

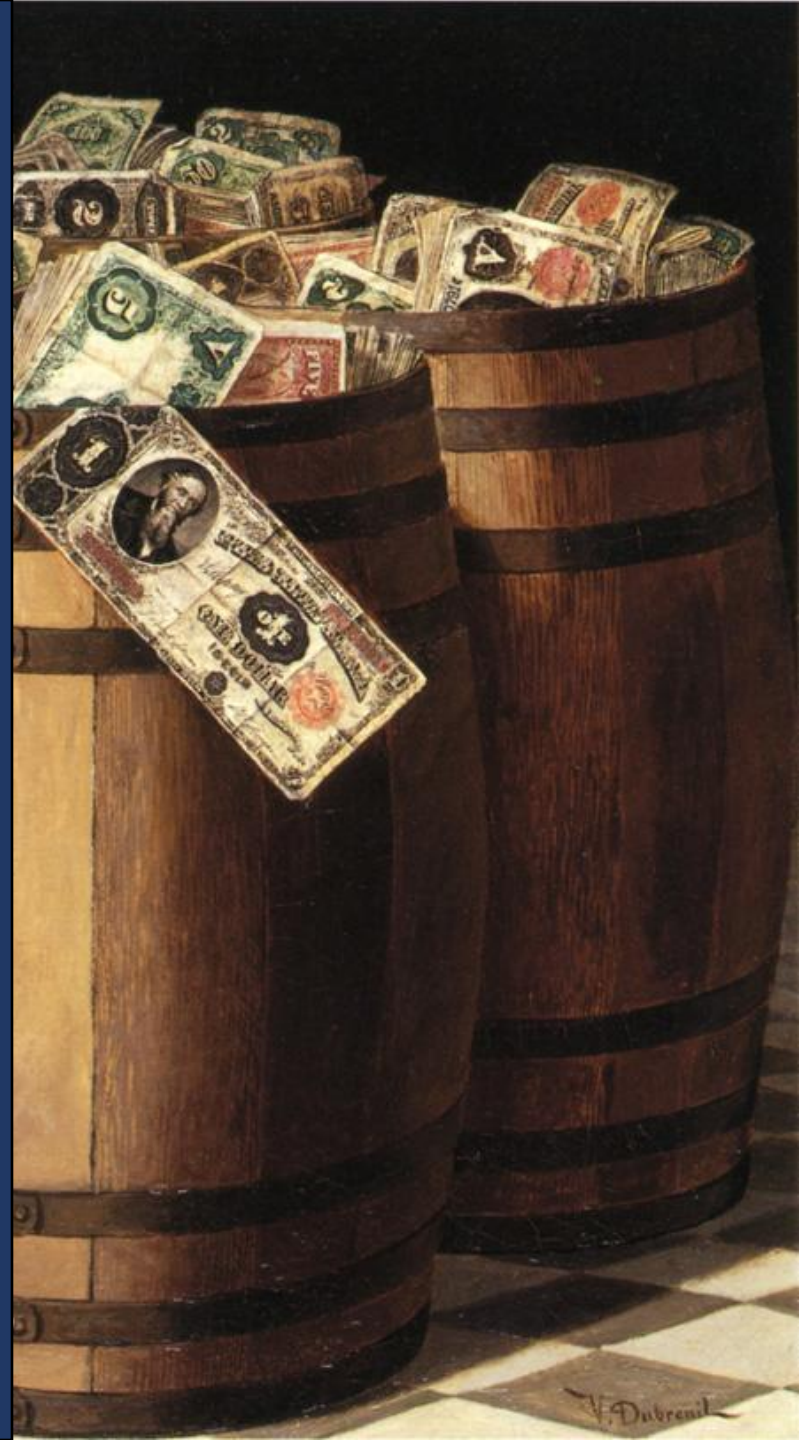
ENHANCING ENERGY SECURITY THROUGH FINANCIAL MARKETS' TRADING: A BRIDGE FOR ENERGY TRANSITION



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Energy security has been the cornerstone of human progress for the past 150 years (Age of Oil)

- Precondition of Industrial Progress
- Main Enabling Factor of Humanity
- Major determinant of outcomes for strategic efforts
- Main goal of global strategic antagonisms
- Major cause of global conflict
- (In)tangible, Elusive, Polysemic

“He who controls the definition, controls the debate...” (Aristotle)

- Assurance of sufficient energy supplies to permit the national economy to function in a politically acceptable manner. (Willrich, 1976)

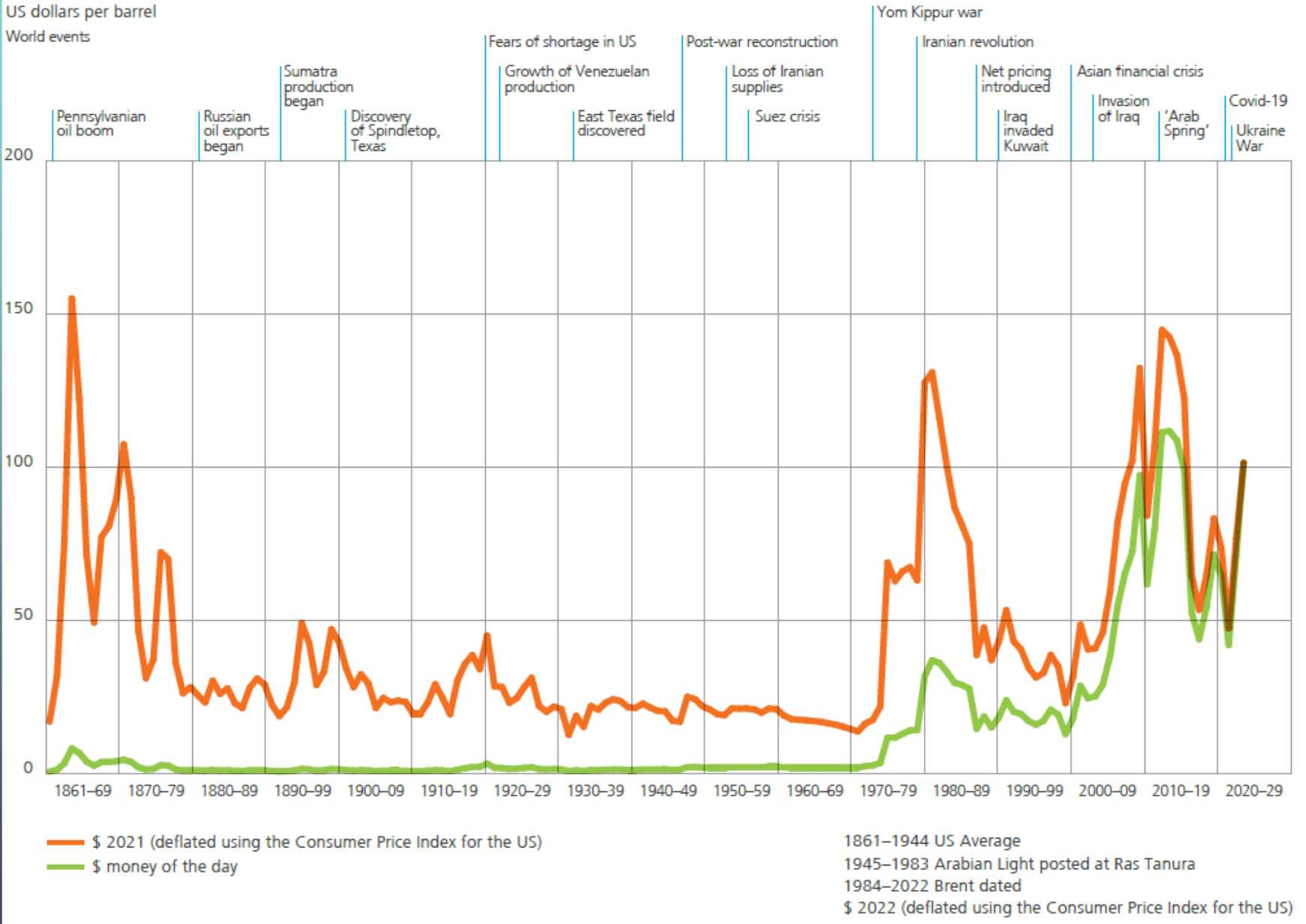
- Availability, Affordability, Accessibility, Acceptability (APERC, 2007)

- The challenge of equitably providing available, affordable, reliable, efficient, environmentally benign, properly governed and socially acceptable energy services. (Sovacool and Rafey, 2011)

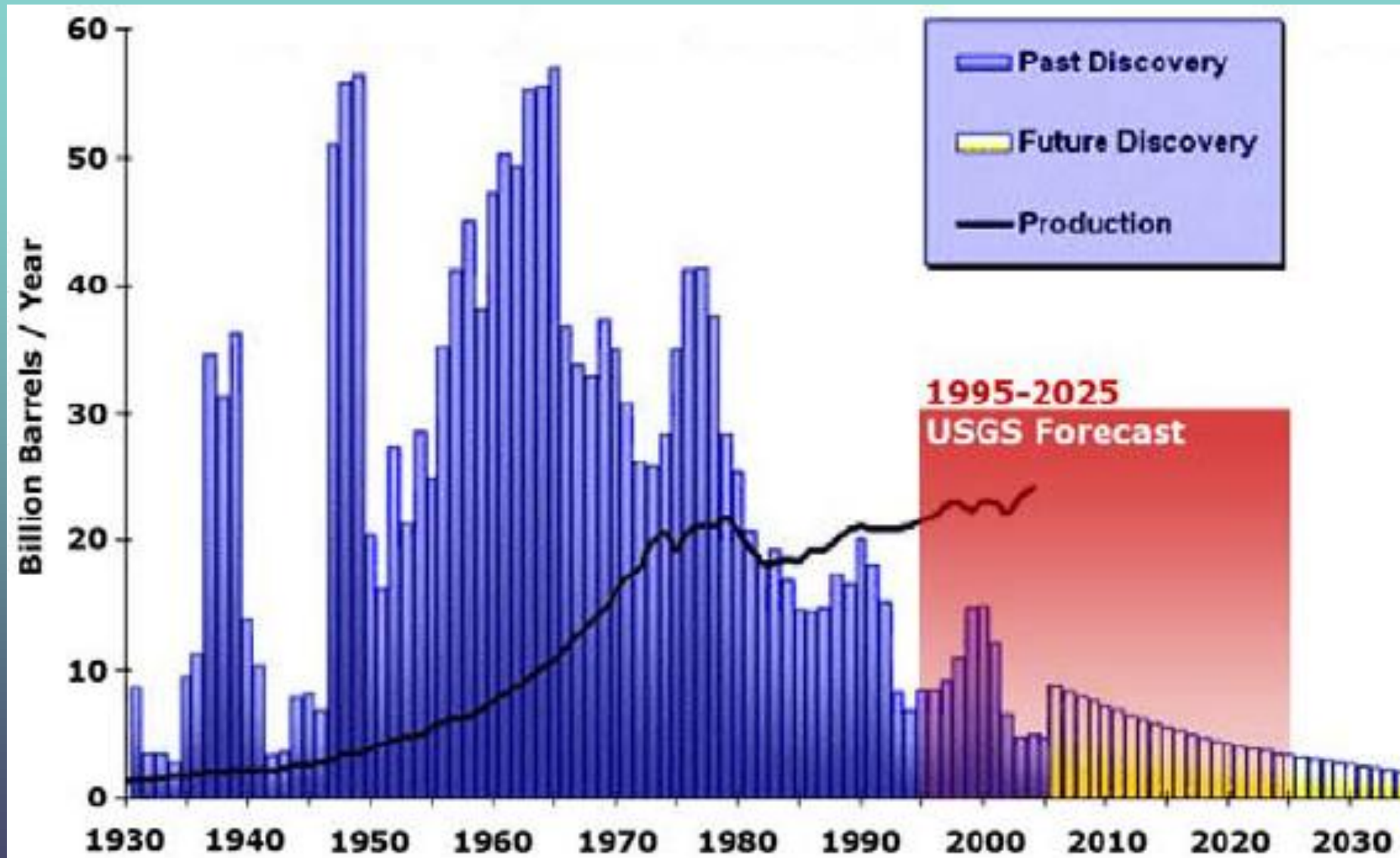
- Uninterrupted availability of energy sources at an affordable price. (IEA, 2019)

Energy transitions, climate change, new challenges and cybersecurity keep changing the Scope of Energy Security.

How much or When?



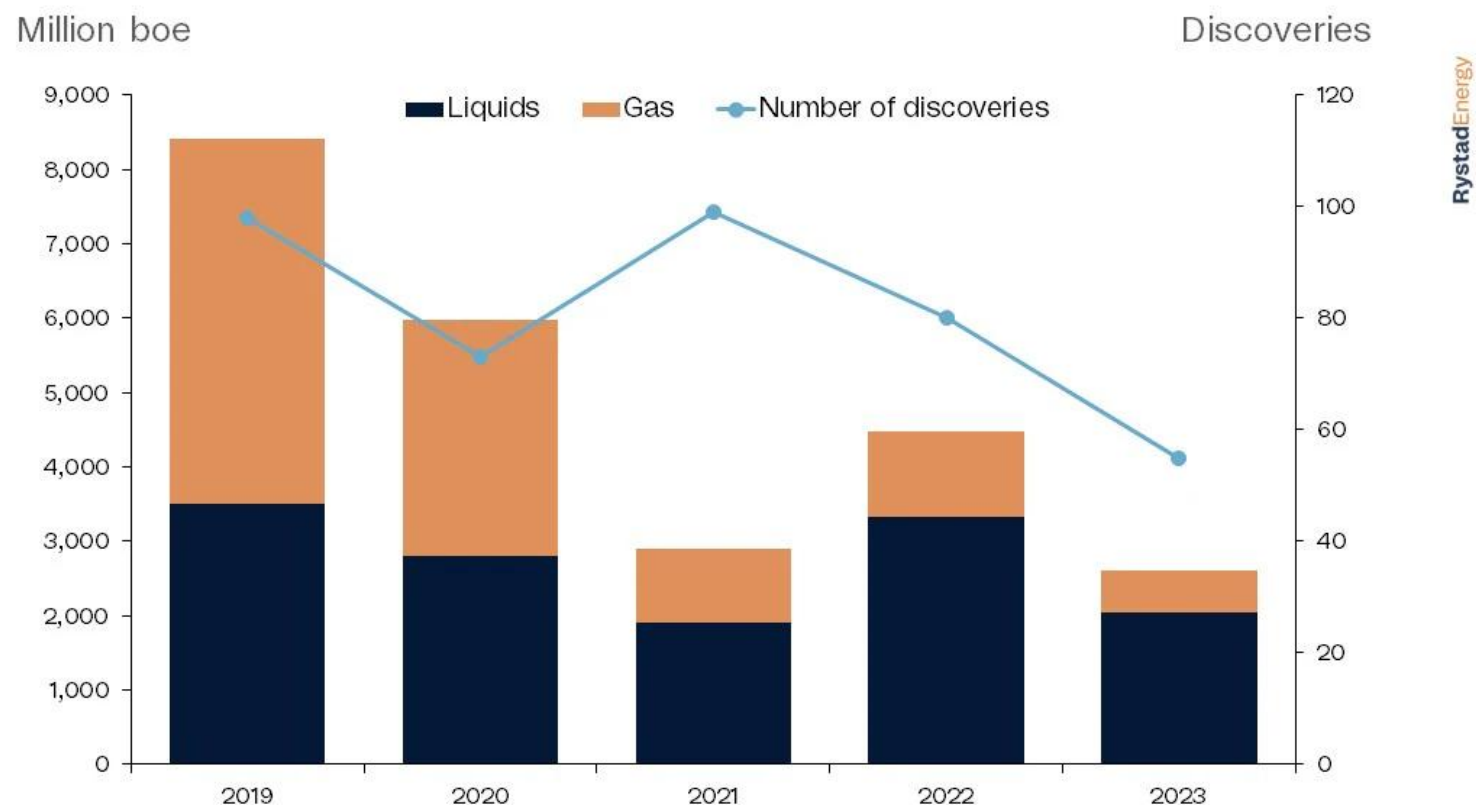
What lies ahead?



Source: Phil Hart, 2007

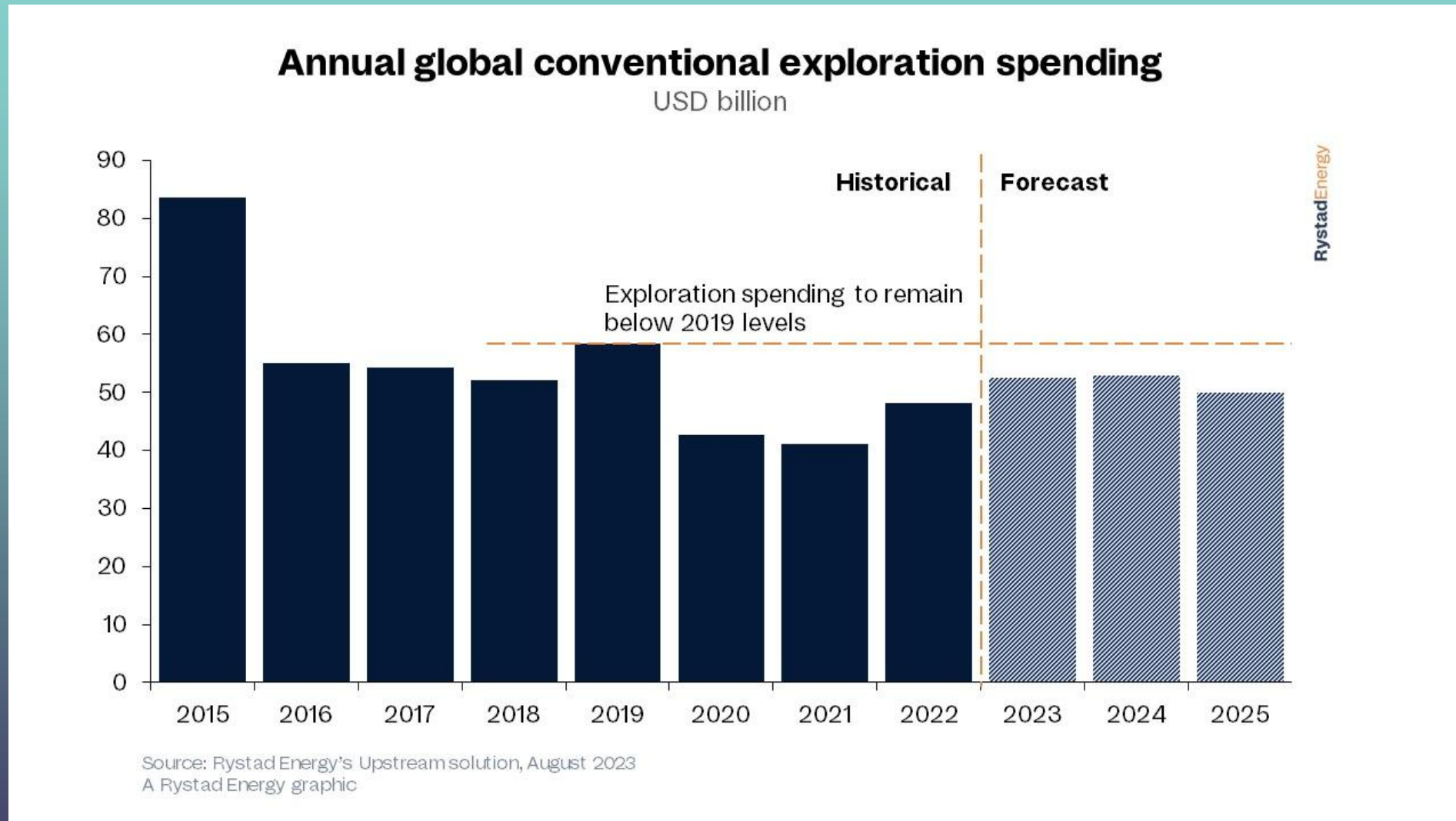
What lies ahead?

Total conventional discoveries by type, January-June



Source: Rystad Energy's Upstream solution, August 2023
A Rystad Energy graphic

A Seller's Market...



SOLUTIONS

- Oil and energy were always valuable, yet only became “expensive” when OPEC and OAPEC solidified cartel practices during the 1970s. (ECONOMICS+FINANCE aspects)
- It becomes clear that the problem of affordability cannot be solved solely through traditional approaches (hedging, storage, new/renewable technologies, diplomacy/war) alone.
- Classic solutions need to be coupled with EFFECTIVE (non-subsidy-based, if at all possible) ECONOMICS+FINANCE solutions.
- Traditional (Macro)Economics-derived solutions are limited, as we are past Hubert’s peak, and thus in a long-term seller’s market, where DEMAND considerably exceeds SUPPLY, with the long-term trend against the consumers.

SOLUTIONS

Thus, what remains as a valid approach is finance-derived solutions, along with new technologies, renewables, energy storage, etc.

- European Energy markets are ever more elaborate, after proliferation of energy exchanges (EPEX, EEX, EnEX, etc)
- The core problem of (c)overt cartels and inefficient, opaque market makers remains.
- The solution that the present work will attempt to explore, is that of actively **TRADING** the energy markets, not just participating only as buyers.



PROCESS PIPELINE

Literature & Markets' Analysis

Understand and document the basic theoretical aspects

Forecasting/Predicting

Algorithm selection and
Model creation

Data Collection & Exploratory Data Analysis

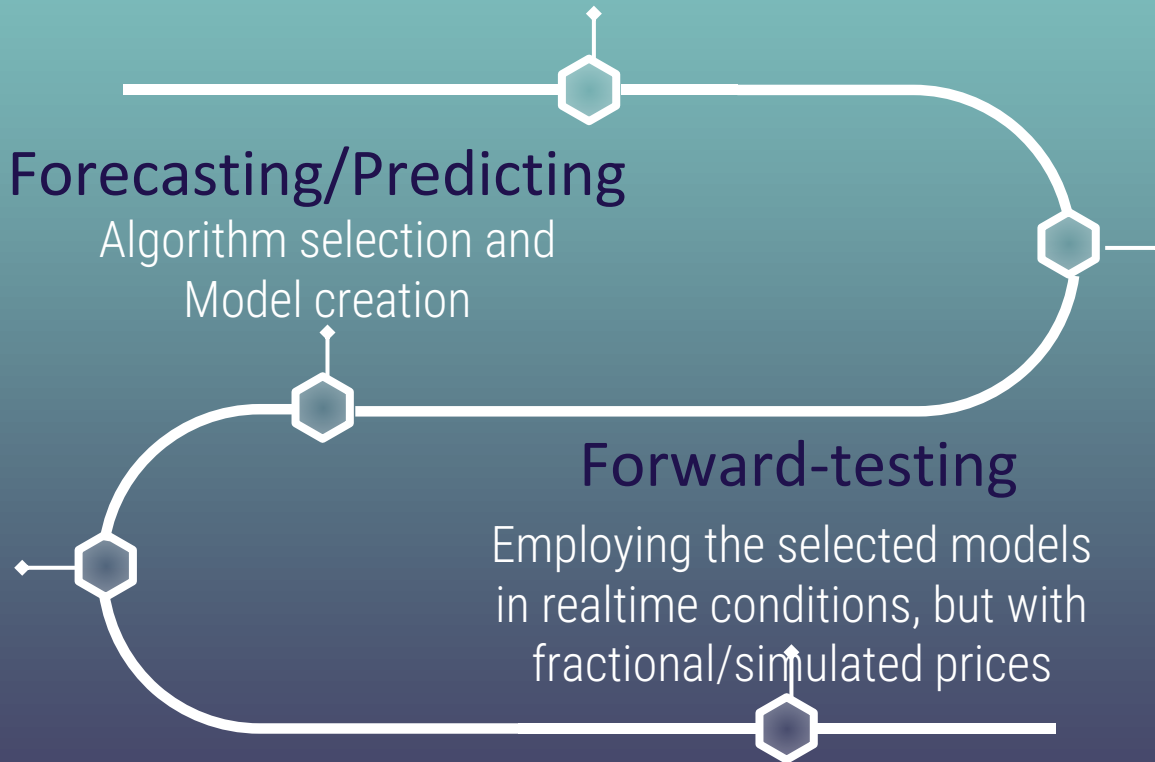
Explore & understand the data, identify relationships, cross-validation

Forward-testing

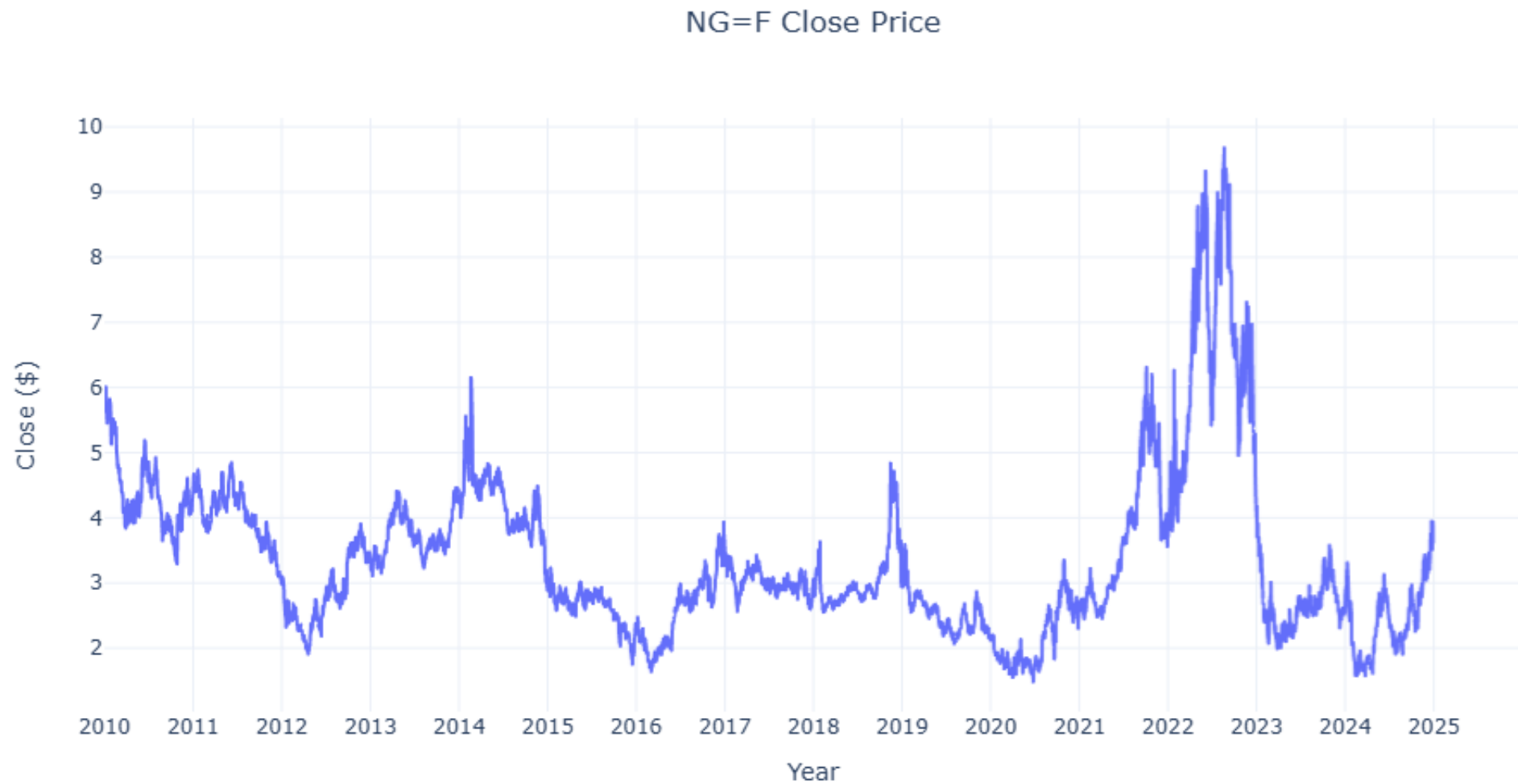
Employing the selected models in realtime conditions, but with fractional/simulated prices

Backtesting

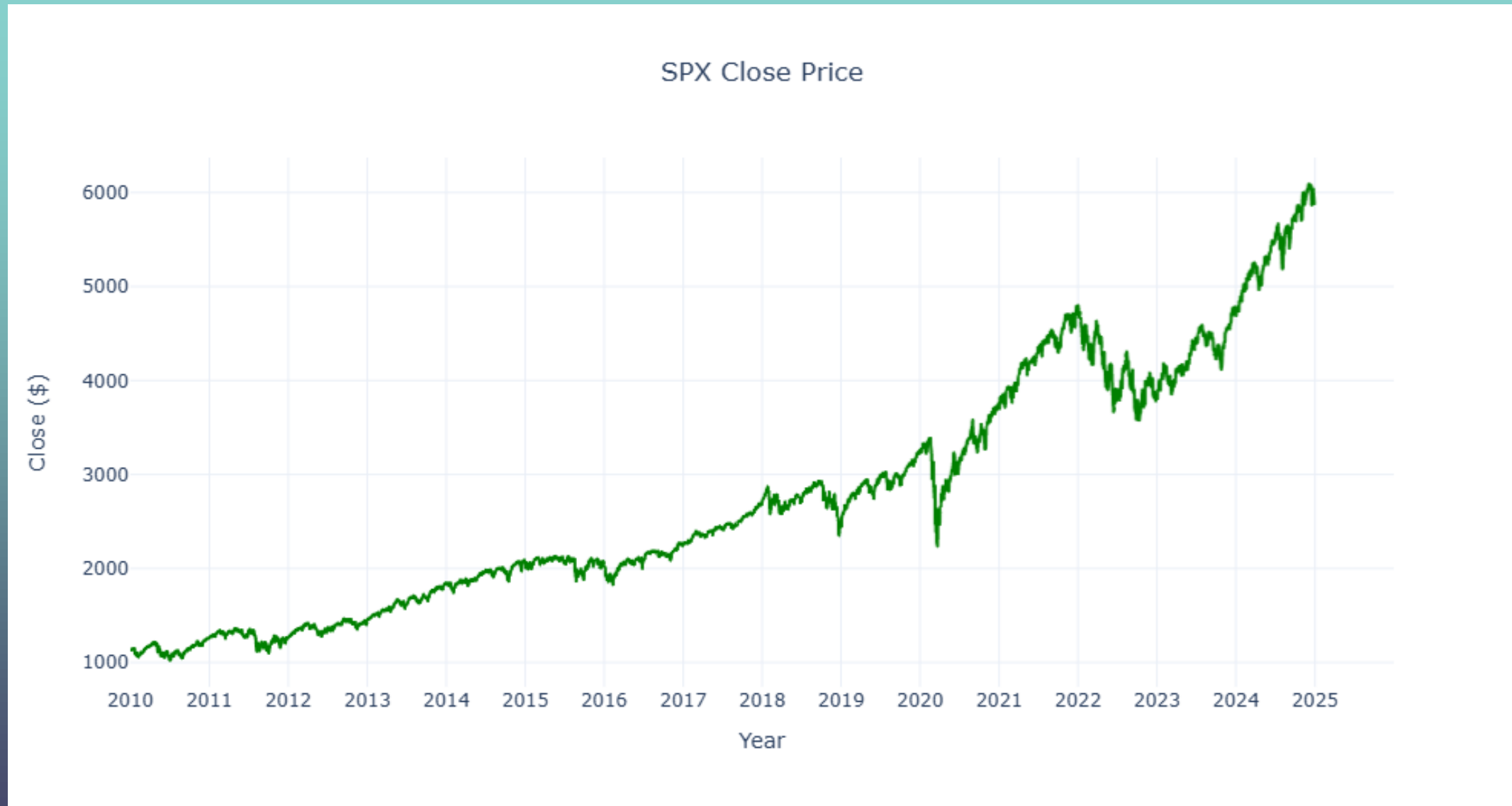
Operation of the devised models using historical data points to optimise operation



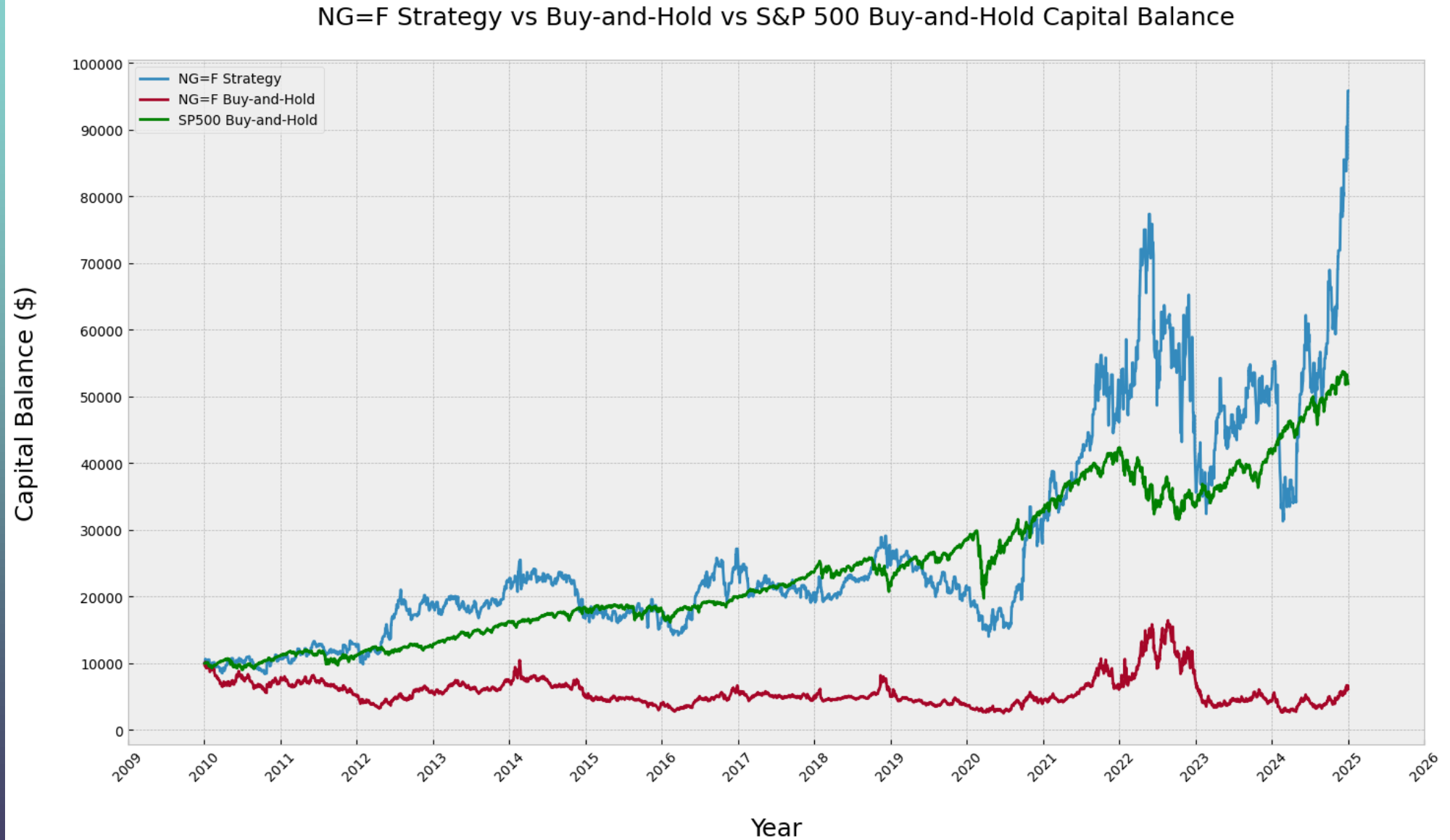
RESULTS



RESULTS



RESULTS



RESULT METRICS

NG=F

Buy_Hold Total Return: -38.26%
Buy_Hold CAGR: -3.16%
Buy_Hold Drawdown: -33.92%
Buy_Hold Sharpe Ratio: 0.163
Buy_Hold Calmar Ratio (CAGR/DD): -0.093

Strategy Total return: 858.45%
Strategy CAGR: 16.26%
Strategy Drawdown: -59.53%
Strategy Sharpe Ratio: 0.488
Strategy Calmar Ratio (CAGR/DD): 0.273
Time in Market: 52%
Trades Won: 987 / 1944
Trades Lost: 957 / 1944
Win Rate: 50.77%

SPX Buy_Hold

Total Return: 419.12%
CAGR: 11.6%
Drawdown: -33.92%
SPX Sharpe Ratio: 0.522
SPX Calmar Ratio (CAGR/DD): 0.342



CONSIDERATIONS

- Market access and trading infrastructure? *Time in the market usually beats timing the market... (Buying-Selling at Close requires high-speed trading servers, possible dark pool afterhours priority order execution...)*
- Legislative, Compliance, Market entry barriers? *Complexity bears poor results... (KISS)*
- **Knowhow and Risk-management approach?** *(No absolute rulebook in trading...)*
- Public acceptance, Trading mentality and Financial Ecosystem?
Building of an ecosystem, i.e. British-law tax havens, Luxemburg, Lichtenstein, San Marino, Switzerland-Geneva, many more...

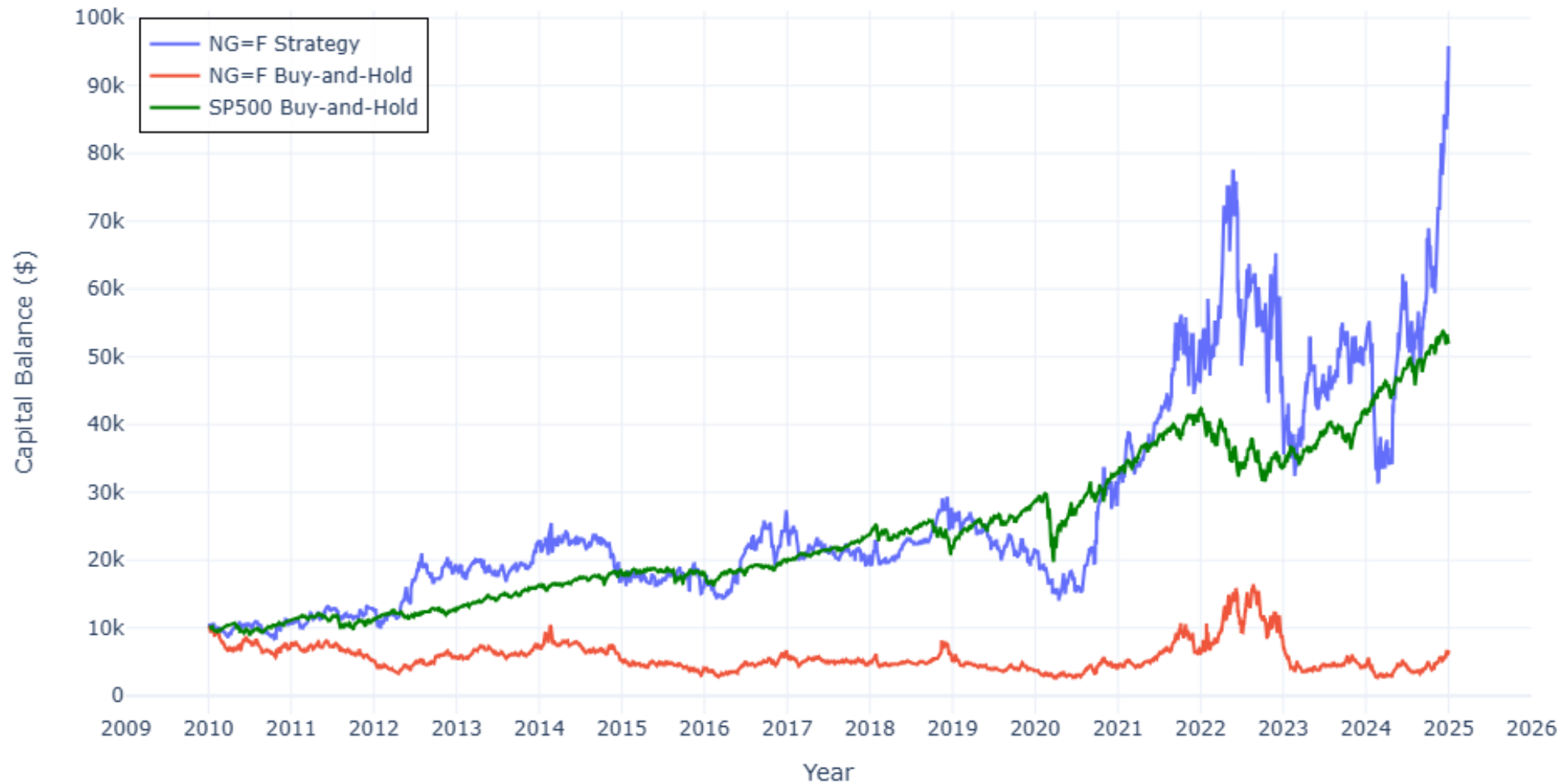
TIME AND CONSISTENCY

A scenic view of a tropical beach. In the foreground, white, foamy waves are washing onto a wide, golden-brown sandy beach. Behind the beach, a dense line of tall palm trees with green fronds stands against a clear blue sky with a few wispy clouds. The text "Q & A" is centered over the palm trees.

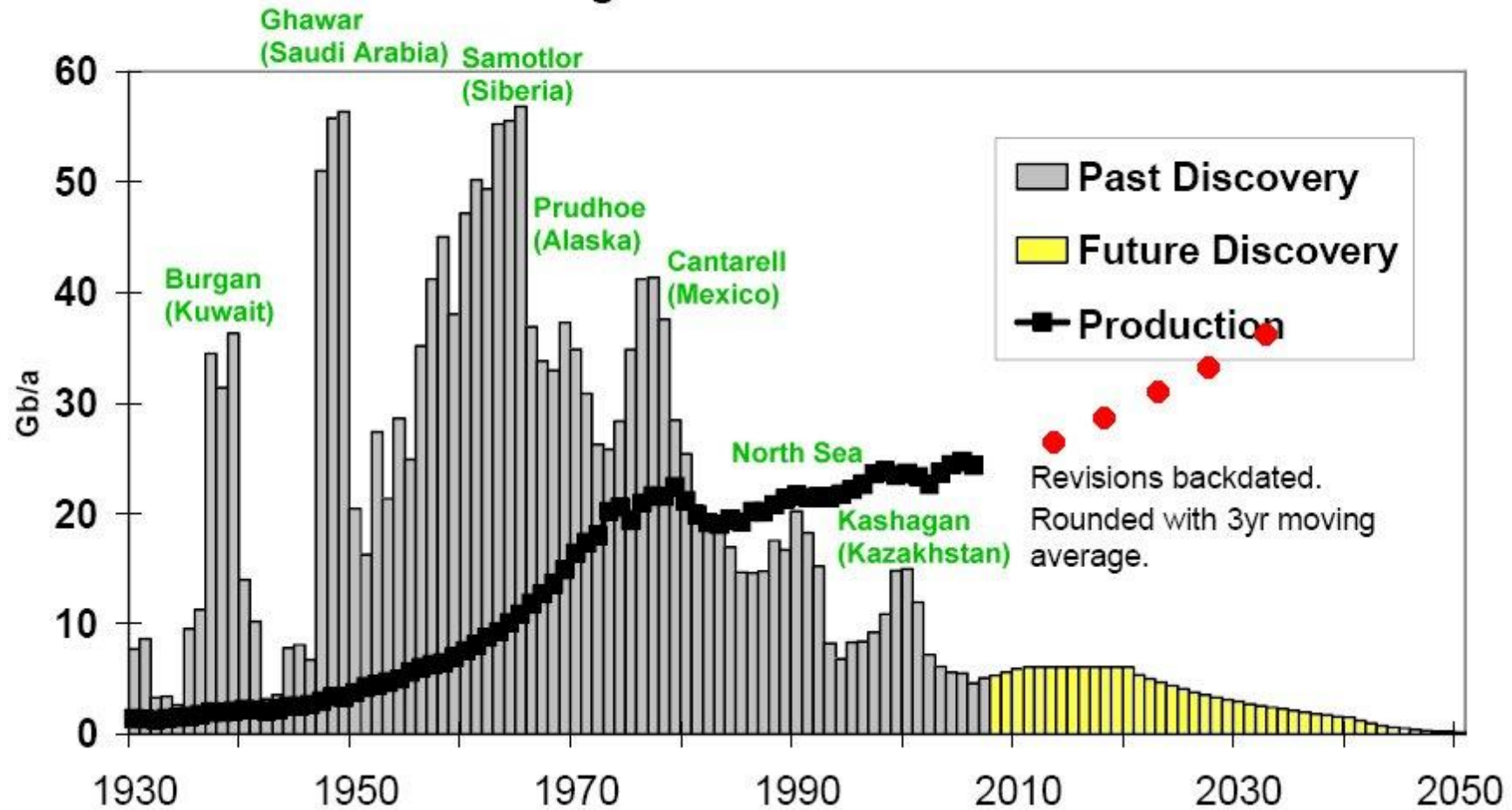
Q & A

RESULTS

NG=F Strategy vs Buy-and-Hold vs S&P 500 Buy-and-Hold Capital Balance

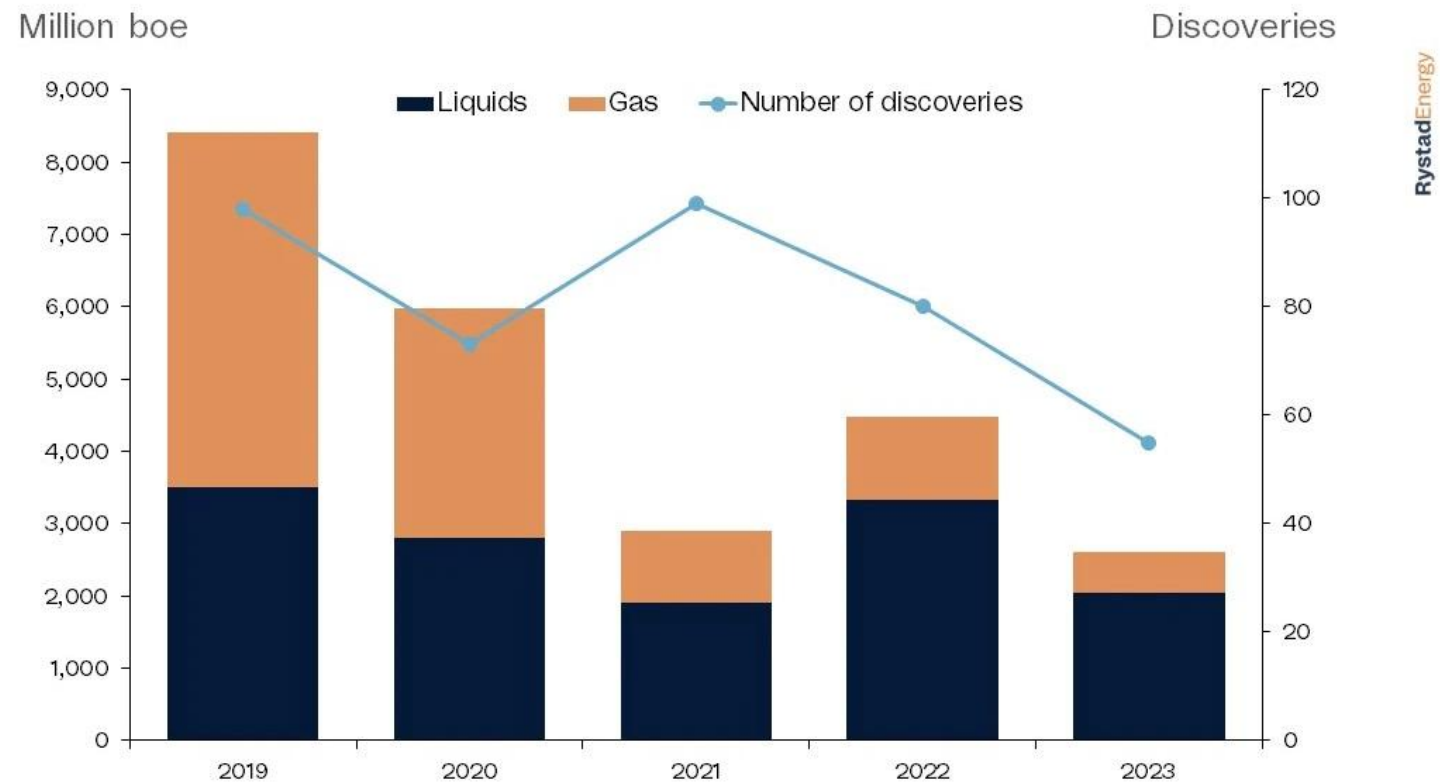


THE GROWING GAP Regular Conventional Oil

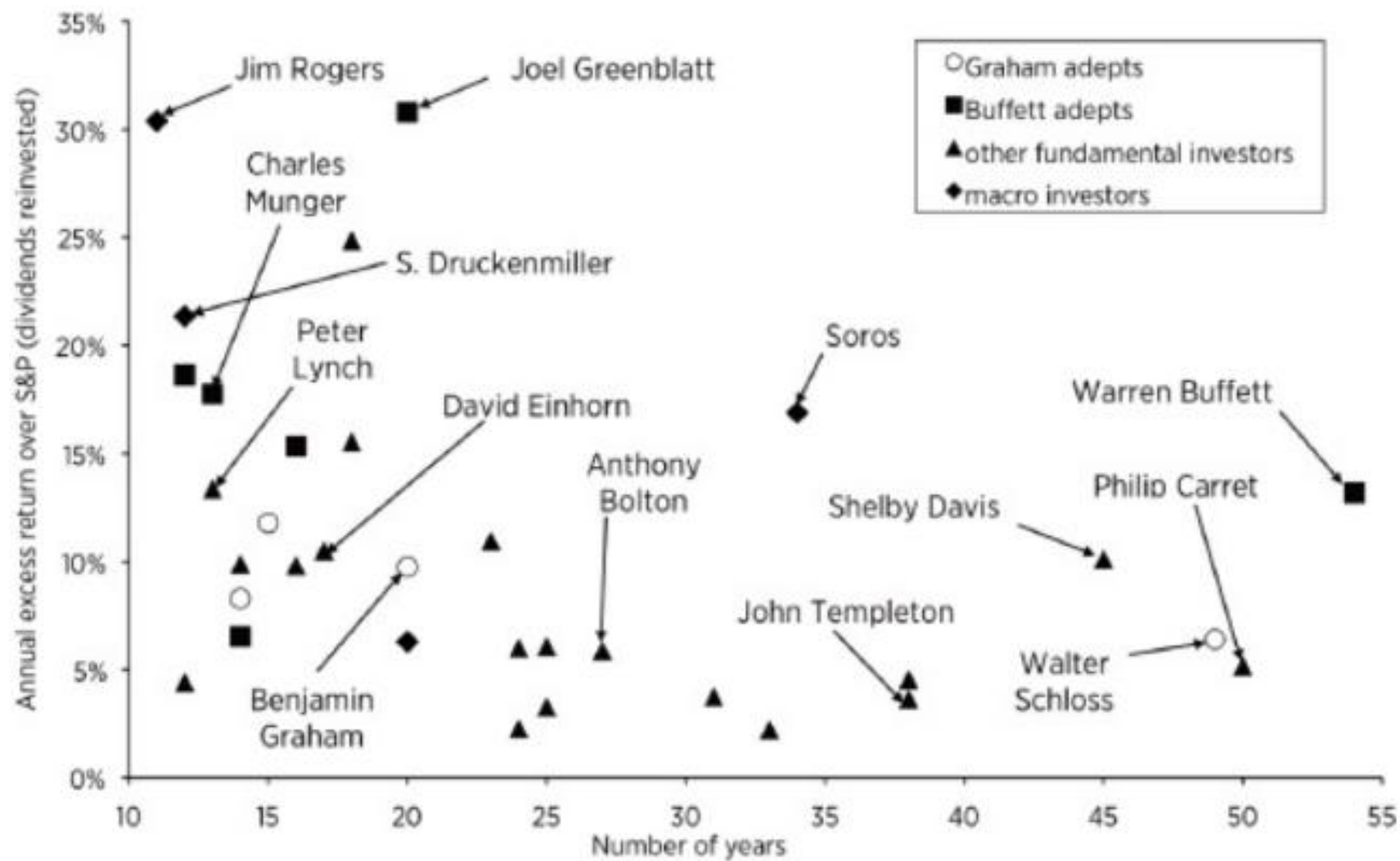


Source: Planet for Life, 2004

Total conventional discoveries by type, January-June

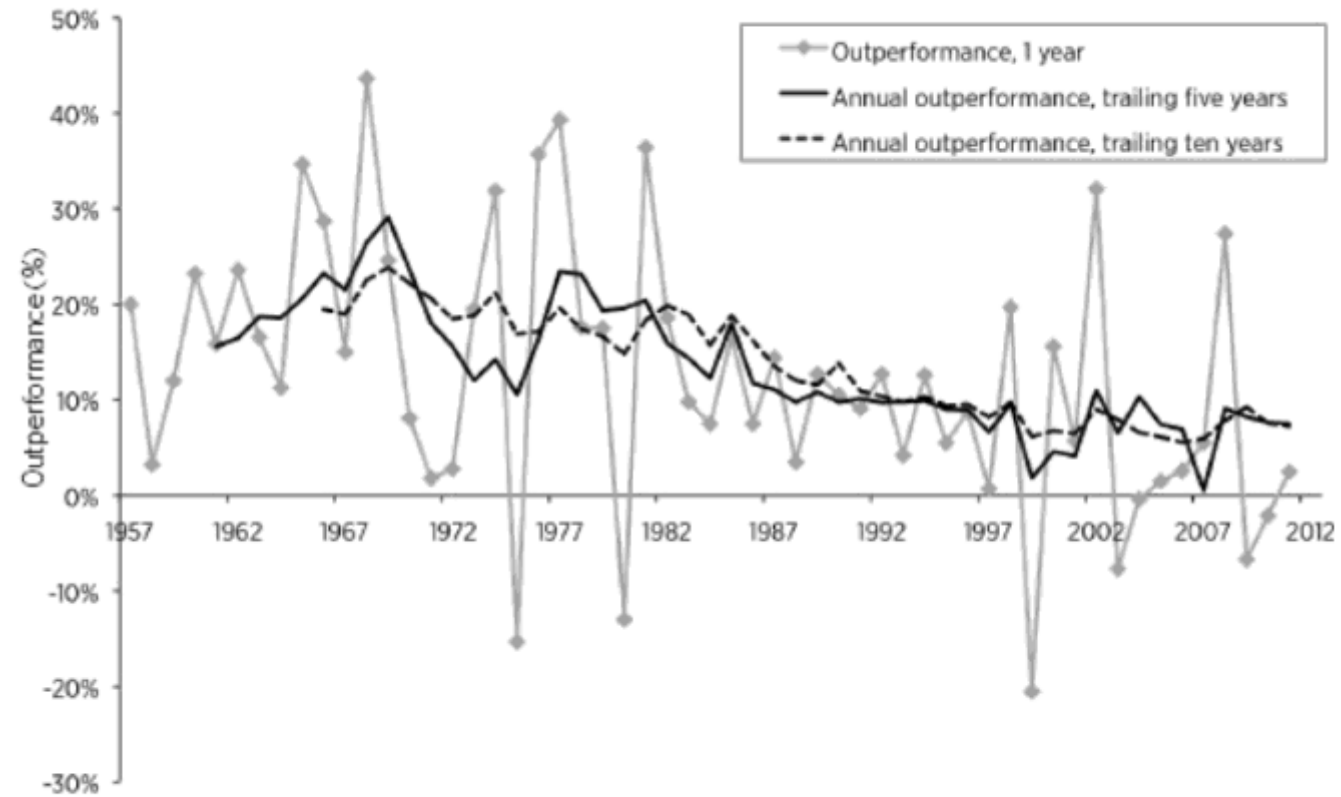


Source: Rystad Energy's Upstream solution, August 2023



Source: Vanhaverbeke, 2014, pp. 5

Figure 2: Outperformance of Warren Buffett versus the S&P 500 Index



Source: Letters to shareholders of Berkshire Hathaway and letters to the investment partnership of Warren Buffett

Source: Vanhaverbeke, 2014

SOLUTIONS

A finance-based approach for energy security is particularly fitting for Europe, as

Europe is a major energy consumer, with comparably few energy resources internally. It depends upon energy imports, which are becoming increasingly expensive.

1. Such energy dependencies lead to serious limitations not just in the financial, but in the geostrategic, diplomatic, military and general security fields as well. This leads to a weaker Europe, even more dependent and energy starved in a vicious circle. (EU-Russia energy dependence and Ukraine War)
2. (Western) European nations are largely post-colonial and risk-averse (and war-averse...). This precludes acquiring foreign energy resources through military force and/or aggression. Although morally sound, such a limitation presents a crucial disadvantage in a VUCA world, where other players are not bound by similar moral notions. Europe's military capacity is also deemed deficient in the pursuit of such aggressive approaches.
3. Europe is also a small continent, divided among many nation states. Despite efforts for common markets, this leads to divergence of politics, priorities, financial capacity, security implications, etc. This is an inherent weakness in global markets, especially those of energy. (OPEC, OPEC+, OAPEC).

SOLUTIONS

4. Europe is also a small continent, divided among many nation states. Despite efforts for common markets, this leads to divergence of politics, priorities, financial capacity, security implications, etc. This is an inherent weakness in global markets, especially those of energy. (OPEC, OPEC+, OAPEC).

5. The European economy, industry and ultimately, way of life are completely dependent upon energy-intensive infrastructure, transportation, and amenities. As such, any major disruption would threaten not just stability of norms and societal functions, but core European standards of living.

6. A number of major exchanges and international money markets are based in Europe, constituting the nervous system of a web of advanced economies. Over the last 30 years, the financial infrastructure of Europe has grown on par with international markets, and thus forms a capable substrate to support active trading of a wide range of financial instruments, so as to extract profit that would in turn be utilized to enhance energy security of broad societal strata.

