

GS SUSTAIN

EU Taxonomy Update - Inclusion of Natural Gas and Nuclear

The European Commission has released new plans to include some natural gas and nuclear energy power plants as 'green' under the existing EU Taxonomy's Climate Change Mitigation objective. Despite the political pressure the new proposal appears likely to pass, leading to implications for corporates and investors. We believe the inclusion of natural gas and nuclear power generation would help provide some guarantee to Europe's volatile energy supply, especially as renewables scale and potentially provide an incentive for natural gas to play a larger role in Big Oils transition to Big Energy, helping drive an acceleration in the phasing out of coal. Investors' recognition of nuclear and gas-fired powered generation as green is likely to remain somewhat tempered by existing exclusions in ESG funds, but their inclusion into the EU Taxonomy now opens the door to more nuanced views, potentially giving more credit to the technologies where they meet the strict performance criteria of the Taxonomy.

Evan Tylenda, CFA

+44(20)7774-1153 |
evan.tylenda@gs.com
Goldman Sachs International

Grace Chen

+44(20)7774-5119 | grace.j.chen@gs.com
Goldman Sachs International

Madeline Meyer

+44(20)7774-4593 |
madeline.r.meyer@gs.com
Goldman Sachs International

Alberto Gandolfi

+39(02)8022-0157 |
alberto.gandolfi@gs.com
Goldman Sachs Bank Europe SE - Milan
branch

Michele Della Vigna, CFA

+44(20)7552-9383 |
michele.dellavigna@gs.com
Goldman Sachs International

Ajay Patel

+44(20)7552-1168 | ajay.patel@gs.com
Goldman Sachs International

Brian Singer, CFA

+1(212)902-8259 | brian.singer@gs.com
Goldman Sachs & Co. LLC

Derek R. Bingham

+1(415)249-7435 |
derek.bingham@gs.com
Goldman Sachs & Co. LLC

Emma Jones

+61(2)9320-1041 | emma.jones@gs.com
Goldman Sachs Australia Pty Ltd

Rachit Aggarwal

+1(212)934-7689 |
rachit.aggarwal@gs.com
Goldman Sachs India SPL

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. Analysts employed by non-US affiliates are not registered/qualified as research analysts with FINRA in the U.S.

Implications of Natural Gas and Nuclear Inclusion into the EU Taxonomy

The European Commission has released new plans to include some natural gas and nuclear energy power plants as 'green' under the existing EU Taxonomy's Climate Change Mitigation and Adaptation objective. The Taxonomy aims to define which economic activities are green by establishing strict carbon performance thresholds, requiring companies to disclose their 'green' revenue, capex and opex and investors to report their exposure to 'green' companies in ESG funds. The intention of the Taxonomy is to facilitate the flow of capital towards more sustainable outcomes.

Below we highlight some of the detail and implications from the draft of Natural Gas and Nuclear's inclusion into the EU Taxonomy.

What's included?: The draft includes pathways for:

- **Nuclear energy production**, including R&D of new advanced nuclear technology, new nuclear power plants with permits received before 2045, and existing nuclear facilities to be considered 'green'.
- **Natural gas power plants** to be considered 'transitional' and green if: **1) existing facilities** produce energy below 100g CO₂e per kWh (requiring CCS technology), or if **2) new facilities** produce emissions below 270g CO₂e per kWh + replace higher emitting facilities (**where renewables are not yet viable**) + only where permits are received before December 31, 2030.

For more detail on the technical screening criteria for each activity please see the Appendix ([Exhibit 1](#) - [Exhibit 6](#)).

Next steps: The EC proposals asks EU Member States and the Platform on Sustainable Finance to provide feedback by January 12th, a much shorter timeline than typical legislative proposals. The EU Commission will then take their contributions and adopt the Delegated Act in January 2022. The European Parliament and Council will then have four months (including a potential extra two) to object to the Delegated Act before it automatically enters into force. If adopted the new Delegated Act would apply from Jan 1st, 2023.

Likelihood of passing: *The inclusion of Natural Gas and Nuclear power production into the Taxonomy appears highly likely.* The topic has been debated for more than a year and has received significant scrutiny from Member States. Germany and Austria remain critical of the inclusion of nuclear energy, while Germany (non-Green party) along with eastern European countries want gas included. France, Finland and Czech Republic are advocates for inclusion of nuclear and remain largely agnostic towards inclusion of gas. Despite the divide it is expected that neither side will have the required 20 countries (65% population of EU) or simple majority in Parliament to block the proposal, which would then see both Gas and Nuclear power included into the Taxonomy.

Our views and implications for corporates and investors:

- **Investor recognition of nuclear and gas power as green will become more nuanced, potentially beginning a shift away from traditional hardline investment exclusions.** Many ESG funds and ESG fund labeling schemes include hardline exclusions around companies with nuclear or fossil fuel exposure that are likely to remain in place. Therefore, even if natural gas and nuclear are included in the Taxonomy, we see investors remaining critical of supporting such technologies outright. However, inclusion into the Taxonomy would add more nuance to the ESG debate and exclusion exceptions may be made where companies with nuclear or gas exposure meet the strict Taxonomy criteria.
- **Gas and nuclear inclusion would help provide guarantee of energy supply to Europe as renewables scale, especially given the existing volatility in energy supply.** We believe inclusion of nuclear and gas into the Taxonomy would help to ensure a smoother transition to a low carbon economy.
- **The recognition of pre-commercial R&D into advanced nuclear technology could provide incentives to develop potential ‘game changing’ energy technology.**
- **The inclusion of existing and new nuclear plants as green could serve as a potential backstop technology for achieving net-zero pathways, especially as renewables, storage, and hydrogen take time to scale.**
- **Inclusion could provide a further incentive for Big Oil to accelerate their transformation to Big Energy, with potentially a bigger role in gas fired power generation as part of their broader power expansion.** Given that revenue generated directly from natural gas and oil exploration and production are not included in the Taxonomy, **the inclusion of natural gas fired power generation could further incentivize Big Oil’s downstream investment into natural gas power production via capex or targeted acquisitions.** Expansion into natural gas power production could expand the revenue mix of Big Oils that could be considered eligible and potentially aligned (green) to the EU Taxonomy. An estimated 33% of natural gas production revenue is linked to power production in Europe, though only incremental gas power replacing coal or existing plants with CCS technology would be covered. This would expand on the existing business activities of petrochemicals, biofuel production, hydrogen production, carbon sequestration, and renewable energy that are already included in the EU Taxonomy.

As highlighted in our **Green Capex: Making Infrastructure Happen** report, we believe meeting Net Zero requires a diverse set of technologies that includes nuclear and carbon capture. The inclusion by the EU Taxonomy of natural gas (with restrictions that will likely warrant carbon capture) and nuclear should provide greater incentive for investment in these areas. Overall, we believe we will need to see \$6.0 trillion per year of Green Capex to support Net Zero, infrastructure and Clean Water (\$3.0 trillion/year

towards Net Zero), up \$2.8 trillion vs. the annual average in 2016-20 (\$1.8 trillion of the incremental towards Net Zero).

Appendix

Exhibit 1: Pre-commercial stages of advanced technologies with minimal waste from the fuel cycle

Description of the activity and Technical screening criteria

Pre-commercial stages of advanced technologies with minimal waste from the fuel cycle	
Description of the activity	Research, development, demonstration and deployment of innovative electricity generation facilities, licenced by Member States' competent authorities in accordance with applicable national law, that produce energy from nuclear processes with minimal waste from the fuel cycle.
Technical screening criteria	<p>General criteria pertaining to substantial contribution to climate change mitigation and Do no significant harm ('DNSH')</p> <p>1. The project related to the economic activity ('the project') is located in a Member State which complies with all of the following:</p> <ul style="list-style-type: none"> (a) has fully transposed Council Directive 2009/71/Euratom and Council Directive 2011/70/Euratom; (b) complies with the Euratom Treaty and the Union legislation adopted on its basis, in particular, Council Directive 2009/71/Euratom, Council Directive 2013/59/Euratom, and Council Directive 2011/70/Euratom as well as applicable Union environmental law adopted under Article 192 TFEU, in particular Directive 2011/92/EU; (c) has in place, as of the approval date of the project, a radioactive waste management fund and a nuclear decommissioning fund which can be combined; (d) has demonstrated that it will have resources available at the end of the estimated useful life of the nuclear power plant corresponding to the estimated cost of radioactive waste management and decommissioning in compliance with Commission Recommendation 2006/851/Euratom; (e) has operational final disposal facilities for all very low-, low- and intermediate-level radioactive waste, notified to the Commission both under Article 41 Euratom Treaty and included in the national programme updated under Council Directive 2011/70/Euratom; (f) has a plan with detailed steps to have in operation, by 2050, a disposal facility for high-level radioactive waste. <p>2. The project is part of a EU-financed research programme or the project has been notified to the Commission, the Commission has given its opinion on it and all the issues raised in the opinion in respect of the application of Article 10(2), Article 17 of Regulation (EU) 2020/852 and of the technical screening criteria laid down in this Section have been satisfactorily addressed. No separate notification is required where the project has been notified in accordance with Article 41 of the Euratom Treaty, the Commission has communicated its views in accordance with Article 43 of the Euratom Treaty and all the issues raised by the Commission in respect of the application of Article 10(2), Article 17 of Regulation (EU) 2020/852 and of the technical screening criteria laid down in this Section have been satisfactorily addressed.</p> <p>3. The Member State concerned has committed to report to the Commission every five years for each project:</p> <ul style="list-style-type: none"> (a) the adequacy of the accumulated resources referred to in point 1(c); (b) actual progress in the implementation of the plan referred to in point 1(f). <p>4. The activity complies with national legislation that transposes the Union legislation referred to in point 1(a) and (b), including as regards the evaluation, in particular through stress tests, of the resilience of the Union nuclear power plants against extreme natural hazards, including earthquakes. Accordingly, the activity takes place on the territory of a Member State where the operator of a nuclear installation:</p> <ul style="list-style-type: none"> (a) has submitted a demonstration of nuclear safety, whose scope and level of detail is commensurate with the potential magnitude and nature of the hazard relevant for the nuclear installation and its site (Article 6, point (b), of Directive 2009/71/Euratom); (b) has taken defence-in-depth measures to ensure, inter alia, that the impact of extreme external natural and unintended man-made hazards is minimised (Article 8b(1), point (a) of Directive 2009/71/Euratom); (c) has performed an appropriate site and installation-specific assessment when the operator concerned applies for a licence to construct or operate a NPP (Article 8c(1) of Directive 2009/71/Euratom). <p>The activity fulfils the requirements of the of Directive 2009/71/Euratom, supported by the latest international guidance through IAEA and WENRA, contributing to increasing the resilience of the ability of new and existing NPPs to cope with extreme natural hazards, including floods and extreme weather conditions.</p> <p>5. Radioactive waste referred to in points (e) and (f) of paragraph 1 is disposed of in the Member State in which it was generated, unless there is an agreement between the Member State concerned and the Member State of destination, as established in Directive 2011/70/Euratom. In this case, the Member State of destination has radioactive waste management and disposal programmes and a suitable disposal facility in operation in compliance with the requirements of Directive 2011/70/Euratom.</p> <p>Additional criteria pertaining to substantial contribution to climate change mitigation</p> <p>The activity aims at generating or generates electricity using nuclear energy. Life cycle greenhouse gas (GHG) emissions from the generation of electricity from nuclear energy below the threshold of 100 g CO₂e/kWh.</p> <p>Life cycle GHG emission savings calculated using Commission Recommendation 2013/179/EU20on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018.</p> <p>Quantified life cycle GHG emissions are verified by an independent third party.</p>

Source: European Commission, Goldman Sachs Global Investment Research

Exhibit 2: Construction and safe operation of new nuclear power plants, for the generation of electricity or heat, including for hydrogen production, using best-available technologies

Description of the activity and Technical screening criteria

Construction and safe operation of new nuclear power plants, for the generation of electricity or heat, including for hydrogen production, using best-available technologies	
Description of the activity	Construction and safe operation of new nuclear installations, for which the construction permit has been issued by 2045 by Member States' competent authorities in accordance with applicable national law, to produce electricity and/or, process heat, including for the purposes of district heating or industrial processes such as hydrogen production (new nuclear installations or NNIs), as well as their safety upgrades.
Technical screening criteria	<p style="text-align: center;">General criteria pertaining to substantial contribution to climate change mitigation and Do no significant harm ('DNSH')</p> <p>1. The project related to the economic activity ('the project') is located in a Member State which complies with all of the following:</p> <ul style="list-style-type: none"> (a) has fully transposed Council Directive 2009/71/Euratom and Council Directive 2011/70/Euratom; (b) complies with the Euratom Treaty and the Union legislation adopted on its basis, in particular, Council Directive 2013/59/Euratom, Council Directive 2009/71/Euratom and Council Directive 2011/70/Euratom as well as applicable Union environmental law adopted under Article 192 TFEU, in particular Directive 2011/92/EU; (c) has in place, as of the approval date of the project, a radioactive waste management fund and a nuclear decommissioning fund which can be combined; (d) has demonstrated that it will have resources available at the end of the estimated useful life of the nuclear power plant corresponding to the estimated cost of radioactive waste management and decommissioning in compliance with Commission Recommendation 2006/851/Euratom; (e) has operational final disposal facilities for all very low-, low- and intermediate-level radioactive waste, notified to the Commission both under Article 41 of the Euratom Treaty and included in the national programme updated under Council Directive 2011/70/Euratom; (f) has a plan with detailed steps to have in operation, by 2050, a disposal facility for high-level radioactive waste. <p>2. The project fully applies the best-available technology and accident-tolerant fuel. The technology is certified and approved by the national safety regulator.</p> <p>3. The project has been notified to the Commission, the Commission has given its opinion on it and all the issues raised in the opinion in respect of the application of Article 10(2), Article 17 of Regulation (EU) 2020/852 and of the technical screening criteria laid down in this Section have been satisfactorily addressed. No separate notification is required where the project has been notified in accordance with Article 41 of the Euratom Treaty, the Commission has communicated its views in accordance with Article 43 of the Euratom Treaty and all the issues raised by the Commission in respect of the application of Article 10(2), Article 17 of Regulation (EU) 2020/852 and of the technical screening criteria laid down in this Section have been satisfactorily addressed.</p> <p>4. The Member State concerned has committed to report to the Commission every five years for each project:</p> <ul style="list-style-type: none"> (a) the adequacy of the accumulated resources referred to in point 1(c); (b) actual progress in the implementation of the plan referred to in point 1(f). <p>5. The Commission shall review starting in 2025 and at least every 10 years the technical parameters corresponding to the best-available technology on the basis of the assessment by the European Nuclear Safety Regulators' Group (ENSREG).</p> <p>6. The activity complies with national legislation that transposes the Union legislation referred to in point 1 (a) and (b), including as regards the evaluation, in particular through stress-tests, of the resilience of the Union nuclear power plants against extreme natural hazards, including earthquakes. Accordingly, the activity takes place on the territory of a Member State where the operator of a nuclear installation:</p> <ul style="list-style-type: none"> (a) has submitted a demonstration of nuclear safety, whose scope and level of detail is commensurate with the potential magnitude and nature of the hazard relevant for the nuclear installation and its site (Article 6, point (b), of Directive 2009/71/Euratom); (b) has taken defence-in-depth measures to ensure, inter alia, that the impact of extreme external natural and unintended man-made hazards is minimised (Article 8b(1), point (a), of Directive 2009/71/Euratom); (c) has performed an appropriate site and installation-specific assessment when the operator concerned applies for a licence to construct or operate a NPP (Article 8c(1) of Directive 2009/71/Euratom). <p>The activity fulfils the requirements of Directive 2009/71/Euratom, supported by the latest international guidance through IAEA and WENRA, contributing to increasing the resilience of the ability of new and existing NPPs to cope with extreme natural hazards, including floods and extreme weather conditions.</p> <p>7. Radioactive waste referred to in points (e) and (f) of paragraph 1 is disposed of in the Member State in which it was generated, unless there is an agreement between the Member State concerned and the Member State of destination, as established in Directive 2011/70/Euratom. In this case, the Member State of destination has radioactive waste management and disposal programmes and a suitable disposal facility in operation in compliance with the requirements of Directive 2011/70/Euratom.</p> <p style="text-align: center;">Additional criteria pertaining to substantial contribution to climate change mitigation</p> <p>The activity generates electricity using nuclear energy. Life cycle greenhouse gas (GHG) emissions from the generation of electricity from nuclear energy below the threshold of 100 g CO₂e/kWh.</p> <p>Life cycle GHG emission savings calculated using Commission Recommendation 2013/179/EU36 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018.</p> <p>Quantified life cycle GHG emissions are verified by an independent third party.</p>

Source: European Commission, Goldman Sachs Global Investment Research

Exhibit 3: Electricity generation from nuclear energy in existing installations

Description of the activity and Technical screening criteria

Electricity generation from nuclear energy in existing installations	
Description of the activity	Modification of existing nuclear installations for the purposes of extension, authorised by Member States' competent authorities by 2040 in accordance with applicable national law, of the service time of safe operation of electricity generation facilities that produce electricity from nuclear energy ('nuclear power plants' or 'NPPs').
Technical screening criteria	<p style="text-align: center;">General criteria pertaining to substantial contribution to climate change mitigation and Do no significant harm ('DNSH')</p> <p>1. The project related to the economic activity ('the project') is located in a Member State which complies with all of the following:</p> <ul style="list-style-type: none"> (a) has fully transposed Council Directive 2009/71/Euratom and Council Directive 2011/70/Euratom; (b) complies with the Treaty establishing the European Atomic Energy Community ('Euratom Treaty') and the Union legislation adopted on its basis, in particular, Council Directive 2013/59/Euratom, Council Directive 2009/71/Euratom, and Council Directive 2011/70/Euratom as well as applicable Union environmental law adopted under Article 192 TFEU, in particular Directive 2011/92/EU of the European Council and of the Parliament; (c) has in place, as of the approval date of the project, a radioactive waste management fund and a nuclear decommissioning fund which can be combined; (d) has demonstrated that it will have resources available at the end of the estimated useful life of the nuclear power plant corresponding to the estimated cost of radioactive waste management and decommissioning in compliance with Commission Recommendation 2006/851/Euratom; (e) has operational final disposal facilities for all very low-, low- and intermediate-level radioactive waste, notified to the Commission both under Article 41 of the Euratom Treaty and included in the national programme updated under Council Directive 2011/70/Euratom; (f) has for projects authorised after 2025 a plan with detailed steps to have in operation, by 2050, a disposal facility for high-level radioactive waste. <p>2. The upgraded project implements any reasonably practicable safety improvement and makes use of accident-tolerant fuel. The technology is certified and approved by the national safety regulator.</p> <p>3. The project has been notified to the Commission, the Commission has given its opinion on it and all the issues raised in the opinion in respect of the application of Article 10(2), Article 17 of Regulation (EU) 2020/852 and of the technical screening criteria laid down in this Section have been satisfactorily addressed. No separate notification is required where the project has been notified in accordance with Article 41 of the Euratom Treaty, the Commission has communicated its views in accordance with Article 43 of the Euratom Treaty and all the issues raised by the Commission in respect of the application of Article 10(2), Article 17 of Regulation (EU) 2020/852 and of the technical screening criteria laid down in this Section have been satisfactorily addressed.</p> <p>4. The Member State concerned has committed to report to the Commission every five years for each project:</p> <ul style="list-style-type: none"> (a) the adequacy of the accumulated resources referred to in point 1(c); (b) actual progress in the implementation of the plan referred to in point 1(f). <p>5. The activity complies with national legislation that transposes the Union legislation referred to in point 1(a) and (b), including as regards the evaluation, in particular through stress-tests, of the resilience of the Union nuclear power plants against extreme natural hazards, including earthquakes. Accordingly, the activity takes place on the territory of a Member State where the operator of a nuclear installation:</p> <ul style="list-style-type: none"> (a) has submitted a demonstration of nuclear safety, whose scope and level of detail is commensurate with the potential magnitude and nature of the hazard relevant for the nuclear installation and its site (Article 6, point (b), of Directive 2009/71/Euratom); (b) has taken defence-in-depth measures to ensure, inter alia, that the impact of extreme external natural and unintended man-made hazards is minimized (Article 8b(1), point (a), of Directive 2009/71/Euratom); (c) has performed an appropriate site and installation-specific assessment when the operator concerned applies for a licence to construct or operate a NPP (Article 8c(1) of Directive 2009/71/Euratom). <p>The activity fulfils the requirements of Directive 2009/71/Euratom, supported by the latest international guidance through IAEA and WENRA, contributing to increasing the resilience of the ability of new and existing NPPs to cope with extreme natural hazards, including floods and extreme weather conditions.</p> <p>6. Radioactive waste referred to in points (e) and (f) of paragraph 1 is disposed of in the Member State in which it was generated, unless there is an agreement between the Member State concerned and the Member State of destination, as established in Directive 2011/70/Euratom. In this case, the Member State of destination has radioactive waste management and disposal programmes and a suitable disposal facility in operation in compliance with the requirements of Directive 2011/70/Euratom.</p> <p style="text-align: center;">Additional criteria pertaining to substantial contribution to climate change mitigation</p> <p>The activity generates electricity using nuclear energy. Life cycle greenhouse gas (GHG) emissions from the generation of electricity from nuclear energy below the threshold of 100 g CO₂e/kWh.</p> <p>Life cycle GHG emission savings calculated using Commission Recommendation 2013/179/EU52 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018.</p> <p>Quantified life cycle GHG emissions are verified by an independent third party.</p>

Source: European Commission, Goldman Sachs Global Investment Research

Exhibit 4: Electricity generation from fossil gaseous fuels

Description of the activity and Technical screening criteria

Electricity generation from fossil gaseous fuels	
Description of the activity	Construction or operation of electricity generation facilities that produce electricity using fossil gaseous fuels. This activity does not include electricity generation from the exclusive use of renewable non-fossil gaseous and liquid fuels referred to in Section 4.7 of this Annex and biogas and bio-liquid fuels referred to in Section 4.8 of this Annex.
Technical screening criteria	<p style="text-align: center;">Substantial contribution to climate change mitigation</p> <p>1. The activity meets either of the following criteria:</p> <p>a) Life-cycle GHG emissions from the generation of electricity using fossil gaseous fuels are lower than 100 g CO₂e/kWh.</p> <p>Life-cycle GHG emissions are calculated based on project-specific data, where available, using Commission Recommendation 2013/179/EU or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018. Quantified life-cycle GHG emissions are verified by an independent third party. Where facilities incorporate any form of abatement, including carbon capture or use of decarbonised fuels, that abatement activity complies with the criteria set out in the relevant Section of this Annex, where applicable. Where the CO₂ that would otherwise be emitted from the electricity generation process is captured for the purpose of underground storage, the CO₂ is transported and stored underground, in accordance with the technical screening criteria set out in Sections 5.11 and 5.12 of this Annex.</p> <p>b) for facilities, for which the construction permit is granted by 31 December 2030:</p> <p>i. direct GHG emissions of the activity are lower than 270 g CO₂e/kWh of the output energy, or annual GHG emissions of the activity do not exceed an average of 550 kg CO₂e/kW of the output energy of the facility's capacity over 20 years, and</p> <p>ii. the power generated by the activity may not yet efficiently be replaced by power generated from renewable energy sources, for the same capacity, and</p> <p>iii. the facility replaces an existing high emitting electricity generation facility that uses solid or liquid fossil fuels, and</p> <p>iv. the production capacity of the facility does not exceed the capacity of the replaced facility by more than 15%, and</p> <p>v. the facility demonstrates compatibility with co-firing of low carbon gaseous fuels and there are effective plans or commitments, approved by the management body, to use at least 30% of renewable or low-carbon gases as of 1 January 2026, and at least 55% of renewable or low-carbon gases as of 1 January 2030, and to switch to renewable or low-carbon gases and the switch takes place by 31 December 2035, and</p> <p>vi. the replacement leads to a reduction in emissions of at least 55% GHG per kWh of output energy, and</p> <p>vii. the activity takes place on the territory of a Member State that has committed to phase-out the use of energy generation from coal and has reported this in its integrated national energy and climate plan referred to in Article 3 of Regulation EU/2018/1999 or in another instrument.</p> <p>Compliance with the above criteria is verified by an independent third party. In particular, every year the independent third party shall publish and transmit to the Commission a report certifying the level of direct GHG emissions referred to in point i) or assessing whether the lifecycle annual GHG emissions of the activity are on a credible trajectory to comply with the average threshold over 20 years referred to in point i). On the basis of the reports transmitted to it, the Commission may address an opinion to the relevant operators. The Commission shall take those reports into account when performing the review referred to in Article 19(5) of Regulation (EU) 2020/852.</p> <p>2. The activity meets either of the following criteria:</p> <p>(a) at construction, measurement equipment for monitoring of physical emissions, such as those from methane leakage, is installed or a leak detection and repair programme is introduced;</p> <p>(b) at operation, physical measurement of emissions are reported and leak is eliminated.</p> <p>3. Where the activity blends fossil gaseous fuels with gaseous or liquid biofuels, the agricultural biomass used for the production of the biofuels complies with the criteria laid down in Article 29, paragraphs 2 to 5, of Directive (EU) 2018/2001 while forest biomass complies with the criteria laid down in Article 29, paragraphs 6 and 7, of that Directive.</p>

Source: European Commission, Goldman Sachs Global Investment Research

Exhibit 5: High-efficiency co- generation of heat/cool and power from fossil gaseous fuels

Description of the activity and Technical screening criteria

High-efficiency co- generation of heat/cool and power from fossil gaseous fuels	
Description of the activity	Construction, refurbishment, and operation of combined heat/cool and power generation facilities using gaseous fuels. This activity does not include high-efficiency co-generation of heat/cool and power from the exclusive use of renewable non-fossil gaseous and liquid fuels referred to in Section 4.19 of this Annex, and biogas and bio-liquid fuels referred to in Section 4.20 of this Annex.
Technical screening criteria	<p style="text-align: center;">Substantial contribution to climate change mitigation</p> <p>1. The activity meets either of the following criteria:</p> <p>a) The life-cycle GHG emissions from the co-generation of heat/cool and power from gaseous fuels are lower than 100 g CO₂e per 1 kWh of energy output of the co-generation.</p> <p>Life-cycle GHG emissions are calculated based on project-specific data, where available, using Commission Recommendation 2013/179/EU or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018. Quantified life-cycle GHG emissions are verified by an independent third party.</p> <p>Where facilities incorporate any form of abatement, including carbon capture or use of decarbonised fuels, that abatement activity complies with the relevant Sections of this Annex, where applicable. Where the CO₂ emitted from the electricity generation is captured, the CO₂ shall meet the emissions limit set out in point 1 of this Section and, the CO₂ be transported and stored underground in a way that meets the technical screening criteria for transport of CO₂ and storage of CO₂ set out in Sections 5.11 and 5.12, respectively of this Annex.</p> <p>b) for facilities, for which the construction permit is granted by 31 December 2030:</p> <p>i. the activity achieves primary energy savings of at least 10% compared with the references to separate production of heat and electricity; the primary energy savings are calculated on the basis of formula provided in Directive 2012/27/EU, and</p> <p>ii. direct GHG emissions of the activity are lower than 270 g CO₂e/kWh of the output energy, and</p> <p>iii. the power and heat generated by the activity may not yet efficiently be replaced by power and heat generated from renewable energy sources, for the same capacity, and</p> <p>iv. the facility replaces an existing high emitting combined heat/cool and power generation facility, a separate heat/cool generation facility, or a separate power generation facility that uses solid or liquid fossil fuels, and</p> <p>v. the production capacity of the facility does not exceed the capacity of the replaced facility, and</p> <p>vi. the facility demonstrates compatibility with co-firing of low carbon gaseous fuels and there are effective plans or commitments, approved by the management body, to use at least 30% of renewable or low-carbon gases as of 1 January 2026, and at least 55% of renewable or low-carbon gases as of 1 January 2030, and to switch to renewable or low-carbon gases and the switch takes place by 31 December 2035, and</p> <p>vii. the replacement leads to a reduction in emissions of at least 55% GHG per kWh of output energy, and</p> <p>viii. the refurbishment of the facility does not increase production capacity of the facility, and</p> <p>ix. the activity takes place on the territory of a Member State that has committed to phase-out the use of energy generation from coal and has reported this in its integrated national energy and climate plan referred to in Article 3 of Regulation EU/2018/1999 or in another instrument.</p> <p>Compliance with the above criteria is verified by an independent third party.</p> <p>2. The activity meets either of the following criteria:</p> <p>(a) at construction, measurement equipment for monitoring of physical emissions, such as those from methane leakage, is installed or a leak detection and repair program is introduced;</p> <p>(b) at operation, physical measurement of emissions are reported and any leak is eliminated.</p>

Source: European Commission, Goldman Sachs Global Investment Research

Exhibit 6: Production of heat/cool from fossil gaseous fuels in an efficient district heating and cooling system

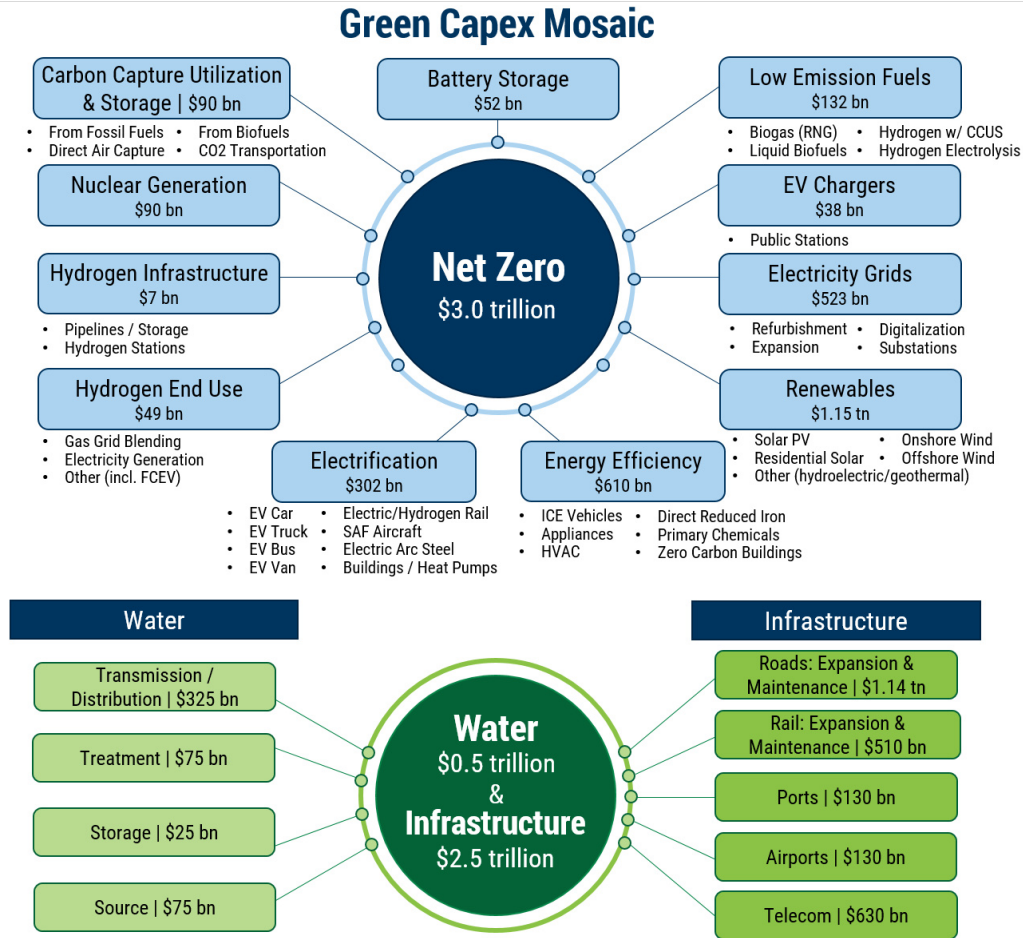
Description of the activity and Technical screening criteria

Production of heat/cool from fossil gaseous fuels in an efficient district heating and cooling system	
Description of the activity	Construction, refurbishment and operation of heat generation facilities that produce heat/cool using gaseous fuels connected to efficient district heating and cooling within the meaning of Article 2(41) of Directive 2012/27/EU of the European Parliament and of the Council. This activity does not include production of heat/cool from in an efficient district heating from the exclusive use of renewable non-fossil gaseous and liquid fuels referred to in Section 4.23 of this Annex and biogas and bio-liquid fuels referred to in Section 4.24 of this Annex.
Technical screening criteria	<p style="text-align: center;">Substantial contribution to climate change mitigation</p> <p>1. The activity meets either of the following criteria:</p> <p>a) Life-cycle GHG emissions from the generation of heat/cool from gaseous fuels are lower than 100 g CO₂e/kWh.</p> <p>Life-cycle GHG emission savings are calculated using Commission Recommendation 2013/179/EU73 or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018.</p> <p>Quantified life-cycle GHG emissions are verified by an independent third party. Where facilities incorporate any form of abatement, including carbon capture or use of decarbonised fuels, that abatement activity complies with the relevant Sections of this Annex, where applicable. Where the CO₂ emitted from the electricity generation is captured, the CO₂ shall meet the emissions limit set out in point 1 of this Section and shall be transported and stored underground in a way that meets the technical screening criteria for transport of CO₂ and storage of CO₂ set out in Sections 5.11 and 5.12, respectively of this Annex.</p> <p>b) for facilities, for which the construction permit is granted by 31 December 2030:</p> <p>i. The thermal energy generated by the activity is used in an efficient district heating and cooling system as defined in Directive 2012/27/EU, and</p> <p>ii. the direct GHG emissions of the activity are lower than 270 g CO₂e/kWh of the output energy, and</p> <p>iii. the thermal energy generated by the activity may not yet credibly be replaced efficiently by thermal energy generated from renewable energy sources, for the same capacity, and</p> <p>iv. the facility replaces an existing high emitting heating/cooling facility using solid or liquid fossil fuel, and</p> <p>v. the production capacity of the facility does not exceed the capacity of the replaced facility, and</p> <p>vi. the facility demonstrates compatibility with co-firing of low carbon gaseous fuels and there are effective plans or commitments, approved by the management body, to use at least 30% of renewable or low-carbon gases as of 1 January 2026, and at least 55% of renewable or low-carbon gases as of 1 January 2030, and to switch to renewable or low-carbon gases and the switch takes place by 31 December 2035, and</p> <p>vii. the replacement leads to a reduction in emissions of at least 55% GHG per kWh of output energy; and</p> <p>viii. the refurbishment of the facility does not increase production capacity of the facility, and</p> <p>ix. the activity takes place on the territory of a Member State that has committed to phase-out the use of energy generation from coal and has reported this in its integrated national energy and climate plan referred to in Article 3 of Regulation EU/2018/1999 or in another instrument.</p> <p>Compliance with the above criteria is verified by an independent third party.</p> <p>2. The activity meets either of the following criteria:</p> <p>(a) at construction, measurement equipment for monitoring of physical emissions, such as those from methane leakage, is installed or a leak detection and repair program is introduced;</p> <p>(b) at operation, physical measurement of emissions are reported and any leak is eliminated.</p>

Source: European Commission, Goldman Sachs Global Investment Research

Exhibit 7: The Net Zero, Infrastructure and Clean Water mosaic

Critical technologies/focus areas and annual investment in the 2020s to achieve Net Zero, Infrastructure and Clean Water needs



Source: IEA, McKinsey, OECD, Company data, Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Evan Tylenda, CFA, Grace Chen, Madeline Meyer, Alberto Gandolfi, Michele Della Vigna, CFA, Ajay Patel, Brian Singer, CFA, Derek R. Bingham, Emma Jones and Rachit Aggarwal, 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.

Disclosures

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%	35%	15%	65%	58%	47%

As of October 1, 2021, Goldman Sachs Global Investment Research had investment ratings on 3,017 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.

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 <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 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. 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:** 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 INH000001493, 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:** 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 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 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, Coverage Suspended or Not Covered), is deemed Neutral. Each region’s 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 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) have been suspended 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. **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. **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 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 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.

Effective from the date of the United Kingdom's departure from the European Union and the European Economic Area ("Brexit Day") the following information with respect to distributing entities will apply:

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: GSI, authorised by the PRA and regulated by the FCA and the PRA, disseminates research in the following jurisdictions within the European Economic Area: the Grand Duchy of Luxembourg, Italy, the Kingdom of Belgium, the Kingdom of Denmark, the Kingdom of Norway, the Republic of Finland, Portugal, the Republic of Cyprus and the Republic of Ireland; GS - Succursale de Paris (Paris branch) which, from Brexit Day, will be authorised by the French Autorité de contrôle prudentiel et de résolution ("ACPR") and regulated by the Autorité de contrôle prudentiel et de résolution and the Autorité des marchés financiers ("AMF") disseminates research in France; GSI - Sucursal en España (Madrid branch) authorized in Spain by the Comisión Nacional del Mercado de Valores disseminates research in the Kingdom of Spain; GSI - Sweden Bankfilial (Stockholm branch) is authorized by the SFSÅ as a "third country branch" in accordance with Chapter 4, Section 4 of the Swedish Securities and Market Act (Sw. lag (2007:528) om värdepappersmarknaden) disseminates research in the Kingdom of Sweden; 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 in the Federal Republic of Germany and those jurisdictions within the European Economic Area where GSI is not authorised to disseminate research and additionally, GSBE, Copenhagen Branch filial af GSBE, Tyskland, supervised by the Danish Financial Authority disseminates research in the Kingdom of Denmark; GSBE - Sucursal en España (Madrid branch) subject (to a limited extent) to local supervision by the Bank of Spain disseminates research in the Kingdom of Spain; GSBE - Succursale Italia (Milan branch) to the relevant applicable extent, subject to local supervision by the Bank of Italy (Banca d'Italia) and the Italian Companies and Exchange Commission (Commissione Nazionale per le Società e la Borsa "Consob") disseminates research in Italy; GSBE - Succursale de Paris (Paris branch), supervised by the AMF and by the ACPR disseminates research in France; and GSBE - Sweden Bankfilial (Stockholm branch), to a limited extent, subject to local supervision by the Swedish Financial Supervisory Authority (Finansinspektionen) disseminates research in the Kingdom of Sweden.

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 (<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, 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 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.fiadocumentation.org/fia/regulatory-disclosures_1/fia-uniform-futures-and-options-on-futures-risk-disclosures-booklet-pdf-version-2018. 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 <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.

© 2022 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.