ROSETTA|ANALYTICS

ESG + AI = RL Carbon

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*Rosetta Analytics' **RL Carbon strategy** is a unique ESG investment strategy that uses advanced machine learning to actively trade ICE EUA futures. Since its inception in May 2020 through July 2021, RL Carbon has returned about 42% (net) with about a third of the volatility of the underlying futures market, a Sharpe ratio of about 1.9, and little or no persistent correlation to alternative and traditional investments and assets.*

The Caliginous State of ESG Investing

A recent survey found that two-thirds of institutional investors will incorporate environmental, social, and governance (ESG) investments into their portfolios in the next few years. The big challenge is how they will achieve this goal.

The explosion of ESG public market equity strategies, green bonds, and private market investments would seem to give investors a smorgasbord from which to choose. But these products often come burdened with challenges like ambiguous metrics and criteria, definitional issues, and questionable benefits that weaken their ESG bona fides.

Tariq Fancy, the former chief investment officer for sustainable investing at BlackRock Inc., forcefully called out the asset management industry ESG practices, writing:

"The financial services industry is duping the American public with its pro-environment, sustainable investing practices. This multitrillion dollar arena of socially conscious investing is being presented as something it's not. In essence, Wall Street is greenwashing the economic system and, in the process, creating a deadly distraction. I should know; I was at the heart of it."

Things are getting so bad that the Securities and Exchange Commission issued a report alerting investors that there is an elevated risk of managers engaging in greenwashing.

Just as Mr. McGuire gave one word of advice to a young Dustin Hoffman in *The Graduate*, I can sum up my advice to institutional investors seeking ESG exposure in a single word: **carbon.**

The Currency of Environmental Investing

Why carbon?

Two reasons: carbon (i.e., carbon dioxide equivalent) is the currency of environmental investing. We measure the environmental value of investments by calculating how much they reduce greenhouse gas (GHG) emissions, whether they are in an equity index claiming "an overall reduction of the greenhouse gas intensity of the Index compared to the investable universe of at least 30%," green bond-financed projects that "avoided a total of 724,000 tons in CO_2eq atmospheric emissions," or a clean tech investment whose goal is "removing 500 megatonnes of carbon dioxide annually from the concrete industry by 2030." (Water-related investments are generally an exception to this calculus.)

Second, carbon is a pure ESG play, a disintermediated way to gain ESG exposure without greenwashing. This is an especially desirable attribute for asset allocators. If carbon is the currency of environmental investing, then it must have a value or a price. The price of carbon is the result of certain regional and national governmental policies aimed at reducing GHG emissions.

One such broadly adopted policy is a regulated emissions trading scheme that provides economic incentives for reducing emissions. These cap-and-trade systems facilitate the buying and selling of the right to emit greenhouse gases, thus creating carbon markets and transforming carbon itself into an investable commodity.

These systems—or markets—make it possible for entities of all sorts to buy and sell these rights or allowances.[1] Commercial entities like power companies that are required to comply with specific regulatory requirements generally dominate these physical markets, although trading firms are becoming more active.

[1] These compliance-market carbon allowances should be distinguished from voluntary carbon offsets. Voluntary offsets are promissory notes to remove a certain amount of GHGs from the air to compensate for emissions occurring elsewhere. They are "voluntary," meaning they are not part of any regulated compliance system and their impact is adjudicated by third parties. Some companies are doing excellent work in this space. However, institutional investors must consider that these offsets suffer from poor liquidity and opaque pricing. Additionally, a growing number of environmental scientists doubt that the underlying projects produce the "sequestered" or "avoided" emissions.

ICE European Union Allowances Futures

An alternative to these physical allowances is exchange-listed carbon futures contracts on physical allowances tied to specific cap-and-trade systems.

There are several listed carbon futures contracts, but the oldest and most liquid are European Union Allowance (EUA) futures traded on the Intercontinental Exchange (ICE). The underlying assets are allowances issued by the European Union Emissions Trading System (EU ETS), the first and largest cap-and-trade program in the world, covering industries that generate approximately 45% of the EU's GHG emissions.

Each EUA futures contract is equal to 1,000 Carbon Emission Allowances, or one tonne of carbon dioxide equivalent gas. About €1 billion in notional exposure is traded every day, making it the most liquid carbon futures contact by far.

Like other futures contracts, ICE EUA futures offer transparent pricing, daily liquidity, efficient use of capital, limited counterparty risk, and regulatory oversight—all benefits institutional investors value.

EUAs' ESG Credentials

Some might question the underlying environmental benefits of cap-and-trade systems like the ETS. These systems are not perfect, but according to the University of Chicago's Michael Greenstone, they are highly effective and highly credible in reducing CO_2 emissions and have a positive environmental impact:

"Based on statistical models, we find strong evidence that the EU ETS reduced CO2 emissions beyond what can be explained by lower emissions during the 2007/2008 financial crisis alone. According to our estimates, EU carbon markets saved cumulative emissions of about 1.2 billion tons CO2 from 2008 to 2016, or roughly 3.8% relative to total emissions over these years."

The EUA futures also help reduce CO2 emissions. They do this by providing daily price signals that assist entities in making decisions related to their ETS compliance and a liquid means to hedge against the potential volatility of future auction clearing prices.

More generally, others might see carbon solely as an environmental investment that ignores the "S" and the "G." However, this view fails to understand that the "E" in "ESG" refers to investment issues directly or indirectly affected by climate change, which is a threat multiplier. Thus, the "E" affects many social and governance issues.

EUAs' Investment Benefits

In addition to these ESG credentials, EUAs have offered investors two meaningful benefits:

1: Over the past few years, EAUs have been one of the best performing assets.

Table One: Returns and Standard Deviation

	EUA Carbon Futures	S&P 500	Russell 2000	MSCI EAFE	Bloomberg U.S. Aggregate	S&P GSCI	FTSE REIT
Return *	35.3%	14.4%	11.3%	7.5%	3.4%	-3.0%	9.3%
Standard Dev	45.3%	17.0%	23.0%	16.9%	3.7%	20.9%	22.7%

Data from Bloomberg January 1, 2014-July 31, 2021. All returns and standard deviations are annualized. All equity indices are expressed in terms of total return. See disclaimer for description of assets. Past performance is not indicative of future results.

2: EUA futures generally have not been correlated with other assets.

Table 2: Correlations

	EUA Carbon Futures	S&P 500	Russell 2000	MSCI EAFE	U.S. Aggregate	S&P GSCI	FTSE REIT
EUA Carbon Futures	1.00						
S&P 500	0.29	1.00					
Russell 2000	0.27	0.89	1.00				
MSCI EAFE	0.24	0.80	0.80	1.00			
Bloomberg U.S. Aggregate	-0.01	0.07	0.01	0.13	1.00		
S&P GSCI	0.27	0.47	0.48	0.51	-0.03	1.00	
FTSE REIT	0.25	0.75	0.72	0.63	0.36	0.31	1.00

Data from Bloomberg January 1, 2014-July 31, 2021. All equity indices are expressed in terms of total return. See disclaimer for description of assets. Past performance is not indicative of future results.

Investing in EUA Futures

The natural users of EUA futures contracts are the 11,000 or so EU utilities, industrial firms, and airlines that are required to hold allowances equivalent to their annual emissions. However, in the past year or so hedge funds, ETF providers, and commodity trading advisors have entered the market, providing institutional investors with a familiar way to invest in these contracts.

Some active managers, like Pierre Andurand, choose to take a passive approach, betting on a stable regulatory regime.

"We're comfortable over a five-year horizon that the price has to go up — that's pretty much a guarantee. As long as the EU maintains this commitment to fighting climate change and utilising the carbon market, we're confident prices will rise."

Institutional investors could themselves implement such a passive EUA futures strategy (futures contracts are typically rolled only once a year), but this approach requires a great deal of fortitude, patience, and, one would assume, job security, as the at-the-money volatility of EUAs is about 48%. Other managers see EUA futures' volatility and liquidity as presenting another opportunity to use their discretionary or trend-following investment processes to generate alpha.

Rosetta Analytics' RL Carbon Strategy

Instead of taking a buy-and-hope approach or using threadbare investment techniques to try to generate alpha, we use the most advanced and powerful machine learning—deep reinforcement learning—as the basis for our actively managed EUA investment strategy, RL Carbon.

Deep reinforcement learning (DRL) is a type of machine learning that produces actions, not predictions, that are most likely to maximize (or minimize) a metric over an infinite time horizon. Beginning simply with data (the model is not programmed), the model learns by undertaking a series of random actions in a trial-and-error fashion and receiving numerical feedback from its environment. Over the course of this learning process, the DRL model discovers sequences of actions that provide the best results. Once the model is trained and its design parameters selected, the model is evaluated and, if acceptable, applied to the real-life problems. Importantly, over time, the model is continuously retrained with new data, learning new sequences of actions and, ideally, improving its performance.

This iterative process makes DRL particularly good at solving dynamic optimization problems like allocating risk capital, which is why we chose to use DRL as the investment process for our RL Carbon strategy.

In our case, the DRL model seeks to maximize the cumulative risk-adjusted return on capital invested EUA emission futures. Starting only with data--and accounting for transaction costs--the model continually adjusts its behavior, learning the optimal daily allocation of risk capital to ICE EUA futures contracts.

These actions, i.e., investment decisions, are expressed as a single value (or signal) ranging from 100% long to 100% short. For example, a signal of 56% would require a 56% allocation of risk capital to long exposure to the EUA futures and a 44% allocation to cash.

We implement these actions by taking long or short positions in the front-year December EUA futures contracts.

Since its inception in May 2020 through July 2021, **RL Carbon has returned about 42% (net)** with about a third of the volatility of the underlying futures market and a Sharpe ratio of about 1.9.

Table 3: RL Carbon Net Performance

Year-To-Date	Inception-to-Date	Annualized Rate of Return	Annualized Volatility
21.44%	**42.80%**	**32.67%**	**16.80%**

Source: Rosetta Analytics (May 2020 - July 2021)

In addition, because our DRL model knows nothing about traditional investment methods, the CFA curriculum, "value," or "momentum"—and because it is not programmed to mimic human decision-making—RL Carbon's returns generally have exhibited little or no correlation to alternative and traditional investments and assets.

Table 4: Benchmark Correlations

Benchmark Correlations	
AlphaMaven HF Index	0.08
Barclay HF Index	0.04
CS AllHedge Index	0.09
S&P 500	0.13
VIX	(0.54)
Gold ETF	0.22
7to10Yr Treasury ETF	0.29
US $ Index ETF	(0.06)
Euro Currency ETF	0.12

Source: AlphaMaven (May 2020-July2021)

RL Carbon: The Solution to Investors' ESG Problem

Institutional investors seeking to incorporate ESG investments into their portfolios face challenges beyond the usual friction associated with manager selection. While this should cause investors to be cautious, it should not prohibit them from proceeding. EUA emissions futures offer investors a systematic, accessible, and transparent way to gain ESG exposure, without all the handwaving, pitfalls, and false promises. And RL Carbon—Rosetta's deep reinforcement learning-based strategy—offers investors an original, powerful way to gain active, risk-controlled exposure to this market.

LINK TO ROSETTA ANALYTICS STANDARD FACT SHEET

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Important Information
For Qualified Eligible Persons as defined by CFTC Regulation 4.7(a)

PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE RESULTS

There are substantial risks to investing. It is possible for investors to lose a portion or all of their investment.

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The performance information herein represents the performance of Rosetta Analytics' RL Carbon strategy (the "Strategy") from inception. The Strategy was traded at a small level in a proprietary account from inception (May 11) through September 2020. For this time period, the live performance of the proprietary account is presented net of exchange fees and operational and trading costs and adjusted to reflect pro forma management fees of 1% per annum and, if eligible, a 20% incentive allocation. Beginning in October 2020, the firm began managing a client account *pari passu* with the proprietary account. Performance data presented from October 2020 forward reflects the live performance of the Strategy in the client account only (exclusive of the performance of the proprietary account) net of exchange fees and operational and trading costs and net of management fees of 1% per annum and, if eligible, a 20% incentive allocation. This performance information is unaudited and subject to revision. RL Carbon was previously managed by Earth Elements AI LLC, of which Rosetta Analytics was the majority owner. Effective August 1, 2021, the strategy and its accounts were transferred to Rosetta. This transfer resulted in no change in the management of the strategy.

The strategy is speculative and involves substantial risks. It is possible that investors may lose some or all of their investment. The material in this fact sheet has been prepared by Rosetta and is general background information about Rosetta's activities current as at the date of this presentation. This information is given in summary form and does not purport to be complete. Information in this presentation, including forecast financial information, should not be considered as advice or a recommendation to investors or potential investors in relation to holding, purchasing or selling securities or other financial products or instruments and does not take into account your particular investment objectives, financial situation or needs. Before acting on any information you should consider the appropriateness of the information having regard to these matters, any relevant offering document and in particular, you should seek independent financial advice.

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Risks -- Securities and financial product or instrument transactions involve risks, which include (among others) the risk of adverse or unanticipated market, financial or political developments and, in international transactions, currency risk. Investments in this strategy and trading in futures are volatile, unpredictable and involves the risk of the loss of capital. Certain market conditions can make it difficult or impossible to trade a position. There is a high degree of leverage that is often obtainable in futures trading because of the small margin requirements. Leverage can lead to large losses as well as gains.

Artificial Intelligence --The predictions underlying artificial intelligence investment strategies are not always accurate. When machine-generated predictions result in losses, it is not always possible to interpret the reasons. There may be other risks specific to this type of investing. The strategy is recently organized and has no (or limited) operating history upon which investors can evaluate all of the risks This presentation may contain forward looking statements including statements regarding our intent, belief or current expectations with respect to Rosetta' businesses and operations, market conditions, results of operation and financial condition, capital adequacy, specific provisions and risk management practices. Readers are cautioned not to place undue reliance on these forward-looking statements. Rosetta does not undertake any obligation to publicly release the result of any revisions to these forward-looking statements to reflect events or circumstances after the date hereof to reflect the occurrence of unanticipated events. While due care has been used in the preparation of forecast information, actual results may vary in a materially positive or negative manner. Forecasts and hypothetical examples are subject to uncertainty and contingencies outside Rosetta' control.

All data sourced from Bloomberg as of July 31, 2021. All equity indices are expressed in terms of total return. There can be no assurance that the indexes/benchmarks are an appropriate comparison for the Strategy, or that other indices/benchmarks would not be more useful for comparison. The indexes/benchmarks are not directly investable and, consequently, not subject to the same fees or expenses as the Strategy. The performance of the Strategy may or may not correlate to these indexes/benchmarks.

Description of indexes/benchmarks:
"EUA Carbon Futures" = Front-Year ICE European Union Allowance (EUA) futures
"S&P 500" = S&P 500 Total Return Index
"Russell 2000" = Russell 2000 Total Return Index
"MSCI EAFE" = MSCI Europe, Australasia and Far East (EAFE) Total Return Index
"Bloomberg U.S. Aggregate" = Bloomberg Barclays US Aggregate Bond Index
"S&P GSCI" = S&P GSCI Total Return Index
"FTSE REIT" = FTSE NAREIT All Equity REITs Total Return Index
"AlphaMaven HF Index" = AlphaMaven's index reflecting the overall trend of the hedge fund industry
"Barclay HF Index" = Barclay Hedge Fund Index reflects the average return of all hedge funds (excepting funds of funds) in the Barclay database
"CS AllHedge Index" = the Dow Jones Credit Suisse AllHedge Index is Credit Suisse's diversified investable index derived from the broad Dow Jones Credit Suisse Hedge Fund Index
"VIX" = CBOE volatility index
"GLD ETF" = SPDR Gold Shares exchange traded fund (Symbol "GLD")
"7to10YR Treasury ETF" = iShares 7-10 year tTeasury Bond exchange traded fund (IEF)
"US $ Index ETF" = Invesco DB US Dollar Index Bullish Fund (UUP)
"Euro Currency ETF" - Invesco CurrencyShares Euro Currency Trust (FXE)