Global energy advisory

Global Energy Advisory Leading Modelling Capability

Modelling, Valuation and Risk Assessment - Global Energy Advisory's valuations and risk assessments are based on some of the most advanced modelling techniques available. At the heart of the approach is a recognition that, irrespective of the conventional wisdom of the moment, future energy prices are highly uncertain.

We also recognise that, in combination with the optionality which is frequently embedded in assets and contracts, this price uncertainty or variability may yield significant value or risk. Thus, although we are not afraid to identify a single number for the value of, say, a power station, we see this as an expectation or mean of a distribution of many (perhaps up to several thousand) possible outcomes or values – our modelling is essentially "stochastic". A valuation can therefore be accompanied by parameters which quantify the potential uncertainty or risk around this number. By contrast, many of our competitors adopt an approach involving a small number of different price tracks or scenarios (eg high, low and central cases) against which assets, power purchase agreements (PPAs) and structured deals are valued deterministically. While superficially appealing, the difficulty with this approach is that the client is often presented with several different valuations without any rational or sound probabilistic basis on which to combine them. Furthermore, there is often the temptation to introduce such extreme price ranges for the longer-lived deals and assets, as a type of stress test, that the corresponding range of valuations becomes extremely wide.

Optionality in Assets

Paper instruments, by their very nature, specify optionality explicitly. On the other hand, any optionality embedded in an asset is often implicit and less obvious. However, the fact that it is implicit does not necessarily lessen its potential value to the buyer (or risk or potential regret to the seller or "writer").

Common examples of asset optionality are

- a physical power station where the owner/operator may have the option, for example, on a daily basis, of whether or not to generate – practical timescales may be set by factors such as market gate closure and operational constraints;
- a gas storage facility where, again perhaps on a daily basis, the owner/operator may have the option of whether to draw gas down from the facility or whether to re-inject.

Less obvious examples may be

- the choice of power station site – one site may be more costly than another but may be close to an alternative fuel source – the fact that this alternative source is not presently the cheapest or most preferred does not mean that the optionality associated with it has no value.
- the possibility of buying additional land for an LNG terminal so opening the option of further expansion at a later date.

Global Energy Advisor has significant experience of searching for less obvious embedded optionality in assets and clients can be confident that this will be drawn out and valued.

There are several features of our approach which further enhance the added value of our probabilistic modelling compared with deterministic methods and, we firmly believe, place us in a top-flight league of our own for modelling, valuation and risk assessment.

- For the near term (up to 3-4 years), where energy price volatility can often be directly observed, we attach considerable importance to derivation of the so-called "volatility term structure";
- For the longer term (3-4 to 20 years) where price volatility is usually not directly observable, we continue to estimate it explicitly as a probabilistic parameter – this preserves the coherence of our stochastic modelling between the near and the far term;
- Our modelling is progressive – we build up sophistication and refinement in layers - each can be directly related to its predecessor;
- We devote special attention to the explanation of our modelling so that the client can be comfortable with our analysis.

Each of these aspects is explained more fully overleaf.

Near Term Modelling

For the near term, energy markets provide information both about forward prices (firm prices today for delivery/maturity in the future) and also about volatility in these prices. It is important to use this information to the full. For gas and electricity, a particular feature is that prices often show a pronounced variation in volatility with

- Time to maturity; and
- Tenor (contract delivery period).

The figure to the right shows a typical variation in volatility with these parameters for GB electricity in the form of a volatility "surface" – volatility increases more and more rapidly as both tenor and time to maturity decrease.

Note that seasonal (eg winter/summer) volatility also needs to be taken into account but the effects of this are sometimes confused with the tenor/expiry time dependency shown above and, indeed, are often dwarfed by this dependency.

There are other energy price features which we also model, including mean reversion, price jumps or spikes and dual price regimes. These features all represent potential value or risk for an asset or contract with optionality, irrespective of whether this optionality is explicit (specified in the contract terms) or implicit (ie, written down implicit (eg, embedded within an asset) or explicit. However, the representation of these features is only worthwhile if volatility term structure is first characterised properly. Having done this we then progress to calibrate the more sophisticated price model elements to observed market prices. It is this calibration stage which is critical and to which we bring our leading-edge expertise.

Long Term Modelling

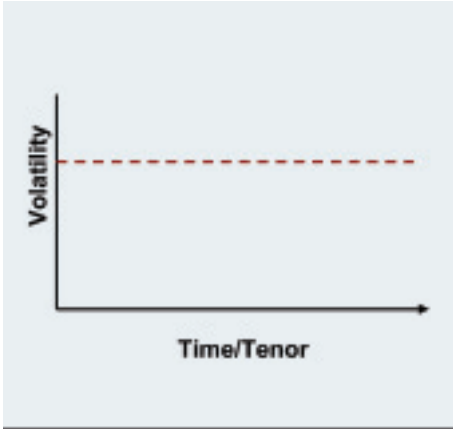
Beyond 3 or 4 years, there are fewer market quotes and there is far less information on transaction prices. Volatility is therefore not directly observable and, indeed, it is questionable whether the word has the same meaning and implications as for the near market. Nevertheless, uncertainty exists about the level of future energy prices.

Our approach is to estimate volatility directly so that we can continue to use stochastic models in the long term portion of the value/risk analysis. We do this through a blend of three approaches:

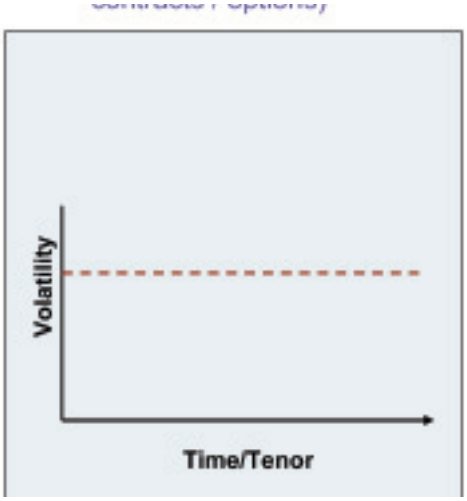
We project many (up to 100) future price paths through extension of our scenario analysis which is generally based on econometric principles such as intersection of supply/demand price inelasticity curves, future technological development scenarios and investment dynamics.

We introduce price disturbances and shocks on a random basis and then utilise investment dynamics techniques to model the rate at which prices return to trend. We know from history that price excursions and disturbances occur over periods of months and years and that it is difficult to predict when these will occur so it seems reasonable to recognise these in modelling terms.

Common assumption (for forward contracts/options)



Global Energy Advisory Modelling



We also fold in probabilistic views of

- Supply interruptions and new sources of supply;
- Fuel substitution both in terms of primary sources (eg, nuclear, renewables) and also in terms of energy vectors (eg, hydrogen and LNG);
- New technological developments; Changes in economic growth, both on a country and global basis;
- Effects of changes in demand from emerging economies (and also recognising potential effects from growing "pains and strains" effects from time to time in such economies; and
- Actions of governments and other administrations to curb the effects of greenhouse gas emissions.

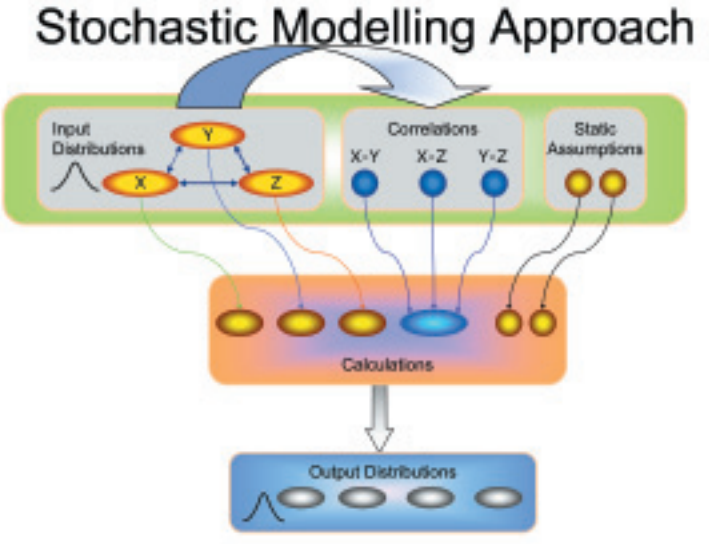
The overall objective is to project a view of the likely envelope or distribution of energy price outcomes in the long term which

- is well characterised but simple;
- has a rational basis;
- is well matched to models of assets and contracts; and
- can be readily understood.

Progressive Approach to Modelling

In order to facilitate understanding and to ensure that our clients receive the best possible value for money our modelling approach is "progressive" – ie, we build up refinement and sophistication in stages. We will only model to a depth with which the client is both comfortable and also recognises that it is valuable. Our modelling typically progresses through the following stages:

- deterministic – to establish a common understanding of basic parameters, eg volumes and values;
- simple optionality modelling – typically using standard models (eg, the @ENERGY suite from Financial Engineering Associates (FEA)) and assuming constant volatility over time – to identify principal optionality elements for discussion;
- use of full volatility term structure (this recognises that the assumption of constant volatility to expiration (Black Scholes-type models) is often a poor approximation in energy markets);
- complex price models, incorporating mean reversion, price jumps and regime switching using either industry standard or proprietary models as appropriate - depending on the application it may also be appropriate to use so-called "least squares Monte Carlo" techniques;
- optimisation of deal or asset parameters (eg, for a power station, improvement of ramp up/down rates at the expense of overall efficiency) or construction of an operational strategy (eg, so-called "delta" or "delta-gamma" hedging strategies for a power station.



Presentation and Client Understanding

Finally, we attach considerable importance to the need for the client to understand and to be comfortable with our modelling. We recognise that some aspects of stochastic can be complex and even counterintuitive. For example, it can be difficult to understand that the value of an option depends upon volatility rather than on the expectation as to whether an asset or commodity is going to go up or down in price.

We have considerable experience of explaining complex concepts to senior management in a pithy but engaging style. We do not believe in "black boxes" neither do we ask our clients simply to accept what we say about the merit of our modelling at face value. We will take as much time as necessary to explain our approach and the contribution which each feature of our modelling makes to the whole.

Conclusions

Whatever the brief, clients can be assured that, from the outset, the most cost-effective approaches to modelling in combination with as much sophistication as necessary will be pressed into use to find and articulate value and risk in any asset or contract.

John Talbot, Head of Risk

Global Energy Advisory

Global Energy Advisory comprises seasoned experts in the global energy market: entry criteria are a minimum of 20 years' experience in related disciplines. At the core of our expertise is one of the most sophisticated middle offices, which offers proprietary modelling to enable us to unveil and quantify global commodity market uncertainty. We then draw on our team of senior advisors and eight consultants to complement and enhance our modelling scenarios, providing unrivalled clarity in an uncertain energy future.

Fast Track System Development

Our solutions company – Global Energy Solutions – works closely with Microgen plc, one of the City's leading business software companies, to offer clients a clean, efficient and fast track delivery. Microgen's Aptitude business process management and business rules framework enables us to advise on best practice price risk management, implementation and control, as well as fast, comprehensive and controlled implementation of company-wide risk systems.

Together, Global Energy Advisory and Global Energy Solutions can assist you with:

- energy mergers & acquisitions.
- strategic energy policy.
- energy asset valuation and optimisation.
- Trade book and risk management audits.
- IAS 39 accounting methodologies.
- energy market regulation and compliance.
- global energy market cross-commodity consultancy.

Contact Us

T: +44 (0) 207 692 0888
F: +44 (0) 118 939 3385
M. +44 (0) 7833 954 817
W. www.globalenergyadvisory.com
E. aily@globalenergyadvisory.com
A. Global Energy Advisory Ltd, 4th Floor, 3 Tenterden Street, Hanover Square, Mayfair, London, W1S 1TD