

## Gassed Up but No Place to Go

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When a great investor points to a vastly underpriced asset, a natural first reaction is to devise the best strategy for buying it. Sometimes, however, the impediments to that strategy prove too great, something anyone will soon discover who listens to Jeremy Grantham's assertion that "everyone who has a brain should be thinking of how to make money" long-term on natural gas.

Jeremy Grantham is bullish on natural resources, and in his most recent [letter](#) to investors he asserted that natural gas, in particular, is historically underpriced relative to oil. Exploiting this mispricing, he said, is one of the great opportunities for investors:

*Natural gas is, for most purposes like home heating and electric utility plants, a better and cleaner fuel than oil or coal, but is for technical reasons in distress: there have been several recent decades in which the BTU equivalent price for natural gas did, at least for a second, reach parity with oil. But now it is at just 14% of BTU equivalency, the lowest in almost 50 years.*

There is invariably a reason why an asset is underpriced. Indeed, if exploiting a mispricing was easy, it would rapidly be arbitrated away. But, as I discuss, making a well-considered long-term bet on the recovery of gas prices is not possible, without taking on substantial risk.

I will explore two vehicles that investors have available to invest in gas: ETFs that are designed to track natural gas prices and the equity of companies with large natural gas reserves. Unfortunately, neither is likely to produce the outsized returns that investors would hope, given the depressed price of natural gas.

First, however, let's consider why natural gas prices are so low.

### The current market for gas

Natural gas prices have plummeted in recent years, from a [high](#) of \$13 or so per mmbtu (million BTU equivalent, equal to 1,000 cubic feet) in 2008 to around \$2.30 today. Oil, of course, is not cheap right now, with prices around \$110 per barrel. On an energy-equivalent basis, a barrel of oil would be about [six times](#) as expensive as 1000 cubic feet of gas. Today, however, the ratio of the price of a barrel of oil to a 1,000 cubic feet of gas is vastly higher than 6-to-1.

Because of very warm [weather](#), the United States is ending the winter of 2011-2012 with near-[record levels](#) of natural gas in storage. Furthermore, domestic production is soaring,



increasing [7.9% in 2011](#). This is the largest annual natural gas production increase ever, according to the Department of Energy (DOE). The DOE's Energy Information Authority (EIA) is forecasting a slow recovery in gas prices on the basis of fundamentals, with an average price of \$4 per mmbtu in 2013. Not surprisingly, producers are planning to [reduce](#) production of natural gas in favor of oil, since the timing of a recovery in prices is a major question.

T. Boone Pickens, himself a big investor in natural gas, [claims](#) that the short-term outlook for natural gas is not positive. To reconcile this with Grantham's emphasis on the *longer* term, the challenge is to take a position that is relatively fault-tolerant in the near-term, while positioning for the long-term expectation that natural gas will recover.

### **Investing in natural gas ETFs**

An investor cannot place a direct bet on the actual price of natural gas unless he is actually a participant in the physical market, with access to storage facilities, delivery mechanisms, and the like. This is a standard problem for speculators. Betting on a price increase in a commodity requires that you build in a factor to account for the cost of storage. The longer it takes until your bet pays off, the greater the drag of storage costs.

Investors who wish to include a commodity in their asset allocation mix typically employ a futures-based strategy. The most widely traded and liquid natural gas futures are the [NYMEX Henry Hub Natural Gas](#) contracts. The simplest approach is to purchase a portfolio of futures contracts and then to sell these contracts as they approach expiration, purchasing longer-date futures with the proceeds. This approach gives you exposure to the movement of prices without your ever taking delivery of the commodity.

Natural gas ETFs attempt to track natural gas prices in this manner. These ETFs are not, in general, appropriate for long-term or even intermediate-term investors. The major problem for these ETFs is that they are not a pure play on gas prices. Their performance can be dramatically affected by how they roll their positions in futures contracts from one month to the next.

Consider UNG, the most popular natural gas ETF, which has substantially [underperformed](#) the spot-price performance of natural gas over its history. UNG's main problem occurs when the forward curve slopes upwards, so that a contract for delivery gets more expensive the longer it is before delivery takes place. This situation is referred to as "contango." It most often occurs when there is abundant supply of a commodity and high levels in storage. Consumers of the commodity tend to buy on the spot market, pushing spot prices down. As the front-month futures contract (the contract nearest to expiration) approaches expiration, its price moves downward to meet the spot price.

A roll strategy, as used by UNG, invests only in the front-month contract. As the contract approaches expiration, the ETF sells the forward contract and buys next furthest-out contract. When prices are in contango, the contract that you buy is more expensive than



the contract you sell. This explains why UNG has underperformed the spot price of gas since the ETF was launched – natural gas has been in contango for an extended period of time.

For a commodity strategy like UNG's to generate positive returns for investors over a long period of time, front-month contracts must be priced higher than forward contracts, a situation known as "backwardation." This tends to occur when inventories are low relative to demand. On the other hand, there is a natural gas ETF that is specifically designed to perform well when gas is in contango, GASZ, which shorts the front month and goes long later months. Tactically managing your exposure to the forward curve by combining a position in UNG with a position in GASZ to control for contango effects is possible, but it is impractical for anyone who is not a commodities specialist.

[Research](#) supports the belief that a fully collateralized strategy of rolling front-month commodities futures has historically generated substantial risk-adjusted returns. As such, there is a case to be made for including futures-based commodity allocations in a strategic asset allocation. An investment in a single commodity is a different issue, because of the contango problem. There is no basis for believing that roll risk or other risks will be compensated with a risk premium. Nor can one obtain the returns from the spot price of natural gas without taking delivery of and storing the commodity.

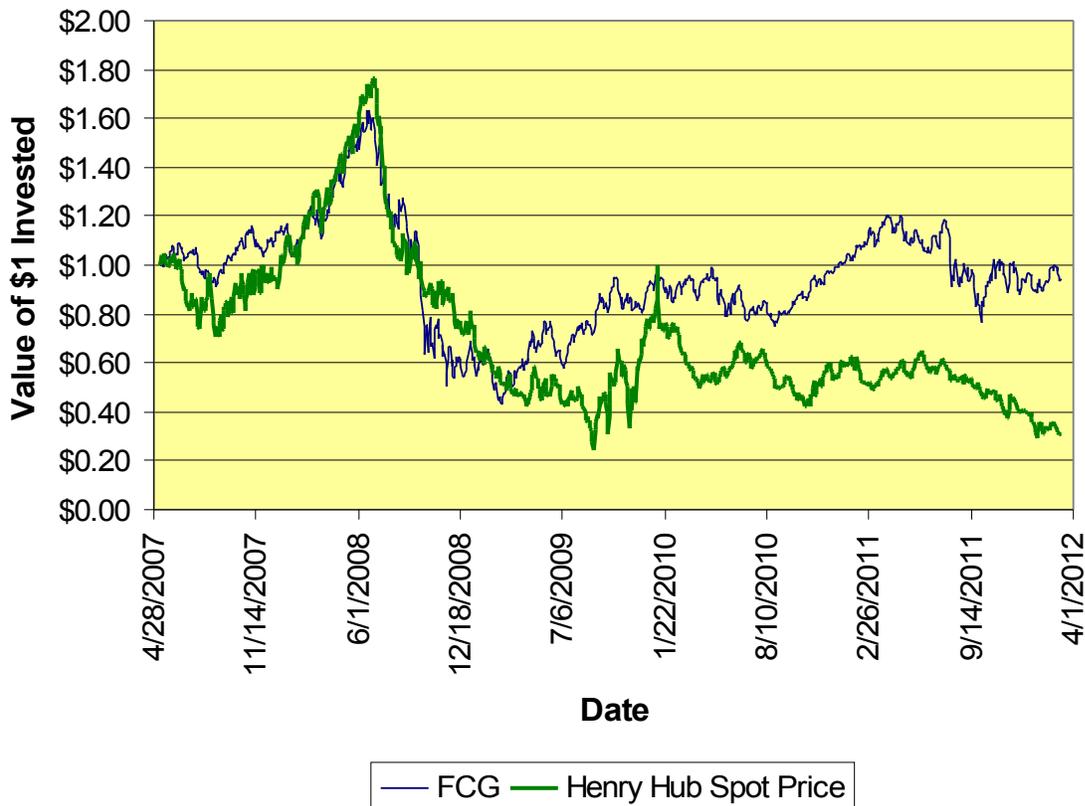
Natural gas ETFs force investors to assume risks that go beyond the spot price of the commodity. Over extended periods of time, there is no solid rationale to suggest that a simple roll strategy will be profitable.

### **Investing in natural gas producers**

Another approach to investing for the long term in natural gas is to buy stocks in natural gas exploration and production (E&P) firms. A representative choice in this space is the First Trust ISE-Revere Natural Gas Index fund (FCG). This ETF [invests](#) in an equal-weighted portfolio of companies that derive a "substantial portion of their revenue from the exploration and production of natural gas."

The question for investors is to what degree the prices of the natural-gas E&P firms track the price of natural gas. Since its inception in May 2007 through 2008, the relationship between the returns on FCG and the hypothetical returns from a direct investment in natural gas tracked very closely, but they have diverged substantially since 2009 (see below).

**Value of \$1 Invested in FCG since inception vs. Henry Hub Natural Gas spot price  
(Henry Hub data obtained from EIA)**



One reason for this divergence is the tendency for firms to see high prices as a signal to invest more heavily in exploration and production. When gas prices were high, drilling more wells looked attractive. When many companies drill more wells, however, higher production drives prices down. While stock in natural-gas producing companies have some exposure to natural gas prices, they are far from a pure play on commodity price. In recent years, this has actually been to investors' benefit.

One alternative to investing in FCG is to construct a portfolio of natural gas E&P stocks with the specific goal of minimizing the tracking error to gas prices. To do so, I started with the top 20 holdings of FCG. I then ran an optimizer to identify a portfolio of those stocks that would be more responsive to the price of gas. I restricted the maximum allocation to any single stock to 20%. The specific variable that I sought to maximize was the covariance between Henry Hub gas prices and the stock portfolio on the basis of monthly returns.

The resultant model portfolio is shown below. It is constructed purely on the basis of statistical relationships between total returns on these stocks and natural gas prices, although there is of course a risk that these relationships will change in time.



***Model portfolio for exposure to natural gas***

Company	Ticker	Weight
Stone Energy Corp.	SGY	20.0%
SM Energy Co.	SM	20.0%
Southwestern Energy Co.	SWN	20.0%
Newfield Exploration Co.	NFX	11.8%
Chesapeake Energy Corp.	CHK	7.5%
EOG Resources	EOG	7.4%
Devon Energy Corp.	DVN	5.5%
SandRidge Energy, Inc.	SD	4.5%
Talisman Energy	TLM	3.0%
EQT Corp.	EQT	0.3%

To compare the various strategies for investing in natural gas, based on their relation to spot-market prices, I constructed a series of measures, using data for the four years through February 2012, below:

***Trailing 4-year statistics through February 2011***

	Correlation to Henry Hub Monthly Return	Beta with Respect to Henry Hub	Annualized Volatility	Average Annual Return	Compound Annualized Return
FCG	44%	0.34	37%	1.7%	-5.2%
Model Portfolio	45%	0.42	46%	13.8%	3.5%
UNG	78%	0.56	36%	-63.0%	-51.2%
Henry Hub Price	100%	1.00	49%	-20.7%	-28.0%
S&P500	10%	0.04	20%	4.76%	2.7%

The returns on UNG have a high correlation (76%) to Henry Hub monthly returns on spot price, as one might expect. The problem with UNG is that performance drag from contango overwhelms the benefits from its correlation.

There is a 44% correlation between the returns on Henry Hub gas prices and the returns on FCG – much higher than the 10% correlation between Henry Hub and the S&P500 (10%), but far below the correlation in returns between UNG and Henry Hub (76%). These results confirm that FCG provides substantial exposure to natural gas prices.

We would expect natural gas utilities to have some exposure to natural gas prices, but not nearly as much as natural gas E&P firms. A similar calculation using a natural-gas utility index fund, GASFX, proves this. GASFX has a 31% correlation to Henry Hub prices and a beta with respect to Henry Hub of only 0.11%.

The model portfolio has a 45% correlation to Henry Hub, almost identical to FCG. But there are a couple of notable differences between how FCG responded to gas prices and how the model portfolio did. The most important difference is in the beta of the returns versus Henry Hub, which measures how returns responded to the return from Henry Hub. The higher the beta, the more an investment has responded to gas prices. The beta of the



model portfolio (0.42) is higher than the beta for FCG (0.34). Given that the correlations to Henry Hub are very similar, the different betas show that the model portfolio has been more responsive to an increase in gas prices. The model portfolio, however, has been more volatile than FCG – 46 % vs. 37% volatility, respectively.

I prefer the model portfolio to gain exposure to natural gas prices, but FCG is a reasonable choice. Because of the higher volatility and beta with respect to natural gas prices for the model portfolio, a smaller allocation to the model portfolio will provide as much exposure to gas prices as a larger allocation to FCG. Higher beta is a form of leverage, and the model portfolio provides higher effective leverage with respect to natural gas prices than does FCG.

One should recognize that the model portfolio was constructed using computer simulation, the results of which are subject to a margin of error. Moreover, constructing and maintaining the model portfolio requires more work than investing in FCG. Given these considerations, the choice between an investment like the model portfolio and FCG will depend on investors' willingness to trust in the relative stability of the correlations.

### Natural gas as part of the asset allocation

While E&P companies are not a pure play on natural gas, a small allocation to them has other portfolio benefits. The trailing four-year beta of FCG with respect to the S&P 500 is 1.33, while the model portfolio's is 1.59. An allocation to these stocks captures some exposure to market beta (with respect to the S&P 500), as well as to some diversification benefits. The relatively high market beta of these stocks allows a portfolio to have a smaller total allocation to equities, which in turn can allow a portfolio to have a higher risk-adjusted return. I discussed this effect in an [article in 2010](#).

### Trailing four-year and projected performance

Portfolio	Trailing 4-Year Performance		Projected Performance		Beta vs. S&P500
	Average Annual Return	Annualized Volatility	Average Annual Return	Annualized Volatility	
60% S&P500 / 40% AGG	5.2%	12.8%	6.0%	9.4%	61%
40% S&P500 / 50% AGG / 10% Model	6.2%	12.4%	6.7%	9.3%	58%
45% S&P500 / 50% AGG / 5% Model	5.7%	12.5%	6.3%	9.3%	60%

I compared the trailing and projected performance of a 60/40 portfolio to those with a 10% and those with a 5% allocation to the model portfolio, with comparable risk (see table above). The projected performance was generated using my portfolio Monte Carlo simulation (Quantext Portfolio Planner, QPP). QPP creates projections for individual asset classes' future expected returns and risks on the basis of the equity risk premium and historical correlations between asset classes. Extensive validation analysis is available at [quantext.com](http://quantext.com).



A portfolio that is 40% allocated to the S&P500, 50% allocated to the aggregate bond ETF (AGG), and 10% allocated to the model portfolio generated higher return with slightly less risk than a simple 60% S&P 500 / 40% AGG portfolio. The higher fixed-income allocation in the portfolio that contains a 10% allocation to natural gas stocks is offset by the much higher beta of the natural gas equities with respect to the S&P 500. The results for the portfolio with only a 5% allocation to the model portfolio show the same effect.

A slight tilt towards natural gas equities, then, will have diversification benefits. For investors who want to bet on the long-term recovery of natural gas prices, a small allocation to high-beta natural-gas equities has that advantage.

### **Bringing the pieces together**

Jeremy Grantham sees the narrative for natural gas as a compelling long-term bet. Natural gas prices are at lows that we have not seen in 10 years, even though oil is quite expensive. The fact that natural gas is cheap on an energy-equivalent basis does not, however, mean that natural gas prices are likely to increase anytime soon. To the contrary, today's natural-gas supply/demand imbalance indicates that prices will remain low for some time to come. Changing from oil to natural gas imposes substantial switching costs. The nation's long-haul trucking fleet cannot simply convert instantly, for example.

To make a long-term bet that natural gas is undervalued, it's best to invest in the stocks of companies that produce natural gas and own substantial reserves. An index of natural gas E&P firms, such as FCG, is the simplest way to achieve such exposure. The model portfolio of stocks, chosen from FCG's component parts, is an alternative way to bet on natural gas, providing a higher beta with respect to the price of natural gas than with FCG.

While the commodity-ETF UNG provides an even higher beta with respect to natural gas than either FCG or the model portfolio, its contango risk renders it unacceptable.

A common misconception is that MLPs provide a way to exploit the potential for rising prices. The reality, however, is that natural gas MLPs generate earnings from the volume of gas produced and transported, rather than from the price of natural gas. For this reason, the correlations between returns from MLPs and the price of natural gas have been very low. Even as gas prices have plummeted, MLPs have performed well.

Overall, attempts to invest based on a recovery in natural gas prices are a risky proposition. No theory supports the idea that a long-term position in any single commodity should generate positive returns. That said, a small allocation to natural gas equities should provide some upside when gas prices recover, and these firms are, generally speaking, profitable companies.

Even if Grantham is correct that the future price of gas will rise, however, the substantial upside potential to an investor in FCG or the model portfolio in the event of a rally in



natural gas is offset by the substantial risk associated with such a position. A small position in E&P stocks is reasonable, but anything more represents a very risky bet.

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