

Utilities - HK/China (H/A)

Watt's Up #3: Dec power output +8% YoY, German module plant closure, grid capex

Industry Overview

"Watt's Up" is our new series highlighting key developments in the China power utilities and renewable energy sector. We also include our latest event calendar at the end.

Power: large generator Dec power output +8.0% YoY

National Bureau of Statistics (NBS) data, power output from generators above designated size increased by 8.0%/ 5.2% in Dec/ full year 2023, vs. 8.4% in Nov. In Dec, thermal power output +9.3% YoY, vs. 6.3% in Nov; hydro output +2.5% YoY, vs. 5.4% in Nov; nuclear output -4.2% YoY, vs. -2.4% in Nov; wind output +7.4% YoY in Dec vs. 26.6% in Nov; solar output +17.2% in Dec vs. 35.4% in Dec.

Solar: Meyer Burger to cease module capacity in Germany

Meyer Burger is considering to shut down its solar module capacity (1.4GW) in Germany citing lack of protection from China's anti-competitive practices. It plans to focus on the new construction of 2GW US cell and module facilities. It produced 650MW solar modules in FY23 but slumped sales meant module inventory increased to around 360MW. Its CHF126mn FY23 EBITDA loss reflects initial write-down of inventory in Europe, low utilization, and costs incurred from continued commissioning of production facilities in Germany and ongoing expansion in the U.S.

Solar: Oman to build 100k tons polysilicon project

On Jan 16th, Shuangliang announced it won bidding for a high-purity silicon-based materials project of 100k tons annual output from United Solar Polysilicon SPC. The Middle East is only able to consume half of the output, and the rest may go to the European and American markets. Oman is building a local polysilicon industry. In July 2023, Oman signed a land lease agreement to invest USD68mn to build its first silicon metal factory in Sohar port and freezone, where the United Solar Project is located.

Power: State Grid CAPEX to exceed RMB500mn in 2024

State Grid's annual investment is expected to exceed Rmb500mn in 2024. 6 UHV AC projects from Wuhan to Nanchang, Sichuan, and Chongqing are expected to commence operation in 2024. 8 UHV projects from Northern Shaanxi to Anhui and from Sichuan Aba to Chengdu East are expected to start construction in 2024.

Solar: CNNC module tender quote as low as Rmb0.81/W

31 module players participated in China National Nuclear Corporation's (CNNC) recent tender of 8GW solar module. Most of the bidders priced P-210 module RMB0.8-3.6cents/W higher than P-182. 7 bidders priced them the same. 1 bidder priced P-210 cheaper. Bidders priced N-type module RMB2cents/W to above RMB10cents/W higher than P-182. For P-182 module, quotations ranged between RMB0.817-0.92/W, averaging RMB0.862/W. For P-210, quotations ranged between RMB0.813-0.941, averaging RMB0.877/W. For N-type, quotations ranged RMB0.858-0.976, averaging RMB0.917/W. (More on the next page...)

19 January 2024

Equity
HK/China
Utilities

Gary Tsang >>
Research Analyst
Merrill Lynch (Hong Kong)
+852 3508 6825
gary.tsang@bofa.com

Charlotte Xia >>
Research Analyst
Merrill Lynch (Hong Kong)
+852 3508 5029
charlotte.xia@bofa.com

Cissy Guan >>
Research Analyst
Merrill Lynch (Hong Kong)
+852 3508 6483
cissy.guan@bofa.com

[Utilities - HK/China \(H/A\): Year Ahead 2024: Opportunities from power reforms and yield 18 January 2024](#)

MW: megawatt

RE: renewable energy

UHV: Ultra High Voltage

MoM: month over month

SOE: state-owned enterprises

WTG: wind turbine generator

LCOE: Levelized Cost of Electricity

CNNC: China National Nuclear Corporation

UHV: ultra-high voltage

>> Employed by a non-US affiliate of BofAS and is not registered/qualified as a research analyst under the FINRA rules.

Refer to "Other Important Disclosures" for information on certain BofA Securities entities that take responsibility for the information herein in particular jurisdictions.

BofA Securities does and seeks to do business with issuers covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. Refer to important disclosures on page 6 to 8.

12647754

Timestamp: 18 January 2024 12:26PM EST

Wind: offshore wind investment to reach record high

In a recent report published by Clarksons, 19.5GW global offshore wind projects have committed investment decision, with total investment of USD59bn, despite global inflation and tight supply chain. EU, with 9.2GW capacity and USD33bn total investment, ranks the highest. The report also stated that, with the rise in US market and China leading the Asia market boom, global offshore wind investment will reach another new record in 2024.

IEA: China has 392GW coal fired capacity in pipeline

International Energy Agency (IEA) published “Renewables 2023” report in Jan 2023, stating that for the next 5 years (2023-2028), China is expected to account for 56%/72% of global renewable energy/ coal-fired power installation additions. China is expected to add 2,060GW renewable energy capacity during 2023-2028, followed by EU 429GW, US 337GW, India 230GW, and ASEAN 63GW. China has 136.24GW coal-fired power under construction and 255.5GW under planning, accounting for 72% of global planned addition.

Mingyang: Acquire 100% of Mingyang Longyuan

On Jan 13th, Mingyang announced to acquire 100% of Guangdong Mingyang Longyuan Power Electronics Co. at Rmb291mn. Mingyang Longyuan engages in Static Var Generator (SVG) products, flexible DC transmission products, solar PV inverters, etc. According to the announcement, Mingyang Longyuan has high synergy with Mingyang and its wholly-owned subsidiary Tianjin Ruiyuan Electric. Mingyang believes the acquisition will help the development of offshore wind and large-scale RE bases in Gobi Desert regions.

SDIC: 2023 net profit to surge by 40-68% YoY

On Jan 13th, SDIC (600886 CH) announced profit alert. 2023 net attributable profit is expected at Rmb5.72-6.86bn, up by 40-68% YoY, thanks to cheaper coal cost, and higher coal (15% YoY), wind (33% YoY), and solar (60% YoY) generation.

Solar: Tongwei approved for energy saving on 16GW cell

On Jan 15th, Sichuan National Development and Reform Commission (NDRC) approved Tongwei's 16GW N-type cell project energy-saving report. The project will have 32 cell manufacturing lines with Rmb5.5bn total investment.

Gas: Europe gas futures price dropped below EUR30/MWh

Europe TTF LNG (Title Transfer Facility Liquefied Natural Gas) price dropped by 8.5% on Monday, and is the 1st time below EUR30/MWh in 8 months. It has come off significantly from peak level since the geopolitical tension, though still doubles the price of previous winters. EU accumulated record level gas storage in 2023, thanks to a weak economy thus less consumption, stable supply, and increase in renewable power generation.

HNP: 2023 power volume +5% YoY, tariff -0.23% YoY

On Jan 15th, Huaneng Power International (HNP) released 2023 operational data. 2023 power sales volume was 448 bn KWh, +5% YoY, with average tariff of RMB509/MWh, drop by 0.23% YoY. In 2023, HNP's market power sales percentage remained at 88.40%.

RE: 353GW of RE project allocation

In 2023, 353GW of Renewable Energy (RE) projects were announced nationwide, including 168.1GW of wind, 179.2GW of solar, and 6.1GW of integrated wind and solar. Xinjiang has the largest project scale of 78GW. In total, more than 400 companies participated in obtaining projects, 97 companies have obtained more than 400MW of RE projects, with a total scale of 321.1GW. SPIC, China Huadian Corporation, China Huaneng Corporation, China Energy Investment, and China Datang Corporation each obtained more than 18GW, totaling 129.9GW or 37% market share. Local energy groups and private companies obtained 24.6GW and 23GW, respectively.

RE: Green certificate trading income won't impact subsidy

On Jan 12th, National Energy Association (NEA) answered a question on whether a subsidized wind project is eligible to collect the gap between subsidy amount and green certificate trading gain, with positive. This is in line with NEA's previous statement. Back in Aug 2023, when it published the notice on expanding the scope of green power certificate issuance to all renewable energy projects, NEA confirmed that, for a) RE projects with central gov't subsidy, green certificate trading income offsets central gov't subsidy or is state-owned; b) RE projects with no central gov't subsidy, green certificate trading income goes to the project owner.

RE: Guangxi RE market power tariff RMB0.38/kWh

Guangxi provincial Ministry of Industry and Information Technology (MIIT) announced the market power tariff to be RMB0.38/kWh for wind and solar base projects, about Rmb4c lower than the local benchmark coal tariff Rmb0.4207/kWh.

RE: 2024 1st batch RE subsidy list added 723MW

On Jan 16th, National Grid announced the 2024 1st batch renewable energy subsidy list, that included 235 projects, totaling 723.4MW, where 543.6MW is centralized projects, and 179.8MW is distributed projects.

Upcoming BofA Utilities events

We highlight our upcoming events and takeaways notes below. Please contact BofA China Utilities team or your BofA salesperson for more details or registration.

[Solar – China: Wood Mackenzie solar expert call takeaways](#)

[Power – China: Key takeaways from power tariffs & reforms expert call](#)

[Solar – China: European solar channel checks with Huasun Energy](#)

[Power – China: Takeaways from power expert call with former Director at China Electricity Council](#)

[Wind - China: Longyuan conference call takeaways](#)

[Solar - China: Key takeaways from solar expert call with Rystad Energy](#)

[Wind - China: Key takeaways from expert call with China Wind Energy Association](#)

[Beijing Enterprises Water: Call takeaways: saw better cash collection rate and water supply tariff](#)

Exhibit 1: Upcoming BofA Utilities eventsIn-person lunch events on Jan 19th (in Hong Kong) and Jan 31st (In Singapore)

1/19/2024	Lunch	BofA	Power	BofA China Utilities	China Utilities & Renewables Year Ahead lunch	Mandarin/English
1/22/2024	16:00	Corporate	Power	Hu Shufeng	Huadian Power (1071 HK)	Mandarin
1/23/2024	9:00	Expert Corporate	Solar Renewables	Shujuan Wang	Chinese solar supply chain with Zhihui Solar PV	Mandarin
1/23/2024	16:00	Corporate	Renewables	Zou Min	Datang Renewable (1798 HK) Director of Securities Department	Mandarin
1/24/2024	9:00	Corporate	Solar	Anais Wu	LONGi Green Energy (601012 CH) IR	English
1/24/2024	10:00	Expert Corporate	Gas	Miao Lv	China Gas Association	Mandarin
1/24/2024	11:00	Corporate	Gas	Kelvin Shan	CR Gas (1193 HK)	Mandarin
1/25/2024	9:00	Expert	Carbon/power	Boyang Jin	Refinitiv LSE - Team Lead China Carbon & Energy Transition	English
1/30/2024	9:00	Expert	Solar	Frank Haugwitz	Asia Europe Clean Energy (Solar) Association	English
1/31/2024	Lunch (SG)	BofA	Solar	Dr. Thomas Reindl	CEO at Solar Energy Research Institute of Singapore at NUS	English
2/1/2024	10:00	Expert	Solar (Glass)	Yuping Cui	SCI99 - Senior Analyst of Float Glass Market	Mandarin
2/1/2024	11:00	BofA	Solar	BofA Asia solar research	China solar supply chain team call	English

Solar calls

Lunch

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 2: Valuation comparison table for China Utilities and Renewable companies

Key selected valuation metrics for utility and renewable sector companies in 2023-25E

		PE			PB			EPS Growth			ROE			Dividend yield		
		2023E	2024E	2025E	2023E	2024E	2025E	2023E	2024E	2025E	2023E	2024E	2025E	2023E	2024E	2025E
Wind																
Longyuan -H	916 HK	5.5	4.2	3.2	0.5	0.5	0.4	37.8%	31.9%	33.0%	10.2%	12.2%	14.5%	3.6%	4.8%	6.3%
Longyuan -A	001289 CH	22.9	17.4	13.1	2.2	2.0	1.8	37.8%	31.9%	33.0%	10.2%	12.2%	14.5%	0.9%	1.2%	1.5%
Datang Renewables	1798 HK	4.4	4.7	4.0	0.3	0.3	0.3	-15.9%	-5.5%	15.3%	7.8%	6.8%	7.3%	2.8%	2.7%	3.1%
China Three Gorges Renewables	600905 CH	16.3	14.2	11.2	1.5	1.4	1.3	3.3%	15.3%	26.3%	9.3%	10.0%	11.7%	1.9%	2.1%	2.7%
MingYang Smart Energy	601615 CH	7.7	6.8	5.8	0.8	0.8	0.7	-9.6%	13.1%	17.4%	11.1%	11.5%	12.2%	2.6%	2.9%	3.4%
Goldwind-H	2208 HK	4.7	4.5	3.5	0.3	0.3	0.3	9.5%	3.6%	27.6%	8.1%	8.4%	9.9%	6.5%	6.7%	8.5%
Goldwind-A	002202 CH	12.7	12.3	9.6	0.9	0.8	0.8	9.5%	3.6%	27.6%	8.1%	8.4%	9.9%	2.4%	2.4%	3.1%
Solar																
Maxwell	300751 CH	33.7	18.0	10.2	4.9	4.1	3.2	20.5%	86.8%	76.5%	15.3%	24.8%	35.4%	0.9%	1.7%	3.0%
LONGi	601012 CH	12.2	17.8	11.3	2.4	2.1	1.9	-4.0%	-31.5%	57.8%	20.9%	12.6%	17.6%	1.7%	1.2%	1.8%
IPPs																
China Resources Power	836 HK	7.0	5.6	5.1	0.8	0.8	0.7	53.0%	23.9%	9.3%	12.6%	14.6%	14.8%	5.7%	10.3%	7.8%
Huaneng-H	902 HK	5.7	5.5	4.9	0.9	0.8	0.7	n.a.	4.3%	11.3%	17.8%	15.6%	15.3%	8.8%	9.1%	10.2%
Huaneng-A	600011 CH	12.4	11.9	10.7	2.0	1.7	1.5	n.a.	4.3%	11.3%	17.8%	15.6%	15.3%	4.0%	4.2%	4.7%
Huadian-H	1071 HK	6.6	6.1	5.4	0.8	0.7	0.6	n.a.	8.8%	11.5%	12.2%	11.6%	11.3%	7.6%	8.3%	9.2%
Huadian-A	600027 CH	11.3	10.4	9.3	1.3	1.1	1.0	n.a.	8.8%	11.5%	12.2%	11.6%	11.3%	4.4%	4.8%	5.4%
CPID	2380 HK	10.1	6.4	5.7	0.8	0.8	0.7	20.4%	58.2%	12.4%	8.4%	12.3%	12.8%	5.4%	8.3%	9.3%
Gas																
ENN Energy	2688 HK	8.0	8.8	8.5	1.3	1.2	1.1	17.0%	-8.8%	3.6%	18.1%	14.0%	13.4%	5.5%	4.8%	5.1%
China Resources Gas	1193 HK	8.6	8.7	7.8	1.2	1.1	1.0	27.2%	-1.2%	10.9%	14.6%	13.4%	13.8%	5.9%	5.9%	6.7%
China Gas	384 HK	10.1	7.7	7.2	0.7	0.6	0.6	-9.9%	31.1%	7.4%	6.6%	8.4%	8.8%	6.9%	7.8%	8.5%
Shenzhen Gas	601139 CH	11.5	11.8	11.1	1.3	1.2	1.1	31.3%	-2.5%	6.6%	11.7%	10.6%	10.5%	2.7%	2.6%	2.8%
Beijing Enterprises Holding	392 HK	4.9	4.7	4.2	0.4	0.3	0.3	-6.9%	6.0%	12.1%	7.6%	7.6%	8.1%	5.5%	7.0%	8.4%
Hydro																
Yangtze Power	600900 CH	18.9	18.4	17.9	2.5	2.4	2.3	31.9%	2.6%	2.9%	14.6%	13.3%	13.2%	3.8%	3.9%	4.0%
Guiguan Power	600236 CH	16.3	14.4	14.1	2.4	2.2	2.0	-14.7%	13.0%	2.4%	15.3%	15.9%	14.9%	3.1%	3.5%	3.5%
SDIC	600886 CH	14.9	12.4	11.9	1.8	1.7	1.5	66.4%	20.8%	4.2%	12.6%	14.0%	13.5%	3.4%	4.1%	4.3%

Exhibit 2: Valuation comparison table for China Utilities and Renewable companies

Key selected valuation metrics for utility and renewable sector companies in 2023-25E

		PE			PB			EPS Growth			ROE			Dividend yield		
Environmental protection																
Everbright Environment	257 HK	3.6	3.7	3.7	0.3	0.3	0.3	-4.7%	-1.7%	-0.4%	9.0%	8.3%	7.8%	8.9%	8.7%	8.7%
Beijing Enterprises Water	371 HK	8.2	8.2	7.7	0.6	0.5	0.5	69.9%	-0.2%	6.6%	6.8%	6.7%	6.9%	8.5%	8.5%	8.5%
HK Utilities																
CK Infrastructure	1038 HK	15.2	13.9	13.5	0.9	0.9	0.9	-5.7%	9.1%	3.3%	6.1%	6.6%	6.7%	5.8%	5.9%	6.0%
CLP Holdings	2 HK	13.9	12.2	11.8	1.4	1.4	1.3	1103.4%	14.3%	3.7%	10.4%	11.5%	11.4%	5.2%	5.4%	5.5%
Guangdong Investment	270 HK	9.5	8.8	7.2	0.9	0.9	0.9	-15.4%	8.7%	21.0%	9.3%	10.1%	12.0%	10.4%	10.4%	10.4%

Source: BofA Global Research estimates

BofA GLOBAL RESEARCH

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.bofam.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 (HKSF); 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 Canadian Investment Regulatory Organization; 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 HKSF; 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 CBL. 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:

Copyright 2024 Bank of America Corporation. All rights reserved. iQdatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Securities clients and may not be redistributed, retransmitted or disclosed, in whole or in part, or in any form or manner, without the express written consent of BofA Securities. BofA Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Securities and is not publicly-available material. Any unauthorized use or disclosure is prohibited. Receipt and review of this information constitutes your agreement not to redistribute, retransmit, or disclose to others the contents, opinions, conclusion, or information contained herein (including any investment recommendations, estimates or price targets) without first obtaining express permission from an authorized officer of BofA Securities.

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.



All opinions, projections and estimates constitute the judgment of the author as of the date of publication and are subject to change without notice. Prices also are subject to change without notice. BofA Securities is under no obligation to update this information and BofA Securities ability to publish information on the subject issuer(s) in the future is subject to applicable quiet periods. You should therefore assume that BofA Securities will not update any fact, circumstance or opinion contained herein. Certain outstanding reports or investment opinions relating to securities, financial instruments and/or issuers may no longer be current. Always refer to the most recent research report relating to an issuer prior to making an investment decision.

In some cases, an issuer may be classified as Restricted or may be Under Review or Extended Review. In each case, investors should consider any investment opinion relating to such issuer (or its security and/or financial instruments) to be suspended or withdrawn and should not rely on the analyses and investment opinion(s) pertaining to such issuer (or its securities and/or financial instruments) nor should the analyses or opinion(s) be considered a solicitation of any kind. Sales persons and financial advisors affiliated with BofAS or any of its affiliates may not solicit purchases of securities or financial instruments that are Restricted or Under Review and may only solicit securities under Extended Review in accordance with firm policies. Neither BofA Securities nor any officer or employee of BofA Securities accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.