CME Group

MARKET FORUM TECH

RISK

Clearing Risk Services: Margin Frameworks and Tools for Managing Risk at CME Group

SPEAKERS

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AGENDA

01. History of Risk Services

02. CME Ecosystem

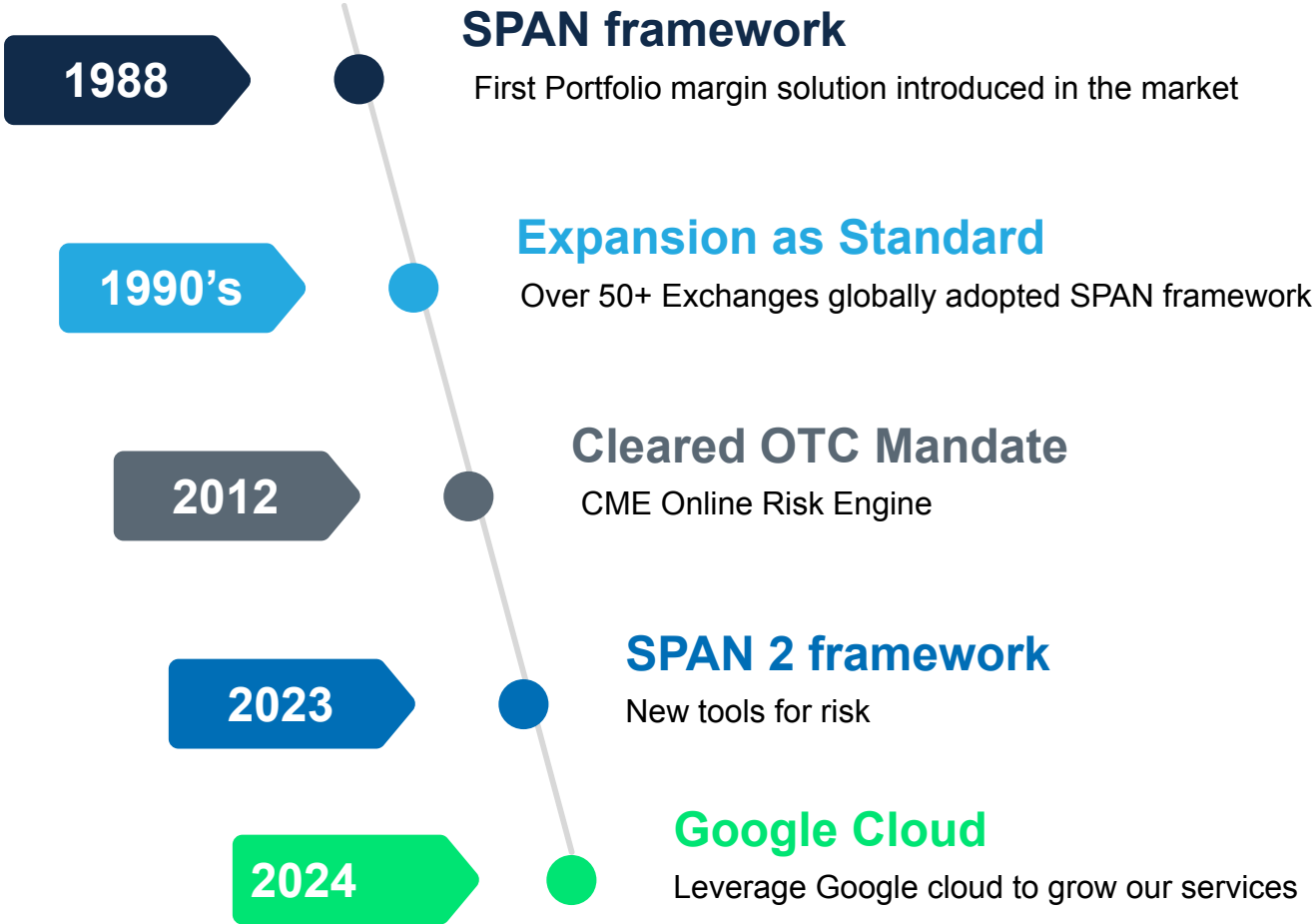
03. Current Risk Services

04. Future Roadmap

05. SPAN2

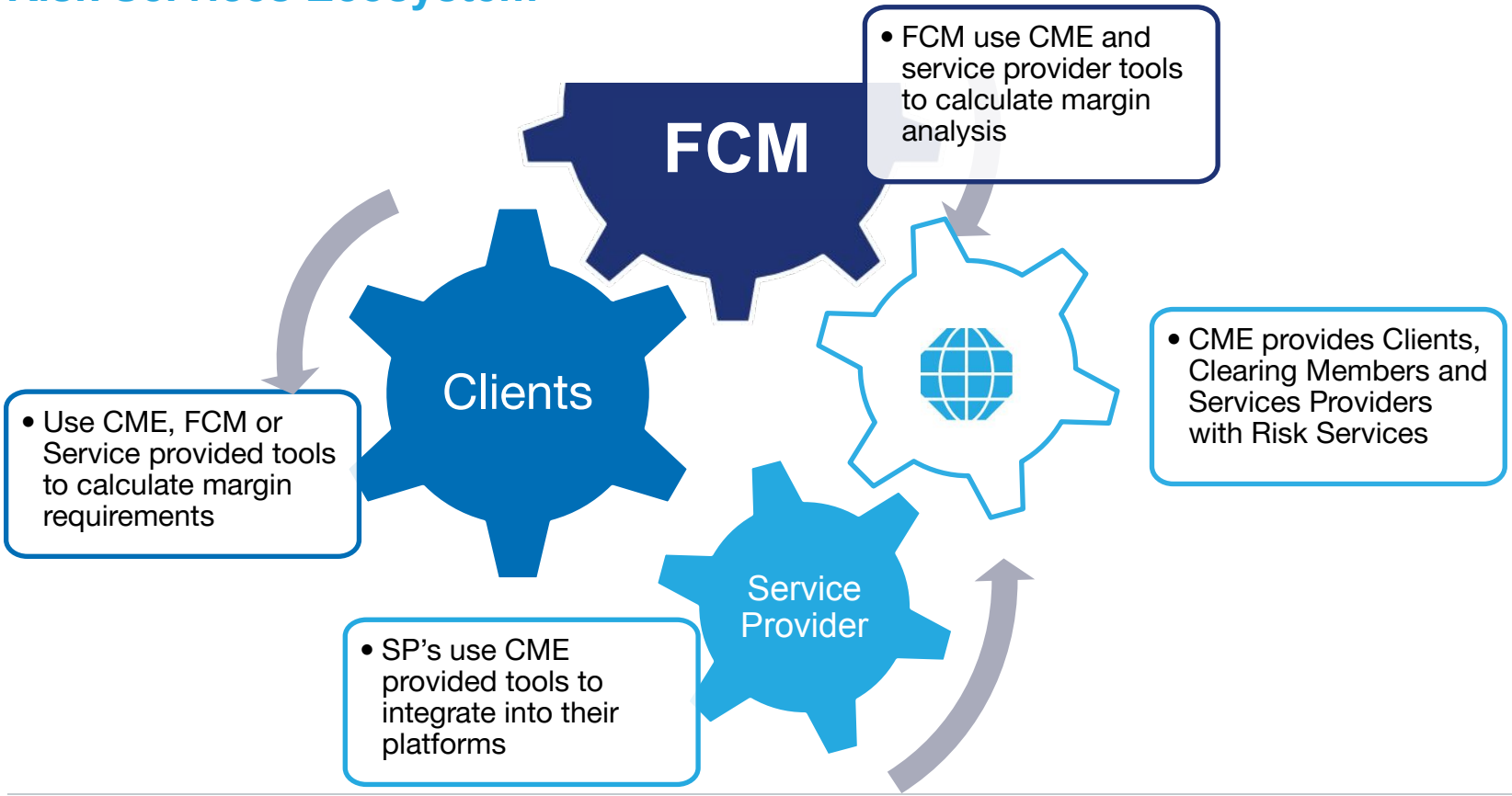
06. Q/A

Evolution of Risk Services at CME



CME Ecosystem

Risk Services Ecosystem



Current Risk Services

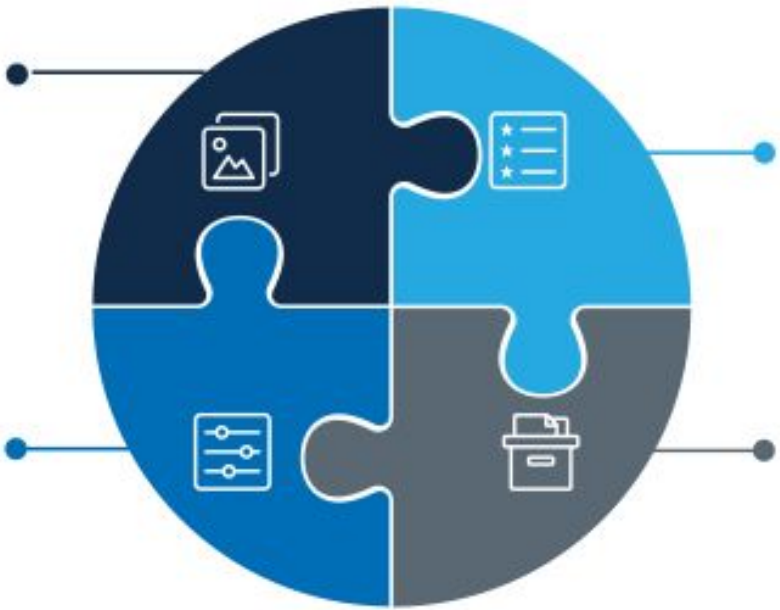
Risk Services

Tools

- Deployable Margin Software (New Java Deployable and PC SPAN Software Suite)
- Pre-Trade Service
- CME Optimizer Software
- CME CORE API
- CME CORE UI

Reports

- Detailed Margin Breakdown reports
- Customer Gross Margin
- Unconstrained Optimization



Risk Data

- Risk Parameter SPAN
- Risk Parameter SPAN 2
- OTC Curves
- Optimizer Risk Data

Education

- Webinars
- Model Overview Presentations
- CME CORE Demo Service User Guides

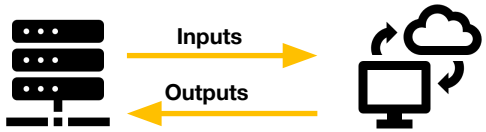
CME Risk Services

Margin Approximation

- Firm Systems Approximate SPAN Margin Methodology
- Firms download SPAN 2 approximation file from CME

CME CORE API

- CME Hosted Solution as calculation process
- Extends existing functionality



CME CORE UI

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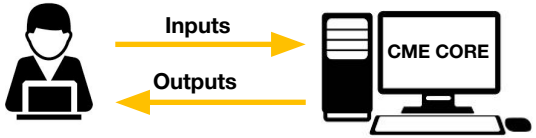


Software

- Margin Library Deployed on Clearing Member Infrastructure for SPAN and SPAN 2 support
- Optimizer Software installed by Clearing Members for Interest Rate Portfolio Margin

Use Cases

- Supports existing SPAN approximation use cases
- Users implement in legacy SPAN based systems as needed

- Minimal releases
- CME's infrastructure, Cloud Based, Scalable, Flexible

- CME's infrastructure
- No release impact
- User Interface to view SPAN/SPAN 2 reports

- Optional and mandatory releases each year
- Ability to control performance, scalability, and flexibility

Services Summary

- CME Post Trade Risk Services enable Margin Calculations globally across all FCMs, Service Providers and Clients
  - The underlying set of tools that enables these calculations includes: PC SPAN Software Suite, CME CORE UI, CME CORE API, Deployable Margin Software and CME Optimizer. Supporting services include publishing daily risk data packages for the software
  - Services are used daily either directly or indirectly to impact every single CME Group Customer for daily margin calculation and for intraday risk management purposes
  - 1000 active users in CME CORE, 1000+ PC SPAN Software users, 125+ API users, 15+ Optimizer users
  - Our hosted services are processing ~5 Million margin requests per week across hundreds users for over 100M trades daily
- Our Risk Services help market participants achieve capital efficiencies
  - Program supports 7.5+ Billion USD in average monthly savings for portfolio margin firms over the past year
  - Optimization Algorithm will continue to support additional products and methodology enhancements

Margin Service Customer Experience Through GCP

Historic Margin Calculation

- Users can now request Margin Calculation for any point in time over last 18 months for the SPAN or SPAN 2 margin framework.
- This functionality is available for users to load this data on demand via UI and API
- This service takes a couple of minutes to initialize and run analysis for new compute requests and calculators will stay initialized for users to complete their analysis during their compute session.
- Historic Margin Calculation requires users to submit portfolios of valid trades for the requested margin processing date to support reconciling or simulating the margin requirement for the historic date. This is not a back testing service as CME CORE does not roll the portfolio or risk exposure automatically.

- *This feature is currently live*

Margin Service Customer Experience Through GCP

Intraday Risk Management

- Within our Google Cloud Compute Environment, we are now enabling 7 risk observation periods through the trading day to capture changes in intraday price to the margin models.
- This data is available to users throughout the day to capture theoretical margin impacts of intraday price change. This can help firms anticipate how intraday p/l change related to margin model change. Some of these files can be used for forecasting margin while others are designed for reconciling back to the Intraday or End of Day margin requirements.
- We anticipate building upon this capability to offer increased number of risk observations in the future.
- These risk observation cycles are available for CORE UI and API users. Users of our Deployable library can download these files for their internal use as well.

- *This feature is currently live*

Margin Service Customer Experience Through GCP

Portfolio Bulk Processing

- The CORE API is being enhanced to offer high speed compute capability for large portfolios through a new endpoint. This is to enable firms to run “batches” of portfolios through the API.
- Initially, this will support ETD margin calculation, but will be the basis for future service offerings including OTC margin calculation, what if margin etc.
- New endpoint does not save portfolios and only temporarily stores margin results which results in a streamlined performance for all calculations, especially for larger portfolios.
- We expect to continue optimizing this framework to potentially offer dedicated compute services for individual API users in the future for those looking to have full control over performance and their data.

- *This feature is available for testing and live*

Margin Service Customer Experience Through GCP

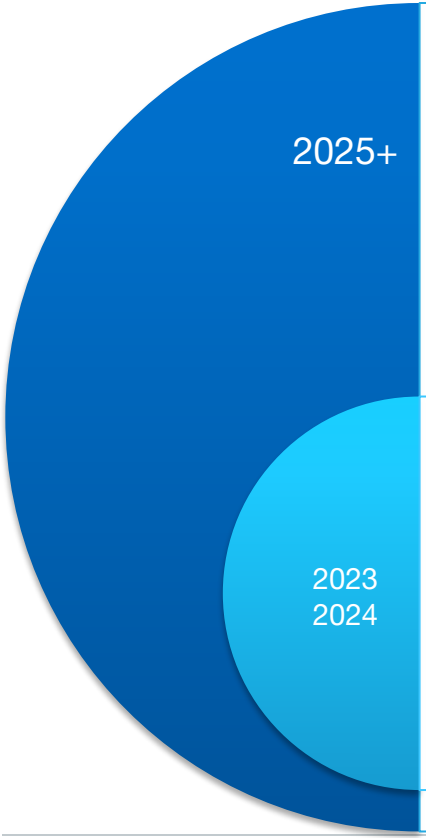
Hosted Optimization

- CME enabling OTC IRS and Listed Interest Rate product optimization through a new offering that will enable clearing members to have CME run this process in a new workflow as a replacement to our current software-based solution.
- This offering builds from our existing optimization capabilities which enable clearing members and clients to run hypothetical portfolio simulations to determine the benefits of the portfolio margin program.

- *New Interfaces and test environment to be made available for integration in Q2 2024*

Roadmap

Risk Services Roadmap



2025+

“Analyze and Optimize”

Integrate analytics, risk models and data

- Complete delivery of all products into SPAN 2 Framework
- Deliver Risk Management Dashboard to FCMs
- Join analytics with Cleared Data to enable next gen analytics around What if Margin, Back Test, and Portfolio Optimization

2023 2024

“Foundation and Scale”

Implement Risk Services on GCP

- Deliver Margin Engines to GCP for margining all Products
- Historical and Current Margins
- Optimize User Performance and services on GCP
- Launch Hosted Optimization Service

CME SPAN 2 Margin Framework

Deep Dive

CME SPAN 2 Framework High Level Overview

Why SPAN2 Framework ?

- Increased demand on margin methodologies in recent years
- New technological innovations
- Increased growth in product volumes and complexities

What stays the same:

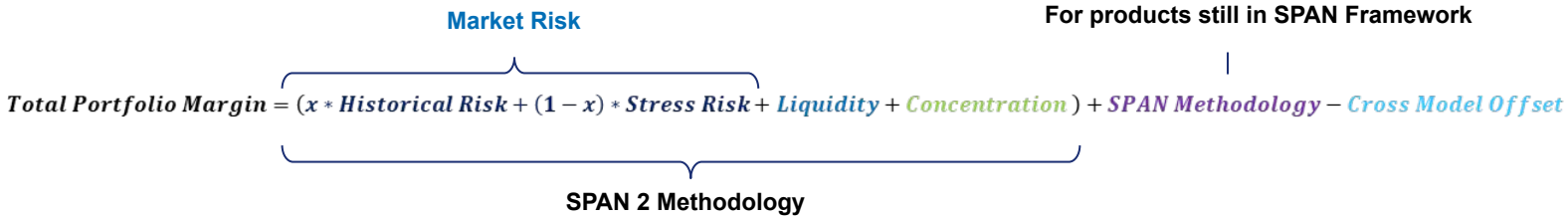
- Current risk appetite and some forecasting capabilities of SPAN

What's new:

- **New modelling**: enhanced consideration of risk factors including seasonality, options term structure and liquidity/concentration costs
- **Self-adjusting:** data driven framework, dynamically adjusts margins while ensuring robust coverage and anti-procyclical changes to portfolios margins
- **Unified framework:** designed as a unified margining framework for listed futures and options products as well OTC Rates & FX products
- **Reporting** : new sets of reports with greater visibility into margin breakdowns, explicit reporting of portfolio level liquidity/concentration margins
- **Scalability:** product growth and complexity, as based on modern infrastructure and can scale

CME SPAN 2 Margin Model Framework

Framework Components and Methodology



Market Risk

- Market Risk under SPAN 2 framework is calculated as a weighted sum of Historical Risk and Stress Risk
  - **Historical Risk**
    - Historical Value at Risk (HVAR) Framework
  - **Stress Risk – Old Historical, Hypothetical as well as Event-Driven**
    - Stress VAR (SVAR) and Hypothetical SVAR Frameworks

Portfolio Liquidity Charge

- Cost to close out a portfolio upon a default, sourcing liquidation cost information from market bid-offer quotes (e.g. from central limit order book)

Concentration Charge

- Accounts for the additional cost of closing out portfolio with large/concentrated positions of size higher than specific threshold calibrated using daily volumes

SPAN Methodology

- SPAN methodology will still be used for products that are not in-scope for SPAN 2 methodology

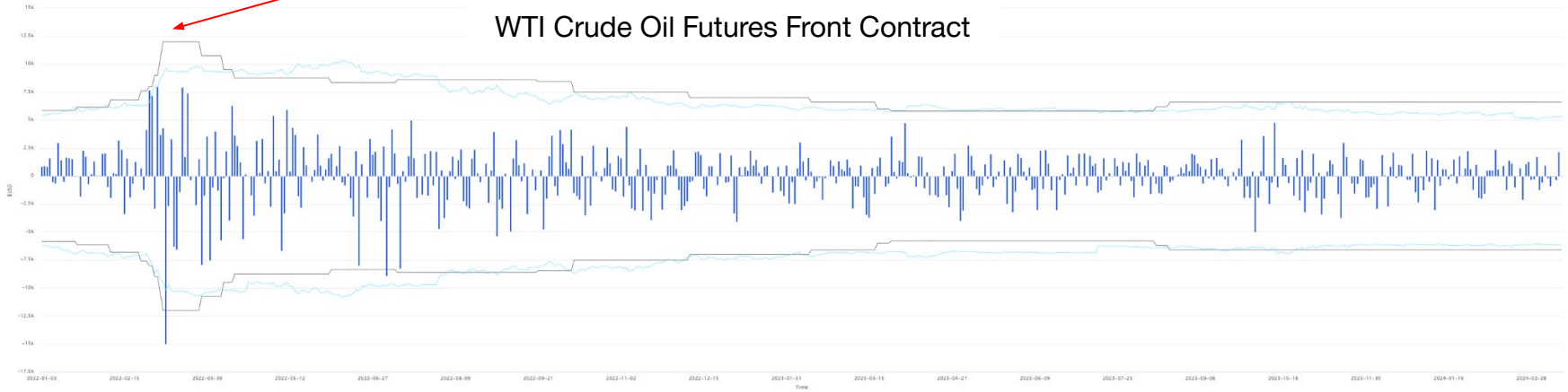
Cross Model Offset

- Offsets will be available between SPAN and SPAN 2 margined products

SPAN2 Back tests

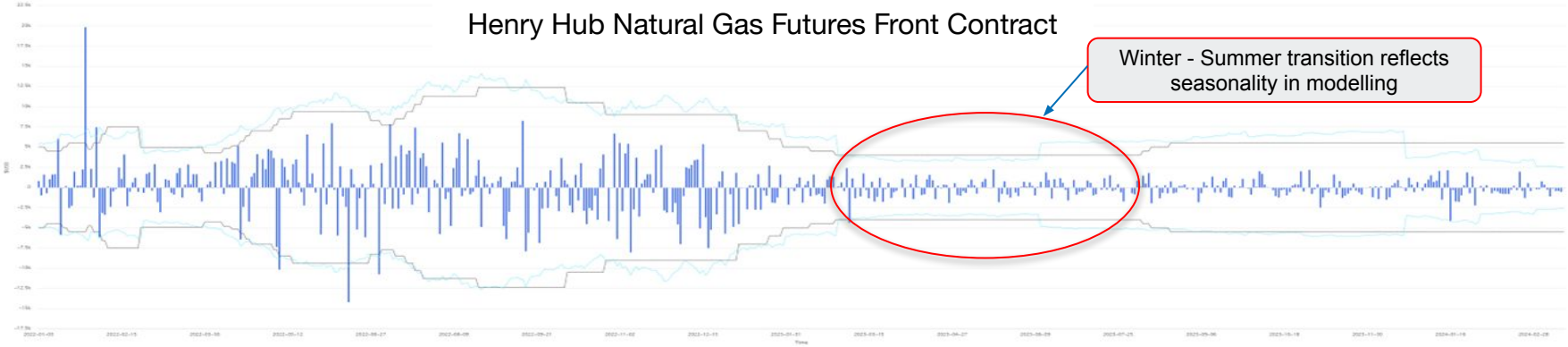
Ukraine war stress event, margin increases dynamically

WTI Crude Oil Futures Front Contract



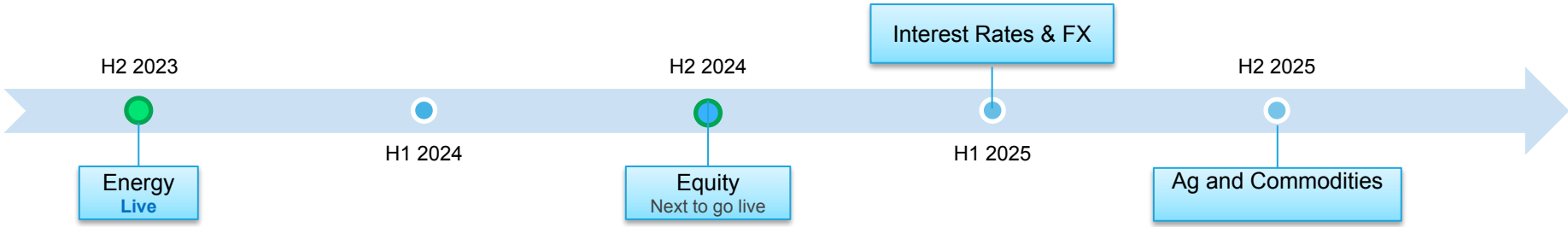
Henry Hub Natural Gas Futures Front Contract

Winter - Summer transition reflects seasonality in modelling



CME SPAN 2 Framework Rollout Plan

SPAN 2 Framework will be rolled out for specific product groupings in a phased multi-year approach after extensive testing



- The NYMEX energy futures and options (excluding power) carrying the majority of existing open interest was the first set to migrate to SPAN 2 framework last year
- CME will work with clearing members and service providers to extensively test technology for computing SPAN 2 margins
- Through the transition, margins for diversified portfolios will flow from both frameworks with appropriate levels of offsets
- CME's margin services will support both margin frameworks, streamlining initial adoption of the framework and updated releases

Please refer to CME Group's website for latest updates on product in-scope.

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Thank you