

## Biases, Pressures, and Problems in Energy Price Forecasting

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Price matters. It is the arbitrator that balances wishes and physical reality. However, stating the obvious, oil and gas prices are volatile. If they were not, there would be little need for price forecasts or forecasters. Based on the latter's track record, some may think that is not a bad idea. Whatever their reputation, this group at least follows the first law of forecasting, which is to forecast often, either a value or timing, but not both.

Needless to say, such arbitration of price is also an issue that many find quite annoying. One of the best surveys showing this was the initial (1983) issue of Arthur Andersen/Cambridge Energy Research Associates' *World Oil Trends* under the title, "The Perils of Prophecy." In that report, several industry executives were asked their opinions of price forecasts. Here is what two said.

- *Since you don't know, or at best can't be sure, the safest place to be is halfway between Exxon and Shell.*

- *Oil price forecasters make a flock of sheep look like independent thinkers.*

Accountability in price forecasts requires the admission of how wrong the forecast could be. Therefore, the only forecast that I offer is in the form of a probability distribution. After all, the recognition of uncertainty is intellectually honest, maximizes information, and minimizes unwarranted detail. Indeed, as the industry moves forward on such issues as probabilistic reserves analysis, it is only consistent to have the economic and operating conditions also expressed in a probabilistic manner.

A better term than forecast would be hypothesis, which by definition is to be questioned and tested. Forecasts, hopefully, are not made in a vacuum. They are based on underlying assumptions that themselves should be forecasted and therefore tested for consistency, on the impacts of unintended consequences, and on the need for reconciliation with macro global realities. One example of such consequences often overlooked is the relationship between price and the cost of capital investment and operations. Price and cost are not independent variables.

Regardless of this questionable record in forecasting, accountants and regulators live on the belief that precision is attainable. They see value in a single point, or snapshot, view of a project or firm's worth. Using such assessments for comparison may have value at that point in time. However, decision makers and investors need to see a range of possibilities to make informed, well-reasoned decisions about the future. This culture of blindly assuming accuracy that cannot be justified has even seeped into the engineer's mentality. And he should know better.

### The Anchoring Phenomenon

George Santayana wrote, "Those who do not study history are doomed to repeat it." A corollary to this observation may very well be that those who do study history will be so confused that they will give up and only watch history go by. At the risk of such confusion, let us look at some actual forecasts from a former major oil company long since merged into another firm. **Fig. 1** is a plot of forecasts (the thin lines) starting in 1974 from that major oil company, expressed in 1987 dollars. The actual oil price in 1987 dollars is shown in the heavy line. Inflation has been taken out so that these forecasts can be shown on a realistic scale.

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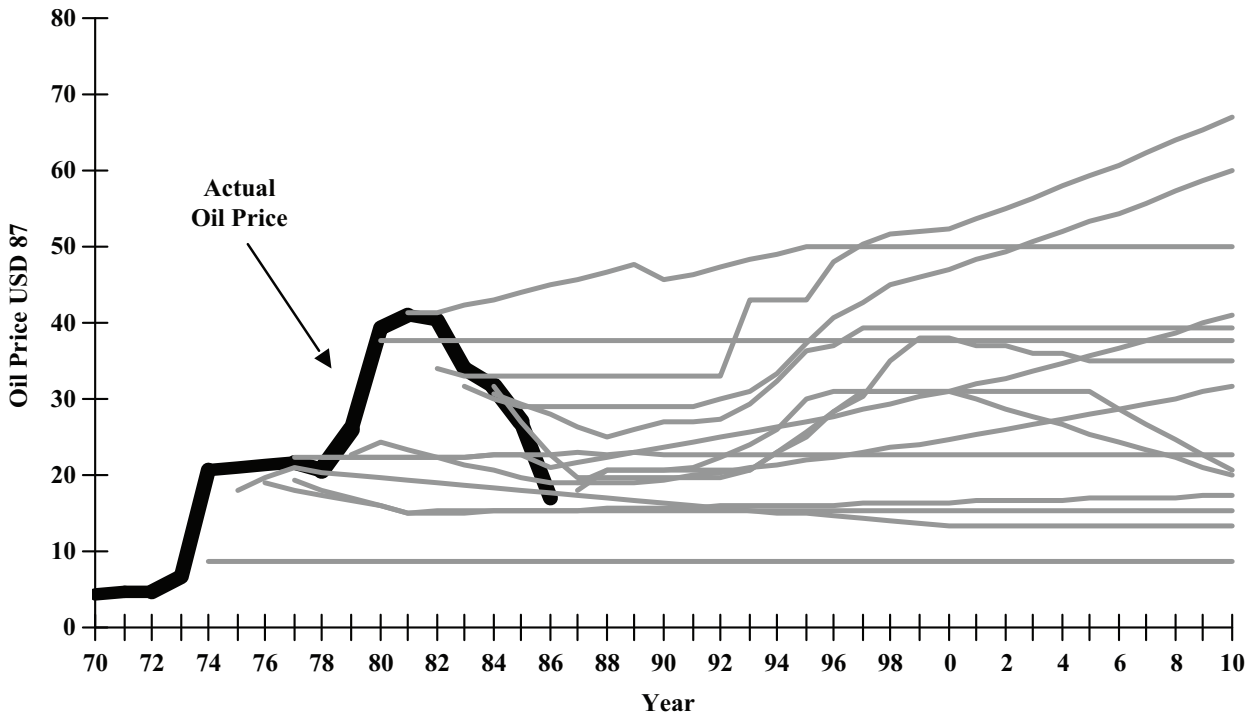
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**Fig. 1—A range of oil price forecasts, in 1987 USD.**

This web of forecasts is typical of most firms. Each planning cycle, a new forecast appears. Needless to say, the economics of any particular project would prove to be different from what was originally envisioned.

One observation is that the slope of the forecast line in general seems to depend on the change between the previous year's actual oil price and the current oil price. When the change shows a greater oil price currently than

in the previous year, the slope of the forecast line is upward indefinitely into the future. If the change in actual prices shows no change or a decline, the forecast is flat or even slightly increasing. Only rarely will there be any real decline in a forecasted price.

This phenomenon is known as anchoring. That is, forecasts are anchored to current conditions. Or: what is going on today will go on forever. It has been said, "When faced with

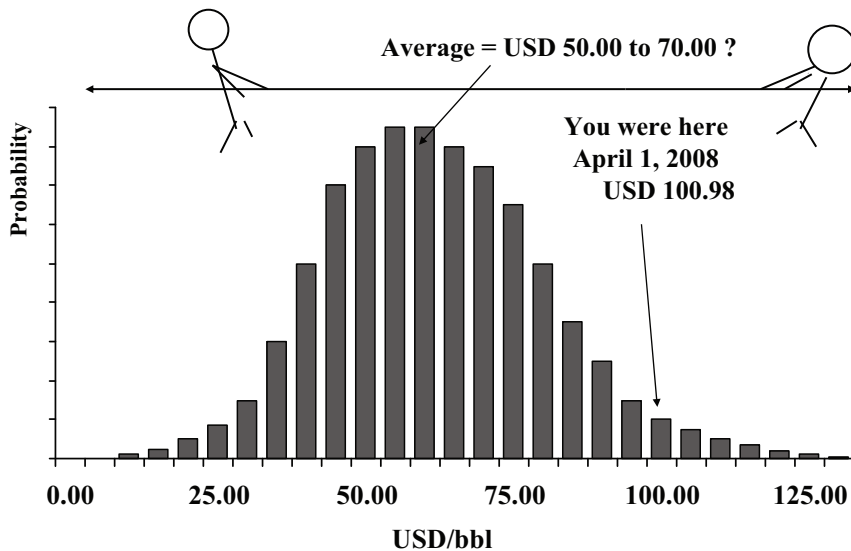
an event that occurs in the real world, the economist will respond, "Yes, but would it have worked in theory?"

It is not certain that this phenomenon can be totally blamed on the economist. In most firms, management has a great deal of control over the final official forecast. Politics, hopes, corporate goals, and bonuses rest on a project's economic justifications and on what can be projected for future company earnings.

Investment decisions do not respond immediately to these ever-changing forecasts. Indeed, the price deck that is implied by current investments in the industry is nowhere as optimistic as today's prices would imply. Is anchoring becoming a phenomenon for the history books or is there just a lag until irrational exuberance returns?

Extending the anchoring phenomenon out into the future led the industry to forecast USD 100/bbl oil during the 1980s and to make various investment decisions based on this extension. Such trend lines and other misuses of mathematics can lead to some interesting, yet ridiculous, conclusions.

Then there are also cases that prove it is indeed better to be lucky than right. Trend-line analysis has been used to defend a perception or desire for future



**Fig. 2—A snapshot of a long-term forecast taken on 1 April, 2008.**

oil prices. Armed with this defense, decisions have been made that in some cases were bailed out by market actions. In the real world, there are some interesting examples of how interpretations or misinterpretations of forecasts can play out. After all, good results do not necessarily follow good forecasts and vice versa.

Take the example of the Trans Alaskan Pipeline System (TAPS). Cost estimates increased by more than a factor of 4 before the construction was actually completed. However, once on line, the North Slope producers were seeing oil prices that were 5 to 6 times the levels at the time the Prudhoe Bay discovery was made. The height of the OPEC era from the mid-1970s to the mid-1980s more than paid for the cost overrun of TAPS. With these costs not only sunk but also fully recovered, Prudhoe became a so-called low-cost producer that would not be cut back in times of low prices.

Of course, different perceptions or trend lines can lead to different outcomes. For example, think back in time and try to identify two firms that made money in oil shale. They are Arco and Tosco, because they sold the Colony Oil Shale project in Colorado to Exxon, which eventually walked away from it in 1982.

### A Forecast

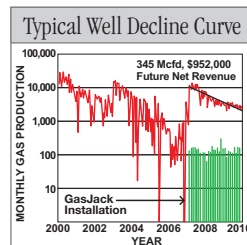
**Fig. 2** is a snapshot of a long-term forecast that was taken on April 1, 2008. Here this tug of war moves prices up and down not in a mean-reverting manner but by continually overcorrecting in a mean-revulsion manner. Insight is gained by seeing the entire range of possibilities and fighting the tunnel vision of what is going on today. The mean of this distribution is in the USD 50 to 70 range. Here is how I explain the USD 100.98 on that day.

Mean Value	USD 60.00
Iran nuclear concerns	5.00
Venezuela concerns	5.00
Terrorism	5.00
Demand pull from refining capacity	5.00
Speculation	10.00
Weak dollar	10.00
OPEC capacity	5.00
Weather	2.00

Strategic Petroleum Reserve filling	2.00
Adjustment for being a fool in trying to explain this in the first place	-18.02
<b>Total</b>	<b>USD 100.98</b>

So where would you put your money? Forecasts, I mean hypotheses, do not offer answers, but only seek enlightenment. The purpose of forecasting is insight, not numbers. **JPT**

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