



## How to use aluminium price volatility to estimate your cash-flow exposures

### Aluminium market developments

The continuing COVID-19 pandemic has caused a decrease in demand for aluminium, especially in Europe and North America. The situation in China is opposite: there is heavy investment from the government in infrastructure, and also new car sales have shown a growth rate for the seventh continuous month in October 2020,

According to World Aluminium<sup>i</sup>, the expectation is that production of aluminium will grow 2% to 64.8k metric tons, back to the same volume as in 2018 (64.1). China is the dominant producer of aluminium, with 57% of the output.

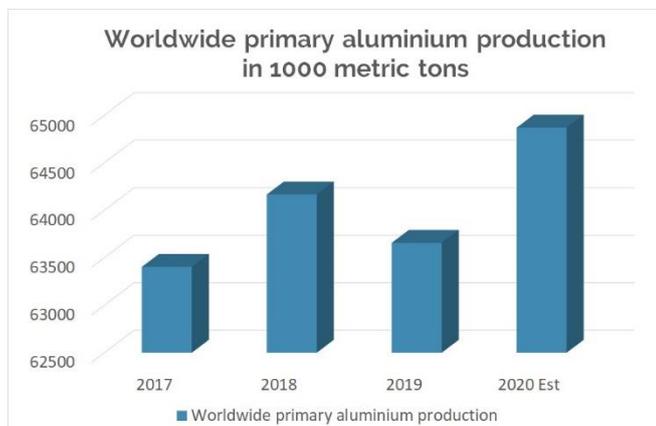


Figure 1: World aluminium production. Source: World Aluminium

### Prices aluminium

The following graph shows the price development over a two-year timeframe for aluminium, as published by Westmetall<sup>ii</sup>. Inventory levels of aluminium are decreasing, and with a positive demand outlook from China this leads to a positive price development. On October 26th and 27th, the Chinese government announced their fifth plenum. The market reacted with a decrease of only 0.7%, and has since risen again.

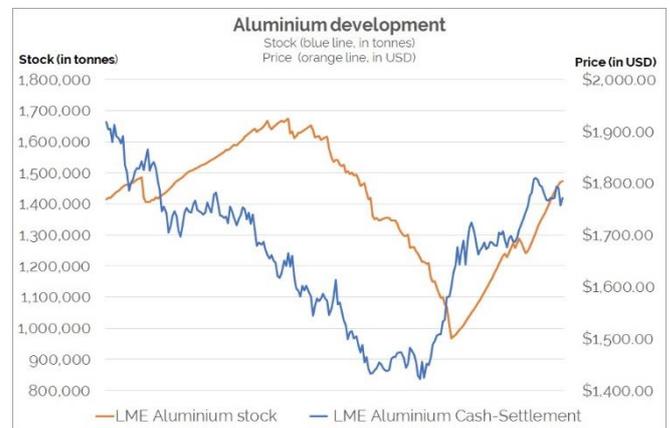


Figure 2 Price vs Stock aluminium - Source Westmetall

### High volatility

To be able to calculate a potential distribution of cash-flows you also need the volatility. Volatility is not a standard percentage, but moves over time depending on how much and how quickly prices go up and down. The level of volatility also depends on the contract traded. Below we present data on the nearby future contract. For a potential cashflow distribution in 2022 we look at relevant products traded.

Volatility aluminium	
20 years of aluminium trading – volatility calculated over historical window of 24 months	
Highest volatility	36%
Lowest volatility	12%
Average	21%
Current	16%

### Volatility Term Structure

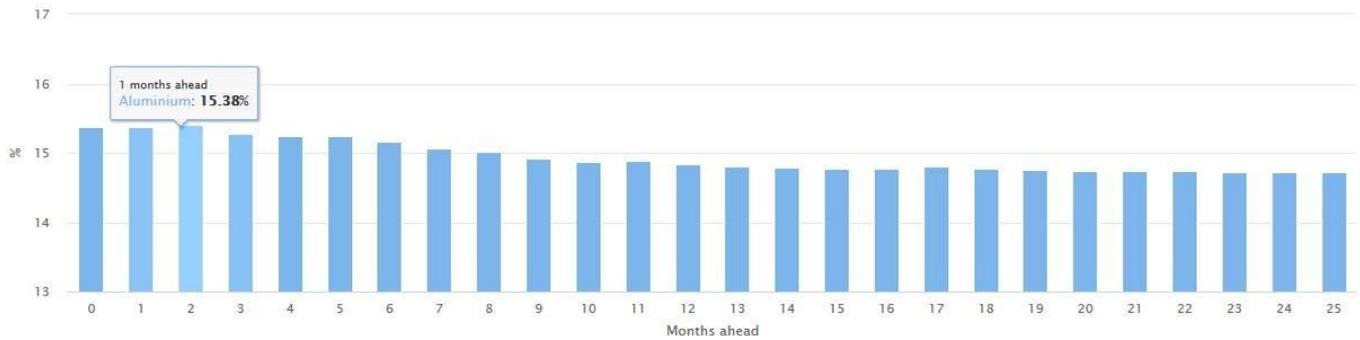


Figure 3 Volatility aluminium - Source KYOS Portfolio and Risk Management System

The above figure is taken from the KYOS Portfolio and Risk Management system. It shows the volatility for aluminium. The current volatility of aluminium is around 16% for the spot contract traded and published on the LME. These calculations are based on a historical forward window of 24 months. Compared to the Euro Dollar volatility, it is 3-4 times higher.

But what else do you need to know about this market? Volatility is an important number for risk management but KYOS also crunched historical data to gain insight in price levels and price movements:

Some interesting facts – 18 years aluminium trading	
Prices in \$/MT	
Highest price	3,291 July 2008
Lowest price	1,253 February 2009
Average	1,944
Current	1,913
Highest price increase in 24 hrs	212
Largest drop in prices in 24 hrs	- 230
Price changes > 25 (up/down)	27%
Price changes > 50 (up/down)	7%

### Your commodity exposure

Suppose in 2022 you consume an annual volume of 25,000 MT aluminium. Based on market prices from 10 November 2022, the expected cost is \$ 49.4 mln.

### What is the Cashflow-at-risk?

Without hedging, this "floating priced" position, the 95% cashflow-at-risk (=CfaR) for 2022 can be presented as the potential cash-flow difference between:

- Sourcing at today's market prices of 1,910 \$/MT
- Sourcing in the short-term market and ending up in the 5% worst case (i.e. highest) price scenario of 2,630 \$/MT or higher

### Cash-flow distribution

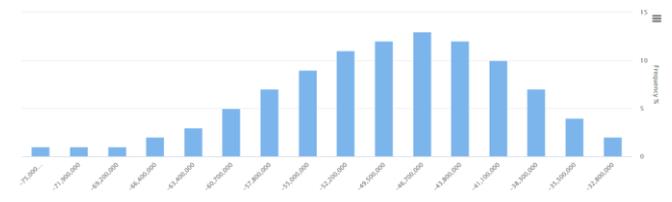


Figure 4 Distribution of cash-flows - Source KYOS

This means that if you leave the position open:

- With 5% probability the cash-flow (costs) will be higher than \$ 65.8 million
- The cashflow-at-risk (CfaR) is \$ 16.4 million (= \$ 65.8 million - \$ 49.4 million)

Be aware that this is not the maximum risk nor the maximum costs, because prices may rise above 2,630 \$/MT.

The management of the company should set certain benchmarks for the financial risk, in particular what is the maximum level of acceptable costs and what level of certainty is required (95% or more). In addition, the company should calculate the actual exposure (CfaR) each day. If the actual CfaR is above the acceptable level of risk, extra volumes should be hedged.

## Value-at-Risk

Cashflow-at-Risk is a measure for risk over a longer horizon, typically 1 to 4 years. For a short-term risk calculation, you can use Value-at-Risk. It measures the potential change in the market value of your position over a short period of time, such as 1, 5 or 10 days

- Value-at-Risk 1 day \$763,000

This means that with 95% certainty the potential costs will not rise with more than \$763,000 in a single day for this position of 25,000MT of aluminium to be bought in 2022.

A holiday break of 10 days more than triples this potential price movement (=VaR) to \$ 2,309,500 again calculated with 95% certainty.

## Monte Carlo price simulations

Most industrials have a forecasting horizon of 2 to 4 years. The Monte Carlo simulation model is well suited for long term risk calculations and to assess a potential cash-flow distribution over a longer horizon.

Especially when the market price returns do not have a very nice normal distribution, this may be more accurate.

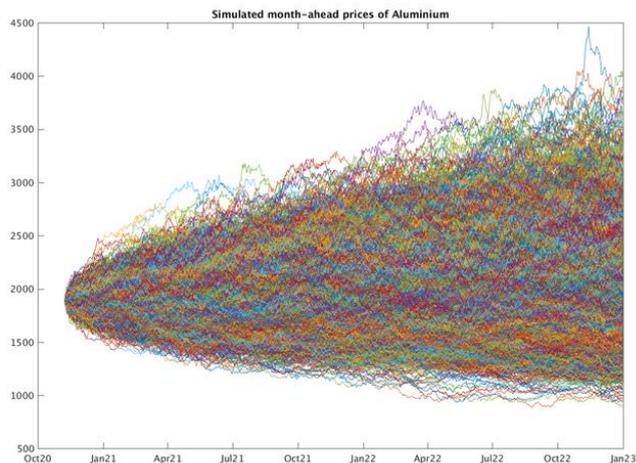


Figure 5: Simulated month ahead prices of Aluminium – Source KYOS Analytical Platform

## And now?

With these relevant calculations you have determined your starting point for a sound hedging strategy.

Your company is better prepared to make the right hedging decisions and avoid large losses!

<sup>i</sup> <https://www.world-aluminium.org/statistics/>

<sup>ii</sup> <https://www.westmetall.com/>

## Advantages KYOS Portfolio and Risk Management System

### Short term versus Long term

KYOS software is used globally by procurement teams, risk managers and CFOs, to manage short- and long-term price risks.

Short term risks can be calculated using stress tests and/or using Value-at-Risk (=VaR) calculations. The main drivers for the Value-at-Risk are (i) the positions and (ii) the price volatility of commodity markets. The VaR model shows both the positions and the volatility per month, giving full insight in the risk drivers.

The standard VaR model in the KYOS Analytical Platform is based on the variance-covariance matrix. It is referred to as parametric VaR, normal VaR or varcovar VaR. It is easy to use and to interpret results.

As alternative methodologies, KYOS offers the Monte Carlo simulation approach. Especially when the market price returns do not have a very nice normal distribution, this may be more accurate.

Most industrials have a forecasting horizon of 2 to 4 years. The Monte Carlo simulation model can also be used for long term risk calculations and to assess a potential cash-flow distribution over a longer horizon.

### Accumulators - embedded options

Many clients in the food & beverage industry use accumulators to manage the price risk. KYOS has developed software to verify price valuations. It enables our clients to have an independent calculation of the value as well as the MtM. It also enables clients to play with the strikes to find their optimum.

### KYOS adds value

To help you understand price risks and improve your company's cash-flow prediction, KYOS has developed risk management software to effectively manage any commodity portfolio. This software is tailor-made to reflect your specific requirements. The KYOS commodity portfolio & risk management system captures years of industrial experience in managing budgets, commodity contracts, physical and/or financial hedging, market price analysis and sophisticated cash-flow forecasts.

### For whom

Are you still using different spreadsheets to calculate your numbers? Whether you are in Procurement, Sales, Finance or Treasury – every department needs good, dependable figures. A good cash-flow forecast will make your life easier.

Please do not hesitate to contact us so we can discuss how we can help you save time – and probably money too.

Interested to learn more? Contact us at [info@kyos.com](mailto:info@kyos.com)