Note: The following is a redacted version of the original report published Jan. 3, 2023 [54 pgs].
All company references in this note are for illustrative purposes only and should not be interpreted as investment recommendations.

3 January 2023 | 9:13PM EST

GS SUSTAIN: From Aspiration to Action

10 predictions for Sustainable Investing in 2023

Inflationary pressures, regulations, fiscal stimulus and continued climate events have pushed forward fruitful debates over how to achieve Sustainable Development Goals while "Aligning the STARS": **S**upply, **T**ransition, **A**ffordability, **R**eliability, **S**ecurity. In 2023, we expect further evolution of the shift From Aspiration to Action that will lead to:

- Broadening of the investable universe
- Greater Engagement over Exclusion and greater consideration for Improvers
- Higher weighting towards Social goals
- Rising focus on themes such as Adaptation, Circular Economy and Biodiversity
- Emphasis on the overlapping links between ESG metrics and financial fundamentals

We continue to see favorable opportunities to invest in stocks of companies exposed to key themes that also have favorable financial fundamentals. We highlight 10 predictions for 2023.

Mitigating 'FOME' through quantifying impact, improvement and performance

Fear of Misaligned Exposure (FOME) — concern among asset managers that owning stocks beyond market bellwethers and pure-play impact companies could draw asset allocator and/or regulatory pushback — is likely to continue as ESG debates grow louder in 2023. We believe analytical tools that quantify impact, improvement and performance are critical to mitigating these fears and highlight our new, expanded and refined GS SUSTAIN data toolkit that can help.

Themes in focus

We identify 9 themes around Environmental and Social themes for 2023: Affordability/Accessibility, Biodiversity, Circular Economy, Clean Reliable Energy, Climate Adaptation, Energy Efficiency, ESG Improvers, Greenablers and Policy Tailwinds (such as the US Inflation Reduction Act).

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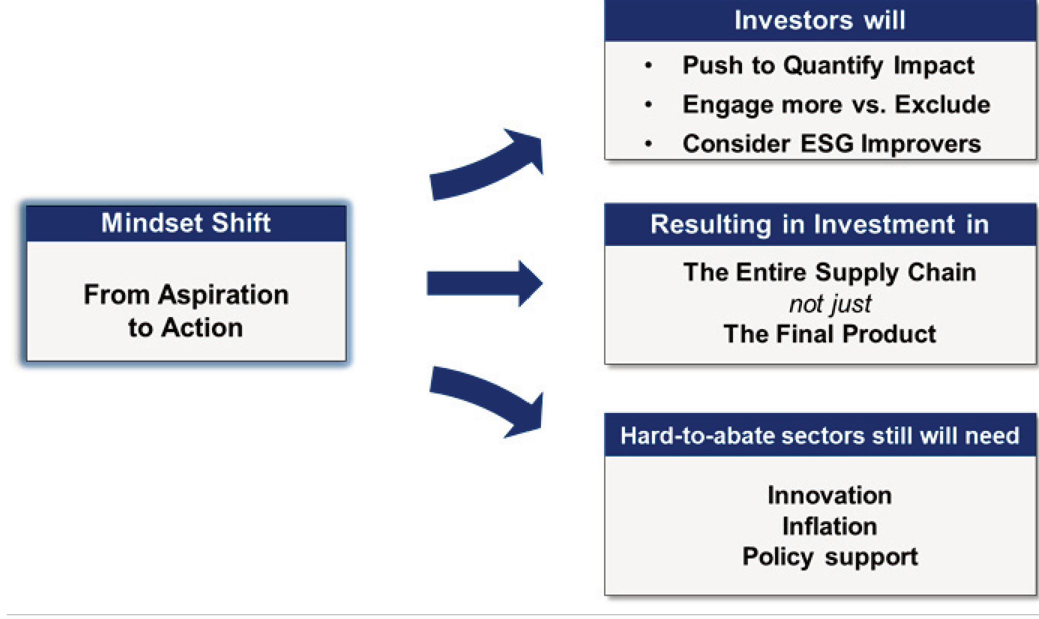
PM Summary

Aligning the STARS: Reality check as 2022 advanced shift from Aspiration to Action in 2023. The seeds for a shift From Aspiration to Action — a greater urgency to accomplish sustainable goals vs. a desire to support them — were sown before 2022, driven initially by energy reliability issues in major global economies. But we believe 2022 will be seen as an accelerator to advance this Aspiration to Action shift by focusing attention on the need — and difficulty — to align the sustainability STARS:

- **Supply**: Matching supply with demand to mitigate economic volatility
- **Transition**: Accelerating the energy transition towards Net Zero by 2050 and mitigating global temperature rise
- **Affordability**: Mitigating inflationary pressures on lower-income populations, which allocate a disproportionate percentage of after-tax income towards energy/utilities food
- **Reliability**: Mitigating risks of potential energy disruptions as a result of excess demand or supply outages and stimulating Clean Reliable Energy.
- **Security**: Optimizing sources of product supply to limit political risk, stimulate inclusive growth and minimize environmental impact

Exhibit 1: We expect continued momentum on the shift From Aspiration to Action, initially highlighted in our 2022 outlook, in 2023, with investment implications



Source: Goldman Sachs Global Investment Research

As ESG's profile and penetration have increased, so too have the decibels of debate. How can investors and corporates navigate this new, noisier environment?

1. Continue to focus on linkages between ESG and financial fundamentals. Our latest backtesting continues to find positive stock performance signals from material environmental & social factors.

2. Pivot away from exclusion and toward innovation, engagement, and more forward-looking assessments in order to stay connected to the real economy and help drive solutions.
3. More granular, transparent and thoughtful ESG assessments to deliver on increasing societal expectations and comply with rising regulatory demands.

We remain bullish on the opportunity for high-quality companies levered to Sustainable goals — including those reinvesting a disproportionate percentage of cash flow back into capex/R&D — to receive rising credit in ESG funds. We believe the volatility and inflationary pressure of 2022 continued a trend started with energy outages in 2021 that is leading to a greater urgency to accomplish Environmental and Social goals simultaneously. We think this will improve capital allocation and prompt further action in 2023 that we believe will broaden the investable universe. Among sectors, we see the greatest opportunities among Capital Goods/Industrials for earnings tailwinds/revenue beneficiaries and hydrogen/battery storage companies for NAV upside/multiple expansion.

10 predictions for Sustainable Investing in 2023

We make 10 predictions for Sustainable Investing, which we place into three categories — shifts in investor allocation and strategy, shifts in corporate/consumer/government investing and policy/regulatory/geopolitical impact.

Shifts in investor asset allocation and strategy

- The Sustainable investable universe will broaden.
- Demand for Improvers and forward-looking approaches will rise.
- Greater weighting on Social goals such as Affordability & Accessibility.
- Net Zero Path, Plan, Performance to receive greater focus.
- Asset managers to initiate more topical Sustainable funds.

Shifts in corporate, consumer and government investment

- Green Capex: Remains global theme with mix shift towards US on back of Inflation Reduction Act.
- Corporate spending on Circular Economy and Biodiversity likely to increase.
- Adaptation-related investment to increase.

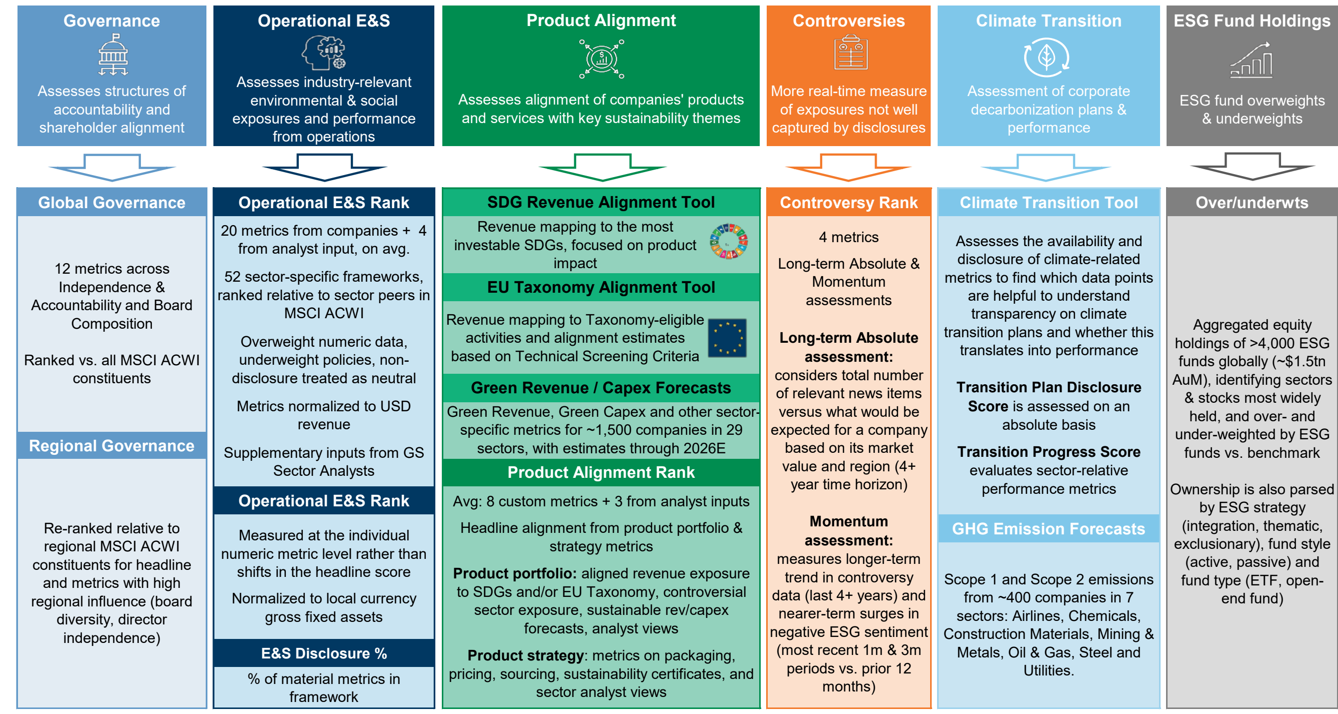
Policy/Regulatory/Geopolitical impacts

- EU Taxonomy disclosure to illuminate underappreciated Green exposure at diversifieds.
- Divestment Dilemma: Increased Engagement over exclusion.

How GS SUSTAIN can help

We have expanded our GS SUSTAIN data toolkit for an environment more focused on looking more granularly at Environmental/Social, Governance, Product Alignment, Controversies, Impact/Revenue Exposure, Climate Transition performance/plan transparency, forward-looking outlook and stock discovery value. We believe these tools are useful for both ESG specialists and generalists in the critical themes, policy impacts and investment strategies that are likely to be deployed in the coming years.

Exhibit 2: The GS SUSTAIN ESG Toolkit



A growing number of metrics from our toolkit are available via Marquee Data Services; metrics not available via Marquee are made available upon request.

Source: Goldman Sachs Global Investment Research

Why the ESG debates are healthy; expectations for 2023

We view increased debate regarding ESG's purpose and progress as indicative of its increasing relevance and a natural and necessary step towards its maturation. We see these debates coalescing around three main topics:

- How to best fuse ESG metrics with financial fundamentals
- Macro and micro implications of Engagement vs. Exclusionary strategies
- How to measure and compare company ESG performance

The combination of energy reliability issues, inflationary pressures, the Russia-Ukraine war, climate events, and social challenges is shifting Sustainable Investing focus towards how to accomplish (not just support) sustainable goals in concert with favorable financial returns. We believe the result of the debates will be more thoughtful policies, practices and investment frameworks.

How best to fuse ESG metrics with financial fundamentals

The critique: ESG ignores or sacrifices fundamentals. A common concern among ESG skeptics is that ESG is a zero-sum approach with increased focus on ESG results necessarily coming at the expense of financial performance.

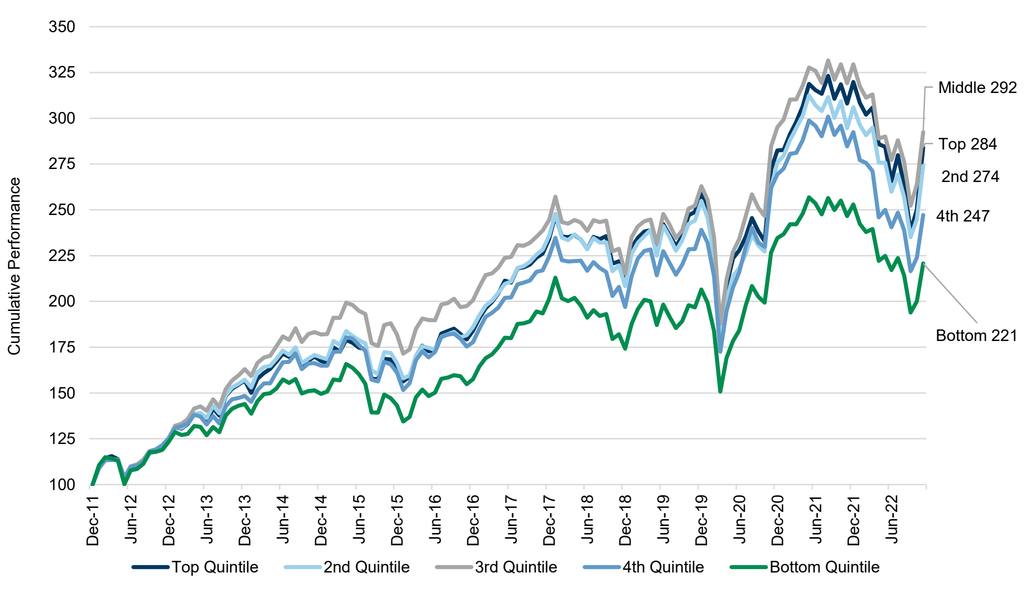
What's needed: Focus on identifying and achieving overlap. We believe that where ESG factors are effectively engaged with alongside financial fundamentals, both fundamental benefits and positive environmental & social impact will tend to be natural bi-products. For example, more efficient use of natural resources can benefit margins, better management of waste and emissions can reduce regulatory risk, and better human capital practices can attract and retain talent that can help to drive innovation and growth (see our report PM's Guide to the ESG Revolution 3: Pillars for the next phase). Companies with strong Operational Environmental & Social scores in our framework tend to have higher margins and more durable returns on capital, while companies with products aligned with Sustainable Development Goals tend to be exposed to superior top-line growth (Exhibit 18).

Application of GS SUSTAIN tools: We continue to believe that applying ESG metrics alongside financial fundamentals can identify well-positioned companies exposed to key sustainability themes that have attractive financial characteristics.

- **Stock selection fusing ESG metrics and financial fundamentals — Green Capex.** In our Investing in Green Capex framework, we have looked for companies that: have 25%-30% or greater revenue exposure to related Sustainable Development Goals (SDG alignment tool); are not in the bottom 20% on environmental and social performance (ESG Scoring tool); are projected to have corporate financial returns above their industry peers (analyst-forecasted cash return on cash invested); and are Buy-rated (analyst fundamental outlook).
- **Backtesting links between ESG and returns shows consistent underperformance of E&S laggards over time (bottom quintile), with less**

orderly results among the top quintiles. Our results also continue to point to material idiosyncratic (uncorrelated) sources of excess returns from the E&S scores. We caveat that, despite these positive performance signals, additional dimensions need to be taken into account to get a comprehensive view of a company's sustainability profile.

Exhibit 3: Bottom-quintile headline E&S companies underperformed over the past 11 years
Cumulative performance of quintiles based on SUSTAIN E&S headline percentiles (January 2012 to November 2022)



Source: Bloomberg, Refinitiv, FactSet, MSCI, Goldman Sachs Global Investment Research

Macro and micro implications of engagement vs. exclusionary strategies

The critique: ESG exclusionary approaches contribute to inflation, which harms lower-income consumers. A rising criticism is that ESG contributes to rising prices, reduced efficiency or increased risk — by restricting investment in proven, affordable natural resources, adding compliance costs, impacting security of supply, etc. This is largely a function of exclusionary policies or tendencies to avoid controversial categories (especially high-emission or asset-intense companies), disconnecting investment from critical activities in the real economy where the greatest change is needed. As we have written before, inflationary pressures are disproportionately impacting lower-income populations, including in the US where the lowest quintile of income-earning households spends a materially greater percentage of after-tax income on gasoline, utilities and food than the highest quintile.

What's needed: Innovation, engagement and more forward-looking assessments. We believe Green Capex is a multi-year secular theme driving innovation to meet decarbonization, clean water and infrastructure goals. Meanwhile, inflationary pressures, supply chain shortages and the Russia-Ukraine crisis have underscored the critical societal benefits of select incumbent industries traditionally eschewed by ESG funds, including traditional Energy, Metals & Mining and Aerospace & Defense. As a result,

2022 saw signs of a turn in the willingness of ESG funds to own some of these industries. Our latest Fund Ownership analysis has shown year-over-year improvements in ESG fund weightings for Autos, Oil Refining, Copper Mining, Midstream Oil & Gas and Diversified Mining (Exhibit 19), and we have also seen a reduced proportion of ESG-linked funds with no exposure to fossil fuels and nuclear power (Exhibit 20). If the goal is to decarbonize, we believe investors should engage, incentivize and be seen as forward-looking as possible in their analysis. Balanced considerations of the 'S' alongside the 'E' by both investors and corporates is also needed.

Application of GS SUSTAIN tools: We believe that critical to broadening the investable universe and impactful engagement are quantifiable tools to measure impact, in particular on a forward-looking basis. GS SUSTAIN's expanded data set now includes: estimated revenue exposure to the EU Taxonomy and UN Sustainable Development Goals; forward-looking estimates by our analysts for key sectors on Green Revenue mix, Green Capex mix, greenhouse gas emissions and select sector-specific operational metrics; and the Climate Transition Tool that measures transparency of company decarbonization plans and performance vs. peers (see section titled *How to get more forward-looking*).

How to measure and compare company ESG performance

The critique: Single-answer ESG scores obfuscate ESG's usefulness. In our view, 'single-answer' ESG scores are widely used but have contributed to confusion about ESG's definition and intent. A single score advances the perception that ESG can be summarized in a single metric. We believe over-simplifying a multi-faceted question in a single score or rating risks obfuscating or overlooking important underlying issues of governance, operations, product impact, controversies, climate transition plans and more, each of which should be considered and understood in turn.

What's needed: More granular, transparent and thoughtful assessments; greater recognition of the multitude of Sustainable Investing strategies. As with fundamental investing, ESG and Sustainable Investing can take the form of multiple strategies. While fundamental investing has value, growth, and GARP approaches, Sustainable Investing has integration, impact, engagement, transition and other strategies. The vast breadth of ESG considerations means that priorities are bound to differ by organization or investment strategy. We believe there is likely to be greater recognition of the limitations of single-answer and disclosure-driven ESG scores to identify and demonstrate fundamental linkages due in part to a lack of granularity and performance focus.

Application of GS SUSTAIN tools: Our SUSTAIN Toolkit takes a transparent, data-driven approach across five principal pillars: Governance, Operational E&S, Product Alignment, Controversies and Climate Transition, complemented by Fund Ownership to provide insight into discovery value. Granular analysis across a company's complete ESG profile through data benchmarking, company engagement and additional due diligence can deliver the best source of investment insight and differentiation, in our view.

- **Backtests suggest to focus on numeric metrics for E&S performance.** Isolating

ESG performance and excess stock returns using a multi-factor model reaffirms our view that numeric metrics are superior to binary ESG metrics, while alpha is found mostly in ESG outliers. We find performance on numeric E&S metrics as the key driver of excess returns (111 bps pa avg outperformance of Q1 vs Q5) while more vague policies and targets are actually linked to material underperformance, particularly amongst outliers (Q1 vs. Q5). We believe it is increasingly important to emphasize numeric metrics over policies and targets, as historical average 3-year rolling returns for numeric, policy and target metrics show that numeric metrics have seen a growing connection with excess returns while policies and targets have seen worsening performance outcomes in recent periods.

For more details on our updated backtesting analysis and why we believe the ESG debates are healthy, please see our December 2022 report The PM's Guide to the ESG Revolution IV: The Way Forward.

Green Capex: Key global theme, with IRA tailwinds shifting mix towards US

What to expect in 2023

We continue to view Green Capex as a multi-year secular theme needed to decarbonize the world and meet Clean Water and Infrastructure goals. As we detailed in our Green Capex: Making Infrastructure Happen report, we believe meeting these three broader goals would require an incremental $2.8 trillion in run rate of annual investment this decade vs. the 2016-20 annual average. With continued inflationary pressures, we see potential upside risk to what is needed. We believe only $0.9 trillion — about a third — of the incremental $2.8 trillion needed to be on path to achieve these goals is currently on track from the private sector. To Stimulate capital and return on capital, we believe investors, management and policymakers should focus on the **three C's**: **C**ollaboration, **C**omprehensive focus, and **C**orporate returns. We see spare capacity from publicly traded companies of an additional $0.9 trillion in Green Capex, highly concentrated in the Oil & Gas, Metals & Mining, Software, Automobiles and Semiconductors sectors.

Inflation Reduction Act could increase competitiveness of US vs. Europe in face of electricity/natural gas price disparity. In 2022, both the US and the European Union and introduced significant policy initiatives to supply renewable energy deployment and clean technology development. According to estimates from the Congressional Budget Office, the US Inflation Reduction Act, which was signed into law in August, would provide $391 bn in Federal support for climate/energy initiatives over 10 years, including $270 bn in incremental tax incentives (Exhibit 6). These tax incentives would lower the average cost of production for essentially all renewable energy and clean technology verticals in our Green Capex Mosaic (Exhibit 7). **We believe the IRA will be most transformative for battery storage, hydrogen, carbon capture and energy efficiency while supportive for renewable electricity, low-carbon fuels, electric vehicles and nuclear.**

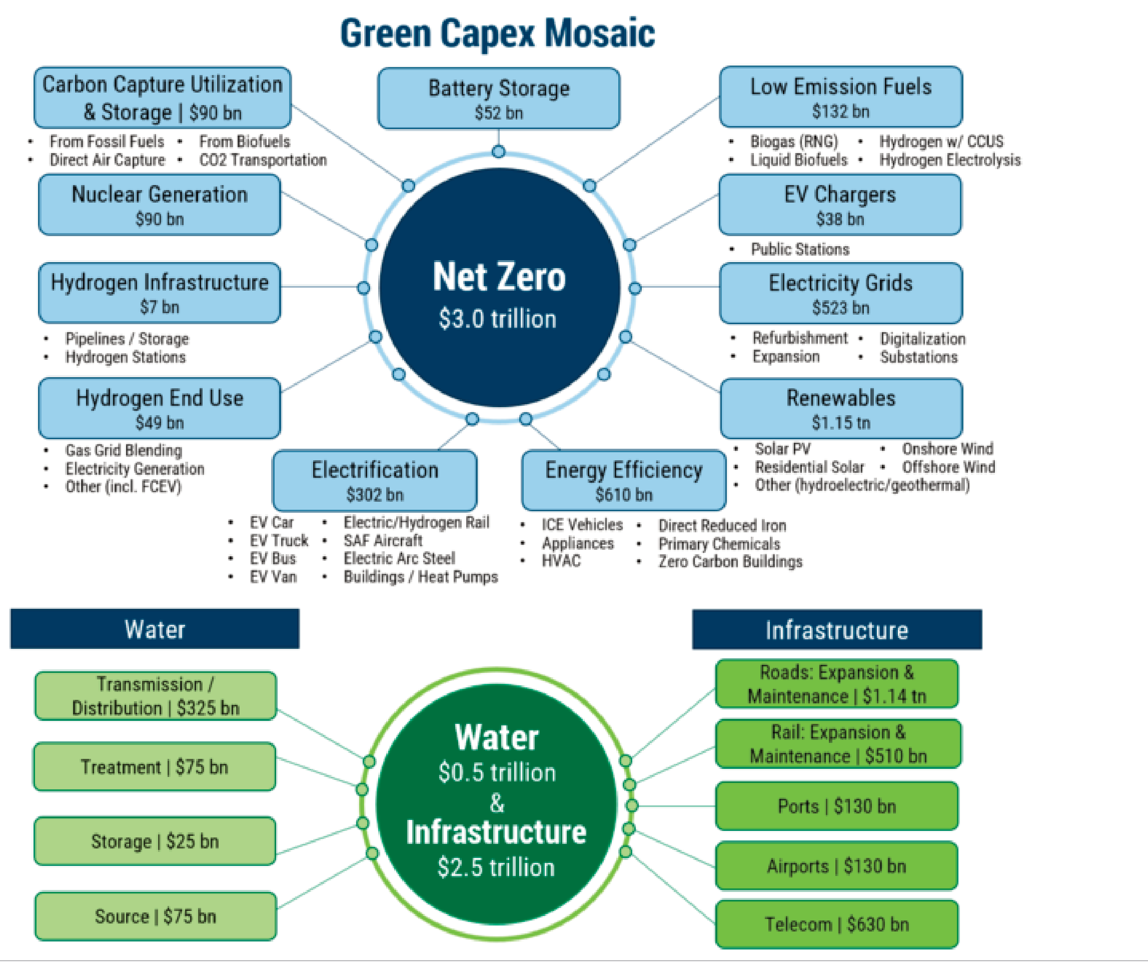
The size and duration of the IRA incentives, combined with much cheaper energy costs, will likely lead to re-industrialization in the US and de-industrialization in Europe, in our view. The EU's REPowerEU plan, introduced in March, set ambitious targets and provided grants/loans for clean energy capacity expansion in Europe by 2030. However, REPowerEU has not provided any explicit monetary incentives for corporates, in contrast to the IRA, but rather focused more on tightening regulations. Furthermore, the Russia-Ukraine war has contributed to significantly higher natural gas and power prices in Europe than in the US. These factors could push European industrial companies to relocate their manufacturing capacity to the US. In particular**,** our Chemicals teams in both the US and Europe have identified petrochemical companies as potential first movers in accelerating their Green Capex plans in the US. The IRA included a number of tax incentives that would benefit chemical companies, such as the new Clean Hydrogen PTC (45V) and the improved credit for CO2 sequestration (45Q).

Based on company commentary, we expect IRA-related investments to pick up in 2H23. 2023 will mark the start of IRA tax credit implementation. We expect the US

Treasury and IRS to continue to issue guidelines on how these credits will be administered through the first half of 2023, which will clear the way for companies to make Green Capex commitments.

Exhibit 4: The Net Zero, Infrastructure and Clean Water mosaic

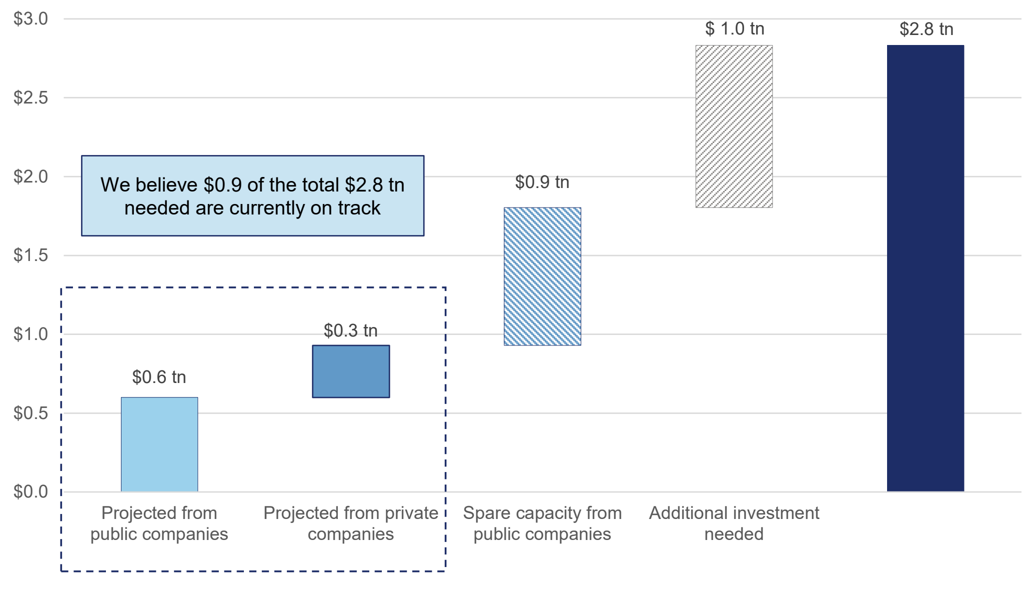
Critical technologies/focus areas and annual investment in the 2020s to achieve Net Zero, Infrastructure and Clean Water needs



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

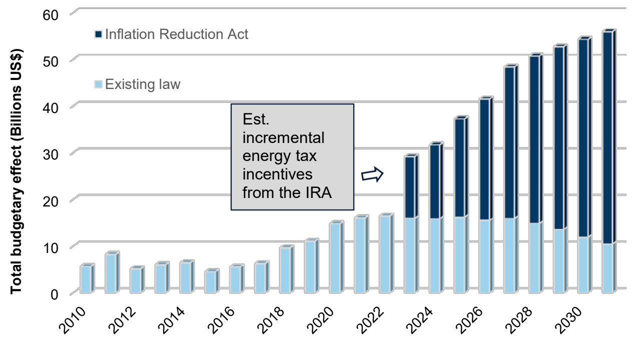
Exhibit 5: We believe the private sector is on track to invest $0.9 tn of the incremental $2.8 tn Green Capex needed annually in the 2020s; this implies the need for $1.9 trillion of additional investment to meet decarbonization, clean water and infrastructure goal pathways

Components of incremental annual investment needed this decade to meet Net Zero, infrastructure and clean water goals, $ trillion



Source: IEA, OECD, McKinsey, FactSet, Preqin, Goldman Sachs Global Investment Research

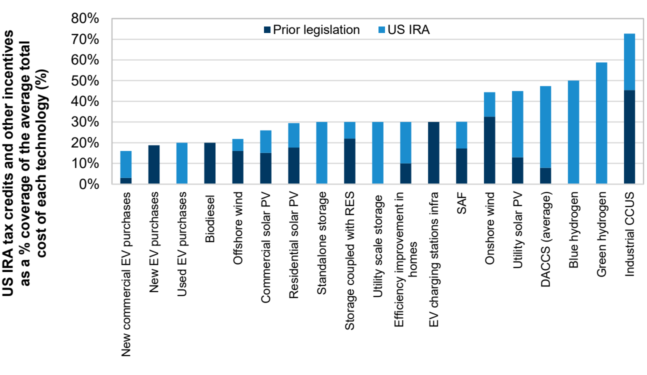
Exhibit 6: The IRA is estimated by the Congressional Budget Office to triple the total US federal tax incentives on energy by 2031, or about $27 billion per year incrementally, but the actual deployment of incentives could exceed this



Source: US Treasury, Congressional Budget Office, Goldman Sachs Global Investment Research

Exhibit 7: The US Inflation Reduction Act is a transformational policy in clean tech

US IRA tax credits and other incentives as a % of coverage of the average total cost of each clean technology (%)



Source: The Senate of the United States, Goldman Sachs Global Investment Research

Relevant GS SUSTAIN data tools

SDG alignment tool: The UN Sustainable Development Goals (SDGs) have emerged as one of the most widely used frameworks for taxonomizing the impact across a broad set of sustainability challenges. Our SDG alignment tool employs granular revenue and capex data, GS analyst inputs and other company metadata to map alignment, exposure and misalignment to ten of the SDGs we deem most investable.

Corporate spending on Circular Economy + Biodiversity likely to rise

What to expect in 2023

While corporate commitments related to sustainability have historically centered around decarbonization and Net Zero goals, we think that transitioning to a circular economy and conserving biodiversity will increasingly move to the forefront. Both of these environmental objectives are pivotal to achieving Net Zero carbon goals and have a number of crossover themes, mutual benefits and symbiotic impacts.

As corporates, investors, other stakeholders and the general public take increasingly sophisticated approaches to sustainability, we believe the symbiosis between circular economy, biodiversity and climate change mitigation through decarbonization will drive increased investment. Transitioning towards a Circular Economy will be pivotal from both an economic and a sustainability perspective — becoming an increasing focus for investors, corporates and regulators to achieve net zero carbon goals, nature conservation goals and decouple economic growth from resource consumption. This is increasingly urgent as resource consumption was 75% more than Earth's regeneration capacity in 2021 and waste is on track to be 70% higher by 2050 vs. 2016.

Catalysts driving this increased focus include:

- An increase in commodity prices is likely to increase deployment of energy/waste/food efficiency solutions
- The links between resource consumption/waste/nature destruction and GHG emissions will make circular and nature-based solutions critical for transitioning to a low carbon economy
- The regulatory environment is increasingly focused on both circularity and biodiversity, including the EU Taxonomy including Circular Economy and Biodiversity categories, local municipalities focusing on nature considerations for permitting and development, the EU Green Deal's Circular Economy Action Plan, the EU Biodiversity Strategy for 2030 and others.
- The Post-2020 Global Biodiversity Framework, agreed upon at COP 15 on Biodiversity, will likely drive increased engagement from a wide variety of stakeholders

Relevant GS SUSTAIN and Goldman Sachs data tools

EU Taxonomy revenue alignment. Our EU Taxonomy alignment tool maps the revenues of 7,000 global companies to Taxonomy-defined green activities under climate change and circular economy environmental objectives to estimate potential Taxonomy-eligible and aligned revenue based on technical screening checks where data exist, and "Do No Significant Harm" and "Minimum Social Safeguards" criteria.

Adaptation-related investment to increase

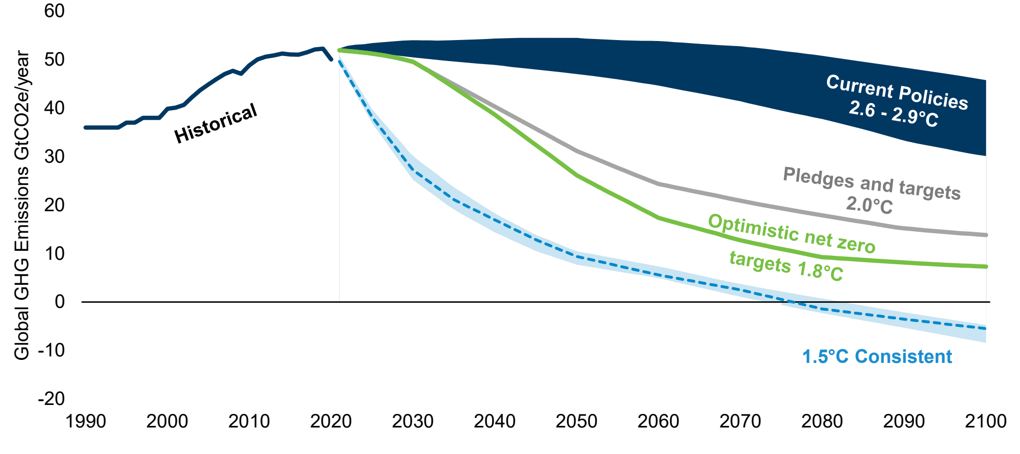
What to expect in 2023

The current trajectory of rising global temperatures could accelerate deployment of adaptation solutions. While climate change mitigation will continue to be a major agenda for policymakers globally, adaptation is beginning to receive increased attention from governments, corporates and investors. This is driven by two factors.

1. **Temperatures likely to rise 1.5 degrees at a minimum.** The path towards net zero emissions by 2050 — which seems not on track, currently — would imply a 1.5°C temperature rise vs. pre-industrial levels, requiring measures to adapt to higher global temperatures and related climate events.
2. **Growing recognition that national targets are significantly off-track vs. the Paris Agreement's objectives.** As discussed in our APAC Decarbonization report, the latest national climate targets set by major economies across Asia Pacific, the US and Europe (contributing to ~70% of global fossil fuel related emissions) imply that absolute global emissions may increase 3% by 2030 vs. 2010, provided that the RoW does not see a material change in emissions from 2019 levels throughout this decade. This marks a significant deviation from recommendations made in the IPCC's recent report, which indicates global anthropogenic CO_2 emissions must decline by 45% by 2030 vs. 2010 in order to be aligned to a 1.5°C scenario or by 25% by 2030 vs. 2010 for a 2.0°C aligned scenario. While we do not take a view on the timing or intensity of future climate target ambitions, the gap between current national targets vs. what would be needed for a 1.5°C or 2.0°C scenario may potentially require accelerated decarbonization initiatives by governments around the world beyond 2030. In October 2022, the UNFCCC stated that latest climate pledges could put the world on track for a 2.5°C scenario by the end of the century.

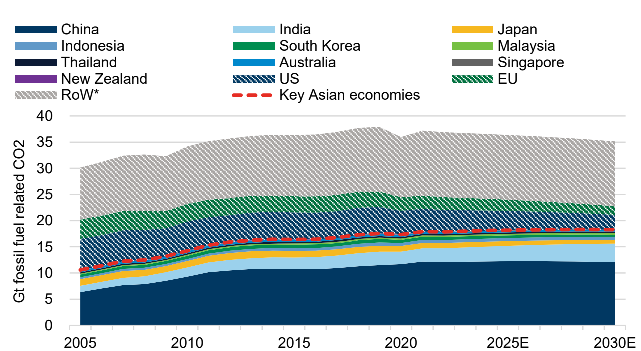
The UN's Adaptation Gap Report, which was released ahead of COP27, estimated that for developing countries, the annual adaptation needs could be $160-$340 bn by 2030 and $315-$565 bn by 2050, adjusted for inflation. As of 2020, international adaptation finance to developing countries only reached $28.6 bn (~34% of total climate finance to developing countries). We believe that as the socioeconomic impact of climate change driven events becomes more acute and clear, more governments will begin to put in place adaptation strategies that will catalyze investments to make cities, communities and public infrastructure more resilient. Rising temperatures and more frequent weather and climate events increase the need to: (1) protect climate-susceptible industries — e.g., agriculture, (2) maintain the livelihoods of populations living in vulnerable regions and (3) counteract the potential physical damages to assets and critical infrastructure.

Exhibit 8: Even with the current pledges and targets, we are still not on track to meet Net Zero by 2050
Emissions and expected warming based on pledges and current policies



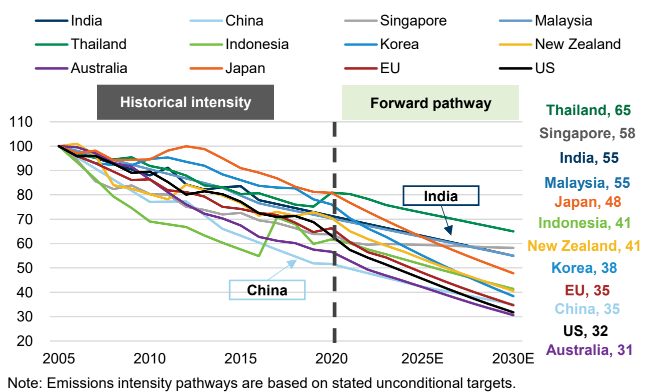
Source: Climate Action Tracker

Exhibit 9: Stated Nationally Determined Contributions from major economies in Asia, the US and EU combined with our Economists' GDP forecasts imply a 3% increase in absolute global emissions by 2030 vs. 2010, provided that other regions do not see a significant change in absolute emissions this decade from 2019 levels
Illustrative global fossil-fuel related CO2 emissions pathways by 2030 assuming key economies meet stated NDCs



Source: European Commission Joint Research Centre, UNFCCC, Goldman Sachs Global Investment Research

Exhibit 10: Despite a growth in absolute emissions, major economies are targeting to significantly reduce emissions per GDP this decade
Emissions intensity per GDP pathways assuming countries meet stated NDCs (Indexed to 2005)



Source: UNFCCC, Goldman Sachs Global Investment Research

Relevant GS SUSTAIN data tools

Sustainable Development Goal revenue alignment. Our UN Sustainable Development Goals (SDGs) employ granular revenue data, GS analyst inputs and other company metadata to map alignment, exposure and misalignment to ten of the SDGs we deem to be most investable for 7,000 global companies, including SDG 9 (Industry, Innovation & Infrastructure) and SDG 11 (Sustainable Cities & Communities).

The Sustainable investable universe will broaden

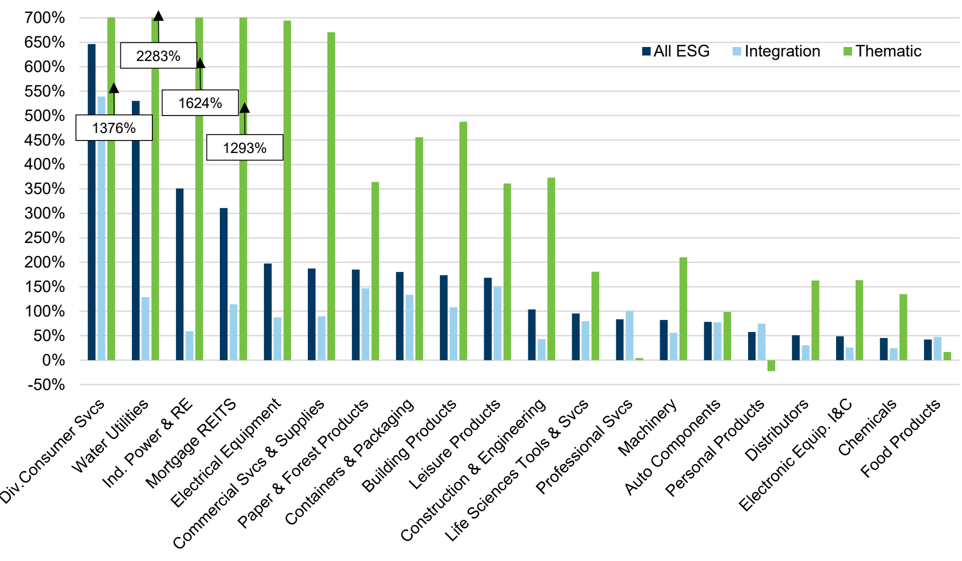
What to expect in 2023

There is growing recognition that ESG fund assets are highly concentrated in market-weight positions in market bellwethers and overweight positions in obvious thematic winners (e.g., renewable energy, energy efficiency & water stocks). ESG ownership at the industry level reflects many of these same preferences. Water Utilities, Independent Power & Renewable Energy Producers, Electrical Equipment and Building Products are among the most overweighted ESG industries by ESG funds, all owned at ~3x or more their benchmark weight (Exhibit 11). Examining industries most eschewed by ESG funds, Aerospace & Defense, Oil & Gas, Metals & Mining and Airlines are all owned at less than 60% of their benchmark weight (~20% in the case of A&D). These underweights are largely driven by industry carbon footprints and other controversial exposures that overshadow any potential positive sustainable alignment (Exhibit 12).

In 2023, we expect rising recognition among investors that an all-in approach is needed to meet global Sustainability goals. We see a growing urgency to accomplish key Sustainable Development goals, catalyzed by energy reliability issues in TX, CA, Europe and China, the Russia/Ukraine War, and inflationary pressures. We have received positive feedback that investors will look for discovery value and broaden to other sectors important in the supply chain of achieving environmental/social goals.

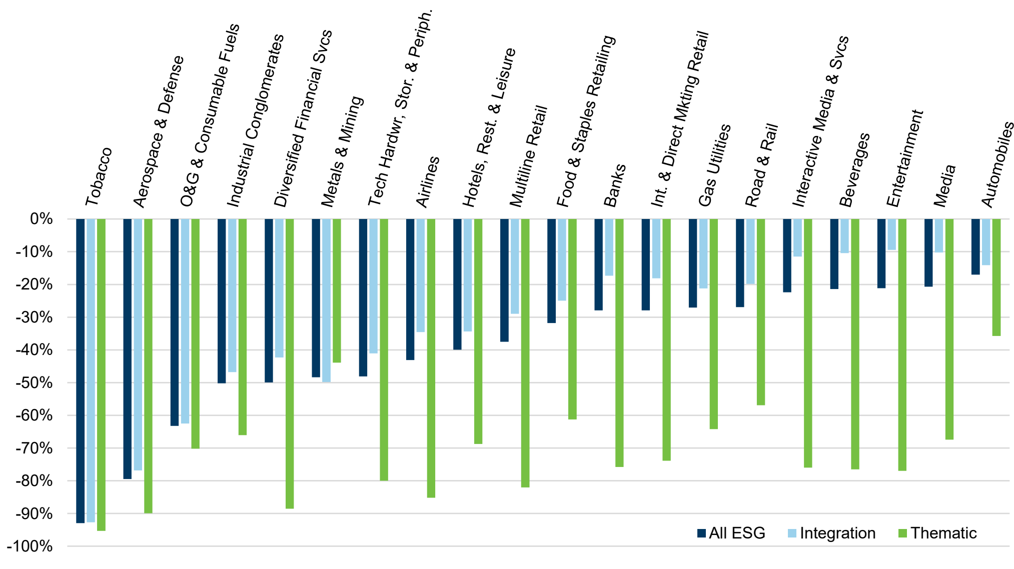
At the same time, investors have reflected FOME — Fear of Misaligned Exposure — that shifting away from pure-play stocks will bring pushback from asset allocators and regulators. We see some risk that perception of need by some asset managers to quickly demonstrate low carbon intensity and high EU Taxonomy-aligned portfolios will temporarily prolong the period of concentration. Over time, however, we believe there will be increased willingness and ability to quantify impact and to search for performance among companies that are important across the supply chain.

Exhibit 11: 20 most overweighted industries (GICS 3) by ESG-linked equity funds
ESG GICS 3 ownership (vs. MSCI ACWI) broken out by ESG sub-strategies; Nov 2022



Source: Morningstar, Refinitiv Eikon, Goldman Sachs Global Investment Research

Exhibit 12: 20 most underweighted GICS 3 industries by ESG funds
ESG GICS 3 ownership (vs. MSCI ACWI) broken out by ESG sub-strategies; Nov 2022



Source: Morningstar, Refinitiv Eikon, Goldman Sachs Global Investment Research

Relevant GS SUSTAIN data tools

ESG Fund Holdings. Our ESG Fund Ownership data consolidates fund holdings for over 3,000 ESG funds ($1.5 tn AUM) to identify which companies are over- and under-owned across ESG strategies, fund types, fund styles and domiciles. This data helps to identify where there is already consensus from an ESG ownership perspective and where there is discovery value.

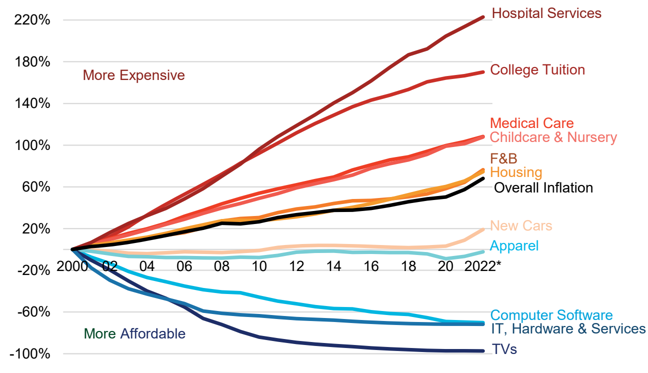
Sustainable Development Goal and EU Taxonomy revenue exposure. Our UN Sustainable Development Goals (SDGs) tool employs granular revenue data, GS analyst inputs and other company metadata to map alignment, exposure and misalignment to ten of the SDGs we deem to be most investable for 7,000 global companies, including SDG 7 on Affordable and Clean Energy. Our EU Taxonomy alignment tool does similar mapping to estimate potential Taxonomy-eligible and aligned revenue and includes "Do No Significant Harm" and "Minimum Social Safeguards" criteria.

Greater weighting on Social goals such as Affordability & Accessibility

What to expect in 2023

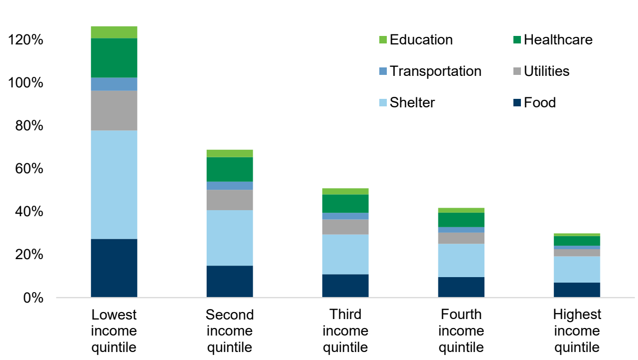
As inflationary pressures and economic slowing continue to disproportionately impact lower-income populations, the 'S' of ESG comes into sharper focus. Key spending categories that have been outpacing inflation for decades such as healthcare and education have been joined by food, housing and transportation in an acceleration of affordability challenges (Exhibit 13). The lowest income quintiles of households spend a materially greater percentage of after-tax income on food, shelter, transportation, education, and healthcare than the highest quintiles (Exhibit 14), underscoring a need for business models that mitigate costs for consumers and enable broader access (see *Investing in the Sustainable Development Goals: Social Capital: How business can drive impact through affordability*).

Exhibit 13: Healthcare, education, food and housing are among areas for which costs have been rising the most
Indexed change in price levels of select categories since 2000



Source: US Bureau of Labor Statistics, US Federal Reserve Bank, Goldman Sachs Global Investment Research

Exhibit 14: The cost of basic necessities weighs far heavier on lower income quintiles
US spending as percent of after-tax income quintiles, 2020 (totals can exceed 100% due to transfer payments, borrowing, use of savings, etc.)

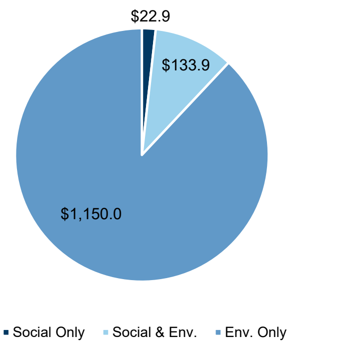


Transportation excludes Vehicle Purchases, Other Vehicle Expenses

Source: US Bureau of Labor Statistics, Goldman Sachs Global Investment Research

We believe that social challenges such as re-stoked inflation, the Russia/Ukraine conflict, as well as increasing competition in ESG-linked assets places a growing premium on differentiation for ESG asset managers moving forward. According to Morningstar, 98% of thematic ESG equity assets currently incorporate an environmental focus, compared with just 12% for social-linked themes (including overlap, Exhibit 15). Social thematic penetration showed a steady climb before plateauing since early 2021 (Exhibit 16). We expect the search for 'less obvious' thematic winners to catalyze an expansion of focus with greater weighting on the 'S'. Most S-oriented themes are owned at lower weights than key E-oriented themes (clean energy, water & circularity in particular) vs. benchmark (Exhibit 17). We count just 8 out of our latest impact-leaning ESG Nifty 50 Relative Overweight list are primarily S-focused.

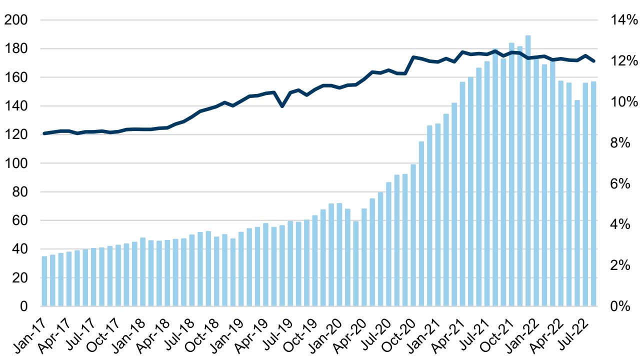
Exhibit 15: Among ESG assets with a thematic emphasis, those including a Social focus make up only about 12%
AUM breakdown of thematic ESG assets by E and/or S thematic focus



Social and Environmental categories are not mutually exclusive

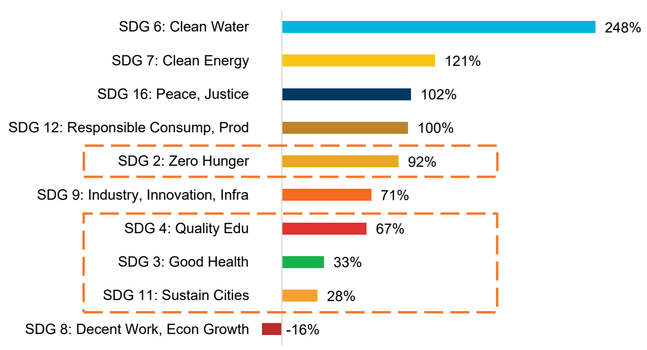
Source: Morningstar, Goldman Sachs Global Investment Research

Exhibit 16: Emphasis of Social themes in ESG thematic funds has plateaued since early 2021
ESG Social thematic AUM in $bn (left); % of total thematic AUM (right)



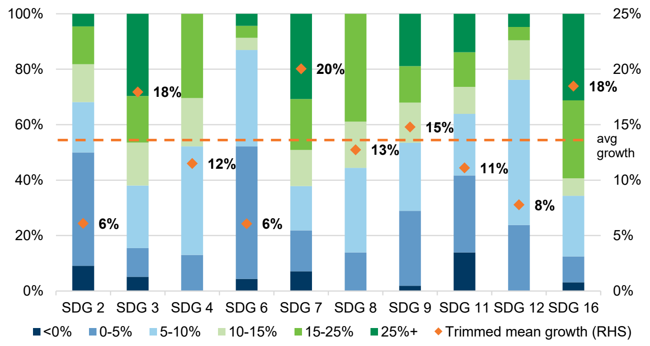
Source: Morningstar, Goldman Sachs Global Investment Research

Exhibit 17: Themes of Social/Access tend to be under-represented in ESG funds
Avg weight (vs. ACWI) of companies with net positive SDG alignment in ESG funds (trimmed mean)



Source: Morningstar, Goldman Sachs Global Investment Research

Exhibit 18: Companies well-aligned with SDGs tend to be well-positioned for growth
% of high-positive alignment companies in our Product Alignment framework aligned with select SDGs by FY3E sales growth (LHS); 10% trimmed mean rev gr (RHS)



Dotted line shows average growth across all SDG cohorts

Source: Bloomberg, Refinitiv Eikon, FactSet, MSCI, Goldman Sachs Global Investment Research

Companies with products aligned to the Sustainable Development Goals tend to be exposed to superior top-line growth, with an average growth estimate of 14% for FY3E (Exhibit 18). Our backtesting work has also found performance on S-oriented operational metrics such as Women Employees and Fatality Rate correlated with excess returns over time (see *The PM's Guide to the ESG Revolution IV: The Way Forward*). Overall, we expect social goals to provide a source of opportunity for greater ESG 'discovery value.'

Relevant GS SUSTAIN data tools

Sustainable Development Goal revenue alignment. Our UN Sustainable Development Goals (SDGs) tool employs granular revenue data, GS analyst inputs and other company metadata to map alignment, exposure and misalignment to ten of the SDGs we deem to be most investable for 7,000 global companies, including SDG 7 on Affordable and Clean Energy.

Divestment Dilemma: Increased engagement over exclusion

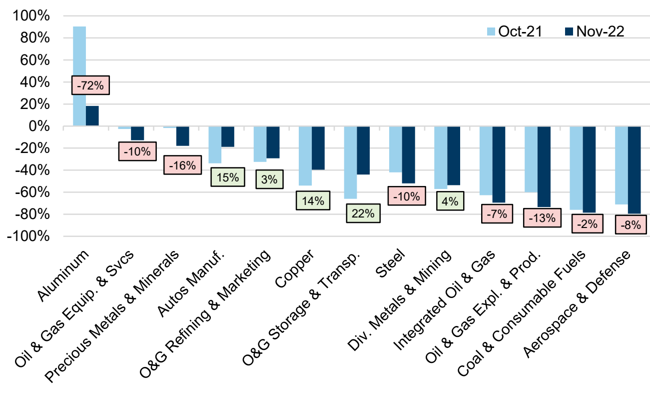
What to expect in 2023

We believe a continued move away from divestment towards engagement will help keep ESG connected to the real economy and focused on the achievement of sustainability-linked solutions in a more balanced way (e.g., also taking into consideration Social impacts). Inflationary pressures, supply chain shortages and the Russia-Ukraine crisis have underscored the critical societal benefits of select incumbent industries traditionally eschewed by ESG funds, including traditional Energy, Metals & Mining and Aerospace & Defense. If the goal is to decarbonize, we believe investors should engage, incentivize and be seen as forward-looking as possible in their analysis. Balanced considerations of the 'S' alongside the 'E' by both investors and corporates is also needed.

As discussed at our recent Global Sustainability Forum, most asset managers we speak with prefer not to be bound by rules-based exclusions and view engagement as the more effective way to help catalyze change, with one comment that divestment only moves assets from one portfolio to another with potentially inferior stewardship. One panelist remarked that divestment should be viewed only as a last resort in the wake of unsuccessful engagement. We believe this supports our broader outlook for stock opportunities across the supply chain.

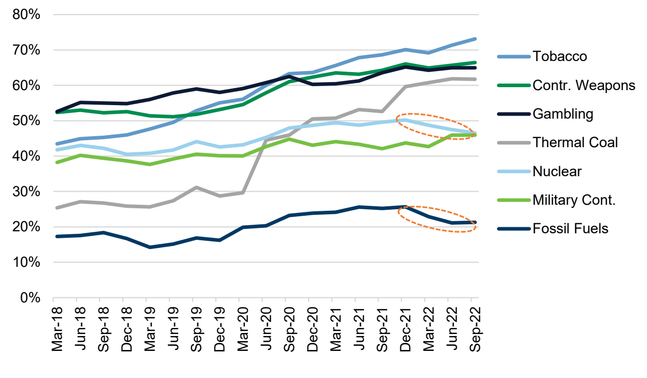
2022 saw signs of a turn in the willingness of ESG funds to own some historically avoided industries, a dynamic which we believe can continue in 2023. Our latest Fund Ownership analysis showed year-over-year improvements in ESG fund weightings for Autos, Oil Refining, Copper Mining, Midstream Oil & Gas and Diversified Mining (Exhibit 19), and we have also seen a reduced proportion of ESG-linked funds with no exposure to fossil fuels and nuclear power (Exhibit 20).

Exhibit 19: Multiple historically underweighted industries have seen improved weightings in ESG funds in the past year
GICS-4 ESG ownership relative weights; boxes show ESG ownership momentum, latest vs. Oct 2021



Source: Morningstar, Refinitiv Eikon, Goldman Sachs Global Investment Research

Exhibit 20: And there are signs of reduced divestment of fossil fuels and nuclear energy
Asset-weighted % of ESG and exclusionary funds with zero exposure to each category



Source: Morningstar, Goldman Sachs Global Investment Research

Will 'FOME' get in the way of broadening the investable universe of ESG funds? We continue to believe that the shift From Aspiration to Action will broaden the

investable universe by ESG funds. We have received positive feedback that investors will look for discovery value and broaden to other sectors important in the supply chain of achieving environmental/social goals. At the same time, investor conversations suggest asset managers continue to have 'FOME' — Fear of Misaligned Exposure — worries that broadening portfolio composition away from pure-play stocks will bring potential pushback from clients, allocators and regulators. We see some risk that perception of need by some asset managers to quickly demonstrate low carbon intensity and high EU Taxonomy-aligned portfolios will temporarily prolong the period of concentration. At the same time, we see greater recognition that contributing to decarbonization is more nuanced and can incorporate improver strategies in which portfolios see falling carbon intensity over time without sector mix shifts.

Relevant GS SUSTAIN data tools

We believe what is critical to the broadening of the investable universe and impactful engagement are quantifiable tools to measure impact, in particular on a forward-looking basis. GS SUSTAIN's expanded data set now includes estimated revenue exposure to the EU Taxonomy and UN Sustainable Development Goals, forward-looking estimates by our analysts for key sectors on Green Revenue mix, Green Capex mix, greenhouse gas emissions and select sector-specific operational metrics, and the Climate Transition Tool that measures transparency of company decarbonization plans and performance vs. peers. Our fund ownership tool identifies sectors and stocks most widely held, under-weighted and over-weighted by ESG funds.

Asset managers to initiate more topical Sustainable Investment funds

What to expect in 2023

We believe we are progressing within the 'Measurement Phase' of ESG investing, marked by greater penetration, rising focus on product impact, and increasing scrutiny on both corporates and asset managers. Demands from asset owners are intensifying on portfolios, processes and engagement. This includes greater scrutiny on portfolio characteristics such as carbon footprint, net zero alignment, impact (e.g., alignment with UN SDGs, EU Taxonomy, etc.), progress on targets, proxy voting and engagement efforts. Asset managers are also increasingly being held accountable for the impact their portfolio companies have on society and the environment (Exhibit 23).

We see rising impact expectations and expanding regulation driving a proliferation of product offerings heading into the 'Refinement Phase'. ESG-related regulation continues to percolate around the world. In our view, the most important developments in ESG capital markets regulation today are Europe's SFDR and EU Taxonomy, with other notable initiatives coming from the US and Asia. Asset managers will need to ensure clarity about fund strategy and goals, supported by careful articulation of process and granular record keeping. In order to meet increasingly granular demands from asset owners, we anticipate accelerating growth in mission-specific Sustainable Investment funds.

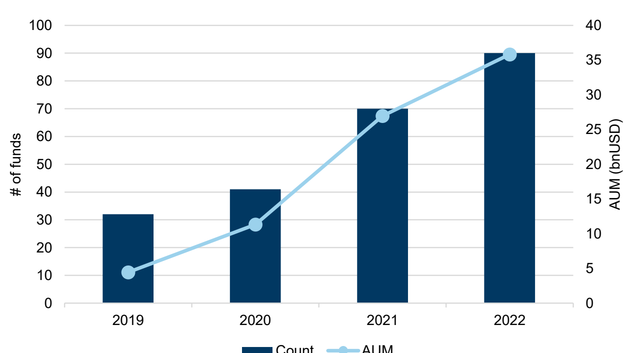
We see Transition and Improver strategies as a key emerging category of ESG AUM. Looking across the ESG fund universe, 58 new equity funds executing transition or improver strategies have launched over the past three years. Over this same period, AUM invested in funds with these strategies has grown 8x, though still only accounting for ~2% of overall ESG assets. To date, the bulk of these funds are climate transition focused (96% of AUM) and actively managed (80% of AUM). Our latest client conversations point to further momentum in this category around the world as a key to better engaging with carbon-intensive or historically controversial categories. We also expect rising interest in topics beyond Transition and Improvers such as Circular Economy, Social Capital, Biodiversity, Renewables, etc.

Exhibit 21: We expect ESG investors to become increasingly forward-looking, driven by multiple factors

Source: Goldman Sachs Global Investment Research

Exhibit 22: We expect an ongoing emergence of transition and improver funds

Annual count (LHS) and AUM (RHS) of transition/improver ESG funds

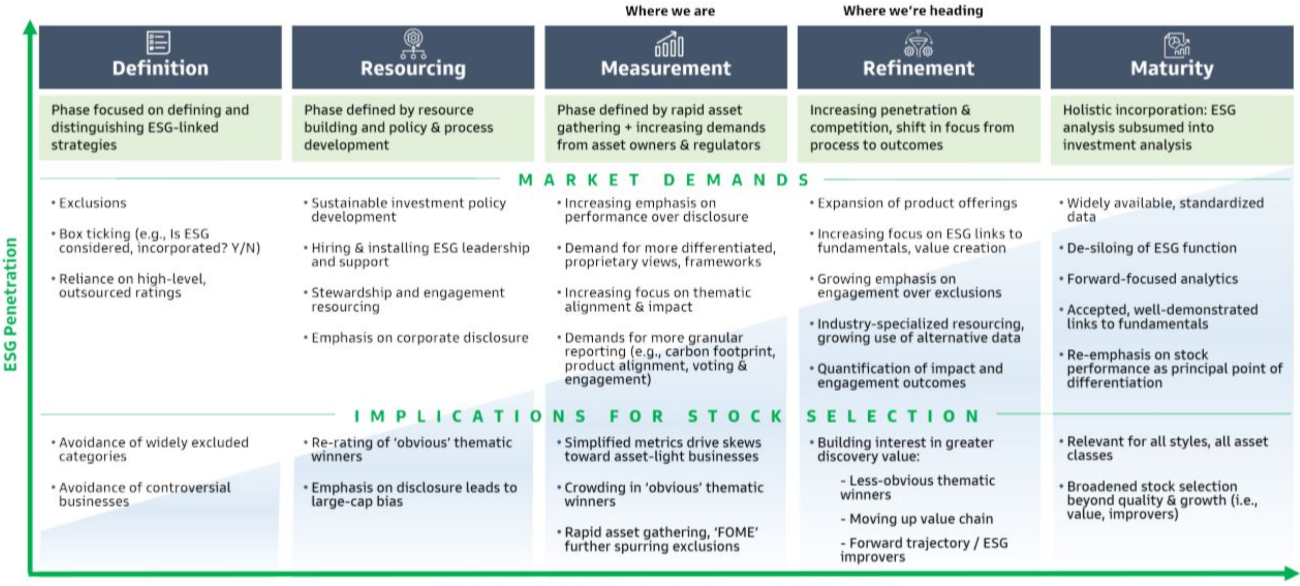


Through 12/5/2022; universe includes Article 8 & 9 labeled funds that are not tagged as ESG; Transition/Improver funds include those with \"Transition\",\"Paris-aligned\" and \"Decarbonisation\" and \"Improver\" in fund names

Source: Morningstar, Goldman Sachs Global Investment Research

Exhibit 23: We believe the market for ESG investing is currently in the 'Measurement Phase', with early signs of movement toward the 'Refinement Phase'

A view of the evolution of ESG investing and implications for stock selection



Source: Goldman Sachs Global Investment Research

Relevant GS SUSTAIN data tools

Forecasts of Green Revenue, Green Capex & Greenhouse Gas emissions: We have expanded our analyst forecasts of Green Revenue and Green Capex to help measure company business mix shifts. We have expanded coverage of these forecasts to 29 sectors (from 19) and extended forecasts through 2026E (vs. 2025E); our Greenhouse Gas emissions estimates cover only a subset of these sectors. These metrics will be key in identifying businesses transforming both their product mix and operations in order to be more sustainable.

ESG Ownership: We consolidate fund holdings for over 3,000 ESG funds ($1.5 tn AUM) to identify which companies are over- and under-owned across ESG strategies, fund types, fund styles and domiciles. This data helps to identify where there is already consensus from an ESG ownership perspective and where there is discovery value.

SDG Mapping & EU Taxonomy Mapping tools: We leverage a revenue mapping dataset with over 1,700 unique business activities and layer in a variety of additional quantitative and qualitative metrics to produce our Sustainable Development Goal and EU Taxonomy mapping tools. Both of these tools help to systematically identify companies with measurable sustainable product alignment and are also valuable for systematic product impact benchmarking and portfolio reporting.

Demand for Improvers and forward-looking approaches will rise

What to expect in 2023

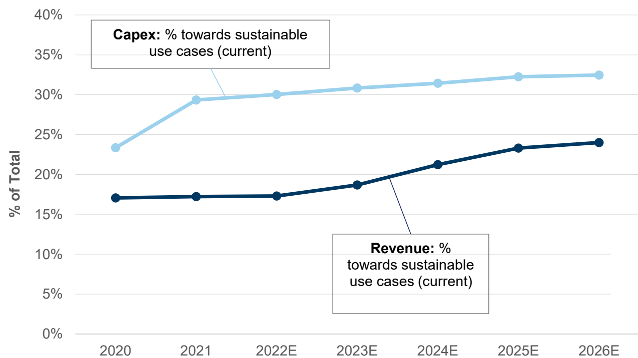
We expect rising demand for improvers strategies across regions, even as debate between 'absolute' vs. 'improvement' is likely to remain. Recent investor discussions in the US, APAC and EMEA suggest increasing recognition that while a low carbon intensity portfolio can be accomplished via carbon-light stocks marginally relevant to the energy transition, generating impact may potentially warrant greater exposure to more carbon-heavy industries and sectors that are on path to meaningfully reduce their carbon footprint without material shifts in sector weights. The ability to identify relevant metrics, and measure and track them over time, will be increasingly important to enable the shift from Aspiration to Action, in our view. To provide analytical rigor to support these strategies, we believe investors could potentially turn to metrics such as business mix shifts, emission reduction pathways and emissions avoided (please see our recent report on Metrics and tools to measure progress) to quantify impact.

Looking more closely at impact, we believe there will be rising willingness to invest in ESG Improvers — companies that may not traditionally have scored well on ESG metrics but where there could be recognition for a significant improvement towards Sustainable Development Goals. As detailed is our recent ESG of the Future report on business mix shifts towards sustainable use cases and corporate GHG emissions, we have engaged our sector analysts to define and measure improvement. While investors might use different metrics to measure, assess and track improvement over time, we believe (1) shift in business mix — i.e., revenues or capital deployed linked to sustainable use cases, "Green Revenue" and "Green Capex" — and (2) carbon footprint could potentially be useful metrics to measure the rate of change and impact.

To enable the shift from Aspiration to Action, we believe investors will increasingly employ a forward-looking approach when investing in sustainability relevant companies and their value chains. As discussed in our previous ESG Nifty Fifty report, ESG fund ownership has historically been (and to a large extent continues to be) concentrated in sectors and stocks that have clear and demonstrable links to sustainability themes, such as solar, wind and water. ESG fund favorites broadly share the commonality that they have an impact that is relatively easier to quantify and qualify (i.e. broadly, there is little market/industry debate on whether these are positive enablers or not). We believe this was historically driven by a range of factors, including lack of granular metrics to quantify current impact, limited forward-looking data to identify companies that are expected to transition their business models in the future and, to some extent, investors' "FOME" (Fear of Misaligned Exposure), which been a recurring theme as highlighted in our 2022 GS Global Sustainability Forum takeaways. **We believe that, as investors increasingly incorporate forward-looking data and consider second-derivative impacts of companies, the inclusion of stocks that have traditionally been underappreciated but with paths towards business mix**

shifts and carbon footprint reduction could rise.

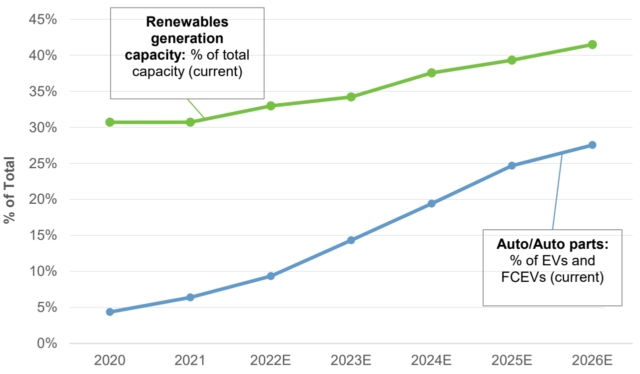
Exhibit 24: Our analysts' estimates imply Green Revenue/Green Capex rising by 1.1%-1.5% annually between 2020 and 2026E
Trajectory of Green Revenue and Green Capex mix tracked from select sectors based on our analyst survey.



Weighted average using revenue and capex as weights for % of revenue from sustainable use cases and % of capex towards sustainable use cases, respectively. As not all analysts model through 2026, 2023E, 2024E, 2025E and 2026E reflect the weighted average yoy change for companies where the covering analysts have submitted data.

Source: Goldman Sachs Global Investment Research

Exhibit 25: Our current analyst estimates imply renewables will represent 41% of total generation capacity in 2026E; in Automotive, the % of units sold linked to EVs/FCEVs is forecast to reach 28% at the end of the forecast period
Trajectory of Renewables as % of total electricity generation capacity and % of units sold linked to EVs/FCEVs in the Automotive sector tracked from select sectors based on our analyst survey.



Percent of electricity generation from renewables and % of auto/auto components linked to EVs and fuel cell vehicles are weighted based on 2020-26E revenue. As not all analysts model through 2026, 2023E, 2024E, 2025E and 2026E reflect the weighted average yoy change for companies where the covering analysts have submitted data.

Source: Goldman Sachs Global Investment Research

Exhibit 26: Green Revenue and/or Green Capex established companies are seeing greater ownership in ESG funds than Improvers in six noted sectors — Automotive, Capital Goods, Chemicals, Mining & Metals, Steel and Utilities; this suggests an opportunity for greater appreciation and recognition among Improvers in these sectors, in our view
Difference in median ownership levels in ESG funds (vs. sector benchmarks) for Green Revenue/Capex Established companies and Green Revenue/Capex Improvers

	Difference in Ownership levels in ESG funds	
	Green Revenue	Green Capex
Sector	Ownership premium Established vs. Improvers	Ownership premium Established vs. Improvers
Automotive	70%	60%
Capital Goods	395%	497%
Chemicals	-86%	148%
Mining & Metals	60%	-20%
Steel	84%	40%
Utilities	122%	175%

Buy-, Neutral- and Sell-rated companies are considered in this analysis

Source: Refinitiv Eikon, Bloomberg, Morningstar, Goldman Sachs Global Investment Research

Relevant GS SUSTAIN data tools

Forward-looking estimates for business mix shifts and GHG emissions. We have available for clients, upon request, our database of forward-looking indicators including revenue/capex linked to sustainable use cases as well as sector-specific metrics through 2026E — e.g., renewables as % of total generation capacity for Utilities, % of units sold linked to EVs/FCEVs for Automotive, among many others. Our database broadly

comprises ~1,500 companies in 29 sectors. Additionally, we can offer forward-looking estimates for corporate emissions through 2025E, measured on Scope 1, Scope 1+2 and emission intensities. The dataset covers ~400 companies across the 7 highest-emitting sectors: Airlines, Chemicals, Construction Materials, Mining & Metals, Oil & Gas, Steel and Utilities.

Climate Transition Tool. We have fused together a number of our GS SUSTAIN data tools (included below) to provide a view on the climate transition efforts of 7,000 global companies through two lenses: (1) Transition Plan Transparency and (2) Transition Performance. The Transition Plan Transparency framework is an absolute assessment of companies' disclosures across metrics demonstrating whether a company has a transition strategy in place (e.g., targets), how integrated the strategy is with the broader business strategy (e.g., climate-linked compensation incentives), and considers the quality of reporting (e.g., granularity of data, verification, TCFD-alignment, etc). The Transition Performance framework is a sector-relative assessment, factoring in the carbon emissions profile of a company and current and future Green Revenue and Green Capex exposures.

Net Zero Path, Plan, Performance to receive greater focus

What to expect in 2023

As the global urgency to decarbonize continues to intensify, we expect there to be heightened focus across financial markets to quantify how companies are progressing towards the climate transition. While more than 90% of global GDP is now covered by national net zero targets, our analysis following COP27 finds that compliance with these targets is not on track to meet the objectives of the Paris Agreement. With the continued growth in assets committing to net zero, now at U$77tn across the net zero asset manager and asset owner initiatives, we expect investors to focus on simplified climate metrics that can be used alongside fundamental metrics like earnings/EBITDA, corporate returns, growth and leverage when considering the attractiveness of an investment opportunity. We believe this will lead to a more specific focus on the 3 P's:

- **P**lan: Transparency of climate transition goals regardless of what the specific goal may be.
- **P**ath: Understanding timing/catalysts for lower corporate emissions.
- **P**erformance: How greenhouse gas emissions intensity and business mix compare with peers.

We believe this will translate to a **focus on five metrics by investors across companies in multiple sectors important to the energy transition:**

- **Green Revenue:** Amount or percentage of revenue linked to sustainable use cases or climate transition activities.
- **Green Capex:** Amount or percentage of capex + R&D linked to sustainable use cases or climate transition activities.
- **Emissions intensity:** Scope 1 + 2 greenhouse gas emissions divided by key industry operational measure of related volume (GWh of generation for utilities, tons of steel for steel companies, revenue passenger km for airlines, etc).
- **Emissions avoidance:** How a sector/company's products help to avoid emissions by customers or customers of customers if a direct impact using historical data can be determined.
- **Accountability:** Disclosure whether management is incentivized to meet its climate targets and/or on the basis of the metrics above.

Exhibit 27: We believe 3 P's are key to measure climate transition progress: Plan, Path and Performance. We expect investors to focus on 5 metrics: Green Revenue, Green Capex, GHG Emissions intensity, Emissions avoidance and Accountability. Our GS Climate Transition Tool incorporates greater detail to provide a use case to assess companies' transition plan transparency and transition performance

The three P's key for measuring climate transition progress

Plan
Transparency of climate transition goals regardless of what the specific goal may be.

Path
Understanding timing/catalysts for lower corporate emissions.

Performance
How greenhouse gas emissions intensity and business mix compares with peers.

Five metrics that will be in focus by investors across companies in multiple sectors important to the energy transition

Green Revenue
Amount or percentage of revenue linked to sustainable use cases or climate transition activities. GS SUSTAIN offers analyst forecasts for companies in 19 sectors. Our EU Taxonomy tool estimates Green Revenue eligibility and alignment for 7,000 companies.

Green Capex
Amount or percentage of capex + R&D linked to sustainable use cases or climate transition activities. GS SUSTAIN offers analyst forecasts for companies in 19 sectors.

Emissions intensity and path
Scope 1 + 2 greenhouse gas emissions divided by key industry operational metrics (GWh of generation for utilities, tons of steel for steel companies, revenue passenger km for airlines, etc) and path forward. GS SUSTAIN offers analyst forecasts for companies in 7 sectors.

Emissions avoidance
How a sector/company's products help to avoid emissions by customers or customers/customers if a direct impact using historical data can be determined. GS SUSTAIN estimated emissions avoided for the semiconductors sector in 2021.

Accountability
Disclosure whether management is incentivized to meet its climate targets and/or on the basis of the metrics above.

GS SUSTAIN Climate Transition Tool

Our tool provides a view on companies' climate transition efforts through two lenses: (1) our Transition Plan Transparency Score and (2) our Transition Performance Score.

1. **Transition Plan Transparency Score**: An **absolute assessment** of companies' disclosures across metrics which demonstrates if a company has a transition strategy in place, how integrated the strategy is with the broader business strategy, and the quality of reporting.

2. **Transition Performance Score**: A **sector-relative assessment** across indicators which demonstrates how companies are performing relative to peers on reducing their carbon emissions footprint and how they are shifting their product mix or business models towards lower carbon outcomes.

Source: Goldman Sachs Global Investment Research

Exhibit 28: The GS SUSTAIN Climate Transition Tool is structured around the IIGCC Net Zero Investment Framework criteria

Detailed metrics and methdology of our GS SUSTAIN Climate Transition Tool scores

IIGCC mapping	GS SUSTAIN Framework Metrics	Maximum pts T	Maximum pts P	Details
1) Ambition	Net zero target	0.5		Points awarded on Y/N basis.
2) Targets	Verified Science-Based target	2.0		Points awarded based on degree alignment of target. 1.5C target +2pts, Well-below 2C target +1.5pts, 2C target +1pts. **Note this metric is not measured for oil & gas companies.**
	Other interim emissions target	*0.5*		***Points awarded only if no SBT but has other interim target*** . Awarded on a Y/N basis.
3) Climate Governance	Climate-linked incentives - (C-suite, Board)	1.0		Points awarded on Y/N basis.
	ESG-linked incentives	*0.5*		***Points awarded only if no climate-linked incentives*** . Awarded on a Y/N basis.
	Sustainability Committee	0.5		Points awarded on Y/N basis.
4) Emissions Performance	Total CO2 (Scopes 1 + 2) intensity		2.0	Points awarded based on sector-relative performance. Q1 (Top quintile in sector) +2pts, Q2 +1pts, Q3 +0.5pts, Q4 and Q5 (Bottom quintile in sector) receive 0pts.
	Energy efficient operators with high Total CO2		*0.5*	***Points awarded only if company if in Q4 or Q5*** (bottom quintile in sector) **on Total CO2 intensity *but in Q1*** (top quintile in sector) ***or Q2 on Energy Intensity.***
	Total CO2 (Scopes 1 + 2) momentum		2.0	Points awarded based on sector-relative performance. Q1 (Top quintile in sector) +2pts, Q2 +1pts, Q3 +0.5pts, Q4 and Q5 (Bottom quintile in sector) receive 0pts.
	Total CO2 momentum reductions >7%		0.5	Points awarded based on Y/N, uses our proprietary momentum calculation.
5) Emissions Data Disclosure & Verification	Scope 1 and 2 disclosures	0.5		Points awarded on Y/N basis.
	Scope 3 disclosure	0.5		Points awarded on Y/N basis.
	Granular Scope 3 disclosures	0.5		Points awarded on a Y/N basis if a company has disclosure in at least 2 of the 7 GS SUSTAIN Scope 3 category buckets.
	Emissions verification - any Scope 1, 2, 3	1.0		Points awarded on Y/N basis.
	Audited ESG report	*0.5*		***Points awarded only if no emissions verification.*** Awarded on a Y/N basis
6) Climate risk and accounts	TCFD Supporter	1.0		Points awarded on Y/N basis.
	Climate Scenario Analysis	0.5		Points awarded on Y/N basis.
	Discusses how climate is integrated into business	0.5		Points awarded on Y/N basis.
	Discusses the impact of climate risks	0.5		Points awarded on Y/N basis.
	Internal carbon pricing	0.5		Points awarded on Y/N basis.
7) Decarbonisation Strategy	GS estimated green revenue mix		2.0	Maximum of (1) GSe EU Taxonomy aligned revenue, (2) GSe analyst green revenue forecasts (2025 or latest avail.), and (3) **GSe revenue tied to SDG 7 (Clean Energy) *new***. Points awarded based on level of green revenue mix. 75%+ mix +2pts, 50-75% mix +1.5pts, 25-50% mix +1pts, 1-25% +0.5pts.
8) Capital Allocation Alignment	GS estimated green capex mix		2.0	Maximum of GS analyst estimated (1) current or (2) forecast (2025 or latest avail) green capex mix. Points awarded based on level of green capex mix.75%+ mix +2pts, 50-75% mix +1.5pts, 25-50% mix +1pts, 1-25% +0.5pts.
9) Climate Policy Engagement	No metrics available at this time			
10) Just Transition	No metrics available at this time			
GS SUSTAIN Transition Plan Transparency Score (absolute)		9.5		Includes only Transition Plan Transparency metrics
	A company's score will be shown as a % of the total maximum points available (9.5)*			
GS SUSTAIN Transition Performance Score (sector-relative)			8.5	Includes only Transition Performance metrics
	A company's score will be shown as a % of the maximum points scored by companies within the same GS SUSTAIN sector.			

*The maximum points Oil & Gas companies can receive is 8.0pts. We do not calculate a Transition Performance Score for companies in the Financials sector.

Source: Bloomberg, Refinitiv Eikon, SBTi, IIGCC, Goldman Sachs Global Investment Research

Relevant GS SUSTAIN data tools

Climate Transition Tool. We have fused together a number of our GS SUSTAIN data tools (included below) to provide a view on the climate transition efforts of 7,000 global companies through two lenses: (1) Transition Plan Transparency and (2) Transition Performance. Transition Plan Transparency is an absolute assessment of companies' disclosures across metrics demonstrating whether a company has a transition strategy in place (e.g., targets), how integrated the strategy is with the broader business strategy (e.g., climate-linked compensation incentives), and considers the quality of reporting (e.g., granularity of data, verification, TCFD-alignment, etc). Transition Performance is a sector-relative assessment, factoring in the carbon emissions profile of a company and current and future Green Revenue and Green Capex exposures.

EU Taxonomy disclosure to illuminate underappreciated Green exposure

What to expect in 2023

The EU Taxonomy is ramping up to become the 'common green standard' used to credentialize companies' green revenue and capex and investors' green investments. As part of the European Green Deal's strategy to transform the EU into a more resource-efficient economy with net zero emissions by 2050, the EU Taxonomy aims to re-direct capital flows to more sustainable outcomes by providing financial market participants with greater transparency through establishing consistent criteria for determining which economic activities and investment projects can be considered green.

With the EU Taxonomy reporting obligations taking effect at the start of 2022 and expanding to cover alignment disclosures in early 2023, we have seen growing recognition of and appreciation for the influence of the Taxonomy among companies in annual reporting and in dialogue with investors on earnings calls, which we expect to increase further in 2023. The complexity of the Taxonomy has led many companies to issue conservative eligibility figures, but we expect with increased clarification of the regulation and new disclosures from companies, increased revenue and capex may fall in scope of eligibility. Alignment figures are to be reported in 2023 and incorporated into European investment reporting under the Sustainable Finance Disclosure Regulation (SFDR).

We believe international influence of the EU Taxonomy is set to grow further, as the Commission continues to build a common ground framework with other regions, through mapping standards, metrics and labels, developing equivalence mechanisms, and working with data vendors to develop and validate officially recognized mapping between statistical systems. In addition, the Commission may potentially translate EU regulation criteria into quantitative and process-based criteria to facilitate the application outside of the EU.

The Taxonomy's success will hinge on its ability to ensure its complexity does not lead to an outsourcing of investor responsibility to assess corporate environmental transition risks or opportunities, nor serve as a crutch that threatens ESG innovation in corporate strategy and investor decision-making, in our view. **We view 2023 as a critical period for the adoption of the Taxonomy and incorporation of climate change mitigation and adaptation alignment figures into investment processes, along with a critical period of experimentation and engagement between investors and companies for environmental objectives, with reporting obligations coming in 2024 (Circular Economy, Biodiversity, Water, Pollution Prevention).**

Relevant GS SUSTAIN data tool

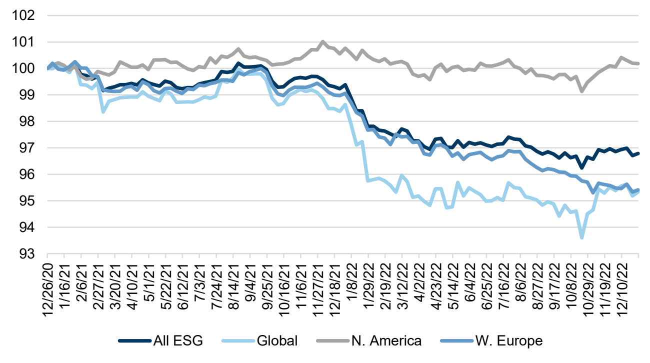
EU Taxonomy revenue alignment. Our EU Taxonomy alignment tool maps the revenues of 7,000 global companies to Taxonomy-defined green activities under climate change and circular economy environmental objectives to estimate potential Taxonomy-eligible and aligned revenue based on technical screening checks where data exist, and "Do No Significant Harm" and "Minimum Social Safeguards" criteria.

FY22 ESG fund relative-performance was negative, driven largely in 1H

The median ESG fund underperformed its benchmark by -2.6 pp in FY22. ESG fund relative performance has been strong over the past several years. However, 1H22 benchmark-relative performance (-2.2 pp) was negative. 2H22 saw more in-line peer-relative and benchmark-relative performance (Exhibit 29). We believe 1H underperformance can be at least partially attributed to ESG funds' propensity to avoid controversial industries, including Energy, Defense and Mining, all of which have performed well in 2022. This dynamic is underscored by the performance divergence between North American-focused ESG funds and other ESG funds as the former have historically had higher rates of ownership for many of these activities, especially the energy complex and military contracting. Also factoring into the stabilized performance of ESG in 2H 2022 has been the rebound of several high profile thematic indices (e.g., ISUN & ICLN) whose constituents are typically overweighted by ESG owners (Exhibit 30).

Exhibit 29: N. American focused ESG funds have performed better vs. their benchmarks since the start of 2021

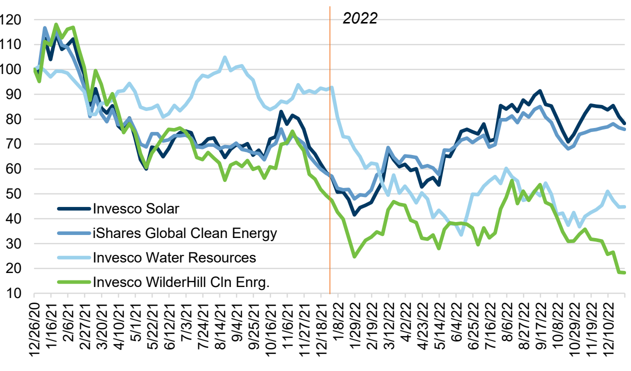
Median excess returns (total returns vs. Morningstar category benchmarks) for ESG funds by region of investable-focus, indexed to 100 (1/1/21-12/31/22)



Source: Morningstar, Goldman Sachs Global Investment Research

Exhibit 30: Invesco Solar and iShares Global Clean Energy ETFs — among the largest ESG Thematic funds — rebounded strongly in 2022 after weakness in 2021

Excess returns for six of the largest ESG Thematic ETFs vs. Morningstar MPT fund category; indexed to 100; through 12/31/22

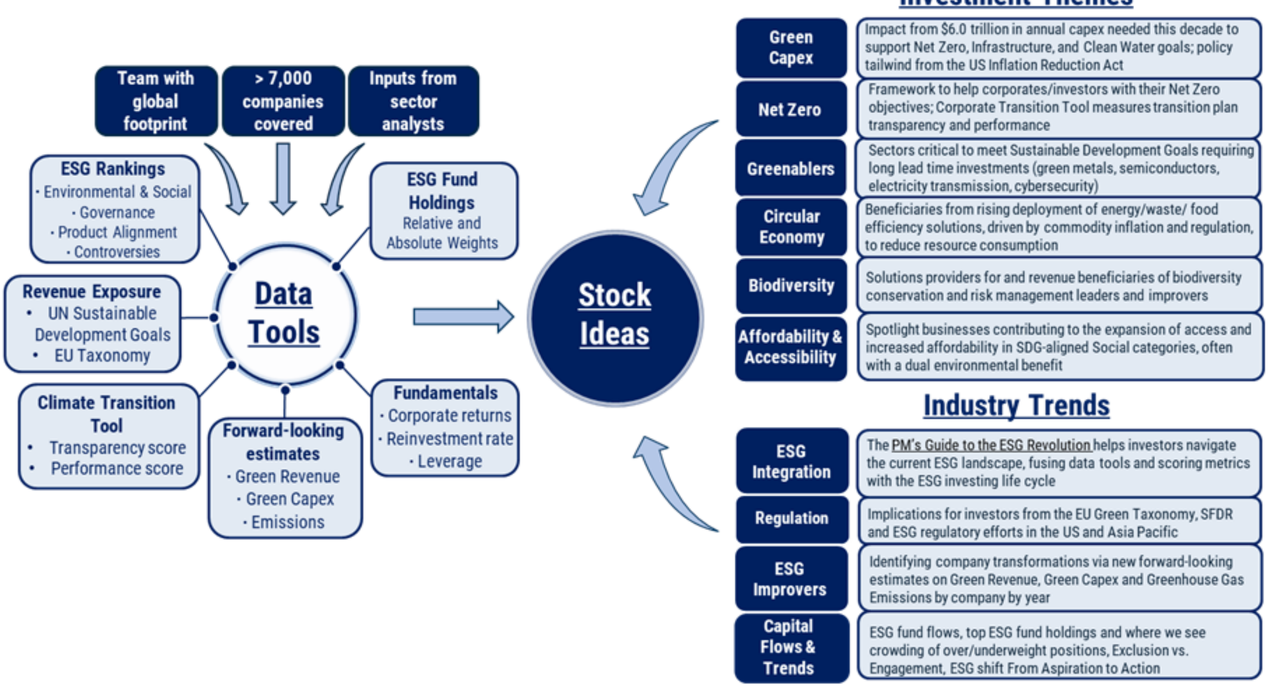


Source: Refinitiv Eikon, Morningstar, Goldman Sachs Global Investment Research

Taken together, we feel these trends will likely further contribute to the debate over the opportunities/risks for a broadening of ESG ownership across sectors that have traditionally been under-owned. Examining performance of several distinct ESG cohorts of stocks since 2021 the two best performing groups are both comprised of stocks generally eschewed by ESG funds. Exposure to Energy/Commodities — particularly among potential beneficiaries on Engagement vs. Exclusion and ESG Improvers — has warranted outperformance vs. market benchmarks in the past 2 years, potentially supporting the case of the expansion of the ESG investable universe.

How GS SUSTAIN can help

Exhibit 33: How GS SUSTAIN can help: Data tools, themes, trends and ideas



Source: Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Brian Singer, CFA, Derek R. Bingham, Evan Tylenda, CFA, Brendan Corbett, Emma Jones, Michael Hao Wu, CFA, Enrico Chinello, Ph.D., Madeline Meyer, Keebum Kim, Varsha Venugopal, Grace Chen 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.

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	Rating Distribution			Investment Banking Relationships		
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