US Utilities & Clean Tech

Rates, rates, & yes, more rates. Utility and clean energy weakness tied to single factor

Industry Overview

03 October 2023

Equity
United States
Utilities & Clean Tech

Julien Dumoulin-Smith
Research Analyst
BofAS
+1 646 855 5855
julien.dumoulin-smith@bofa.com

Paul Zimbardo
Research Analyst
BofAS
+1 646 855 1470
paul.zimbardo@bofa.com

Dariusz Lozny, CFA
Research Analyst
BofAS
dariusz.lozny@bofa.com

Alex Vrabel
Research Analyst
BofAS
alexander.vrabel@bofa.com

Cameron Lochridge
Research Analyst
BofAS
cameron.lochridge@bofa.com

Morgan Reid
Research Analyst
BofAS
morgan.reid@bofa.com

IRP: Integrated resource plan
HoldCo: Holding company
OpCo: Operating company

ITC: Investment tax credit
PTC: Production tax credit

DSCR: debt service coverage ratio

Interest rates overwhelmingly driving the utilities sector

Utilities and clean energy continue to lag, highly correlated with interest rates. Utilities were -5% on October 2nd and are now -11% since September 1st. NextEra Energy's (NEE) -22% acute weakness has been an outsized contributor due to its 15-20% weighting in the utilities index but the overwhelming driver is interest rates. See our latest on NextEra: Day two debates: What are clients focused on after YieldCo growth reset. Utilities were outperforming what long-term treasuries would imply starting in mid-July and our last macro deep dive at the start of September showed the sector as relatively expensive. See here: As the leaves fall, preparing for Autumn utility outlook. Micro still has potholes 9/6/23. We show charts in the full report of utilities, clean energy, and residential solar versus long-term interest rates: they all look the same. The rise in interest rates is having the same macro impact on companies on different ends of the growth spectrum – perhaps a surprising outcome given the difference in fundamentals. *What chart looks different? Midstream – relevant for Cheniere Energy (ticker LNG).*

NEE readthroughs? More limited than you would guess

NextEra's material increase in cost of capital has led to multiple inbound questions about (1) who is next to 'reset'; and (2) whether this will cause a slow down for the renewables sector broadly? A higher cost of capital will pressure returns for companies, but we do not anticipate a major change to the quantum of renewables. What could shift is more utility owned projects (see Xcel Energy's IRP as an example: Parsing the Colorado upside – is the jurisdiction turning a corner? 29 September 2023). Perhaps the biggest lesson learned and investor feedback from NEE/NextEra Energy Partners (NEP) stock declines is that if that one of the historically best regarded companies in the sector can have flaws, perhaps no company's guidance is beyond reproach. Reiterate caution into 3Q.

Utilities with equity needs and asset sales under pressure

The companies adversely exposed to the macro backdrop are the same as we have written about frequently: AES Corp (AES), Avangrid (AGR), Dominion Energy (D), Eversource Energy (ES), and Portland General Electric (POR) to name a few with high financing needs. While the decline in stock prices is unfortunate, unless a company needs to crystalize the 'mark-to-market' by raising equity directly/indirectly, the weaker stock price does not impact the earnings outlook. Here we prefer companies with no equity and strong balance sheets such as Consolidated Edison (ED) and PPL Corp (PPL).

What are the warning signs to watch?

Some of the flags to look for signaling a need for more research are (1) stale guidance initiated in 2020-2021; (2) reliance on short-term interest rate hedges. These will roll off and create headwinds; (3) equity issuance and asset sales in guidance; (4) lack of rate cases? This was once a positive but can present a lag in the wrong jurisdiction; (5) HoldCo and OpCo maturities in 2022-2024. Historically a lack of rate cases has been a favorable attribute but now many investors are looking at this more of a risk rather than an opportunity given the rapidly evolving macroeconomic backdrop. We emphasize that these are not all inherently cautious but simply require more diligence.

Timestamp: 03 October 2023 05:30AM EDT

We have repeatedly been asked what the read is from NEE

Yes, we think there is a broader read. See the charts below on rates. The latest legdown for the sector arguably only brings utilities back to 'in-line' with moves in treasuries. We're not particularly enthused to step into a sector that has admittedly more upfront rate sensitivity than NEE (considering its swap positions). We see 3Q and 4Q results as boding fairly cautiously and anticipate companies able to successfully navigate discussions on '24/'25 implied refinancings to reaffirm EPS guidance (as well as corresponding dilution from reduced equity valuations) will be rewarded.

What about a further slide in NEE.

As far as a 'further' slide in NEE: we perceive substantive fixation from many clients on seeing NEE still as a 'premium' company peer (the latest slide actually positions it at a slight discount). We anticipate for the time being, limited near-term downside to shares especially considering likely robust affirmation of EPS growth – and incremental efforts to bolster confidence via cost cuts, etc. Reaffirming the 'premium' nature of their NEER biz remains the longer-term question to shore up confidence: mid-'24 guidance roll forward at biennial Analyst Day remains the real litmus test of showing resilience thru cycle for NEE shares. Similar to NEE, we perceive more muted gyrations for NEP shares after rapid erosion of premium vs many YieldCo peers. Expecting some stability ahead.

To summarize the latest de-rating, investors have historically been able to comfortably side-step the non-regulated valuation questions embedded in NEE on the back of consistent EPS growth. Doubts in the consistency of this EPS growth rate – whether driven by rate - or otherwise - have reinvigorated this scrutiny.

How rates sensitive are renewables really?

Renewable generation projects are effectively a microcosm of large-scale infrastructure projects and thus the return profile and associated cost of capital ultimately mirrors that of industries in that vein. As food for thought, the effective drop-down structure between NEE and NEP is predated by many a general/limited partner arrangement as is the debate of what to do with the drop-down assets once the economics are no longer obvious. In general, renewable projects trend towards relatively low asset level returns given the fact that they can support a sizable amount of project leverage; this is unique compared with commodity linked forms of generation whose cash flows are less predictable and support less leverage as a consequence.

Our latest checks suggest that while the cost of debt has undoubtedly increased, debt structuring remains effectively stagnant with utility scale solar projects supporting a debt service coverage ratio (DSCR) at 1.2-1.25x the unlevered a "P50" forecast for cash flows at the project level. The P50 in this case links back to a Monte Carlo simulation for asset level generation which can be done with significant statistical accuracy in solar. Wind by contrast is less predictable and has required a DSCR of 1.3-1.35x in recent deals while we understand that uncontracted renewables can see debt service coverage requirements in excess of 2x.

Investors are asking us how asset level returns are affected by an increase in rates and if renewables developers will continue to develop assets as rates continue to trend higher. Our general answer is "yes" which links back to basic project economics. We design a simple project model to show how the capital structure evolves under a 4%, 6%, and 8% interest rate scenario. For simplification purposes, we assume Investment Tax Credit/Production Tax Credits (ITC / PTC) are monetized via transfer to avoid complicating cash flow economics with tax equity distributions. What we find is that even under debt capital limited to an 8% effective coupon, a relatively standard project (electing a PTC) can require as little as 20% equity. To be clear this is the correct way to think about the benefit/headwind of rates. Under the same debt service coverage terms, higher/lower rates = lower/higher debt advance. Noting that for most developers the transfer of an otherwise unusable tax credit represents a cost of capital of effectively 0, the WACC still presents favorably with the vast majority reflecting the cost of debt capital in all scenarios.

We emphasize that while rates have trended higher for all projects, capacity to elect a solar PTC in higher yielding projects can make up for significant headwinds in debt financing. On our project economics model below as an example (at a 26% capacity factor), simply selecting the PTC buffers ~200bps of rates move as a function of equity required in the project. We acknowledge pressure on asset level valuations which is appropriate in this environment but reiterate that rates are a headwind for all players, and that if project economics are underwater for the population, prices will increase for projects to clear. Watch the return of fossil generation as a key unknown variable, but we maintain that there is nothing structurally broken in renewables and that NEE's issues are more idiosyncratic than sector norm.

Exhibit 1: Project Returns Mini Model – In Renewables WACC is All about How much Equity You Need

Even under 8% interest rates, we think a PTC eligible project can require as little as 20% equity with debt still 40% of the capital stack

Asset Inputs

$/W	1.05
Asset Size (MW)	100
Capacity Factor	26%
Degradation Rate	0.5%
Fair Market Value Step Up (ITC Only)	15%
Asset Valuation for ITC ($mm)	121
PPA Price ($/MWh)	35
Escalator	0%
O&M ($/KW-yr)	20
Inflation	3%
Debt Service Coverage Ratio	1.25

Interest Rate	4%	6%	8%
ITC			
Tax Credit % of Stack	35%	35%	35%
Debt % of Stack	52%	45%	39%
Equity % Required	13%	21%	27%
PTC			
Tax Credit % of Stack (PV-9)	41%	41%	41%
Debt % of Stack	52%	45%	39%
Equity % Required	6%	14%	20%

Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**20**
PTC ($/MWhr)		27	28	29	30	30	31	32	33	34	35	
Generation (GWhr)		228	227	225	224	223	222	221	220	219	218	207
PTC Value ($mm)		6,150	6,302	6,459	6,619	6,784	6,953	7,125	7,302	7,484	7,670	
PPA ($/MWhr)		35	35	35	35	35	35	35	35	35	35	35
Revenue		7,972	7,932	7,892	7,853	7,813	7,774	7,735	7,697	7,658	7,620	7,247
O&M		2,000	2,060	2,122	2,185	2,251	2,319	2,388	2,460	2,534	2,610	3,507
EBITDA		**5,972**	**5,872**	**5,770**	**5,667**	**5,562**	**5,456**	**5,347**	**5,237**	**5,125**	**5,010**	**3,740**
DSCR		1.25x	1.25x	1.25x	1.25x	1.25x	1.25x	1.25x	1.25x	1.25x	1.25x	1.25x
Cash Flow available for Debt Service		**4,777**	**4,697**	**4,616**	**4,534**	**4,450**	**4,365**	**4,278**	**4,190**	**4,100**	**4,008**	**2,992**
Interest		2,204	2,101	1,997	1,892	1,787	1,680	1,573	1,464	1,355	1,246	115
Principal		2,573	2,597	2,619	2,642	2,663	2,685	2,705	2,725	2,744	2,763	2,877
Debt Balance	**55,095**	**52,521**	**49,925**	**47,305**	**44,664**	**42,001**	**39,316**	**36,611**	**33,886**	**31,141**	**28,379**	**0**

Source: BofA Global Research Estimates

BofA GLOBAL RESEARCH

What is important to remember.... Power Production Agreement (PPA) prices are up for renewable deals.

We stress that the backdrop for the renewable sector itself is not all that bad. We are not particularly cautious on returns across the landscape. While utility-scale deals are still able to see outsized returns, we see a different backdrop elsewhere where returns are biased higher (if not actually seeing an expanding spread vs treasuries) as difficult execution has led to a broad shortage of projects. Delays that have been pervasive have made readily-developed projects more valuable. While NEE and others have been unable to revise higher their near-term outlook to capture such benefits – new contracts are being signed clearly are generally not the source of interest rate worries.

Rather, the concern on NEE, AES and others in the renewable landscape are around projects that are already COD and under construction – where financing has yet to be locked-in and admittedly higher leveraged assets are simply more exposed to rate sensitivities than conventional utilities, able to recoup these costs over time.

NEER's biz of developing renewables not in doubt; Shifts in asset values are.

On balance, we stress the core NEER renewable model of developing renewables is not in doubt here. If anything the model is poised to thrive once more under IRA. The issues of late that delays have afflicted NEE as well as most other developers around challenged execution – we see difficulties in reaching the top end of renewable origination ranges for every reason that most developers are seeing the same issues.

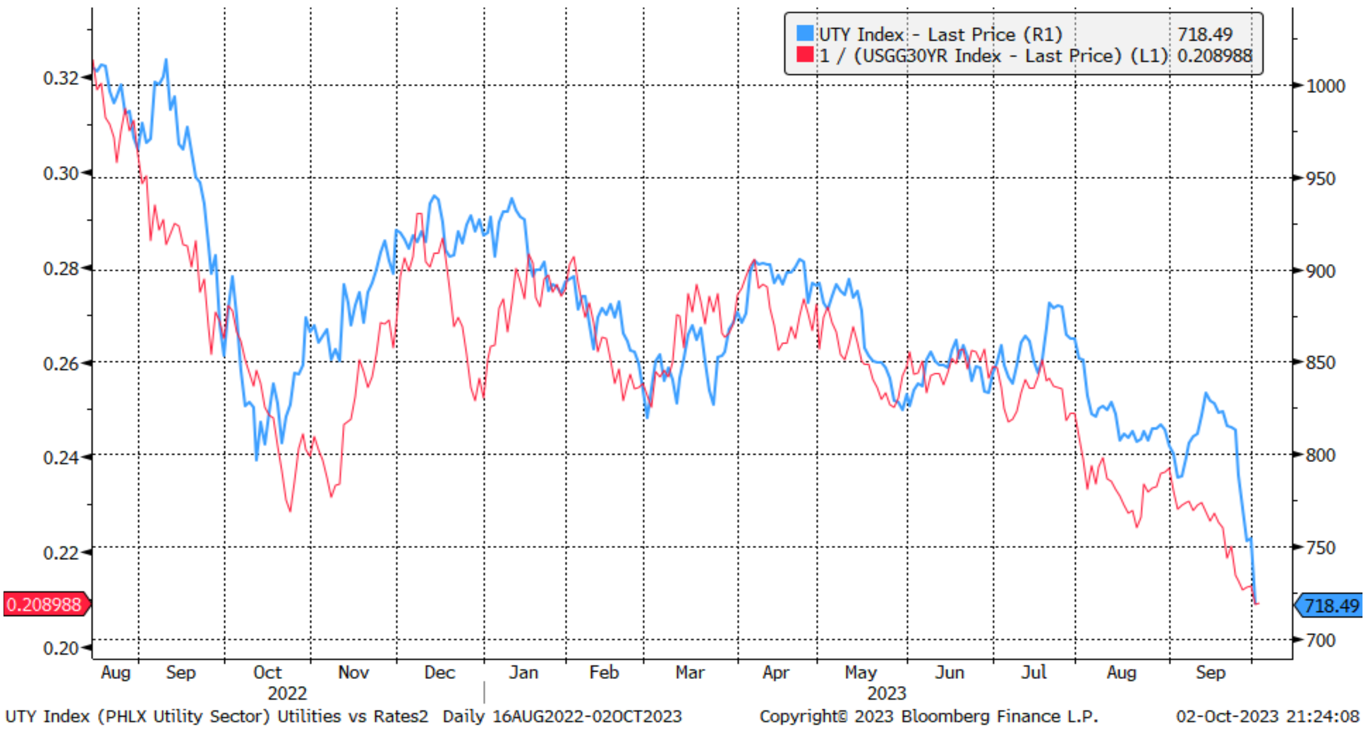
The decision to elect (at NEE's discretion) not to drop down assets into NEP was seemingly a reflection of shifts in equity valuations on existing assets arising from interest rates. While we appreciate the questions arising from concerns on the original returns under which these projects were developed, we see much of the fear of printing a loss (for NEE) on a drop is tied to meaningful shifts in rates.

Pictures tell a thousand words

The next four exhibits show (1) utilities, (2) clean energy, (3) residential solar, and (4) midstream equities versus long-term interest rates. We compare versus the 30Yr US Treasury yield except residential solar where we use the California mortgage rate (similar trend).

Exhibit 2: Utilities Equities (Blue) vs 30Yr US Treasuries Rates (Red)

Utilities were significantly outperforming what the interest rate move would dictate in the first half of September – that outperformance has closed rapidly

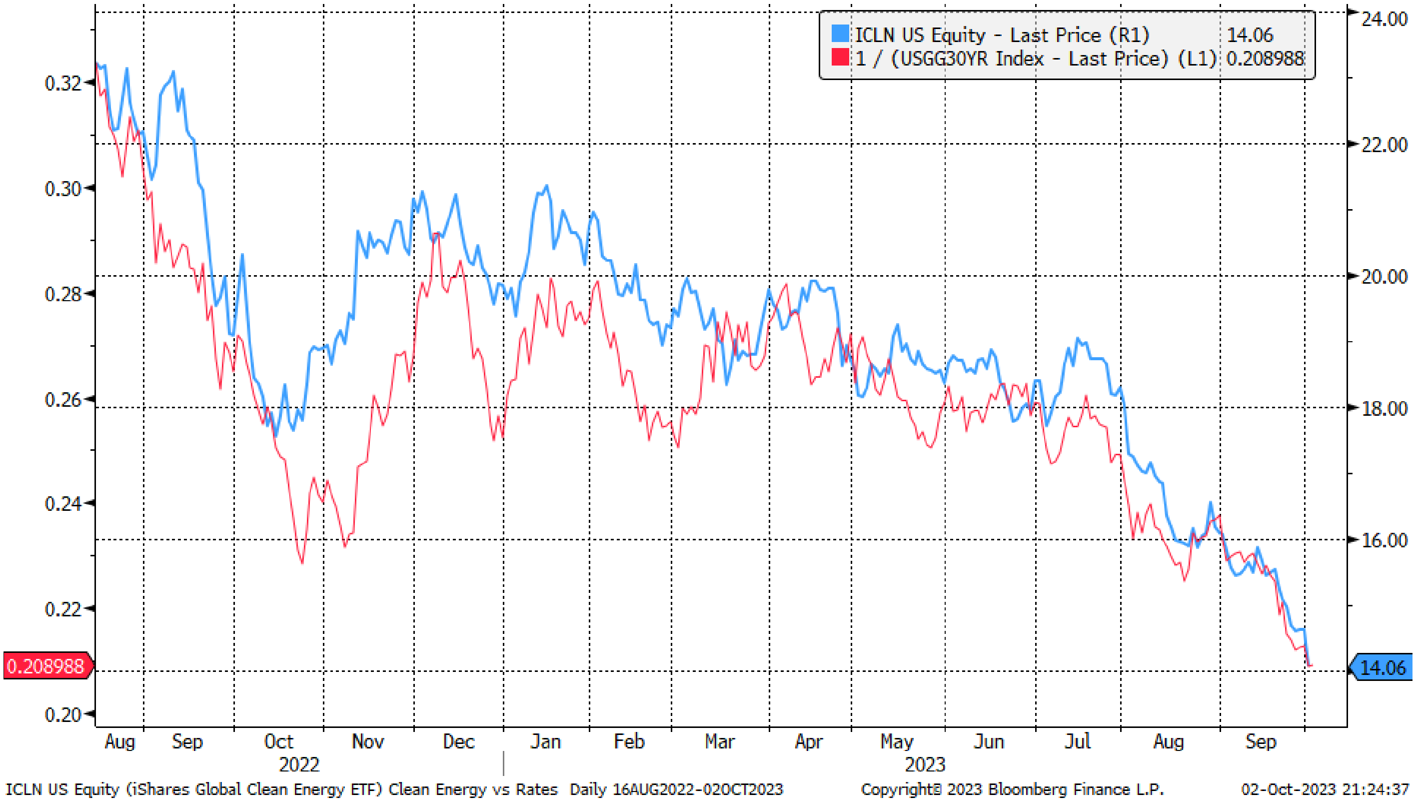


Source: Bloomberg

BofA GLOBAL RESEARCH

Exhibit 3: Clean Energy Equities (Blue) vs 30Yr US Treasuries Rates (Red)

Clean energy equities have ironically performed in a tighter band versus interest rates since May 2023 than utilities have



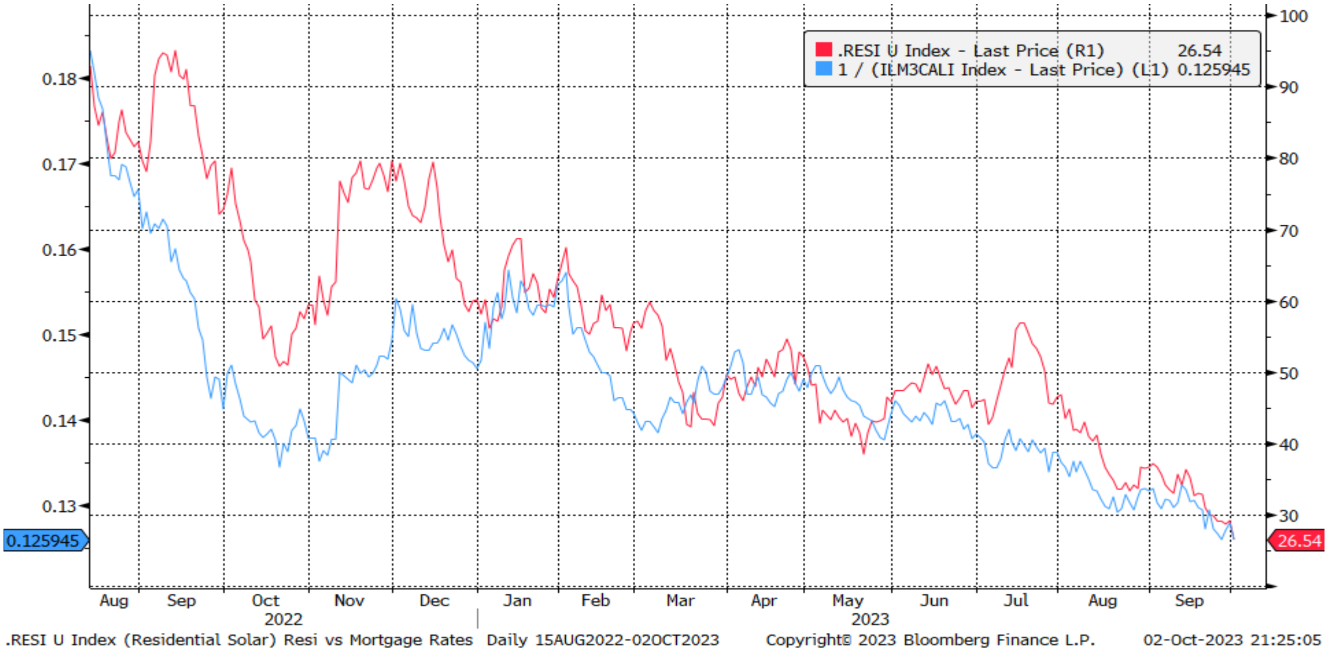
Source: Bloomberg

BofA GLOBAL RESEARCH

The inherent linkage to financing costs for growth and customer affordability has lead to a more challenging outlook for residential solar and prevented positive performance. No subsector has side-stepped these pressures.

Exhibit 4: Residential Solar Equities (RUN, NOVA, & SPWR) vs 30Yr Mortgage Rates

Residential solar equities have struggled to outperform during the Fed tightening cycle

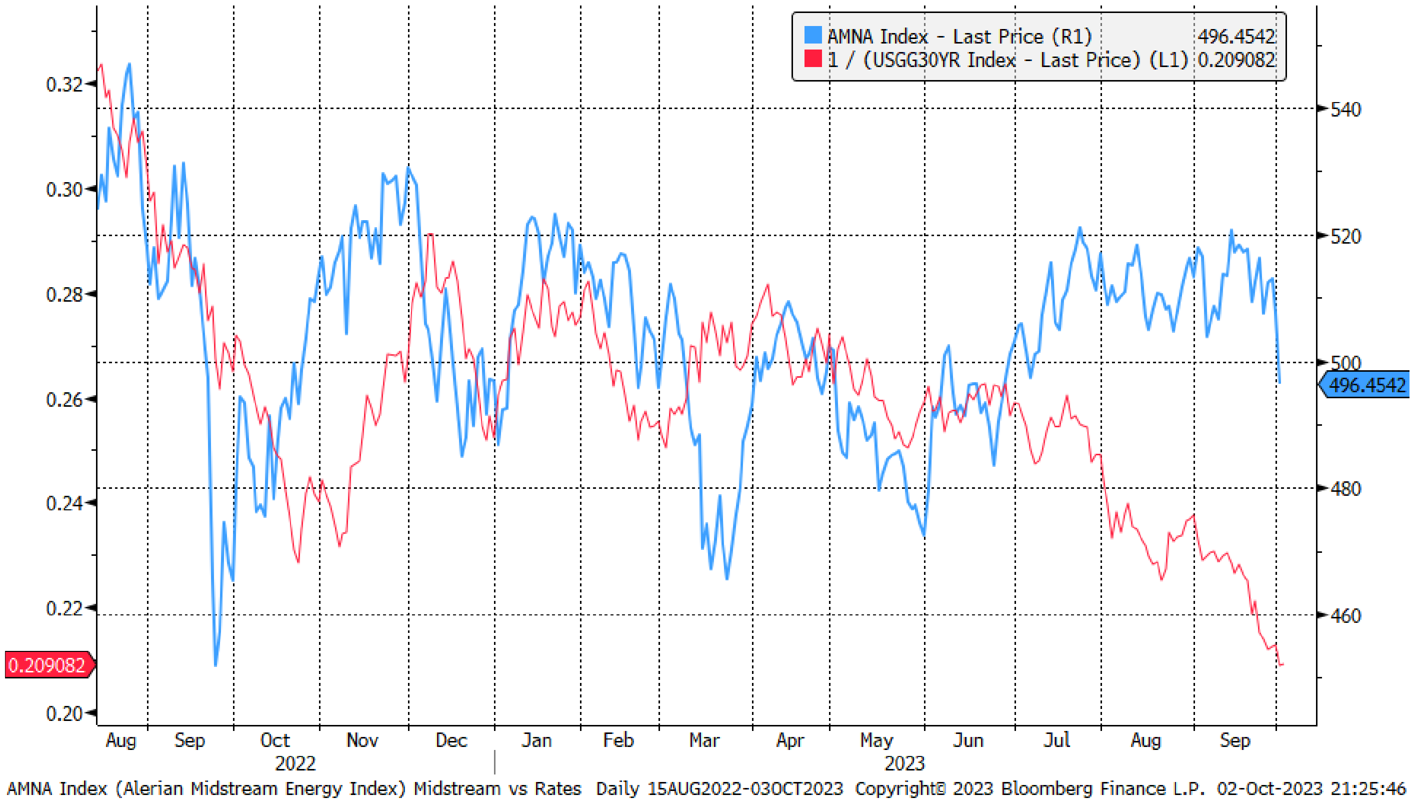


Source: Bloomberg

BofA GLOBAL RESEARCH

We have been surprised about the lack of investor questions about how well infrastructure asset valuations have held up versus utilities and clean energy. Infrastructure assets generally should have stronger organic free cash flow in contrast to utilities that are free cash flow negative by design. This is a key differentiating factor but it is unclear how durable the relative strength is.

Exhibit 5: Midstream Energy (Blue) vs 30Yr US Treasuries Rates (Red)
The midstream companies have fared much better than utilities and clean energy despite higher interest rates



Source: Bloomberg

BofA GLOBAL RESEARCH

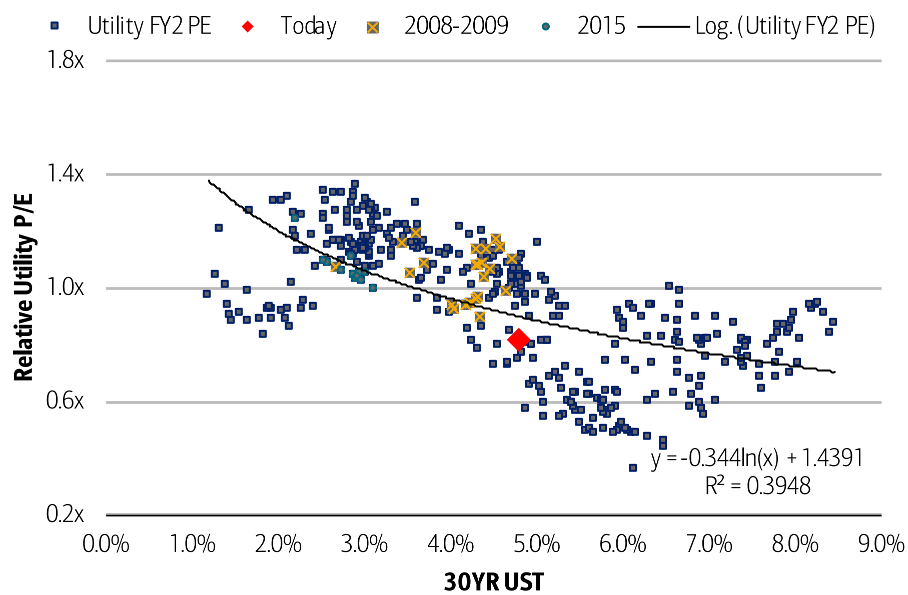
Latest dislocation leaves utilities attractively valued

The utilities sector continued its underperformance with a return of -6.4% in September which followed -6.1% in August. The month of October is off to an ugly start at -5.3% in one day. We had previously written that despite YTD weakness, the sector remains near historical average valuation levels against credit and equity benchmarks. Our latest analysis shows that the recent bout of underperformance has driven utilities to officially look cheap relative to historical relationships. Below we refresh several key data points and charts.

{Finally} cheap against 10Y and 30Y UST based on regression

Our August refresh indicated that the Utility sector has traded to mostly in line based on historical nonlinear regression relationships between relative PE ratios and the 30Y and 10Y. The latest refresh indicates that shares are now cheap based on the historical relationship between shares and rates.

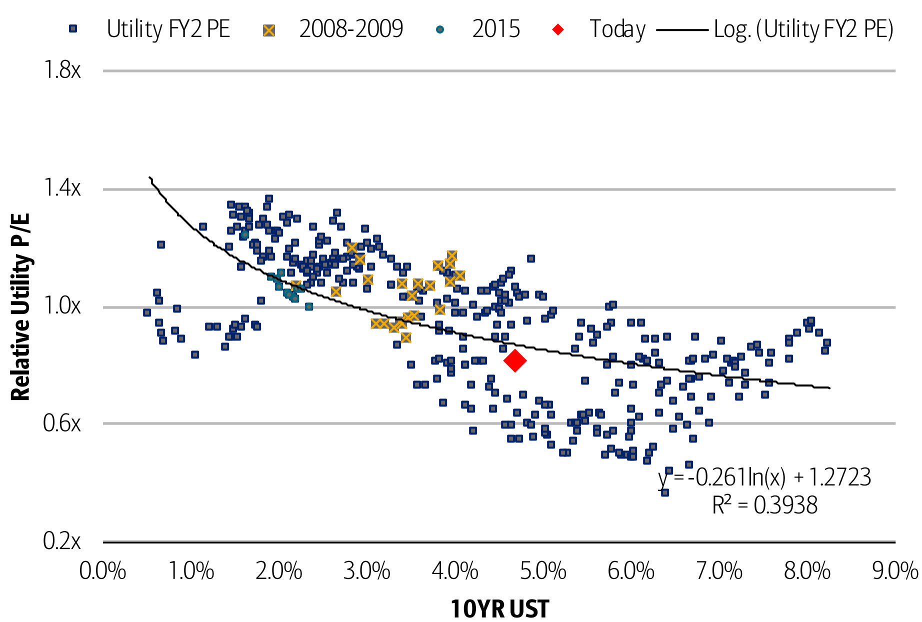
Exhibit 6: Relative PE vs 30Y UST
Utilities now screen as cheap based on nonlinear relationship



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Exhibit 7: Relative PE vs 10Y UST
Relatively cheap vs 10Y yield too



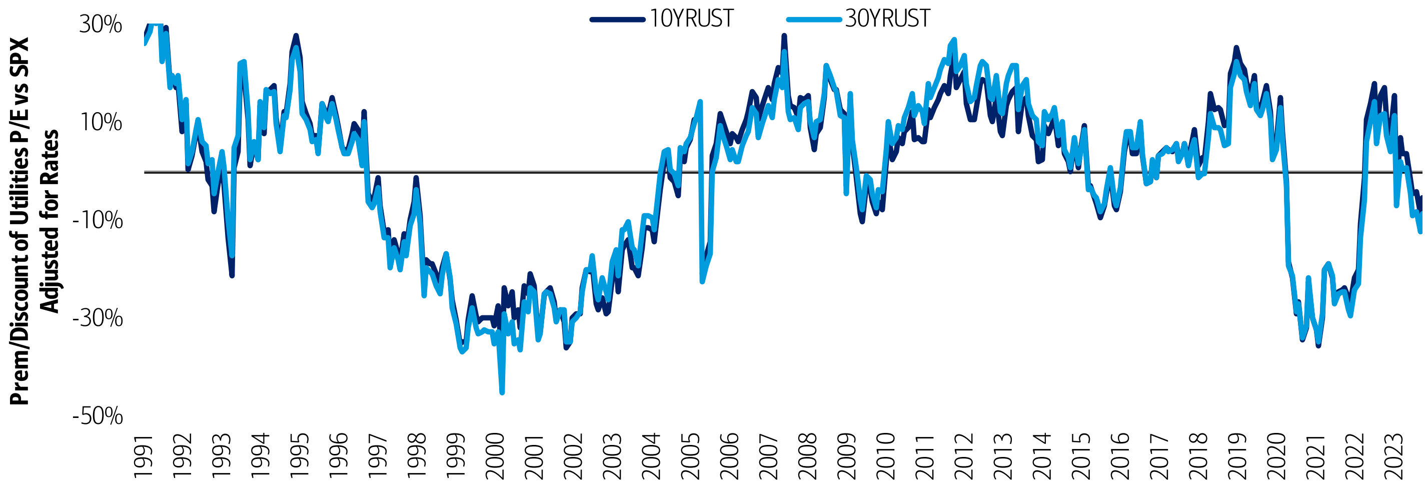
Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Ex-COVID, first time sector has been this cheap in nearly a decade

We highlight the time series for the nonlinear data shown above – the sharp move lower in Utilities has driven the sector to the biggest discount vs rates (excluding COVID) in over a decade.

Exhibit 8: 10Y and 30Y relative value over time – back to 2009 and 2015 valuation lows.
Ex-COVID utility discount biggest in over a decade



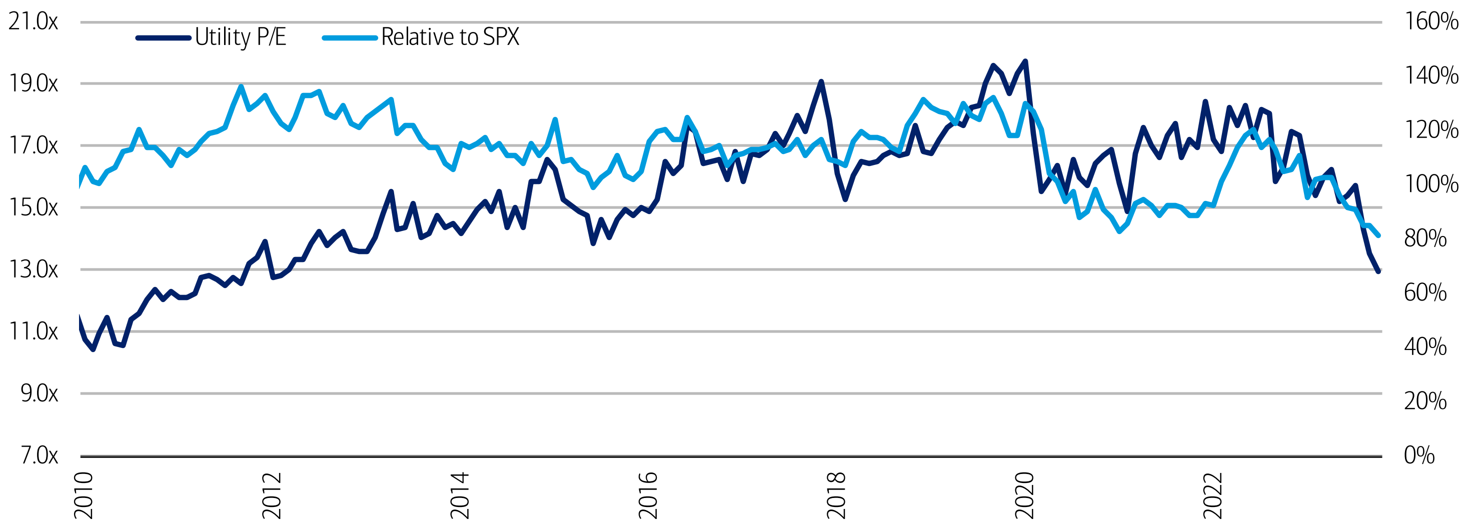
Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Utilities also remain cheap vs broader equity markets

While relative valuations vs rates have shifted in Utility investors' favor in recent weeks, the sector has been fairly valued / cheap relative to the S&P 500 on a forward PE basis for much of 2023, with the trend accelerating of late. While Utilities have screened as favorably valued compared to the broader market for most of calendar 2023, the gap has widened with the sector's recent underperformance with Utilities now at a roughly 0.8x relative discount to the S&P 500.

Exhibit 9: Utilities relative PE vs S&P 500
Valuation vs rest of market now screens attractive (P/E on LHS and Relative % to SPX on RHS)



Source: BofA Global Research, Bloomberg

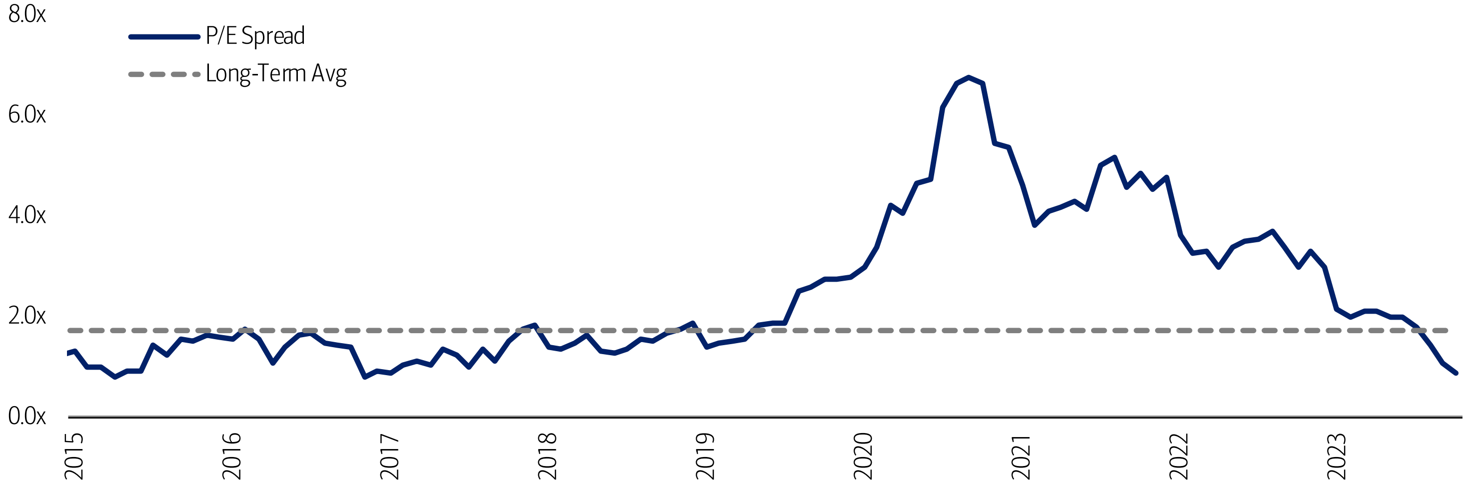
BofA GLOBAL RESEARCH

"Premium" utility valuations have contracted significantly

The significant bifurcation between a small number of premium utility stocks that first emerged in late 2019 and accelerated in 2020 has largely reversed in 2023. We note that NEE has been a driver of much of the premium – particularly with outperformance in 2020. With that stock's reversion vs the sector, the gap between these sub-groups is now below historical average levels, supporting the general theme that the sector is selling off largely on the back of elevated macro / interest concerns.

Exhibit 10: Premium-value spread

Premium utilities no longer at a spread above historical average: better backdrop to find truly quality & defensive companies among utilities



Source: BofA Global Research, Bloomberg

BofA GLOBAL RESEARCH

Analyst Certification

I, Julien Dumoulin-Smith, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

Disclosures

Important Disclosures

FUNDAMENTAL EQUITY OPINION KEY: Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. VOLATILITY RISK RATINGS, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. INVESTMENT RATINGS reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster[R1]
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

[R1] Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

INCOME RATINGS, indicators of potential cash dividends, are: 7 - same/higher (dividend considered to be secure), 8 - same/lower (dividend not considered to be secure) and 9 - pays no cash dividend. *Coverage Cluster* is comprised of stocks covered by a single analyst or two or more analysts sharing a common industry, sector, region or other classification(s). A stock's coverage cluster is included in the most recent BofA Global Research report referencing the stock.

BofA Global Research personnel (including the analyst(s) responsible for this report) receive compensation based upon, among other factors, the overall profitability of Bank of America Corporation, including profits derived from investment banking. The analyst(s) responsible for this report may also receive compensation based upon, among other factors, the overall profitability of the Bank's sales and trading businesses relating to the class of securities or financial instruments for which such analyst is responsible.

Other Important Disclosures

From time to time research analysts conduct site visits of covered issuers. BofA Global Research policies prohibit research analysts from accepting payment or reimbursement for travel expenses from the issuer for such visits.

Prices are indicative and for information purposes only. Except as otherwise stated in the report, for any recommendation in relation to an equity security, the price referenced is the publicly traded price of the security as of close of business on the day prior to the date of the report or, if the report is published during intraday trading, the price referenced is indicative of the traded price as of the date and time of the report and in relation to a debt security (including equity preferred and CDS), prices are indicative as of the date and time of the report and are from various sources including BofA Securities trading desks.

The date and time of completion of the production of any recommendation in this report shall be the date and time of dissemination of this report as recorded in the report timestamp.

Recipients who are not institutional investors or market professionals should seek the advice of their independent financial advisor before considering information in this report in connection with any investment decision, or for a necessary explanation of its contents.

Officers of BofAS or one or more of its affiliates (other than research analysts) may have a financial interest in securities of the issuer(s) or in related investments.

Refer to BofA Global Research policies relating to conflicts of interest.

"BofA Securities" includes BofA Securities, Inc. ("BofAS") and its affiliates. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor if they have questions concerning this report or concerning the appropriateness of any investment idea described herein for such investor. "BofA Securities" is a global brand for BofA Global Research.

Information relating to Non-US affiliates of BofA Securities and Distribution of Affiliate Research Reports:

BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). BofA Securities Europe SA ("BofASE") with registered address at 51, rue La Boétie, 75008 Paris is registered under no. 842 602 690 RCS Paris. In accordance with the provisions of French Code Monétaire et Financier (Monetary and Financial Code), BofASE is an établissement de crédit et d'investissement (credit and investment institution) that is authorised and supervised by the European Central Bank and the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers. BofASE's share capital can be found at www.bofaml.com/BofASEdisclaimer; BofA Europe (Milan): Bank of America Europe Designated Activity Company, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (CBI); BofA Europe (Frankfurt): Bank of America Europe Designated Activity Company, Frankfurt Branch regulated by BaFin, the ECB and the CBI; BofA Europe (Madrid): Bank of America Europe Designated Activity Company, Sucursal en España, regulated by the Bank of Spain, the ECB and the CBI; Merrill Lynch (Australia): Merrill Lynch Equities (Australia) Limited, regulated by the Australian Securities and Investments Commission; Merrill Lynch (Hong Kong): Merrill Lynch (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSFC); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Investment Industry Regulatory Organization of Canada; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd., regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.

This information: has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BofASE (France), which is authorized by the ACPR and regulated by the ACPR and the AMF; has been considered and distributed in Japan by BofAS Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by HKSFC; is issued and distributed in Taiwan by Merrill Lynch (Taiwan); is issued and distributed in India by BofAS India; and is issued and distributed in Singapore to institutional investors and/or accredited investors (each as defined under the Financial Advisers Regulations) by Merrill Lynch (Singapore) (Company Registration No 198602883D). Merrill Lynch (Singapore) is regulated by MAS. Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distributes this information in Australia only to 'Wholesale' clients as defined by s.761G of the Corporations Act 2001. With the exception of Bank of America N.A., Australia Branch, neither MLEA nor any of its affiliates involved in preparing this information is an Authorised Deposit-Taking Institution under the Banking Act 1959 nor regulated by the Australian Prudential Regulation Authority. No approval is required for publication or distribution of this information in Brazil and its local distribution is by Merrill Lynch (Brazil) in accordance with applicable regulations. Merrill Lynch (DIFC) is authorized and regulated by the DFSA. Information prepared and issued by Merrill Lynch (DIFC) is done so in accordance with the requirements of the DFSA conduct of business rules. BofA Europe (Frankfurt) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI. BofA Securities entities, including BofA Europe and BofASE (France), may outsource/delegate the marketing and/or provision of certain research services or aspects of research services to other branches or members of the BofA Securities group. You may be contacted by a different BofA Securities entity acting for and on behalf of your service provider where permitted by applicable law. This does not change your service provider. Please refer to the Electronic Communications Disclaimers for further information.

This information has been prepared and issued by BofAS and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security discussed herein should do so through BofAS and/or MLPF&S and not such foreign affiliates. Hong Kong recipients of this information should contact Merrill Lynch (Asia Pacific) Limited in respect of any matters relating to dealing in securities or provision of specific advice on securities or any other matters arising from, or in connection with, this information. Singapore recipients of this information should contact Merrill Lynch (Singapore) Pte Ltd in respect of any matters arising from, or in connection with, this information. For clients that are not accredited investors, expert investors or institutional investors Merrill Lynch (Singapore) Pte Ltd accepts full responsibility for the contents of this information distributed to such clients in Singapore.

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities.

This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

Securities and other financial instruments referred to herein, or recommended, offered or sold by BofA Securities, are not insured by the Federal Deposit Insurance Corporation and are not deposits or other obligations of any insured depository institution (including, Bank of America, N.A.). Investments in general and, derivatives, in particular, involve numerous risks, including, among others, market risk, counterparty default risk and liquidity risk. No security, financial instrument or derivative is suitable for all investors. Digital assets are extremely speculative, volatile and are largely unregulated. In some cases, securities and other financial instruments may be difficult to value or sell and reliable information about the value or risks related to the security or financial instrument may be difficult to obtain. Investors should note that income from such securities and other financial instruments, if any, may fluctuate and that price or value of such securities and instruments may rise or fall and, in some cases, investors may lose their entire principal investment. Past performance is not necessarily a guide to future performance. Levels and basis for taxation may change.

This report may contain a short-term trading idea or recommendation, which highlights a specific near-term catalyst or event impacting the issuer or the market that is anticipated to have a short-term price impact on the equity securities of the issuer. Short-term trading ideas and recommendations are different from and do not affect a stock's fundamental equity rating, which reflects both a longer term total return expectation and attractiveness for investment relative to other stocks within its Coverage Cluster. Short-term trading ideas and recommendations may be more or less positive than a stock's fundamental equity rating.

BofA Securities is aware that the implementation of the ideas expressed in this report may depend upon an investor's ability to "short" securities or other financial instruments and that such action may be limited by regulations prohibiting or restricting "shortselling" in many jurisdictions. Investors are urged to seek advice regarding the applicability of such regulations prior to executing any short idea contained in this report.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned herein. Investors in such securities and instruments, including ADRs, effectively assume currency risk.

BofAS or one of its affiliates is a regular issuer of traded financial instruments linked to securities that may have been recommended in this report. BofAS or one of its affiliates may, at any time, hold a trading position (long or short) in the securities and financial instruments discussed in this report.

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information.

In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

Copyright and General Information:

Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material discusses any legal proceeding or issues, it has not been prepared as nor is it intended to express any legal conclusion, opinion or advice. Investors should consult their own legal advisers as to issues of law relating to the subject matter of this material. BofA Global Research personnel's knowledge of legal proceedings in which any BofA Securities entity and/or its directors, officers and employees may be plaintiffs, defendants, co-defendants or co-plaintiffs with or involving issuers mentioned in this material is based on public information. Facts and views presented in this material that relate to any such proceedings have not been reviewed by, discussed with, and may not reflect information known to, professionals in other business areas of BofA Securities in connection with the legal proceedings or matters relevant to such proceedings.

This information has been prepared independently of any issuer of securities mentioned herein and not in connection with any proposed offering of securities or as agent of any issuer of any securities. None of BofAS any of its affiliates or their research analysts has any authority whatsoever to make any representation or warranty on behalf of the issuer(s). BofA Global Research policy prohibits research personnel from disclosing a recommendation, investment rating, or investment thesis for review by an issuer prior to the publication of a research report containing such rating, recommendation or investment thesis.

Any information relating to the tax status of financial instruments discussed herein is not intended to provide tax advice or to be used by anyone to provide tax advice. Investors are urged to seek tax advice based on their particular circumstances from an independent tax professional.

The information herein (other than disclosure information relating to BofA Securities and its affiliates) was obtained from various sources and we do not guarantee its accuracy. This information may contain links to third-party websites. BofA Securities is not responsible for the content of any third-party website or any linked content contained in a third-party website. Content contained on such third-party websites is not part of this information and is not incorporated by reference. The inclusion of a link does not imply any endorsement by or any affiliation with BofA Securities. Access to any third-party website is at your own risk, and you should always review the terms and privacy policies at third-party websites before submitting any personal information to them. BofA Securities is not responsible for such terms and privacy policies and expressly disclaims any liability for them.