

KYOS Commodity Risk Management

Turbulent times call for advanced risk management

– a practical case-study of a food company

27 April 2022



Introduction to KYOS

- Provide analytical support to large industrial companies including energy producers
- Software to value and optimize complex assets with flexibility
- **easy to use, on-line system:** “Analytical Platform”

More than 100 corporate clients using KYOS software and services



Differentiation from ERPs

- Logistics
- Inventory
- Invoicing
- Positions
- Cashflows
- MtM for standard products
- Dedicated coverage reporting
 - Volumes, percentages, performance YoY, hedge strategy
- MtM for all derivatives (incl. accumulators)
- Stress testing
 - prices
 - volatility
- Value-at-Risk (short term)
- Cashflow-at-Risk (long term)

“RISK COMES FROM NOT KNOWING WHAT YOU'RE DOING.”

WARREN BUFFET



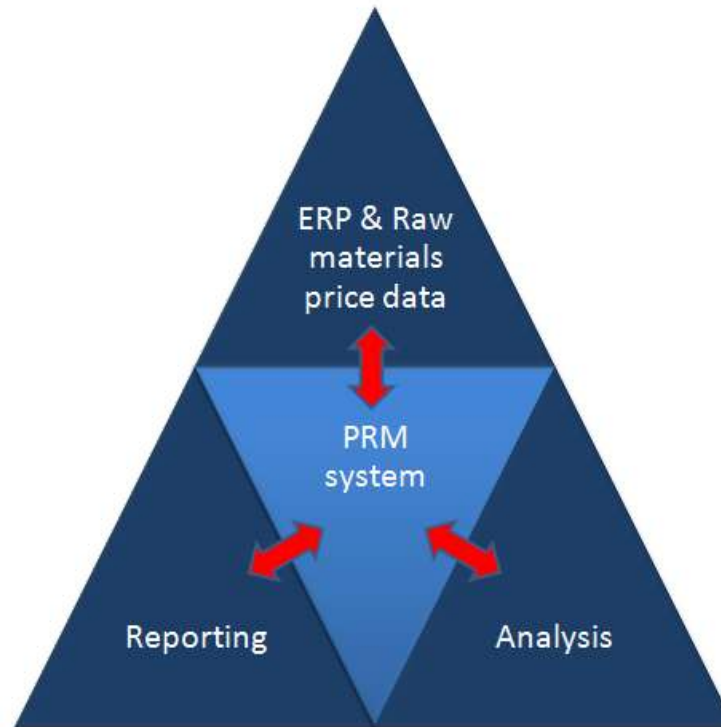
Where does KYOS add value to the chain?



Physical flows
Financial hedges
Price analytics



Cashflow forecasts
Hedge reports
Stress testing
VaR - CfaR



CPO/CFO
Head of Trading
Head of Risk
Treasury (GTreasury)

Enable you to look forward as
hindsight is a wonderful thing

Base case - food producer – bread & cookies



- Sugar
 - \$ 12.5 million - 66 million Lbs
- Wheat
 - \$ 53.0 million - 5 million BU
- SBO
 - \$ 16.0 million - 26.5 million Lbs
- Packaging/Transport/Utilities
 - \$ 5.0 million
 - Aluminium, PET
 - Diesel
 - Natural gas

Market prices 21st April 2022

Natural gas prices have exploded



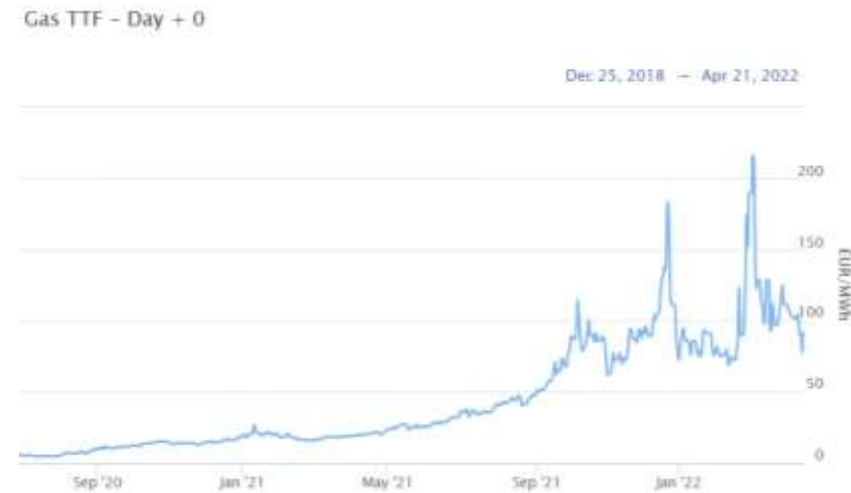
- Strong prices for natural gas - ammonia
- Fertilizer producers like YARA (March '22) closing production facilities (Ferrara and Le Havre) leaving production < 45 %
- Prices fertilizer products rose globally (doubled and more)



Visualization of market prices



- Sugar (up 30% - 12 months)
- Wheat & SBO (up 75% - 12 months)
- Utilities (e.g. natural gas - unprecedented...)



From physical contracts to financial risks



Conversion factors embedded in the KYOS modules

Sales will lead to “direct” exposures:

Underlying comm	Contract/Underlying	Unit	Total
Bread & Cookies	Contract	Pcs (1000)	-15,000,000
Soybean Oil	underlying	Lbs	26,500,500
Sugar #11	underlying	Lbs	66,000,000
Wheat Chicago SRW	underlying	Bushel	4,999,500



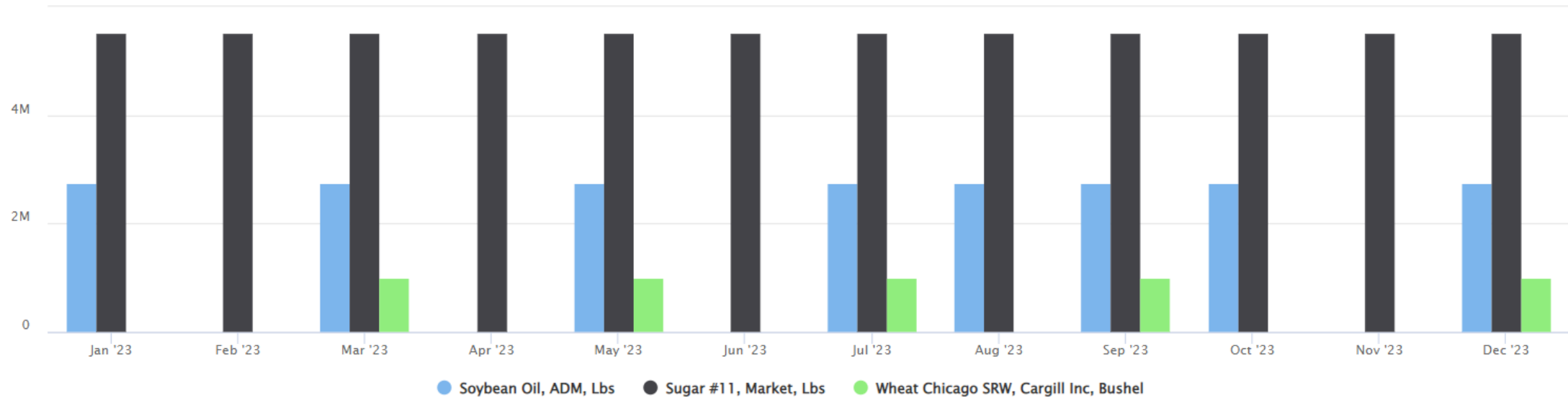
Visualization of procurement versus sales



Counterparty	Period	Commodity	B/S	Volume	FX	Price type
Retailer company	Jan'23 - Dec'23	Bread	Sell	-15,000,000 Pcs (1000)	USD	phys future
Cargill Inc	Jan'23 - Dec'23	Wheat Chicago SRW	Buy	5,000,000 Bushel	USD cent	phys future
Market	Jan'23 - Dec'23	Sugar #11	Buy	66,138,600 Lbs	USD cent	phys indexed
ADM	Jan'23 - Dec'23	Soybean Oil	Buy	22,046,200 Lbs	USD cent	phys future



CPO team buys commodities



Kyos Energy Consulting

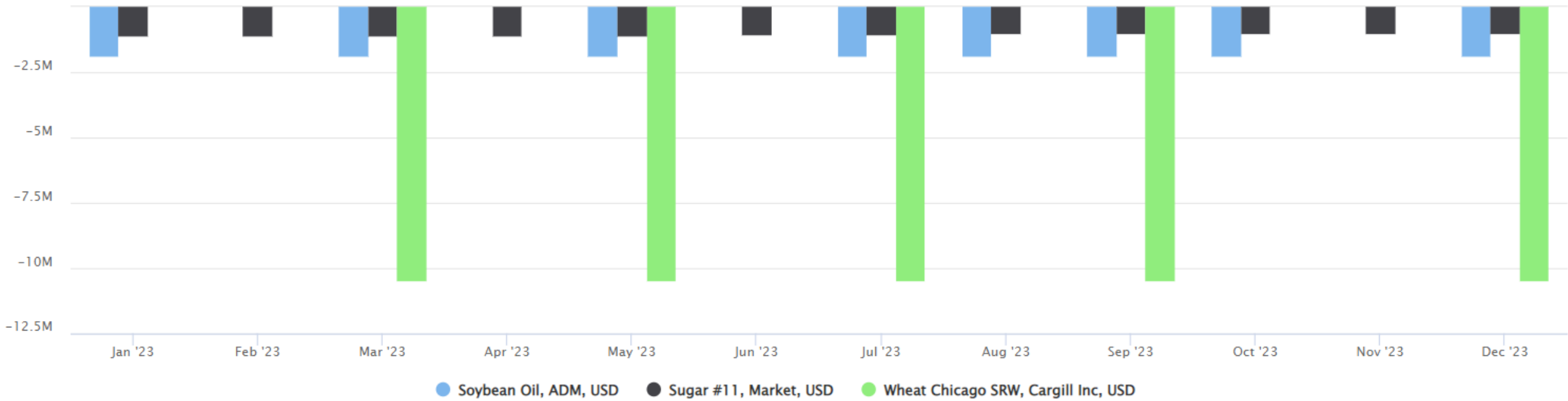
Contracts

				2023									
Commodity	Counterparty	Unit	Tot	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Soybean Oil	ADM	Lbs	22,046,200	2,755,775	0	2,755,775	0	2,755,775	0	2,755,775	2,755,775	2,755,775	2,755,775
Sugar #11	Market	Lbs	66,138,600	5,511,550	5,511,550	5,511,550	5,511,550	5,511,550	5,511,550	5,511,550	5,511,550	5,511,550	5,511,550
Wheat Chicago SRW	Cargill Inc	Bushel	5,000,000	0	0	1,000,000	0	1,000,000	0	1,000,000	0	1,000,000	0



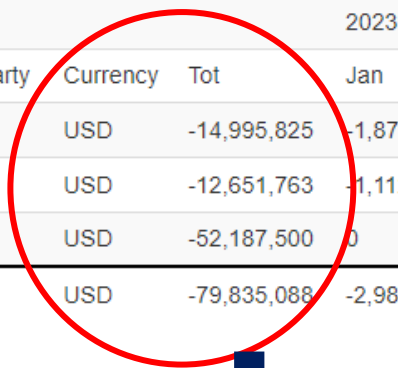
Physical flows because of physical agreements

The easy part: “daily market value”



Kyos Energy Consulting

				2023											
Commodity	Counterparty	Currency	Tot	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Soybean Oil	ADM	USD	-14,995,825	-1,874,478	0	-1,874,478	0	-1,874,478	0	-1,874,478	-1,874,478	-1,874,478	-1,874,478	0	-1,874,478
Sugar #11	Market	USD	-12,651,763	-1,112,782	-1,112,782	-1,112,782	-1,070,894	-1,070,894	-1,040,029	-1,040,029	-1,018,534	-1,018,534	-1,018,534	-1,017,983	-1,017,983
Wheat Chicago SRW	Cargill Inc	USD	-52,187,500	0	0	-10,437,500	0	-10,437,500	0	-10,437,500	0	-10,437,500	0	0	-10,437,500
Total		USD	-79,835,088	-2,987,260	-1,112,782	-13,424,760	-1,070,894	-13,382,872	-1,040,029	-13,352,008	-2,893,013	-13,330,513	-2,893,013	-1,017,983	-13,329,961



Physical contracts leading to financial flows

Starting point for analytics – “actual vs history”



Backwardation/contango – correlation – co-integration

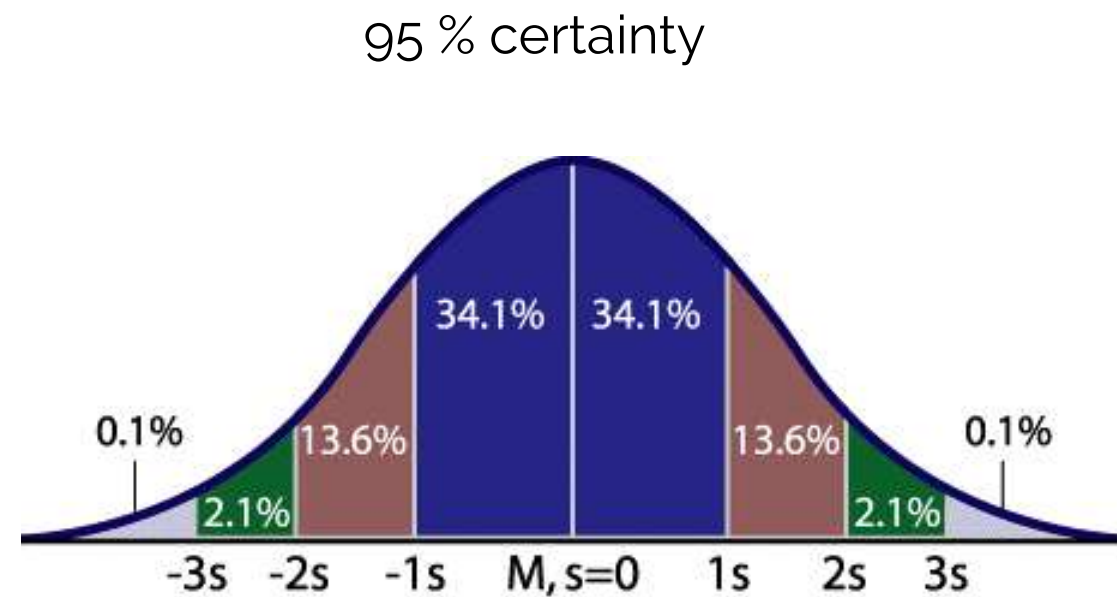
Estimating or calculating risks



How to “look forward”



What can happen from today to tomorrow



Monte Carlo (MC) simulations



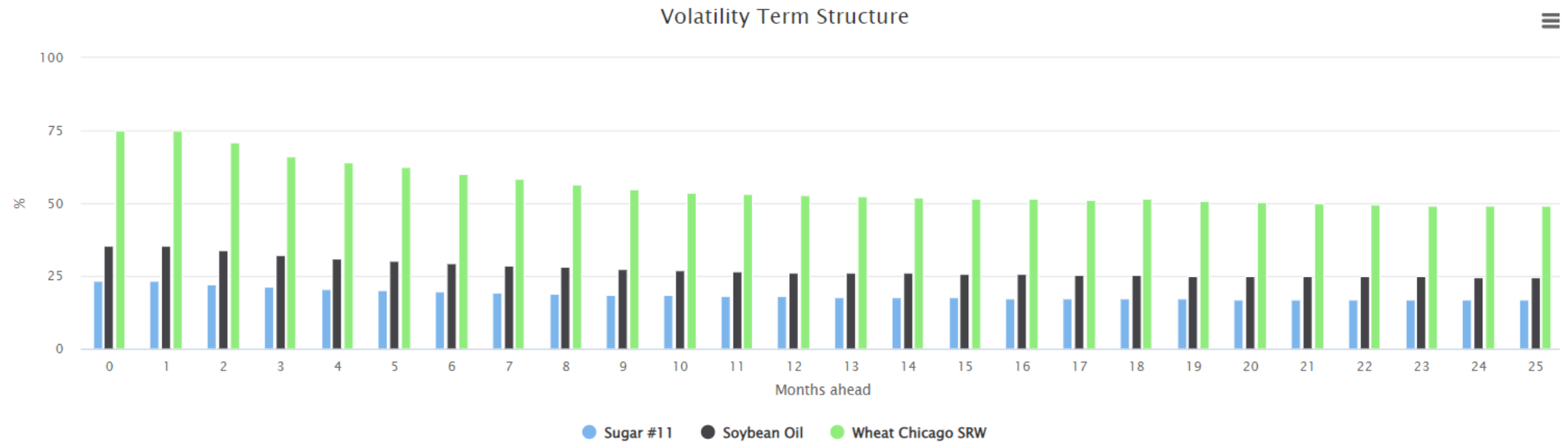
- Long horizons (e.g. budget for 2023 or long term investment)
- Tails – non “normal distribution”
- Exposure is complex
 - multiple commodities
- Volume uncertainty



From basic mathematical calculations



VaR **Volatility** Exposures Forward

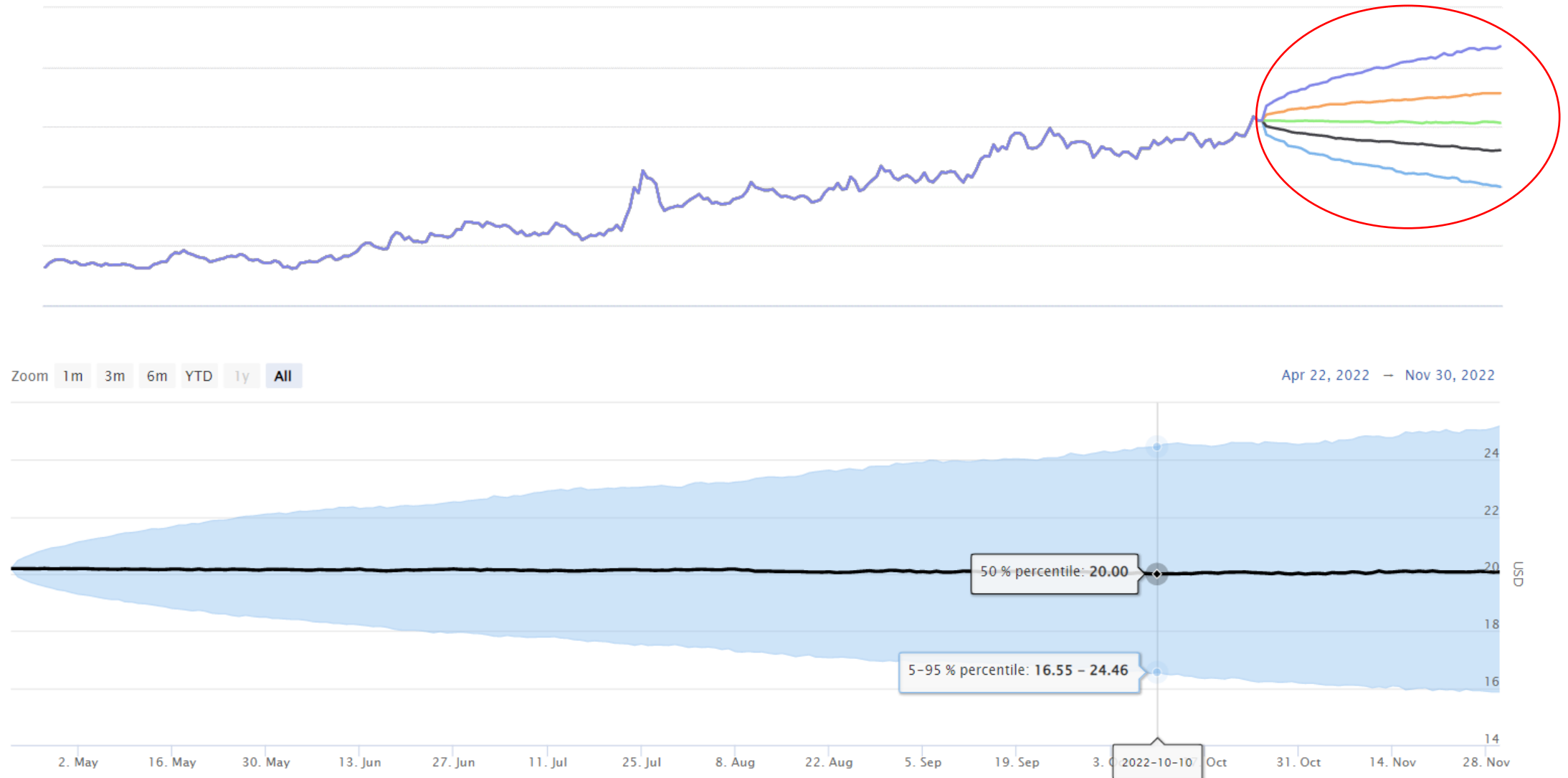


Kyos Energy Consultin

Correlation M01

	Sugar #11
Sugar #11	1.00
Wheat Chicago SRW	0.32
Soybean Oil	0.10

To a quantification of potential movements



Short term risk calculation: Value-at-Risk

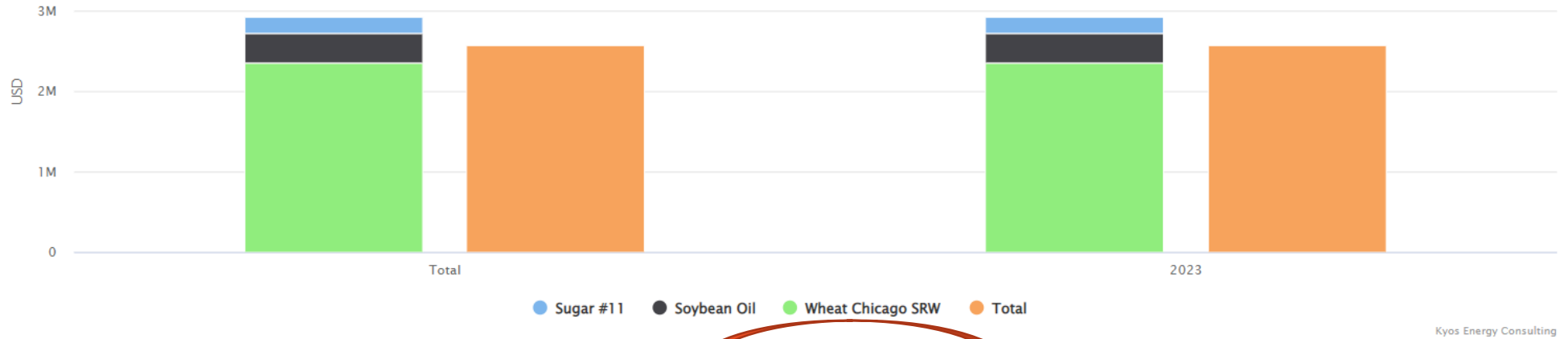


How to use VaR in practice:

- What can happen with a commodity value in 1 single day with a 95% confidence level?
- Or what can happen during your holiday of 10 days without internet, prices and news
- Base case represents a (current) value of "\$ 79.8 million" for 2023 (21st April 2022)

Note: differences in MtM can lead to additional margin requirements, and have therefore implications on working capital requirements

Use of VaR in practice



	VaR 2022-04-21 (USD)		VaR 2022-04-20 (USD)		Change in VaR (USD)	
	Total	Jan '23 - Dec '23	Total	Jan '23 - Dec '23	Total	Jan '23 - Dec '23
VaR total	2,577,600	2,577,600	2,637,900	2,637,900	-60,300	-60,300
VaR per commodity						
Sugar #11	211,430	211,430	209,260	209,260	↑ 2,170	↑ 2,170
Soybean Oil	363,210	363,210	362,310	362,310	↑ 900.00	↑ 900.00
Wheat Chicago SRW	2,358,800	2,358,800	2,402,700	2,402,700	↓ -43,900	↓ -43,900

With 95% certainty the change (up or down) will be < \$ 2.6 million

Portfolio value ranges between approximately \$ 77.2 to \$ 82.4 million

Long term cashflow risks



Cashflow-at-Risk (CfaR):

CFO question two: What can happen with our cashflow during 2023 if we do not hedge our position? How sure are we?

In real life, many clients hedge exposures

- Fully and/or partially hedged
- Physical and/or financial hedges

CfaR should be part of your risk management procedures

Risks – but what is risk ?



If you can't stand the heat, get out of the kitchen.

(Harry S. Truman)

CFO base case scenario – what can happen?

Earnings at Risk

Cash-flow at Risk

Volumes at Risk

Comparison

Cash-flow at Risk Summary

Commodity

Commodity

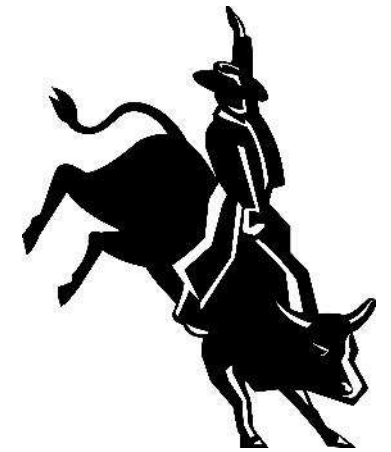
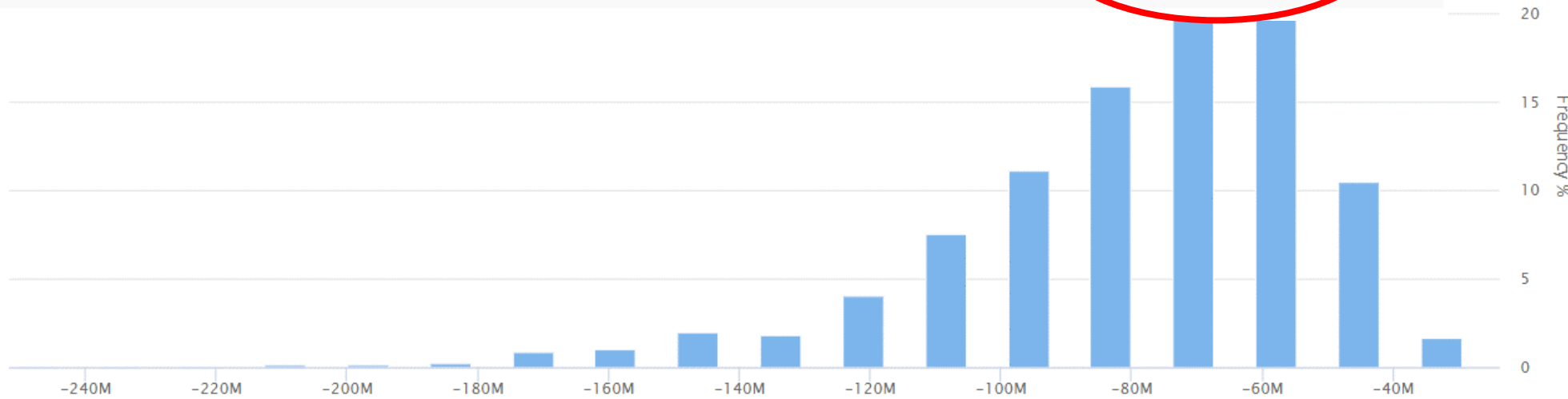
Total

Currency

USD

95% at Risk

57,599,218



Commodity	Currency	Avg	1%	5%	10%	90%	95%	99%
Total	USD	-79,835,088	-174,170,950	-137,434,306	-115,880,320	-50,002,680	-44,704,584	-37,247,329
Sugar #11	USD	-12,651,763	-18,260,198	-16,635,279	-15,419,508	-10,115,463	-9,503,916	-8,311,156
Soybean Oil	USD	-14,995,825	-25,915,667	-22,023,602	-19,960,554	-10,609,825	-9,756,438	-8,038,178
Wheat Chicago SRW	USD	-52,187,500	-141,304,693	-103,385,690	-84,704,362	-25,571,485	-20,857,667	-15,040,679

The day after... the most important calculation

- Which hedging instruments are we going to use ?
- How to connect them to the physical flows

Contract linking

This is a hedge for the following contract:

ID	Counterparty	Period	B/S	Commodity	Legal entity	Volume	Currency
2520	Ardagh Group	Jan'23 - Dec'23	Buy	Aluminium	Beverage Producer	18000 MT	USD

“Hedges” – control the bull

Hedging instruments:

- Physical price agreements
- Financial hedges like futures, swaps and options
- Embedded structures like **accumulators**

What is an accumulator ?



Accumulator: physical and/or financial

ADM, Bunge, Cargill, T&L etc

JPM, Citi, GS, BNP, RABO etc

<https://admadvantage.com/grain-contracts/price-accumulator/>

Run selected profiles

<input type="checkbox"/>	ID	Confirmation number	B/S	Trade date	Counterparty	Commodity	Future	Volume	Accumulated	Completed	Scheduled	Automated	Jobs	Reporting
<input type="checkbox"/>	49	Wheat Chicago SRW	Buy	2022-01-04	ADM	Wheat Chicago SRW	2022-07	100.00 lots	70.97 lots	59.68 %	No	<input type="checkbox"/>	4	No

Accumulator inputs



Basis accumulation

Future Jul 2022

Lots or units Lots Units

Number of Lots 100

Lot size 5000 Bushel / lot

Start accumulation 2022-01-04

End accumulation 2022-06-30

Pricing days 128

Settlement price 1 day Yes No

Settlement day 2022-06-30

Payment date 2022-07-01

Pay-off structure (All prices are in USD cent / Bushel)

Market price >=	Market price <	Volume	Strike
0	850	100 %	800
850		50 %	800

Add Pay-off

Additional accumulations

Additional accumulation #1

Early termination Yes No

Future Jul 2022

Type Daily Accumulation

Barrier Yes No

Barrier price 1025 USD cent / Bushel

Barrier method Up-and-out

Intraday has exceeded barrier Yes No

Barrier date 2022-03-02

Pay-off structure (All prices are in USD cent / Bushel)

Market price >=	Market price <	Volume	Strike
0	850	100 %	800

Add Pay-off



Accumulator price path and MtM



Tables

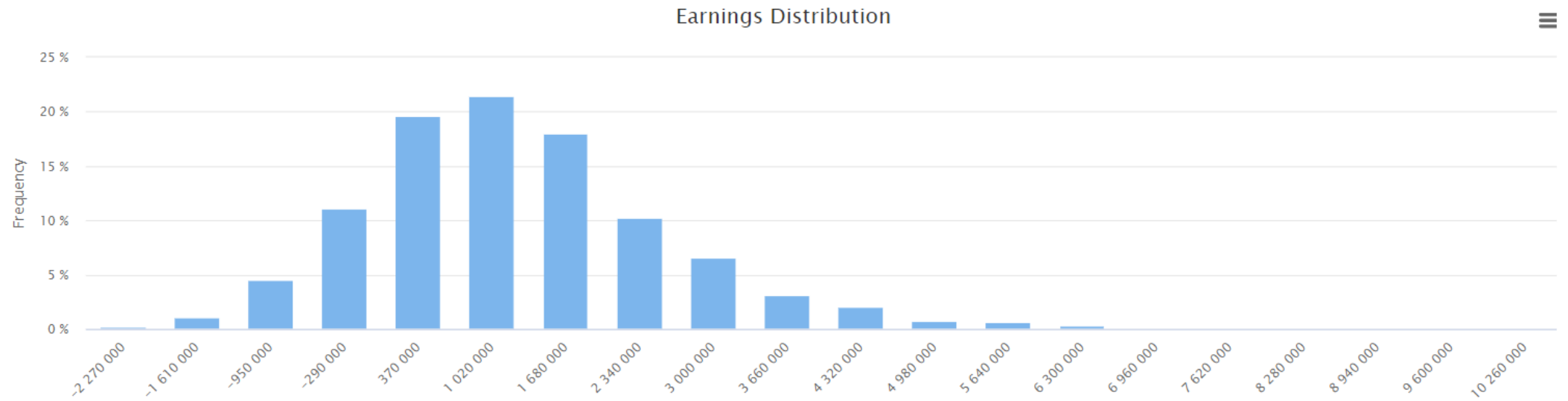
Graphs



		Basis		Leg-1		Total	
	Units/Currency	Intrinsic	Simulation	Intrinsic	Simulation	Intrinsic	Simulation
Total Position	Lots	63.71	65.84	27.42	27.42	91.13	93.26
Accumulation Price	USD cents	800.00	800.00	800.00	800.00	800.00	800.00
Settlement Price	USD cents	1,077	1,077	1,077	1,077	1,077	1,069
Mark to Market	USD	880,786	876,151	379,073	379,073	1,259,859	1,255,223



Accumulator “Greeks & Earnings distribution”



Greeks

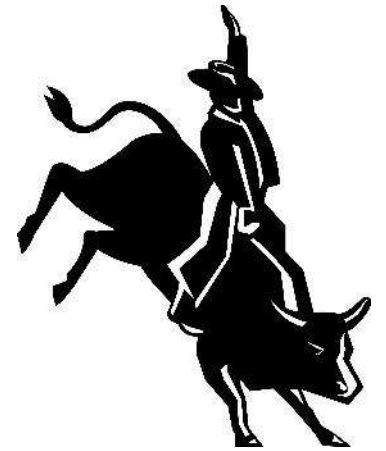
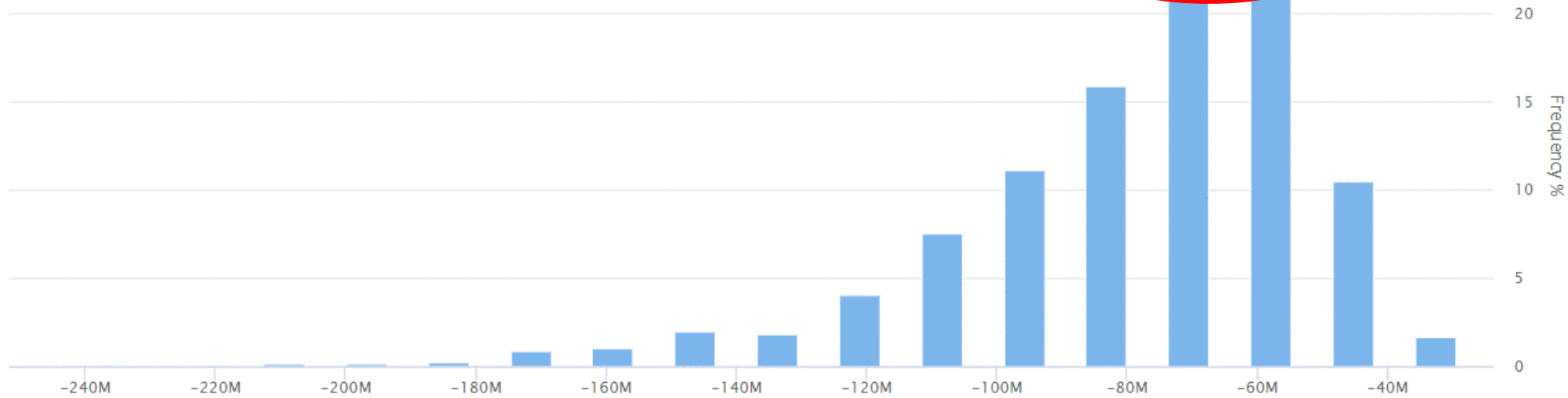
	Currency/Unit	Basis Accumulation	Additional Accumulation
Underlying future		Jul 2022	Jul 2022
Delta	Lots	64.41	27.42
Gamma	Lots / (USD cents/Comm Unit)	0.00	0.00
Vega	USD	-192.97	0.00

Barrier Info

	Barrier Type	Barrier Price	Is Knocked Out	Knocked Out Date
Additional Accumulation	Up-and-Out	1,025	True	2022-03-02

30% Hedged scenario – mitigated risk?

CfaR down – from 57.6 million to **\$ 37 million**



Commodity	Currency	Avg	5%
Total	USD	-79,835,088	-116,910,902
Sugar #11	USD	-12,651,763	-15,345,150
Soybean Oil	USD	-14,995,825	-19,915,269
Wheat Chicago SRW	USD	-52,187,500	-84,885,662

Specific reporting per group of users

CPO and category managers

CFO, treasury and finance

Risk manager



THE KEY IS NOT
TO PREDICT THE
FUTURE, BUT TO
BE PREPARED FOR
THE FUTURE

PERICLES, 495 – 429 V. CHR.

Thank you for joining



Thank you

Time for Q & A





Contact Details

Richard Cornielje
cornielje@kyos.com



KYOS Commodity Risk Solutions
Nieuwe Gracht 49
2011ND Haarlem
The Netherlands