INTRODUCTION: WHY SCENARIO PLANNING?

Scenario planning was developed as a management tool in the 1970s. When done well and used as part of a business’s decision support systems, it proved to be a flexible and valuable tool for informing critical business decisions.

At its best, scenario planning allows businesses to understand the best- and worst-case outcomes of a proposed project or strategy, as well as all the possibilities in between. Businesses using scenario planning are therefore better placed to take advantage of market changes, and can prepare effectively for downturns and negative circumstances (as well as market upturns). By analysing and planning for different outcomes, those businesses can protect their interests; and by considering different scenarios, they could prepare for those outcomes – even in times of volatility and hard-to-predict geopolitical events.

In a typical example, a business might choose to carry out a scenario-planning exercise to prepare the case for investment in a capital project, or it might use scenario planning to help decision-makers understand the key business drivers influencing a given project.

This was certainly the case in the 1980s and 1990s, at a time when businesses were more likely to carry out long-term planning exercises. However, the initial popularity of
scenario planning has faded since the early 2000s. The accuracy of the long-term forecasts that had initially excited the industry were increasingly called into question, particularly as government regulations proliferated and often invalidated long-term forecast assumptions. As many clients have told us, accurately predicting the price of oil or petrochemical feedstocks is as much a question of luck as judgement, so long-term plans with their guesswork and estimates have only limited value.

This inability to accurately predict significant changes to both the geopolitical situation and the financial markets over the longer term caused the industry’s focus to shift to planning over shorter timeframes of two or three years. At the same time, budget squeezes meant that scenario planning was increasingly seen an unnecessary drain on resources. The underlying purpose of scenario planning began to get submerged as firms scored different scenarios against each another simply because they could – rather than establishing an overarching strategy for what they were trying to achieve, and the reasons for conducting the scenario analysis.

This aversion to long-term scenario planning has continued into the 2010s. The past ten years have seen unprecedented levels of volatility, with markets moving quickly – often overnight – in response to geopolitical or financial market events, or in the past four years to advances in resource technology such as horizontal drilling and hydraulic fracturing (fracking). The speed and unpredictability of today’s environment raises the question of whether scenario planning can remain relevant.

This paper attempts to answer this question and suggests that, in times of increased volatility, scenario planning can be as important as ever, provided it is done well.

UNDERSTANDING THE VARIABLES

The underlying principal of any strategic scenario planning exercise is to understand and account for a full range of variables that could affect the business, and to use that understanding to improve strategic decision-making. Understanding these variables is therefore the first step for any successful scenario planning exercise.

The most significant of these variables are often geopolitical. International or internal conflicts, regulations and legislation, production planning, pricing strategies, weather and climate, and even changing patterns of global demand can all affect a chosen business model. They are also notoriously difficult to predict.

Successful planning also has to take into account the availability of the physical product and the impact of price signals from the market on extraction, production and transportation of the product – another key variable in a volatile petrochemicals market. A classic example here is the U.S. ethanol market, where a mandate to add ethanol to gasoline has driven up production of corn-based ethanol and obscured market price signals for corn, leading to subsidy and over production.

The third group of variables to consider are future technological changes and improvements. Again, this requires a long-term view. For example, in the 1980s, 1990s and even the late 2000s, peak oil theory formed the basis for much of the planning and strategy in the refining and petrochemical industries.
Predicted outcomes were based on the principle that crude oil is a finite resource that was soon to run out. This view also led to government policies mandating global investment in renewable energy, which have increased the costs to consumers in many countries.

However, in recent years, technological advances such as horizontal drilling and fracking have produced new reserves and enabled operators to get more out of existing sites by improving recovery rates and lowering costs. These new techniques have also brought sources that were previously economically inaccessible into play. Starting an analysis of crude oil and natural gas supply based on peak oil theory has, therefore, become increasingly irrelevant.

Among all these variables, however, there is one constant that businesses need to consider: their starting point. Since scenario planning is primarily about understanding possible future outcomes, it is important to clarify the business position at the point that the exercise is being undertaken. Equally, a business must be clear about why it is carrying out a scenario planning exercise. Is the business preparing for growth? Does it need to consolidate its position in a changing market? Is the market, or the business itself contracting or expanding? The results of the exercise can only make sense when seen in the context of these and other business drivers.

A recent example of a scenario planning exercise shows how the starting point of such an exercise is the single most critical success factor. A U.S. plant worked with a third party to develop a low-margin and a high-margin scenario as the basis of its analysis of the plant’s financial performance. Following a review and secondary analysis by ICIS, it became clear that in both scenarios the starting point did not match reality – in this case, the plant’s actual historical performance. As a minimum, the starting point for each scenario needed to be reasonably calibrated to actual plant and financial performance – as Figure 1 shows.

**DATA ACCURACY AND ANALYTICS**

It is tempting to seek out one version of the truth, and many people who have undertaken a scenario planning exercise have done so with the expectation of finding a clear answer to inform their business planning activity. However, business planning is rarely that simple. Fortunately, one of the things that scenario planning can effectively deliver is the ability to consider multiple outcomes and identify which is the most likely to occur.

In fact, there is real value in examining multiple permutations and possibilities. Planning for a ‘two-tail outcome’ enables businesses to consider two or three different outcomes, just by changing the input data – although changing too many of the inputs at the same time can...
obscure the impact of each variable. It is also important to consider a sufficiently wide range of possible outcomes so that all risk factors that may affect the business are considered.

For example, a petrochemical plant was looking at different scenarios regarding its proposed expansion into a regional market. During the planning process, no possible negative outcomes were identified and the planning group decided that a bigger project was their best option. However, subsequent independent analysis showed that there was a 70% probability that the larger project could result in a negative return on investment if market conditions changed, while a smaller project had less risk (only 10% chance of a negative return) and was more likely to result in a positive return outcome even if the expected net present value is smaller than the bigger project – as shown in Figure 2.

Scenario planning – like all business operations – lives and dies by the quality and accuracy of the data involved. As the amount of data available to every business continues to increase, accuracy becomes imperative. Without it, there is no way of knowing whether an outlier result is significant or simply the result of bad data.

Even at this level it is all too easy – and extremely dangerous – to confuse correlation and causality. Even when statistical analysis shows a very high correlation factor (r²), it may have no link in reality. Industry bias can also be a factor. In North America, many basic petrochemicals come from ethane, propane, and butane. It is tempting therefore to develop forecast scenarios on global ethylene and derivative chemicals on the assumption that supply chain values are based on natural gas prices. However, analysis and insight about the global market shows that most global petrochemical prices are linked to naphtha, a crude oil component. This is because naphtha, and not natural gas liquids, is the key feedstock in the rest of the world.

Equally, precision is not synonymous with accuracy. It is possible to calculate results to three decimal places, for example, but when the accuracy of the data has a margin of error of 20 percent, those results are fairly meaningless.

It is therefore essential that the data is subject to some form of validating analysis. Without the ability to confirm the accuracy and relevance of the data being used, there is no way of being sure that the outputs of the scenario planning process form a robust foundation for making the right decisions about the business’s future. Their value will always be questionable at best.

By analysing the data outputs, businesses can apply knowledge of previous cycles and historic events to future predictions and provide the necessary context for decision-making. One of the mistakes that planners often make is to ignore or disregard long-term cycles. For
example, many organizations in today’s refining and petrochemical industries are unaware that they are in the middle of a long-term cycle for processing light and heavy feedstocks.

Two recent examples illustrate the point. First, by looking at historical prices of crude oil and petrochemical feedstocks such as ethane, propane and naphtha, planners could easily come to the conclusion that prices would either remain at current levels or increase – as shown in Figure 3. However, as shown in Figure 4, more appropriate analysis looks at the data within the context of a longer cycle and raises a red flag that a price drop is a strong possibility.

The second example considers the average quality of feeds and what happens when data is considered without analytics and proper context. During the height of the ‘peak oil’ debate around 2007-2008, a major petrochemical operator was considering investment in heavy-liquid furnaces for its ethylene crackers because naphtha was readily available, while light feeds such as ethane and propane were not. The availability of light tight (shale) oil and gas means today it is investing in new ethane cracking. Refiners who upgraded their metallurgy and added coking and residual conversion to process their heavy crude oils now wish they still had the unit configurations that were in place before going to the heavy-feed slates. Cracker operators that were disadvantaged by running only light feed for many years now enjoy better margins than those that made substantial heavy-feed furnace upgrades in the late 1990s and early 2000s.
DECIDING THE TIME FRAME

The initial focus on scenario planning was very much on the long-term outlook, and was a factor in its slide down the corporate agenda. But scenario planning also has value for shorter-term projects and tactics, which may prove more relevant for many participants in today’s markets.

The most appropriate timeframe will largely depend on the nature of the product, its own lifecycle and the size and timeframe of the commitment the business wishes to make. Scenario planning can take the long or the short view: what is important is that it is agreed at the beginning of the planning process.

There are a number of factors that will determine the timeframes involved. The planning cycle itself is an important factor, as it is the period in which the business expects a return. So whereas some businesses might base their planning on a model with a break-even period of five or ten years, others need a scenario that plays out over 12 to 18 months.

Another important factor is the size and scope of the project being considered. A large-scale capital investment, which may have a 20-40 year lifecycle, is a very different proposition from a small project that helps the business respond to a sudden change in wholesale prices.

Recently, ICIS worked with a client that was considering a multi-million dollar, co-located investment. The company’s planners wanted to establish whether the site and proposed formula pricing would be competitive for 30 years. An ICIS market study revealed previously unseen issues for both buyers and sellers, and identified alternative options that led to savings worth more than $40 million.

These are important considerations that must be factored in when starting the scenario-planning process. But it is also essential that businesses establish how often they are going to revisit the process. Carrying out a scenario-planning exercise and then putting the results away for the next 12 months will deliver only limited value to the business. Instead, businesses should consider revisiting the variables once a quarter, and carrying out a much deeper review every year as a part of their strategic business planning process. At heart, scenario planning is a dynamic exercise; and it is this that brings its true value to life.

THE RISK PARAMETERS – ESTABLISHING BOUNDARIES FOR DECISION-MAKING

Having established the drivers, considered the variables, prepared the plan and scheduled regular reviews, businesses also need to consider their risk appetite. This is a critical part of the process. From the beginning, decision-makers and planners need to understand their organization’s attitude to risk, and to establish what the risk parameters are within the context of the broader business strategy.

Defining and understanding risk is often challenging because of different attitudes within different business units and roles, and because of different ways of measuring it. For example, some people look at risk in terms of probability – particularly those with an engineering background – and consider whether an outcome with an 80 percent probability of realization is acceptable, compared to a 75 percent probability. Very risk-averse firms may focus on 10 percent or 25 percent probabilities, testing worst-case assumptions to see if their projects are still feasible. Others might decide to place a sequential series of decision gates throughout the process and decide on acceptable risk at each one of those points.

Scenario planners also need to be clear on the whole organization’s attitude to risk and reward. Where some businesses prefer to take an approach based on steady profits, low risk, and low volatility, others will take more risks in order to reap larger rewards. There is no right answer or universally appropriate approach. What is essential,
however, is that the scenario planning process is based on the approach that is right for the individual business, and that everyone involved understands what that approach is.

When assessing risk, the strategy of third parties is often overlooked. The actions taken by other participants in a given scenario can have a fundamental impact on its outcomes. The scenario may therefore need to adapt to allow for human variables: this can have an impact on everything from supply and demand through to raw product pricing.

In periods of great change, such as that from 2011 to 2015, which has seen the arrival of light tight oil and a precipitous drop in crude oil prices, the time to market is critical, whether for expansion or new investment. Data alone cannot tell scenario planners how many new crackers or polymer plants will be built without the additional analysis of the companies proposing such investments or greater understanding of the broader context. Figure 5 below shows the difference in capacity additions if every announced cracker was built compared to those that ICIS believes will be built. In the expected scenario, capacity will increase by approximately 35-40% by 2025; if everything announced is built, the capacity increase would be a staggering 60%.

When carrying out scenario planning, it is therefore essential to look at companies’ past responses to similar opportunities and take those subjective factors into account. Some operators do not – or cannot – execute in a timely fashion, regardless of how quickly they announce major capital plans. Others always move forward when they decide on new investments and, if anything, often get into the field and start operations sooner than publicly announced.

DELIVERING VALUE FROM SCENARIO PLANNING

Scenario planning can provide a vital and relevant tool that can be used to inform strategic decisions. But it is important to prepare fully before undertaking the exercise, as well as applying a layer of context: what has happened historically, what can be learned from previous experience and how things might be done differently in the future.

It enables businesses to understand their attitude to risk – as well as the advantages and disadvantages of a given approach. But crucially, it allows business leaders to understand how flexible their organization is in the context of a business decision.
ABOUT ICIS

Part of Reed Business Information, ICIS is the world’s largest petrochemical market information provider, and has fast-growing consulting, energy and fertilizer divisions.

We have more than 30 years’ experience of providing pricing information, news, analysis, and specialist consultancy to buyers, sellers and analysts.

Our global team covers over 180 commodity markets and has in-depth knowledge across markets in upstream and downstream sectors in Europe, Africa, the Middle East, Asia-Pacific and the Americas.

The ICIS Global Supply & Demand Database gives you a wealth of data ranging from specific plant information (capacities, ownership) to country level supply and demand balance, to regional trade flows, currently forecasting to 2030.

LET’S TALK

Contact ICIS Consulting today for a confidential discussion about how we can help to address your business challenges and support your decision-making.

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