Energy
Industry Brief

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EQUITY RESEARCH

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Raymond James' Energy "Stat of the Week"

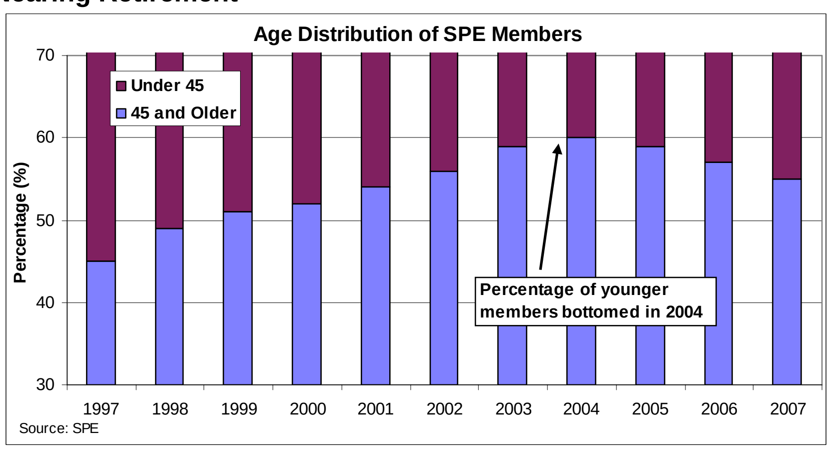
As the Oil Patch Gets Grayer, Long-Term Prospects for Oil and Gas Production Get Bleaker

Think high oil prices are not sustainable? Think that supply will somehow find a way to meet steadily growing demand? **Think again….** As we have said many times, high commodity prices going forward should be a sustained phenomenon – not a cyclical one – making energy an **essential investment theme** for years to come. In this report, we discuss one key reason for our long-term bullish thesis on commodity prices.

To the many challenges facing the future of oil and natural gas exploration in the United States, add the following: Soon, the country will not have anyone left to do the exploring. That is an exaggeration, of course, but only slightly. This problem is known as the "graying of the oil patch" – as the current geoscientists approach retirement, their ranks are **not being fully replenished with new hires.** At a time when commodity prices are near record levels and global excess production capacity is near historical lows, demand for petroleum professionals is rising. At least as far as the U.S. is concerned, however, the supply of these professionals – just like new discoveries of oil and gas – is steadily dwindling.

The Experts Are Getting Older and Nearing Retirement

Petroleum engineers (PEs) are highly skilled professionals whose work is essential for (1) creating and executing plans for exploratory and developmental drilling, both for E&P companies and the integrated majors; and (2) working with oilservice companies to improve rigs and other equipment.



Beyond the absolute numerical decline in the ranks of U.S. PEs over the past 25 years, which we discuss later, the demographics of the oil patch are not looking good. According to the Society of Petroleum Engineers, the average age of its members currently stands at about 47. To put it in even more stark terms, **55% are 45 or older** (compared to 45% in 1997) and only 21% are under 35. Although the percentage of younger SPE members bottomed in 2004 and has rebounded slightly since then – thanks to the huge financial incentives now being offered for young professionals to enter this industry – these are still worrisome statistics.

The data implies that within 15 years, at least half of this vital group of industry professionals will be retiring, depriving the industry of a huge pool of technological talent and expertise. In fact, given the robust outperformance of energy stocks over the past several years, massively boosting the investment portfolios of many of these professionals, the prospect of early retirement for at least some of them must be considered. The key question therefore becomes: **Where will the future PEs come from?**

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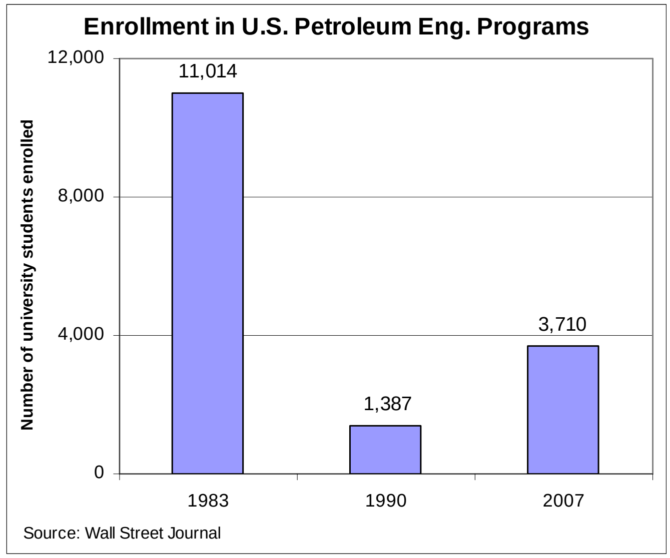
Few U.S. Students Are Choosing a PE Career – Despite the Huge Financial Incentives



The PEs of the future will certainly not come from America's petroleum engineering departments – at least not in the numbers required to sustain the current level of domestic oil and gas exploration. Enrollment in these university programs peaked at the same time as industrywide employment did. In 1983, roughly 11,000 U.S. students were studying to become a PE. Today, the number is about 3,700. **This is a staggering drop of 66%.**

To be sure, somewhat more students are now being drawn to a PE career, relative to the 1990s and early 2000s, due to the huge financial incentives now being offered to prospective PEs. These include generous scholarships, paid internships, and of course hefty salaries. In other words, the labor market is responding to the personnel shortage, with typical **starting** salaries for petroleum engineering graduates now up to $80,000 to $110,000 (plus bonus), according to the *Wall Street Journal*. Geologist pay is similarly up sharply, currently averaging $81,000 (up 48% in five years).

Here is another key point. Petroleum engineering has **one of the steepest learning curves** of any profession, even relative to the complex world of other engineering disciplines. It can take five to ten years for a new PE to learn the field, so even as the 3,700 or so graduates each year begin their training, it will take a long time for them to reach the experience level of the PEs they are replacing.

Why Are the Ranks of U.S. Petroleum Engineers Dwindling?

There are many reasons, both economic and technological, for the decline in the number of U.S. PEs over the past 25 years. We would highlight the following three key points:

- *Memories of the harsh 1980s*. From 1971 through 1981, the number of PEs domestically more than doubled as oil prices posted dramatic gains. In 1973-1974, the Middle Eastern oil embargo caused prices to roughly triple from $3/Bbl to $10/Bbl. The Iranian revolution in 1979 led to another tripling of prices, to $35. However, the subsequent global oil glut caused a collapse in prices back down to the low $10s, devastating the U.S. petroleum industry. Massive layoffs followed as companies tried to stay competitive, which lingers in the memories not only of the workers affected but also those that may now be contemplating a career in the industry.

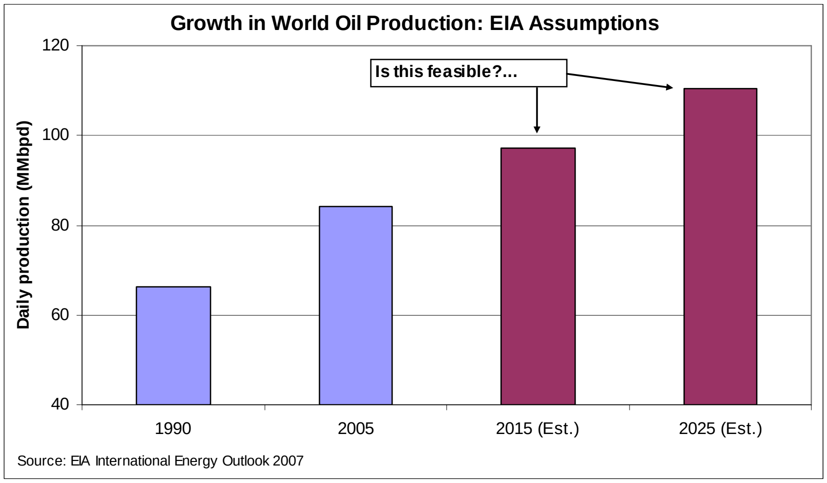
- *Lack of confidence in the future*. Today, of course, low commodity prices are not the problem. The futures markets are clearly signaling that $80+ oil will be sustainable in the years to come. Nevertheless, most petroleum executives, energy analysts, and potential job-seekers simply do not believe that the current price environment can hold for long. This is reflected in the fact that most integrated majors still assume roughly $50 long-term oil in project planning. While some E&P independents are using higher assumptions, they are still concerned about overinvesting and overhiring. Similarly, many young professionals considering a petroleum career are **afraid of entering the industry** at what they believe is the peak of its latest boom phase. Continuing consolidation among the majors and independents is also raising concerns about the potential for future downsizing.

- *Unattractive perceptions*. This factor is impossible to quantify, but it is real. Quite simply, for an engineering student deciding between a petroleum career and various alternatives, the petroleum option is not often viewed as particularly exciting or stimulating. In a word, it is less "sexy" than the more popular careers in biomedical, aeronautical, or even civil and mechanical fields. For better or for worse, **the perception on today's college campuses is that working in the oil business is dirty, dull, and dangerous**. Additionally, in today's unstable world, the danger of this profession includes not just the operational risk. News reports of foreign oil workers killed in Saudi Arabia or kidnapped in Nigeria are hardly encouraging.

Eventually, it may well be that rising salaries and perks for petroleum professionals will offset the ingrained pessimism about future oil prices and the negative perception of the industry. Until then, companies will find other ways of maintaining their talent pool, such as hiring from abroad (especially Russia and the Middle East) and keeping some retirees as consultants. The fact remains, though, that the dearth of new entrants into the industry does not bode well for the future of U.S. oil and gas exploration.

Conclusion: Hope Is Not a Strategy

The U.S. Energy Information Administration currently projects that world oil production will continue to rise through 2025, by which time it would reach levels more than 25% higher than today. In our view, **this is, to say the least, a highly optimistic assumption**, and hence our thesis on long-term oil prices is firmly bullish.

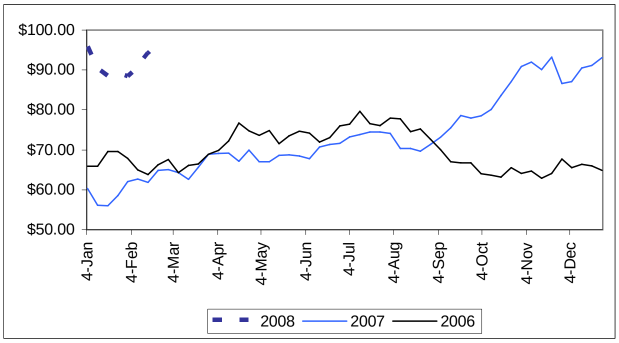


Over the past 25 years, the petroleum industry has suffered from chronic underinvestment. The end result is that today there is too little of nearly all industry infrastructure: rigs, refineries, etc. The "graying of the oil patch" is arguably an even more acute problem, because while a rig can be built in months, it takes many years to train a new petroleum professional. Of course, this is not the only reason why oil supply will increasingly have difficulty meeting demand, or even the most important one, but it is **a major challenge for the industry to overcome** in the coming years. Without large numbers of talented people, the industry has no future.

Raymond James Weekly Oilfield Review

For Week Ending: 22-Feb-08

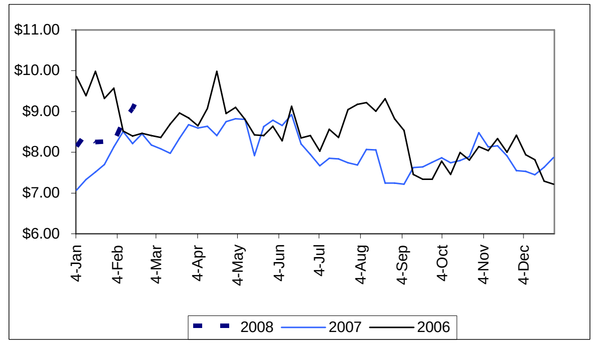
12 Month Oil Calendar Strip
West Texas Intermediate



	This Week	Last Week	Beginning of Year	Last Year
Price	$96.89	$94.23	$95.81	$60.35
Percent Change		2.8%	1.1%	60.5%

Source: Bloomberg

12 Month Gas Calendar Strip
Henry Hub



	This Week	Last Week	Beginning of Year	Last Year
Price	$9.53	$9.06	$8.14	$7.07
Percent Change		5.2%	17.1%	34.8%

Source: Bloomberg

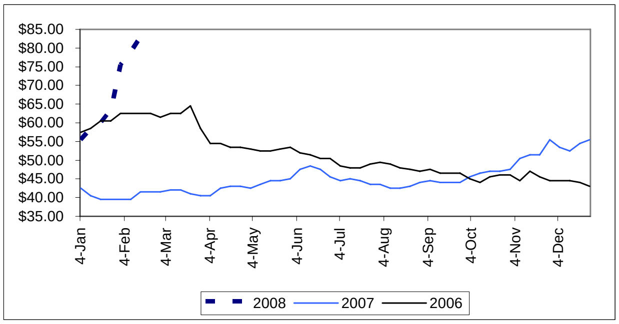
	22-Feb-08 This Week	15-Feb-08 Last Week	23-Feb-07 Last Year	Change From: Last Week	Change From: Last Year
1. U.S.Rig Activity					
U.S. Oil	333	339	278	-1.8%	19.8%
U.S. Gas	1,430	1,428	1,472	0.1%	-2.9%
U.S. Miscellaneous	8	6	4		
U.S. Total	**1,771**	**1,773**	**1,754**	**-0.1%**	**1.0%**
U.S. Horizontal	464	453	349	2.4%	33.0%
U.S. Directional	366	369	379	-0.8%	-3.4%
U.S. Offshore	55	55	89	0.0%	-38.2%
U.S. Offshore Gulf of Mexico					
Fleet Size	125	126	138	-0.8%	-9.4%
# Contracted	94	92	114	2.2%	-17.5%
Utilization	75.2%	73.0%	82.6%	3.0%	-9.0%
U.S. Weekly Rig Permits *	1882	1480	1857	27.2%	1.3%
2. Canadian Activity					
Rig Count	647	632	603	2.4%	7.3%
3. Stock Prices (2/22/08)					
OSX	278.9	255.5	201.4	9.1%	38.5%
S&P 500	1,353.1	1,350.0	1,451.2	0.2%	-6.8%
DJIA	12,381.0	12,348.2	12,647.5	0.3%	-2.1%
S&P 1500 E&P Index	626.3	600.1	432.9	4.4%	44.7%
Alerian MLP Index	292.6	293.0	300.2	-0.2%	-2.6%
4. Inventories					
U.S. Gas Storage (Bcf)	1,770	1,942	1,865	-8.9%	-5.1%
Canadian Gas Storage (Bcf)	271	304	239	-11.0%	13.5%
Total Petroleum Inventories ('000 bbls)	694,980	694,172	716,654	0.1%	-3.0%
5. Spot Prices (US$)					
Oil (W.T.I. Cushing)	$98.96	$95.64	$60.52	3.5%	63.5%
Oil (Hardisty Med.)	$76.18	$71.99	$44.42	5.8%	71.5%
Gas (Henry Hub)	$8.65	$8.66	$7.54	-0.1%	14.7%
Residual Fuel Oil (New York)	$5.22	$5.24	$6.54	-0.4%	-20.2%
Gas (AECO)	$8.11	$7.93	$6.79	2.3%	19.4%
UK Gas (ICE)	$10.22	$10.07	$3.50	1.5%	191.7%

Sources: Baker Hughes, ODS-Petrodata, API, EIA, Oil Week, Bloomberg
** Note: Weekly rig permits reflect a 1 week lag*

Raymond James Weekly Coal Review

For Week Ending: 22-Feb-08

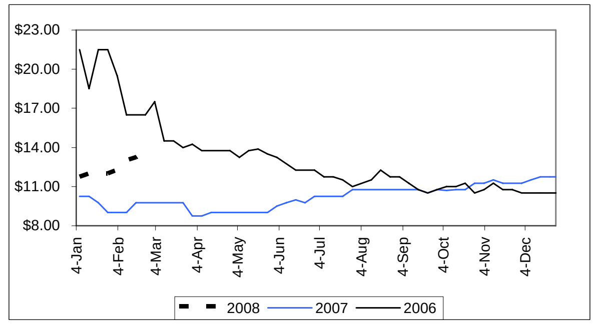
12 Month Big Sandy Barge Prices



	This Week	Last Week	Beginning of Year	Last Year
Price	$84.00	$83.00	$55.50	$42.50
Percent Change		1.2%	51.4%	97.6%

Source: Bloomberg

12 Month Powder River Basin 8800 Prices



	This Week	Last Week	Beginning of Year	Last Year
Price	$13.75	$13.25	$11.75	$10.25
Percent Change		3.8%	17.0%	34.1%

Source: Bloomberg

	22-Feb-08 This Week	15-Feb-08 Last Week	23-Feb-07 Last Year	Change From: Last Week	Change From: Last Year
1. Coal Prices					
Eastern U.S.					
Big Sandy Barge	$84.00	$83.00	$41.50	1.2%	102.4%
Penn. Railcar	$70.00	$67.50	$43.50	3.7%	60.9%
Illinois Basin Mid Sulfur	$43.00	$35.50	$33.00	21.1%	30.3%
Illinois Basin High Sulfer	$41.00	$34.50	$32.00	18.8%	28.1%
Western U.S.					
Powder River 8800	$13.75	$13.25	$9.75	3.8%	41.0%
Powder River 8400	$10.25	$10.00	$7.75	2.5%	32.3%
Colorodo/Utah 1% Sul	$32.00	$33.00	$33.00	-3.0%	-3.0%
2. Production	**15-Feb-08**	**8-Feb-08**	**16-Feb-07**		
Eastern U.S.	9,816	9,512	8,940	3.2%	9.8%
Western U.S.	13,008	12,988	12,464	0.2%	4.4%
Total	22,824	22,500	21,404	1.4%	6.6%

Source: Bloomberg

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Strong Buy (SB1)................. Expected to appreciate and produce a total return of at least 15% and outperform the S&P 500 over the next six months. For higher yielding and more conservative equities, such as REITs and certain MLPs, a total return of at least 15% is expected to be realized over the next 12 months.

Outperform (MO2)................ Expected to appreciate and outperform the S&P 500 over the next 12 months. For higher yielding and more conservative equities, such as REITs and certain MLPs, an Outperform rating is used for securities where we are comfortable with the relative safety of the dividend and expect a total return modestly exceeding the dividend yield over the next 12 months.

Market Perform (MP3).......... Expected to perform generally in line with the S&P 500 over the next 12 months and is potentially a source of funds for more highly rated securities.

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