

# Tokai Carbon (5301.T)

## CEO meeting takeaways: Current conditions to be sustained into FY19; reiterate Buy (on CL)

BUY  
CL

<b>5301.T</b>	12m Price Target: <b>¥3,200</b>	Price: <b>¥1,576</b>	Upside: <b>103.0%</b>
---------------	---------------------------------	----------------------	-----------------------

We hosted a meeting with Tokai Carbon CEO Hajime Nagasaka on November 30. Although the stock price has failed to gain ground lately with the market pricing in potential risks of supply-demand loosening on the back of graphite electrode debottlenecking by peers and large-scale capacity ramp-ups in China for needle coke/graphite electrodes, the company said it sees a high likelihood of current favorable business conditions being sustained into FY19 onwards. We believe the shares will move back onto an upward trajectory as this supportive environment is reflected in contract pricing for graphite electrodes from 1H2019 and in the company's results and guidance. In addition, although we expect Tokai Carbon's spending on maintenance/renewal of aging facilities to increase sharply from FY2019, we think the company is likely to generate ample cash flow from 2H2019 to balance this spending with enhanced shareholder returns. We thus focus on the potential for Tokai Carbon to strengthen its shareholder returns policy in the next medium-term business plan, slated for release in February 2019. Reiterate Buy (on CL).

### CEO meeting takeaways

- Favorable business conditions sustained for graphite electrodes:** Tokai Carbon sees little possibility of needle coke producers making large capacity additions amid currently very tight supply/demand for this key input. The company reiterated its view that supply/demand for graphite electrode is thus likely to remain tight for the next 4-5 years. On a contract price basis, the average 1H2019 price of Tokai Carbon's graphite electrodes is expected to be around US\$14,000-15,000/t (vs. US\$12,000 in 2H2018), and at present the company is in negotiations with both Japanese and overseas customers. The company also

#### Shuhei Nakamura

+81 (3)6437-9932 | shuhei.nakamura@gs.com  
Goldman Sachs Japan Co., Ltd.

#### Ayaka Misonou

+81 (3)6437-9907 | ayaka.misonou@gs.com  
Goldman Sachs Japan Co., Ltd.

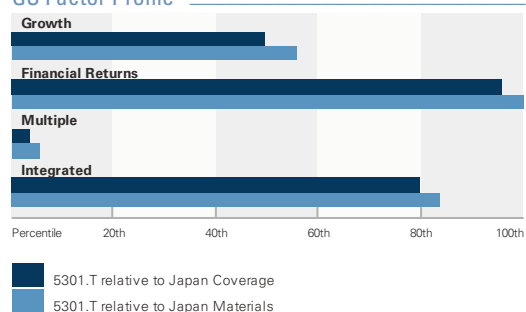
#### Key Data

Market cap: ¥335.9bn / \$3.0bn  
Enterprise value: ¥379.4bn / \$3.3bn  
3m ADTV: ¥22.8bn / \$202.2mn  
Japan  
Japan Materials  
M&A Rank: 3  
Japan Conviction List

#### GS Forecast

	12/17	12/18E	12/19E	12/20E
Revenue (¥ bn)	106.3	230.7	334.7	353.9
Op. profit (¥ bn)	11.5	76.0	110.0	112.5
Op. profit CoE (¥ bn)	-	75.0	-	-
EPS (¥)	55.4	356.5	354.2	363.1
P/E (X)	13.2	4.4	4.4	4.3
P/B (X)	1.2	1.7	1.3	1.0
Dividend yield (%)	1.6	1.5	3.0	3.4
Net debt/EBITDA (X)	(0.3)	0.5	0.2	(0.2)
CROCI (%)	5.0	17.1	19.9	18.9
	<b>9/18</b>	<b>12/18E</b>	<b>3/19E</b>	<b>6/19E</b>
EPS (¥)	71.4	77.7	64.3	64.3

#### GS Factor Profile



Source: Company data, Goldman Sachs Research estimates. See disclosures for details.

Goldman Sachs does and seeks to do business with companies 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. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to [www.gs.com/research/hedge.html](http://www.gs.com/research/hedge.html). Analysts employed by non-US affiliates are not registered/qualified as research analysts with FINRA in the U.S.



## Tokai Carbon (5301.T)

Rating since Sep 27, 2017

## Ratios &amp; Valuation

	12/17	12/18E	12/19E	12/20E
P/E (X)	13.2	4.4	4.4	4.3
P/B (X)	1.2	1.7	1.3	1.0
FCF yield (%)	4.0	1.1	7.2	17.0
EV/EBITDA (X)	18.3	4.5	3.1	2.6
CROCI (%)	5.0	17.1	19.9	18.9
ROE (%)	10.0	47.1	32.9	26.2
Net debt/equity (%)	(4.7)	20.7	10.0	(6.0)
Interest cover (X)	34.4	69.1	220.0	NM
Days inventory outst, sales	82.6	54.5	55.6	64.8
Receivable days	93.6	75.9	87.8	101.1
Days payable outstanding	56.2	56.1	57.1	65.2
DuPont ROE (%)	9.3	38.2	28.3	23.0
Turnover (X)	0.6	0.8	1.0	0.9
Leverage (X)	1.4	1.5	1.3	1.2

## Growth &amp; Margins (%)

	12/17	12/18E	12/19E	12/20E
Total revenue growth	20.0	117.1	45.1	5.7
EBITDA growth	95.5	363.7	42.9	3.7
EPS growth	249.0	543.1	(0.7)	2.5
DPS growth	100.0	100.0	100.0	12.5
EBIT margin	10.8	32.9	32.9	31.8
EBITDA margin	17.0	36.4	35.8	35.1
Net income margin	11.1	32.9	22.6	21.9

## Price Performance



Source: FactSet. Price as of 30 Nov 2018 close.

## Income Statement (¥ bn)

	12/17	12/18E	12/19E	12/20E
Total revenue	106.3	230.7	334.7	353.9
Cost of goods sold	(78.4)	(119.1)	(173.1)	(186.8)
SG&A	(14.9)	(34.1)	(49.6)	(52.1)
R&D	(1.5)	(1.5)	(2.0)	(2.5)
Other operating inc./exp.)	-	-	-	-
<b>EBITDA</b>	<b>18.1</b>	<b>83.9</b>	<b>119.9</b>	<b>124.3</b>
Depreciation & amortization	(6.6)	(7.9)	(9.9)	(11.8)
<b>EBIT</b>	<b>11.5</b>	<b>76.0</b>	<b>110.0</b>	<b>112.5</b>
Net interest inc./exp.)	0.2	(0.8)	(0.2)	0.3
Income/(loss) from associates	1.3	0.7	0.1	0.2
<b>Pre-tax profit</b>	<b>15.9</b>	<b>99.5</b>	<b>110.2</b>	<b>113.3</b>
Provision for taxes	(3.9)	(22.0)	(31.8)	(32.7)
Minority interest	(0.3)	(1.5)	(2.9)	(3.2)
Preferred dividends	-	-	-	-
<b>Net inc. (pre-exceptionals)</b>	<b>11.8</b>	<b>76.0</b>	<b>75.5</b>	<b>77.4</b>
Post-tax exceptionals	-	-	-	-
<b>Net inc. (post-exceptionals)</b>	<b>11.8</b>	<b>76.0</b>	<b>75.5</b>	<b>77.4</b>
<b>EPS (basic, pre-exception) (¥)</b>	<b>55.4</b>	<b>356.5</b>	<b>354.2</b>	<b>363.1</b>
<b>EPS (diluted, pre-exception) (¥)</b>	<b>55.4</b>	<b>356.5</b>	<b>354.2</b>	<b>363.1</b>
<b>EPS (basic, post-exception) (¥)</b>	<b>55.4</b>	<b>356.5</b>	<b>354.2</b>	<b>363.1</b>
<b>EPS (diluted, post-exception) (¥)</b>	<b>55.4</b>	<b>356.5</b>	<b>354.2</b>	<b>363.1</b>
DPS (¥)	12.0	24.0	48.0	54.0
Div. payout ratio (%)	21.6	6.7	13.6	14.9

## Balance Sheet (¥ bn)

	12/17	12/18E	12/19E	12/20E
Cash & cash equivalents	22.2	15.6	0.3	22.3
Accounts receivable	30.3	65.7	95.3	100.8
Inventory	27.4	41.6	60.4	65.2
Other current assets	5.5	43.2	43.2	43.2
<b>Total current assets</b>	<b>85.2</b>	<b>166.1</b>	<b>199.3</b>	<b>231.5</b>
Net PP&E	48.4	57.5	72.6	86.8
Net intangibles	17.7	17.7	17.7	17.7
Total investments	28.1	28.8	28.9	29.1
Other long-term assets	3.4	33.4	33.4	33.4
<b>Total assets</b>	<b>183.0</b>	<b>303.6</b>	<b>352.0</b>	<b>398.6</b>
Accounts payable	14.5	22.1	32.1	34.6
Short-term debt	14.1	39.8	-	-
Other current liabilities	8.3	8.3	8.3	8.3
<b>Total current liabilities</b>	<b>36.9</b>	<b>70.1</b>	<b>40.4</b>	<b>42.9</b>
Long-term debt	2.1	17.1	27.1	2.1
Other long-term liabilities	17.4	17.4	17.4	17.4
<b>Total long-term liabilities</b>	<b>19.5</b>	<b>34.5</b>	<b>44.5</b>	<b>19.5</b>
<b>Total liabilities</b>	<b>56.4</b>	<b>104.6</b>	<b>84.9</b>	<b>62.4</b>
Preferred shares	-	-	-	-
<b>Total common equity</b>	<b>125.8</b>	<b>196.7</b>	<b>262.0</b>	<b>327.9</b>
<b>Minority interest</b>	<b>0.8</b>	<b>2.3</b>	<b>5.2</b>	<b>8.4</b>
<b>Total liabilities &amp; equity</b>	<b>183.0</b>	<b>303.6</b>	<b>352.0</b>	<b>398.6</b>
Gross cash invested (ex cash)	324.2	415.8	473.3	501.0
Net debt, adjusted	(6.0)	41.2	26.7	(20.2)
Average capital employed	111.1	180.4	267.0	304.9
BVPS (¥)	590.4	922.9	1,229.1	1,538.2

## Cash Flow (¥ bn)

	12/17	12/18E	12/19E	12/20E
Net income	11.8	76.0	75.5	77.4
D&A add-back	6.6	7.9	9.9	11.8
Minority interest add-back	0.3	1.5	2.9	3.2
Net (inc)/dec working capital	(4.6)	(42.1)	(38.5)	(7.7)
Other operating cash flow	(3.5)	(22.7)	(0.1)	(0.2)
<b>Cash flow from operations</b>	<b>10.5</b>	<b>20.6</b>	<b>49.7</b>	<b>84.5</b>
Capital expenditures	(4.3)	(17.0)	(25.0)	(26.0)
Acquisitions	-	-	-	-
Divestitures	-	-	-	-
Others	(9.8)	(45.7)	-	-
<b>Cash flow from investing</b>	<b>(14.0)</b>	<b>(62.7)</b>	<b>(25.0)</b>	<b>(26.0)</b>
Dividends paid (common & pref)	(2.6)	(5.1)	(10.2)	(11.5)
Inc/(dec) in debt	(1.0)	40.7	(29.8)	(25.0)
Other financing cash flows	0.7	0.0	0.0	0.0
<b>Cash flow from financing</b>	<b>(2.9)</b>	<b>35.6</b>	<b>(40.0)</b>	<b>(36.5)</b>
<b>Total cash flow</b>	<b>(6.4)</b>	<b>(6.5)</b>	<b>(15.3)</b>	<b>22.0</b>
Free cash flow	6.3	3.6	24.7	58.5

Source: Company data, Goldman Sachs Research estimates.

noted that its 1H2019 procurement price for needle coke is likely to rise by US\$1,000/t vs. 2H2018, but this would signify that the margins for graphite electrodes are likely to increase sequentially in 1H2019.

- **Update on pricing formula for graphite electrodes:** Tokai Carbon's customers, chiefly in the US, are gradually adopting the company's new pricing formula that adjusts the graphite electrode price in line with fluctuations in the price of needle coke. The company expects some 20% of overall sales volume to have switched to this new formula by January 2019. Since the base price for the formula is the 1H2019 graphite electrode price, any movement in the needle coke price will be automatically reflected in the graphite electrode price from 2H2019 for customers adopting this formula system.
- **Balance possible between sharp rise in renewal capex on existing facilities from FY2019 and expansion of shareholder returns, in our view:** Tokai Carbon said it sees internal factors rather than external as potential risks amid the ongoing supportive business environment, highlighting as an example opportunity losses from any disruptions to production. As such, spending from FY2019 on maintaining/upgrading existing facilities, including renewal capex, is likely to be 4-5X the levels of past years (c.¥5 bn annually), according to the company. That said, the company believes it can strike the right balance between increased capex and enhancement of shareholder returns based on its current outlook for cash flows.
- **Other businesses besides graphite electrodes also doing well on the whole:** Tokai Carbon said that with supply of carbon black beginning to tighten in the US market in particular from 2H2018, it is looking to generate a profit margin for its completed North American acquisition on par with its Japan business from FY2019. Elsewhere, it noted that production was at full capacity for industrial furnaces and LiB anode materials amid brisk demand, and that for anode materials it was time to start considering capex in more detail. The company also noted that it sees a slight slowdown in fine carbon for semiconductor applications but also said that demand remains robust for SiC focus rings made by Tokai Carbon Korea amid a structural material substitution trend from quartz. With Tokai Carbon Korea to make a full-year contribution as a consolidated subsidiary in FY2019 (it was fully consolidated in May this year), the company expects the fine carbon segment's profits to continue expanding.

We reiterate our Buy rating on Tokai Carbon (on Conviction List). Our 12-month target price of ¥3,200 is based on correlation between materials sector EV/GCI and FY12/19E CROCI. Key risks include a slump in global electric furnace steel production, use of alternatives to graphite in LiB anode materials, and easing of environmental regulations in China.

# Disclosure Appendix

## Reg AC

We, Shuhei Nakamura and Ayaka Misonou, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our 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.

## GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our coverage universe) 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.

## GS SUSTAIN

GS SUSTAIN is a global investment strategy focused on the generation of long-term alpha through identifying high quality industry leaders. The GS SUSTAIN 50 list includes leaders we believe to be well positioned to deliver long-term outperformance through superior returns on capital, sustainable competitive advantage and effective management of ESG risks vs. global industry peers. Candidates are selected largely on a combination of quantifiable analysis of these three aspects of corporate performance.

## Disclosures

### Coverage group(s) of stocks by primary analyst(s)

Shuhei Nakamura: Japan-Advanced Materials sector.

Japan-Advanced Materials sector: Daicel, Daido Steel, Hitachi Metals, JFE Holdings, Kansai Paint, Kobe Steel, Kuraray, Nippon Carbon, Nippon Paint Holdings, Nippon Shokubai, Nippon Steel & Sumitomo Metal, Sekisui Chemical, Tokai Carbon, Tokyo Steel Manufacturing, Toray Industries, UACJ.

### 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 the Global Investment Research Division of Goldman Sachs 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 second most recent month end: Tokai Carbon (¥1,576)

Goldman Sachs had a non-securities services client relationship during the past 12 months with: Tokai Carbon (¥1,576)

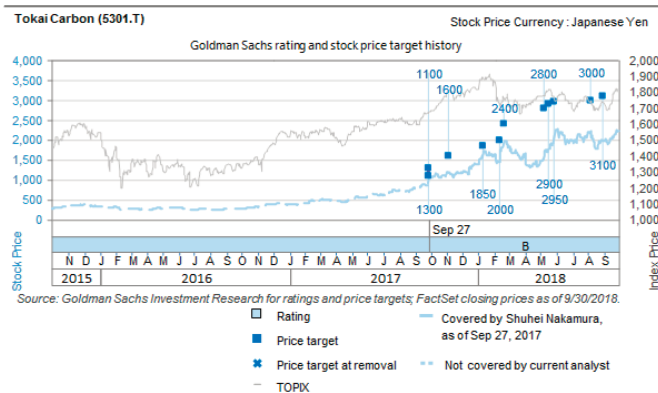
### Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	35%	54%	11%	64%	57%	55%

As of October 1, 2018, Goldman Sachs Global Investment Research had investment ratings on 2,814 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 groups and views 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)



The price targets shown should be considered in the context of all prior published Goldman Sachs research, which may or may not have included price targets, as well as developments relating to the company, its industry and financial markets.

## 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 subject company, public appearances and trading securities held 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 <http://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 the Global Investment Research Division 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.

**Brazil:** Disclosure information in relation to CVM Instruction 598 is available at <http://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 Instruction 598, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** Goldman Sachs Canada Inc. is an affiliate of The Goldman Sachs Group Inc. and therefore is included in the company specific disclosures relating to Goldman Sachs (as defined above). Goldman Sachs Canada Inc. has approved of, and agreed to take responsibility for, this research report in Canada if and to the extent that Goldman Sachs Canada Inc. disseminates this research report to its clients. **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 INH00001493, 951-A, Rational House, Appasaheb Marathe Marg, Prabhadevi, 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. **Japan:** See below. **Korea:** 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. **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. **Singapore:** Further information on the covered companies referred to in this research may be obtained from Goldman Sachs (Singapore) Pte. (Company Number: 198602165W). **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:** Disclosure information in relation to Article 4 (1) (d) and Article 6 (2) of the European Commission Directive 2003/125/EC is available at <http://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 and Type II Financial Instruments Firms Association. 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 groups and views 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. 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, Coverage Suspended or Not Covered), is deemed Neutral. Each regional Investment Review Committee manages various regional Investment Lists to a global guideline of 25%-35% of stocks as Buy and 10%-15% of stocks as Sell; however, the distribution of Buys and Sells in any particular analyst's coverage group may vary as determined by the regional Investment Review Committee. Additionally, each Investment Review Committee manages Regional Conviction lists, which 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 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 groups and views:** A list of all stocks in each coverage group is available by primary analyst, stock and coverage group at <http://www.gs.com/research/hedge.html>. The analyst assigns one of the following coverage views which represents the analyst's investment outlook on the coverage group relative to the group's historical fundamentals and/or valuation. **Attractive (A).** The investment outlook over the following 12 months is favorable relative to the coverage group's historical fundamentals and/or valuation. **Neutral (N).** The investment outlook over the following 12 months is neutral relative to the coverage group's historical fundamentals and/or valuation. **Cautious (C).** The investment outlook over the following 12 months is unfavorable relative to the coverage group's historical fundamentals and/or valuation.

**Not Rated (NR).** The investment rating and target price have been removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or strategic transaction involving this company and in certain other circumstances. **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, or there are legal, regulatory or policy constraints around publishing, an investment rating or target. The previous investment rating and price target, 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. **Not Available or Not Applicable (NA).** The information is not available for display or is not applicable. **Not Meaningful (NM).** The information is not meaningful and is therefore excluded.

## Global product; distributing entities

The Global Investment Research Division of Goldman Sachs produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce equity 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.; Ombudsman Goldman Sachs Brasil: 0800 727 5764 and / or [ouvidoriagoldmansachs@gs.com](mailto:ouvidoriagoldmansachs@gs.com). Available Weekdays (except holidays), from 9am to 6pm. Ouvidoria Goldman Sachs Brasil: 0800 727 5764 e/ou [ouvidoriagoldmansachs@gs.com](mailto:ouvidoriagoldmansachs@gs.com). Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by either Goldman Sachs Canada Inc. or 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 and European Union.

**European Union:** Goldman Sachs International authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority, has approved this research in connection with its distribution in the European Union and United Kingdom; Goldman Sachs AG and Goldman Sachs International Zweigniederlassung Frankfurt, regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht, may also distribute research in Germany.

## 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 our Global Investment Research Division. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (<http://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 group as described herein.

We and our affiliates, officers, directors, and employees, excluding equity and credit analysts, 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.

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 disclosure documents which are available from Goldman Sachs sales representatives or at <http://www.theocc.com/about/publications/character-risks.jsp>. 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 the Global Investment Research division of GS 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 <http://360.gs.com>.

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

© 2018 Goldman Sachs.

**No part of this material may be (i) copied, photocopied or duplicated in any form by any means or (ii) redistributed without the prior written consent of The Goldman Sachs Group, Inc.**