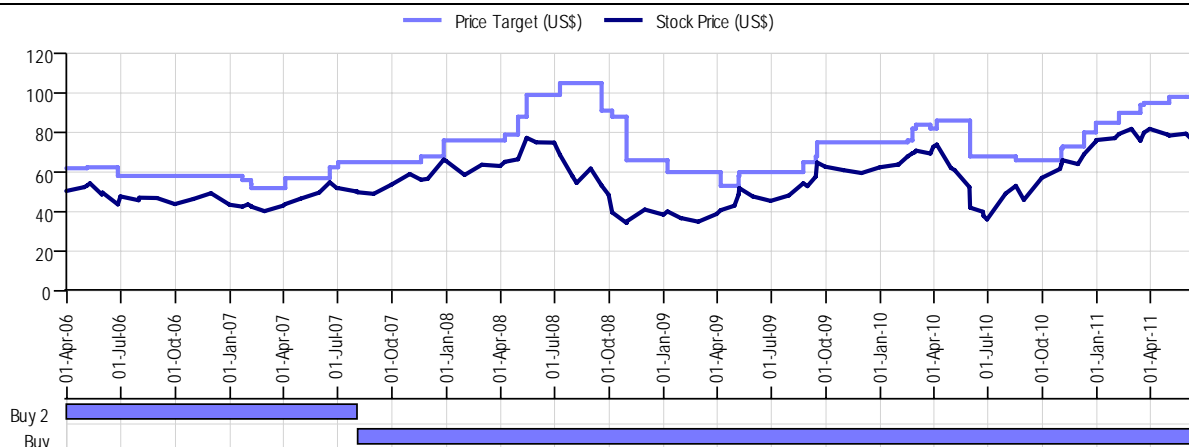
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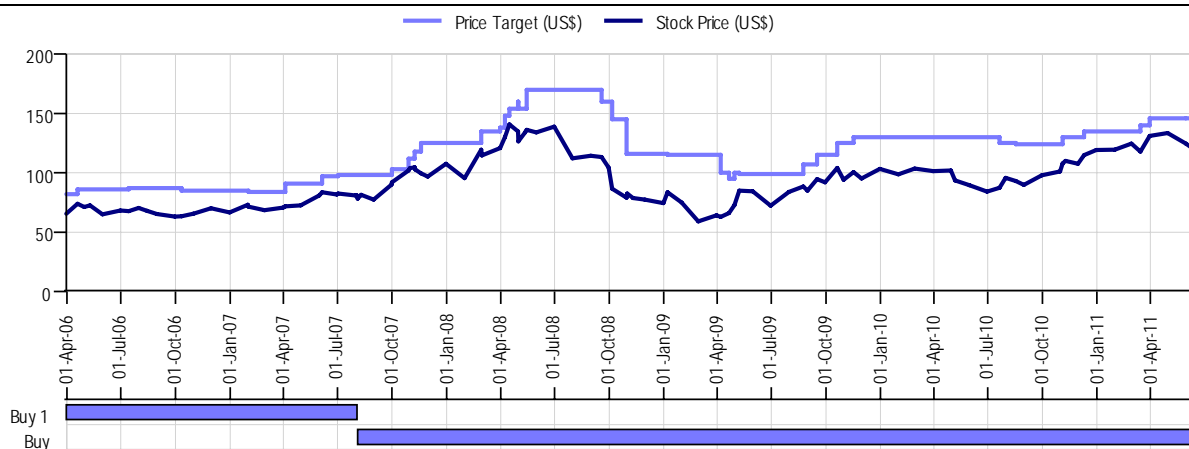
Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

**Anadarko Petroleum Corp. (US\$)**



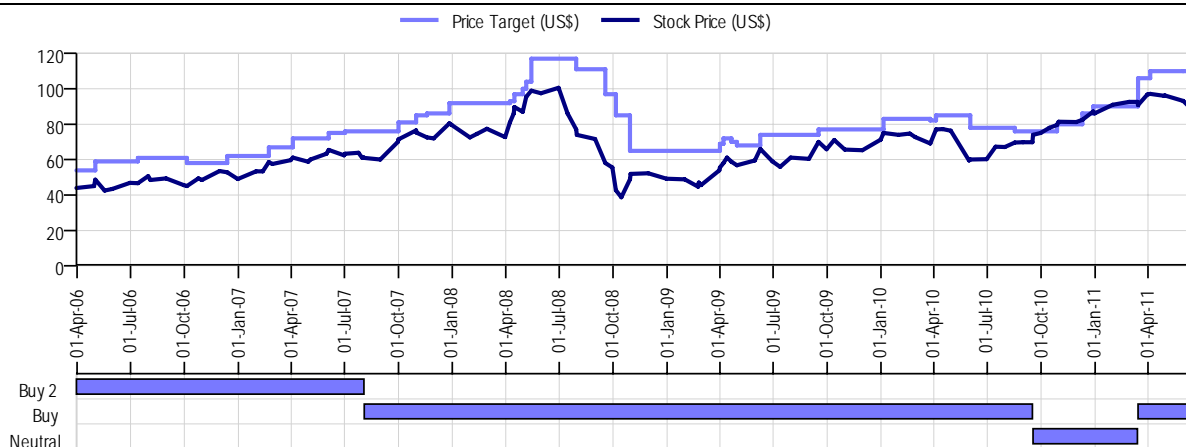
Source: UBS; as of 24 Jun 2011

**Apache Corporation (US\$)**



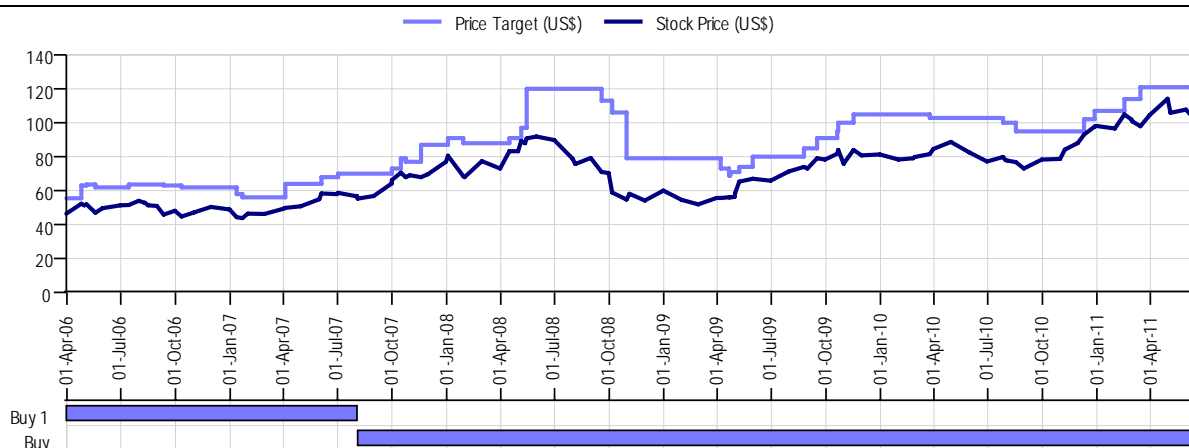
Source: UBS; as of 24 Jun 2011

Noble Energy, Inc. (US\$)



Source: UBS; as of 24 Jun 2011

Occidental Petroleum Corp. (US\$)



Source: UBS; as of 24 Jun 2011

Note: On August 4, 2007 UBS revised its rating system. (See 'UBS Investment Research: Global Equity Rating Definitions' table for details). From September 9, 2006 through August 3, 2007 the UBS ratings and their definitions were: Buy 1 = FSR is > 6% above the MRA, higher degree of predictability; Buy 2 = FSR is > 6% above the MRA, lower degree of predictability; Neutral 1 = FSR is between -6% and 6% of the MRA, higher degree of predictability; Neutral 2 = FSR is between -6% and 6% of the MRA, lower degree of predictability; Reduce 1 = FSR is > 6% below the MRA, higher degree of predictability; Reduce 2 = FSR is > 6% below the MRA, lower degree of predictability. The predictability level indicates an analyst's conviction in the FSR. A predictability level of '1' means that the analyst's estimate of FSR is in the middle of a narrower, or smaller, range of possibilities. A predictability level of '2' means that the analyst's estimate of FSR is in the middle of a broader, or larger, range of possibilities. From October 13, 2003 through September 8, 2006 the percentage band criteria used in the rating system was 10%.

Additional Prices: Cabot Oil & Gas Corporation, US\$61.45 (24 Jun 2011); Chesapeake Energy Corp., US\$28.01 (24 Jun 2011); ConocoPhillips, US\$71.43 (24 Jun 2011); EOG Resources, US\$98.27 (24 Jun 2011); Hess Corp., US\$69.04 (24 Jun 2011); Marathon Oil Corporation, US\$49.55 (24 Jun 2011); Murphy Oil Corporation, US\$62.81 (24 Jun 2011); Petrohawk Energy Corporation, US\$23.24 (24 Jun 2011); Range Resources Corp., US\$52.28 (24 Jun 2011); Southwestern Energy Company, US\$40.84 (24 Jun 2011); Ultra Petroleum Corp., US\$43.74 (24 Jun 2011); Source: UBS. All prices as of local market close.

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