Weichai Power (000338.SZ): Asia Communacopia + Technology — Key Takeaways: More upside from RICE and SOFC

Nick Zheng, CFA
+852-2978-1405 | nick.zheng@gs.com
Goldman Sachs (Asia) L.L.C.

Selina Yan
+852-2978-0178 | shuling.yan@gs.com
Goldman Sachs (Asia) L.L.C.

We hosted Weichai Power's management at our Asia Communacopia + Technology conference on May 18-19 in Hong Kong. We highlight three key takeaways:

- **Exponential not linear growth for data center power generator engines**, with diesel shipment volume ramping to ~3.5k units in 2026 (vs. ~1.4k units in 2025) and ~5–6k units by 2027, while gas (RICE) growing from ~200 units in 2026 to ~800-1,000 units in 2027. Our current volume assumptions sit near or below the lower-end of the guidance range.
- **Scope of faster capacity ramp-up pace for SOFC** (to 500MW in 2027 from ~200MW currently planned) as customer interests turned out to be stronger than expected with current orders in discussion already amounted to 200-300MW.
- **Production localization in North America** is underway with mass production likely to start by end-2027.

Key Takeaways

Power generator engines for data center

Diesel large-bore engines for back-up power

- Management reiterated its diesel large-bore engine **shipments (AIDC-use) to reach ~3.5k units in 2026 (vs. ~1.4k in 2025), and further increase to ~5–6k units by 2027.**
- Looking ahead, management reiterated its **global market share target of ~30% for data center diesel large-bore engine**.

Gas reciprocating engines (RICE) for prime power

- Management highlighted key product launch milestones:
    - **2.5MW gas engine to be launched by late June/early July**, with

  - certification obtained and **commercial sales expected in 4Q, targeting ~200 units in 2026**
  - **5.5MW product to be launched by end-2026,** with commercialization starting mid-2027
- **Management expects 2027 to see RICE shipment volume of 800~1,000 units.**

Capacity expansion

- Management mentioned that **current total capacity is around ~5k units, and expects to expand to ~8k–10k units by end-2027**, with the **majority of the incremental capacity expected to be allocated to gas.**
- Geographically, management shared that production remains primarily China-based at the moment, complemented by ~500–1,000 units of overseas capacity in France. Looking ahead, the company **plans to add capacity footprint in North America** to address tariff risks and localization requirements.
- Management noted that **North America factory is scheduled to start mass production by end-2027**, with flexible supply chain sourcing strategy (China and Europe), and multiple business models under consideration, including self-built capacity, joint ventures with key clients, or leveraging PSI resources.
- Management emphasized that capacity is not a constraint, and expects a relatively fast growth trajectory supported by strong demand visibility.

Channel strategy

- Management mentioned diversified overseas customer access:
  - **Diesel engines are primarily sold to genset OEMs**, such as Weichai's subsidiary PSI, and Generac with which the partnership was built via Weichai's own sales team in the region.
  - **Gas engines are mainly sold directly to end customers**
- Management emphasized that service capability is not a bottleneck as the company has already established service teams locally in North America.

ASP and competitive positioning

- Management emphasized pricing competitiveness, with **RICE ASP broadly in line with global peers** (2.5MW gas engine priced at Rmb10mn+ per unit), while diesel engines are priced at ~20% discount vs. global peers.
- Regarding the industry pricing trends, management shared that **domestic diesel engine pricing has softened slightly** amidst increased competition, **while overseas ASPs have increased by at least 20% yoy YTD.**
- Management highlighted that **new entrants face significant barriers** due to high R&D requirements, testing capabilities, heavy capex requirement, and supply chain integration. Management emphasized Weichai's vertical integration capabilities.

SOFC

- Management shared that demand for SOFC has turned out to be stronger than expected, with close collaboration with its partner Ceres Power (covered by our European Natural Resources analyst Michele Della Vigna).
- Management noted **deep involvement in Ceres Power's commercialization effort of its SOFC technology**. Its current license agreement with Cerew Power does not impose any geographic restrictions.
- Management highlighted strong adoption potential in the UK market, particularly in industrial and small-scale distributed energy scenarios driven by environmental considerations.
- Management reiterates its capacity and shipment ramp-up roadmap:
  - **~30MW capacity in 2026, with shipments starting mainly in 2027**
  - **Planned capacity of ~200MW in 2027, with scope of further expansion to 500MW if demand is strong,** and eventually 1GW by 2030.
- Management indicated **current order under discussions already amounted to ~200–300MW,** signaling strong customer interests.

Investment Thesis - Weichai Power

Weichai Power is China's largest manufacturer of internal combustion engines, with ~20% volume share in China's multi-cylinder engine market, with key verticals across commercial vehicle (mainly heavy-duty trucks), construction machinery, agricultural equipment, marine and power generation. In addition to the engine business, Weichai has also managed to build a diversified business portfolio over the years that spans across **1) complete vehicles and auto components**, primarily through its 51% owned subsidiary Shaanxi Heavy-duty Motor (China's third largest heavy-duty truck producer) and 51% owned subsidiary Fast Gear (China's largest manufacturer of gear boxes); **2) agricultural equipment** which is operated under its 61.1% owned subsidiary Weichai Lovol - China's largest manufacturer of agricultural equipment; and **3) intelligent logistics** (mainly sales of industrial trucks and supply chain solution) through its 46.5% owned subsidiary KION (KGX.DE), which is the second largest producer of industrial trucks globally and the largest provider of supply chain solutions globally.

We believe the investment narrative for Weichai has now shifted from heavy-duty trucks to AI data center power generation as the company has managed to build a comprehensive technology/product portfolio across large engines for diesel gensets (as back-up power for AIDC), gas gensets (onsite primary/standby power) and fuel cells (an emerging onsite generation solution). AIDC power generation, currently 12% of Weichai's total 2025E NP, is poised to grow ~10x by 2030E and we see its earnings contribution more than tripling to 43% of the total, driving 60%+ of its incremental EPS growth through 2030E. Such a shift in investment narrative, in our view, warrants a rerating. We are Buy rated on both the H-share and A-share.

Price Target Risks and Methodology - Weichai Power

Valuation: We adopt a SoTP-based valuation methodology as we believe SoTP better captures the different stages of growth the company's various power generation products are in. Our primary valuation is anchored to the H-share.

- We value **Weichai's legacy business** using mid-cycle P/E (12x) on average 2026E-27E EPS and KION's attributable market cap value to Weichai.
- For Weichai's AIDC power generation business portfolio: **1) Diesel large engines (back-up power):** We apply 25x 2028E P/E, discounted back to mid-2027E using a CoE of 9%; **2) RICE (prime power):** We apply 30x 2030E P/E, discounted back to mid-2027E using a CoE of 9%. **3) SOFC (prime power):** We apply 51x 2030E P/E, discounted back to mid-2027E using a CoE of 9%.

With this, we derive our H-share 12-m target price at HK$56.0/share. For the A-share, we assume a 6% discount to the H-share equity value referencing to the trading patterns over the 6 month, leading to a 12-m target price of Rmb48.00/share.

Key risks: 1) Slower-than-expected macro activity, particularly in road freight, infrastructure and property; 2) weaker-than-expected global economic growth; 3) powertrain shift to higher electrification penetration and lower LNG penetration; 4) weaker-than-expected HDT engine market share performance; 5) slower-than-expected development in power generation business.

000338.SZ	12m Price Target: **Rmb48.00**	Price: **Rmb33.30**	Upside: **44.1%**
2338.HK	12m Price Target: **HK$56.00**	Price: **HK$40.12**	Upside: **39.6%**

Buy

Market cap: Rmb290.6bn / $42.7bn
Enterprise value: Rmb300.3bn / $44.2bn
3m ADTV: Rmb3.7bn / $542.6mn
China
China Advanced Materials & Construction
M&A Rank: 3
Leases incl. in net debt & EV?: Yes

GS Forecast

	12/25	12/26E	12/27E	12/28E
Revenue (Rmb mn)	231,809.3	257,070.1	282,494.6	306,598.2
EBITDA (Rmb mn)	27,451.6	35,007.4	41,773.3	47,257.7
EPS (Rmb)	1.25	1.72	2.13	2.49
P/E (X)	12.4	19.4	15.6	13.4
P/B (X)	1.4	2.9	2.7	2.6
Dividend yield (%)	4.7	3.3	4.4	5.1
N debt/EBITDA (ex lease,X)	(1.0)	(0.9)	(0.6)	(0.7)
CROCI (%)	14.9	14.8	16.2	17.3
FCF yield (%)	12.7	7.5	5.2	11.9

	3/26	6/26E	9/26E	12/26E
EPS (Rmb)	0.36	0.40	0.46	0.47

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 18 May 2026 close.

Disclosure Appendix

Reg AC

I, Nick Zheng, CFA, hereby certify that all of the views expressed in this report accurately reflect my personal views about the subject company or companies and its or their securities. I also certify that no part of my compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

Contributing Authors: Nick Zheng, CFA Goldman Sachs (Asia) L.L.C., Selina Yan Goldman Sachs (Asia) L.L.C..

Unless otherwise stated, the individuals listed in the Contributing Authors disclosure of this report are analysts in Goldman Sachs' Global Investment Research division.

GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our universe of rated stocks) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

M&A Rank

Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

The rating(s) for Weichai Power (A) and Weichai Power (H) is/are relative to the other companies in its/their coverage universe: Beijing New Building Materials, Boqian New Materials, China Jushi, First Tractor (A), First Tractor (H), Jiangsu Hengli Hydraulic Co., Lonking Holdings, Milkyway, NHU, Oriental Yuhong, Rianlon, Richful, Sany Heavy, Sinocera Functional Material, Sinotruk, Skshu Paint Co., Sunresin, Vasen, Wanhua Chemical Group, Weichai Power (A), Weichai Power (H), Zhejiang Dingli Co Ltd.

Company-specific regulatory disclosures

The following disclosures relate to relationships between The Goldman Sachs Group, Inc. (with its affiliates, "Goldman Sachs") and companies covered by Goldman Sachs Global Investment Research and referred to in this research.

Goldman Sachs beneficially owned 1% or more of common equity (excluding positions managed by affiliates and business units not required to be aggregated under US securities law) as of the month end preceding this report: Weichai Power (A) (Rmb33.30) and Weichai Power (H) (HK$40.12)

Goldman Sachs expects to receive or intends to seek compensation for investment banking services in the next 3 months: Weichai Power (A) (Rmb33.30) and Weichai Power (H) (HK$40.12)

Goldman Sachs had an investment banking services client relationship during the past 12 months with: Weichai Power (A) (Rmb33.30) and Weichai Power (H) (HK$40.12)

Goldman Sachs had a non-securities services client relationship during the past 12 months with: Weichai Power (A) (Rmb33.30) and Weichai Power (H) (HK$40.12)

Goldman Sachs makes a market in the securities or derivatives thereof: Weichai Power (A) (Rmb33.30) and Weichai Power (H) (HK$40.12)

Distribution of ratings/investment banking relationships

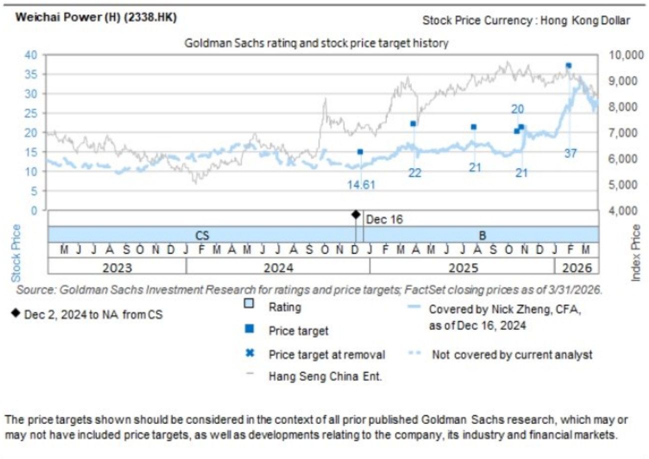
Goldman Sachs Investment Research global Equity coverage universe

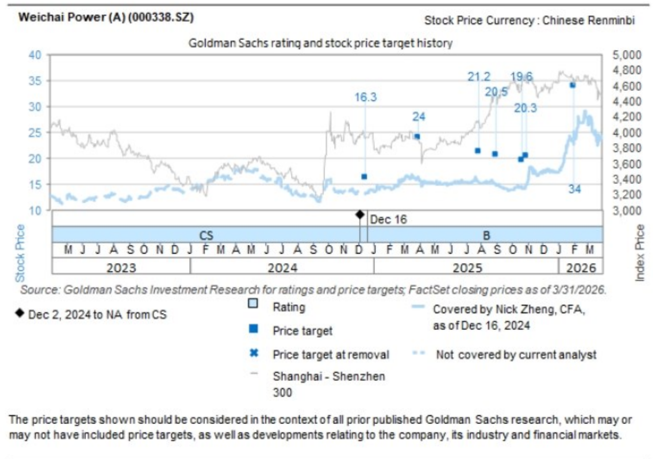
	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	50%	34%	16%	65%	60%	45%

As of April 1, 2026, Goldman Sachs Global Investment Research had investment ratings on 3,074 equity securities. Goldman Sachs assigns stocks as

Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage universe and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

Price target and rating history chart(s)





Target price history table(s)

Weichai Power (A) (000338.SZ)

Date of report	Target price (Rmb)	Closing price (Rmb)
06-May-26	48.00	34.32
04-May-26	42.00	31.20
05-Apr-26	38.00	25.10
03-Feb-26	34.00	24.31
31-Oct-25	20.30	14.96
22-Oct-25	19.60	14.63
01-Sep-25	20.50	14.81
29-Jul-25	21.20	15.33
01-Apr-25	24.00	15.96
16-Dec-24	16.30	13.17

Weichai Power (H) (2338.HK)

Date of report	Target price (HK$)	Closing price (HK$)
06-May-26	56.00	44.66
04-May-26	46.00	43.32
05-Apr-26	41.00	29.10
03-Feb-26	37.00	27.18
31-Oct-25	21.00	16.05
22-Oct-25	20.00	15.13
29-Jul-25	21.00	17.04
01-Apr-25	22.00	16.00
16-Dec-24	14.61	11.12

Price targets shown in table(s) are unadjusted for corporate actions.

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with a subject company, public appearances and trading in securities covered by the analysts.

Distribution of ratings: See the distribution of ratings disclosure above. **Price chart:** See the price chart, with changes of ratings and price targets in prior periods, above, or, if electronic format or if with respect to multiple companies which are the subject of this report, on the Goldman Sachs website at https://www.gs.com/research/hedge.html.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of Global Investment Research of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Resolution n. 20 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Resolution n. 20, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** This information is being provided to you for information purposes only and is not, and under no circumstances should be construed as, an advertisement, offering or solicitation by Goldman Sachs & Co. LLC for purchasers of securities in Canada to trade in any Canadian security. Goldman Sachs & Co. LLC is not registered as a dealer in any jurisdiction in Canada under applicable Canadian securities laws and generally is not permitted to trade in Canadian securities and may be prohibited from selling certain securities and products in certain jurisdictions in Canada. If you wish to trade in any Canadian securities or other products in Canada please contact Goldman Sachs Canada Inc., an affiliate of The Goldman Sachs Group Inc., or another registered Canadian dealer. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 10th Floor, Ascent-Worli, Sudam Kalu Ahire Marg, Worli, Mumbai-400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. Investment in securities market are subject to market risks. Read all the related documents carefully before investing. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors. Goldman Sachs (India) Securities Private Limited compliance officer and investor grievance contact details can be found at: https://www.goldmansachs.com/worldwide/india/documents/Grievance-Redressal-and-Escalation-Matrix.pdf, and a copy of the annual audit compliance report can be found at this link: https://publishing.gs.com/content/site/india-annual-compliance-report.html. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union and United Kingdom: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council (including as that Delegated Regulation is implemented into United Kingdom domestic law and regulation following the United Kingdom's departure from the European Union and the European Economic Area) with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan Type II Financial Instruments Firms Association, and Investment Management Association of Japan. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Ratings, coverage universe and related definitions

Buy (B), Neutral (N), Sell (S) Analysts recommend stocks as Buys or Sells for inclusion on various regional Investment Lists. Being assigned a Buy or Sell on an Investment List is determined by a stock's total return potential relative to its coverage universe. Any stock not assigned as a Buy or a Sell on an Investment List with an active rating (i.e., a stock that is not Rating Suspended, Not Rated, Early-Stage Biotech, Coverage Suspended or Not Covered), is deemed Neutral. Each region manages Regional Conviction Lists, which are selected from Buy rated stocks on the respective region's Investment Lists and represent investment recommendations focused on the size of the total return potential and/or the likelihood of the realization of the return across their respective areas of coverage. The addition or removal of stocks from such Conviction Lists are managed by the Investment Review Committee or other designated committee in each respective region and do not represent a change in the analysts' investment rating for such stocks.

Total return potential represents the upside or downside differential between the current share price and the price target, including all paid or anticipated dividends, expected during the time horizon associated with the price target. Price targets are required for all covered stocks. The total return potential, price target and associated time horizon are stated in each report adding or reiterating an Investment List membership.

Coverage Universe: A list of all stocks in each coverage universe is available by primary analyst, stock and coverage universe at https://www.gs.com/research/hedge.html.

Not Rated (NR). The investment rating, target price and earnings estimates (where relevant) are removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or in a strategic transaction involving this company, when there are legal, regulatory or policy constraints due to Goldman Sachs' involvement in a transaction, and in certain other circumstances. **Early-Stage Biotech (ES).** An investment rating and a target price are not assigned pursuant to Goldman Sachs policy when this company has neither a drug, treatment or medical device that has passed a Phase II clinical trial nor a license to distribute a post-Phase II drug, treatment or medical device. **Rating Suspended (RS).** Goldman Sachs Research has suspended the investment rating and price target for this stock, because there is not a sufficient fundamental basis for determining an investment rating or target price. The previous investment rating and target price, if any, are no longer in effect for this stock and should not be relied upon. **Coverage Suspended (CS).** Goldman Sachs has suspended coverage of this company. **Not Covered (NC).** Goldman Sachs does not cover this company.

Global product; distributing entities

Goldman Sachs Global Investment Research produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Public Communication Channel Goldman Sachs Brazil: 0800 727 5764 and / or contatogoldmanbrasil@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Canal de Comunicação com o Público Goldman Sachs Brasil: 0800 727 5764 e/ou contatogoldmanbrasil@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom.

Goldman Sachs International ("GSI"), authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA, has approved this research in connection with its distribution in the United Kingdom.

European Economic Area: Goldman Sachs Bank Europe SE ("GSBE") is a credit institution incorporated in Germany and, within the Single Supervisory Mechanism, subject to direct prudential supervision by the European Central Bank and in other respects supervised by German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and Deutsche Bundesbank and disseminates research within the European Economic Area.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by Global Investment Research. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

The analysts named in this report may have from time to time discussed with our clients, including Goldman Sachs salespersons and traders, or may discuss in this report, trading strategies that reference catalysts or events that may have a near-term impact on the market price of the equity securities discussed in this report, which impact may be directionally counter to the analyst's published price target expectations for such stocks. Any such trading strategies are distinct from and do not affect the analyst's fundamental equity rating for such stocks, which rating reflects a stock's return potential relative to its coverage universe as described herein.

We and our affiliates, officers, directors, and employees will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research, unless otherwise prohibited by regulation or Goldman Sachs policy.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at https://www.theocc.com/about/publications/character-risks.jsp and https://www.goldmansachs.com/disclosures/cftc_fcm_disclosures. Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by Goldman Sachs Global Investment Research may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to https://research.gs.com.

Disclosure information is also available at https://www.gs.com/research/hedge.html or from Research Compliance, 200 West Street, New York, NY 10282.