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How innovative energy users can manage energy market risks

Value at Risk, a tool that helps businesses quantify and mitigate risk

Contents

Summary	02
Quantifying and managing risk	03
Progressive purchasing	03
Introduction to Value at Risk	04
Value at Risk in action	05
Complements to Value at Risk	07
The importance of ongoing monitoring	08
About Enel X	09



Summary

- Large users are purchasing energy in more innovative ways, such as progressive purchasing
- These innovative contracts achieve savings, but also come with some market risks that need to be quantified and managed
- Applying a Value at Risk methodology, combined with ongoing monitoring, is the best way to ensure contracts are managed efficiently

The challenge for savvy energy consumers – quantifying and managing risk

After the significant electricity price rises following the Hazelwood Power Station closure announcement¹, Australian energy users were caught in the lurch as prices almost doubled within a short period of time. Many energy users that were used to paying 4c/kWh for their electricity would soon be paying upwards of 8c/kWh if they were coming out of their energy contract.

This price shock was felt on many business bottom lines and prompted energy users to explore ways of better managing their electricity costs. More attention was paid at board level to energy costs, with the establishment of risk committees to keep executives apprised of the energy market generally. Energy users also begun to explore innovative contracting options. While fixed price contracts have been the mainstay for Australian electricity users, they are suited for a benign market where pricing is predictable and volatility is muted. To better manage their risk and avoid price shocks, progressive purchasing contracts have been increasingly taken up by large users throughout Australia.

Progressive purchasing - an innovative contracting option



What is progressive purchasing?

Progressive purchasing is where the energy user enters a contract that fixes the term (say one year, two years) of supply but does not fix the price over that time. During the contract term, the energy user will then purchase energy in blocks whose price is linked to the ASX Energy Futures price² at that time. This allows energy users to make multiple decisions on when to purchase, spreading risk rather than buying energy in one go (as you would in a fixed price contract). It also allows users to quickly lock in prices should any market news favourably affect the Future market prices. For energy users who purchase progressively, they are left with the quandary of when to purchase and how much energy they should buy. ASX Energy Futures change during intraday trading with a settlement price posted at the end of trade each day. Unless the buyer on a progressive purchasing contract has purchased enough blocks to cover all their electricity usage for a quarter or a year, the "position" of this buyer will change each day as the Futures market goes up and down. This is because the "unhedged" blocks are exposed to the Futures market.

While the fluctuations in the Australian energy Futures market is not as high as other markets, it is a still a risk that needs to be managed otherwise energy users may be caught out if the market becomes volatile. Energy users have embraced risk management tools and strategies to manage their progressive purchasing contracts – one of these is using the Value at Risk methodology.

¹<u>Hazelwood Power Station in Australia to close at the end of March 2017</u>, Engie, 3 November 2016
²<u>ASX Energy Futures</u>

Introduction to Value at Risk

Value at Risk is a risk assessment measurement tool that quantifies the level of risk over a specific period. It provides a measurement of the best and worst-case scenarios, based on current market conditions using recent market data. Value at Risk can flag where it may be suitable to transact in advance of the contract position deteriorating. Likewise, if the market is dropping, using triggers with Value at Risk can highlight favourable purchases to lower the overall energy cost. This is useful for the electricity Futures market which can be prone to sudden price movements, such as the Hazelwood announcement or the recent Yallourn retirement announcement³. Value at Risk uses the following inputs:

- The value of the contract
- Volatility over time
- Confidence level typically 95% assuming normalised distribution

With these inputs, Value at Risk can measure the potential change in the value of a contract over a time period at a certain confidence level. Assuming 95% confidence, it can measure the dollar amount of losses to the contract value for 95% of scenarios, while stating losses will be greater than this amount in 5% of scenarios (the red in figure 1).

For example, a contract with a current value of \$1,200,000 per annum will not fall by more than \$15,000 in one day, assuming a certain amount of volatility and a 95% confidence level. Note in this example, this also means that there is a 5% probability the value will fall by more than \$15,000 over one day.

Value at Risk can then be applied to progressive purchasing. By using ASX Energy Futures data, the volatility can be assessed over, say, a month or a year. This volatility is then applied to the electricity contract value to calculate the Value at Risk figure.



Case study

An Australian industrial client saved \$3.1m over the course of a three-year period by using Value at Risk with progressive purchasing. This client created a Risk Management policy that set Baselines and Trigger points to guide their purchasing decisions. The client used the Value at Risk assessment to monitor the market daily, so were able to react when prices spiked but also took advantage when the market dropped.



Predicted profit/ Loss (Millions of dollars)

³Energy Australia announces the retirement of Yallourn, AEMO, 11 March 2021

Figure 1

Introduction to Value at Risk – position and risk banding

As the ASX Energy Futures settlement prices change daily, this means the 'position' and the Value at Risk associated with it also change day to day. If there was sudden price movement from one day to the next, the volatility will increase and subsequently so will the Value at Risk.

In the example below, we see how the Value at Risk changes over time from the movement in the ASX Energy Futures prices. The purple line shows the contract position value, which changes over time as the Futures move up and down. The light purple banding surrounding the contract position value is the Value at Risk. This banding shows the best and worst outcomes for the contract position using recent volatility and a confidence level.

Position vs Baseline (AUD)



Value at Risk in action - buying triggers

One way to use Value at Risk is to set trigger points (shown as pinkdashed line below) where, if the position breaches this figure, the energy user is prompted to make a purchase – see graph below illustrating how such a policy might work.

Position vs Baseline (AUD)



Value at Risk in action – mitigating risk in an increasing market

In this example, a large energy user on a progressive purchasing contract is using Value at Risk methodology to assess the risk on their electricity portfolio. This user has not purchased any energy blocks yet, so, their position (the purple line below) changes day to day in line with the ASX Energy Futures market. They use a monitoring tool to visualise their energy position as well as the Value at Risk collars (the light purple banding), and have set a pre-agreed upper Trigger (pink-dashed line) that may prompt them to make a transaction.

After a period of increases in ASX Energy Futures prices, both the user's position and Value at Risk increase. However, the Value at Risk figure has breached the trigger before the position has breached the trigger, allowing the user to take steps to mitigate further increases. They decide to transact 30% of the energy contract at this point.



Value at Risk in action – a reducing risk banding

After this transaction is made, the customer has now locked out 50% of energy for the period. Over time, the Value at Risk figure reduces as only 50% of the user's energy is exposed to the ASX Futures rates and the market (in this example) seems to have flattened (less volatile). Consequently, the Value at Risk banding has reduced significantly.

Note the Value at Risk banding around the position has narrowed slightly. After a couple of weeks, the market still hasn't moved down, and the Value at Risk still exceeds around the trigger. This prompts the user to make another transaction of 20% to protect their position below the trigger point.



Complements to Value at Risk

All risk measurement systems have limitations, including Value at Risk. For one, Value at Risk assumes a normal distribution of outcomes. ASX Energy derivatives are not always distributed normally, especially in times of poor liquidity. Another limitation is that it may understate "tail risk", such as extreme events which are beyond the expected volatility.

There are variants, or complements, to address these limitations. A variant of Value at Risk uses Monte Carlo simulations – the generation of random numbers to perform stress tests. Another is the Expected Shortfall, also known as Conditional Value at Risk. Expected Shortfall is a way of measuring the tail risk, or the potential loss from extreme outcomes.

As Hull (2006) notes, Value at Risk is a measurement of "how bad can things get?", while Expected Shortfall is a measurement of "if things get bad, what is our expected loss?"⁴. The graph 2 below illustrates these complementary methods. As Expected Shortfall accounts for losses beyond the confidence level, it is a more conservative risk management assessment.



Case study

Not just electricity Futures – Value at Risk can also be used as a risk assessment tools for other commodities. As long as the commodity is expected to (generally) have outcomes on a normal distribution curve, then Value at Risk is suitable. This means it is more suited to Futures products, such as LREC certificate prices, rather than spot prices which have high volatility and extremes.

Graph: Value at Risk vs. Expected Shortfall⁵





2. Different scenario: VaR is the same, but the potential risk is higher



⁴ Hull J, <u>Risk management and financial institutions</u>, Prentice Hall, 2006
⁵ <u>VAR vs. Expected Shortfall</u>, Risk.net, 2007

Ongoing monitoring is essential

Whichever risk assessment method is used, it is important progressive purchasing energy users monitor their positions to mitigate the impacts of sudden price movements. Users should be able to assess their position each day as the Futures prices settle (as above) and ascertain how much of their portfolio is unhedged. Users should also be able to monitor the Value at Risk figure as it changes daily, and set benchmarks or baselines to provide a framework for decision making. Lastly, the market context should be understood – users need to understand why the market has moved up and down (lower price of gas, increased renewable generation, unexpected outages, etc.). Taken together, energy users can be confident about when to purchase to achieve a favourable price outcome.

Enel X's expertise

With over \$2 billion of electricity supply currently under management globally, Enel X has the expertise and experience to manage large and complex procurement activities, including advisory services to support risk management and alternate procurement strategies.

Our team has a deep and comprehensive understanding of the market price components, drivers and mechanisms essential in delivering value and managing buying risk for customers. We are supported by a global network of procurement experts and analysts with operations spanning multiple capacity and energy markets and bilateral utility arrangements including USA, Canada, Germany, Austria, Ireland, Japan and New Zealand. This global knowledge base is leveraged by our domestic team on a weekly basis to ensure our market insight is finely tuned. Enel X has over 150 national customers across Australia and New Zealand, with a team that has been deeply entrenched in the competitive energy markets for over 10 years. Our customers represent a variety of industries including manufacturing, real estate, data centres, government, healthcare, education and more. Our Australia and New Zealand procurement services team is made up of experts with many years in both markets, as well as Asia and Europe.



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About Enel X

Enel X is leading the energy transformation all over the world. We help businesses to decarbonise, digitalise and electrify energy use to drive sustainability outcomes and reduce costs.

For more information, visit: www.enelx.com.au, or get in touch with one of our energy advisory experts at info@enelxanz.com.au.

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