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Pathways to Decarbonization: Why IT Companies Can and Need to Do More to Reduce Supply Chain Carbon Emissions

Contents

Executive Summary

The global climate crisis has intensified the urgency for the Information Technology (IT) sector to initiate substantive actions to decarbonize. Currently, the sector contributes to 4% of global greenhouse gas emissions.[1] However, the growing demand for electricity in the industry has escalated its dependence on fossil fuels, especially in Asian manufacturing hubs.[2] The intertwining challenges of mounting fossil fuel demand and the critical need for global emission reductions underscore the need for systemic and transformative changes throughout supply chains.

This report aims to provide comprehensive insights into the broader climate landscape within the IT industry, focusing on efforts and strategies employed by companies to decarbonise their supply chains. The efforts of six global IT brands are assessed, including levels of commitment to reducing carbon footprint, progress in supply chain decarbonization, practices in energy transition, and advancements in managing greenhouse gas emissions. In addition, various gaps in supply chain decarbonization are revealed. Then, a

roadmap to decarbonize the supply chain is proposed emphasizing the collective responsibilities of brands and suppliers as well as encouraging coordinated and joint action to achieve an energy transition.

While efforts are being made across the six brands, which are publicly disclosed, these remain insufficient. In the way towards supply chain decarbonization, several gaps in practice continue to exist, including:

- **Insufficient Initiatives in Asia:** Asia remains under-prioritized by the assessed brands. This is concerning, especially since many production countries already face considerable negative impacts of the climate crisis. This reflects a broader problem across the industry given that these companies are among the most significant players in the IT industry in terms of global leverage and influence. The failure to address decarbonization and fossil fuel dependence in Asia indicates a broader neglect in mitigating greenhouse gas emissions.

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[1]"Decarbonizing the Electronics Industry with Sustainable Manufacturing," IDTechEx, December 6, 2022, https://www.idtechex.com/en/research-article/decarbonizing-the-electronics-industry-with-sustainable-manufacturing/28329.
[2]"Supply Change," November 4, 2022, https://stand.earth/wp-content/uploads/2022/11/supplychange_1-compressed.pdf.

- **Over Reliance on Renewable Energy Certificates:** Some IT companies heavily rely on unbundled Renewable Energy Certificates (RECs) to claim carbon neutrality. This is problematic because it potentially masks actual carbon emissions and a continued reliance on, and demand for, fossil fuels.

- **Limited Industry-Wide Collaboration:** There remains a substantial lack of meaningful collaboration and unified action among sector leaders to address climate change, leaving significant potential for industry-wide climate strategies unexplored.

To address the aforementioned gaps, this report introduces a cooperative roadmap reflecting the mutual responsibilities of brands and suppliers to decarbonize production and manufacturing processes. This ultimately underscores the need for a unified, industry-wide approach, encouraging brands and suppliers to: collaborate on climate strategies, create working groups, build long-term partnerships, publicly and consistently sharing relevant emissions and energy related information, and jointly advocate to national and/or regional decision-makers for impactful climate progress such as changes to laws and policies aimed at advancing a renewable energy transition. Through synergistic and substantive collaborations, brands and suppliers can uphold their pivotal roles in supply chain decarbonization and energy transition.

Report Background

As the global climate crisis escalates, meaningful action from the private sector is urgently required. The Information Technology (IT) sector, accountable for 4%[3] of global greenhouse gas (GHG) emissions, is under increasing examination for its decarbonization strategies. Recently, many consumer electronics brands have committed to achieving carbon neutrality or net zero emissions in their own operations, with some having already realized this aspiration and others still navigating the initial phases of decarbonization. However, given that the majority of GHG emissions occur at the manufacturing and production stages, decarbonization in the supply chains of global brands is essential and remains the ultimate decarbonization challenge: it requires scaling up clean energy procurement across value chains, particularly in semiconductor manufacturing processes. Mitigating supply chain GHG emissions is a pivotal approach for brands to embrace responsibility for their environmental footprint globally and contribute to the formation of a resilient and environmentally responsible industry.

This report aims to provide an exploration and evaluation of company decarbonization efforts within the IT industry. It features an analysis of six prominent IT brands headquartered in the United States by considering their market reach, influence among peer brands, international supply chains, and production volumes (see Methodology in Appendix). Based on publicly disclosed information and brand feedback, the report assesses the progress and challenges faced by brands in decarbonising their supply chains. The report identifies and analyzes gaps in company decarbonization efforts with a view to understanding where they fall short in addressing rapid growth in supply chain emissions and the suboptimal decarbonization targets set by them. Furthermore, the report underscores the importance of sector-wide collaboration, dialogues, advocacies, and agreement between IT brands and suppliers for achieving decarbonization goals, and fostering a sustainable and environmentally responsible industry.

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[3]"Decarbonizing the Electronics Industry with Sustainable Manufacturing."

Climate Progress of IT Brands

A variation in climate progress exists among globally influential companies, each navigating a distinct path in their decarbonization journey, characterized by individual strides and challenges. These offer valuable insights into the broader climate landscape within the technology industry.

Decarbonization and Energy Transition Plan

Among the six IT brands examined, five have publicly declared 2030 climate commitments — each with varying degrees of effectiveness — to reduce GHG emissions related to their operations. Furthermore, they
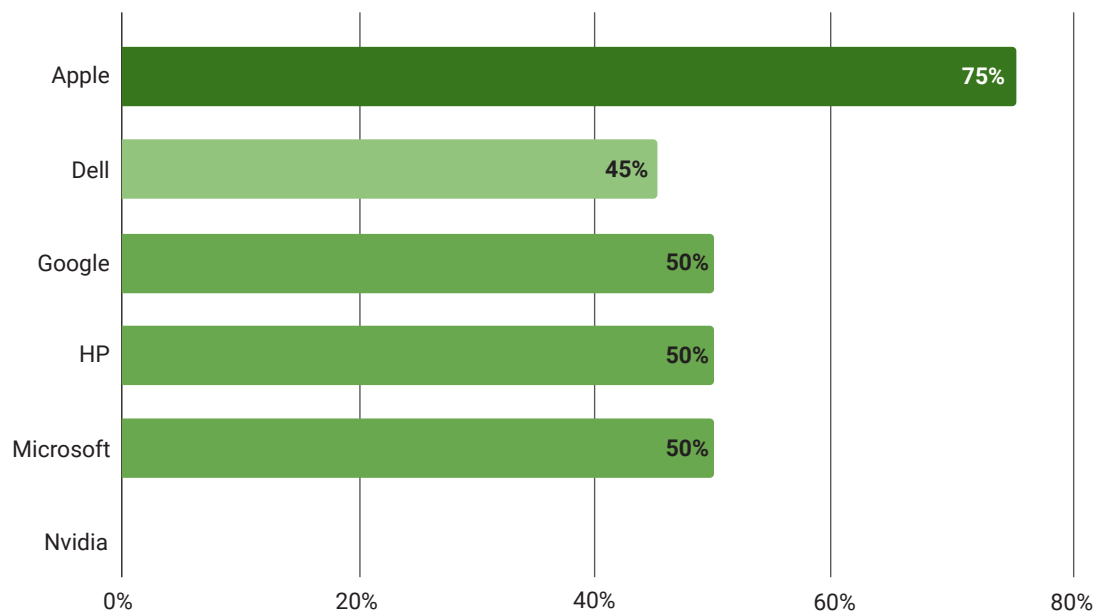
Brand	Target
Apple	75%
Dell	45%
Google	50%
HP	50%
Microsoft	50%
Nvidia	

Figure 1. Absolute scope 3 GHG emissions reduction target by 2030[4]

[4] Please note that Dell has not made a carbon reduction target for its supply chain. It has committed to reduce absolute scope 3 GHG emissions from purchased goods and services by 45% by 2030. Apple has not established a distinct GHG target for Scope 3. Instead, the company set a goal to reduce emissions by 75% across Scopes 1-3, using 2015 as the base year.

have instituted plans to curtail absolute GHG emissions within their supply chains, albeit with differing levels of ambition (see Figure 1).

All six brands have made clear plans on the use of renewable energy in self-operated stores and facilities (see Figure 2). Among them, Apple has generated or sourced enough renewable electricity to match 100 percent of electricity demand for its corporate operations since 2018. Among the six brands examined, it is the only company that has a 100% renewable electricity target in its supply chain.

Supply Chain Engagement

Recently, brands have recognized the importance of supplier engagement in achieving emission reduction goals. Five out of six brands have taken measures to intervene with suppliers by providing training, incentives, and other financial support. Apple, Dell and Google have reported providing training to their suppliers; Dell, Google and HP have reported helping

their suppliers set climate targets. According to a recently released report by Apple, more than 300 manufacturers have committed to using 100 percent clean energy for Apple production by 2030 as of September 2023,[5] contributing to Apple's goal to be carbon neutral across every product by the end of the decade.

Energy Transition

Among the six brands, Apple, Dell, HP, and Google have disclosed information regarding the procurement of renewable energy within their supply chains, each to varying extents. In a recently released Sustainable Impact Report, HP disclosed 100% of tier 1 suppliers' energy use and the percentage of renewable energy used in HP's production from 2019 to 2021.[6] Apple also disclosed its renewable energy capacity and renewable energy use in its supply chain over the past five years.[7] To accelerate corporate clean energy sourcing and decarbonize electrical grids, Apple and Google have reported joining the Asia Clean Energy Coalition[8].
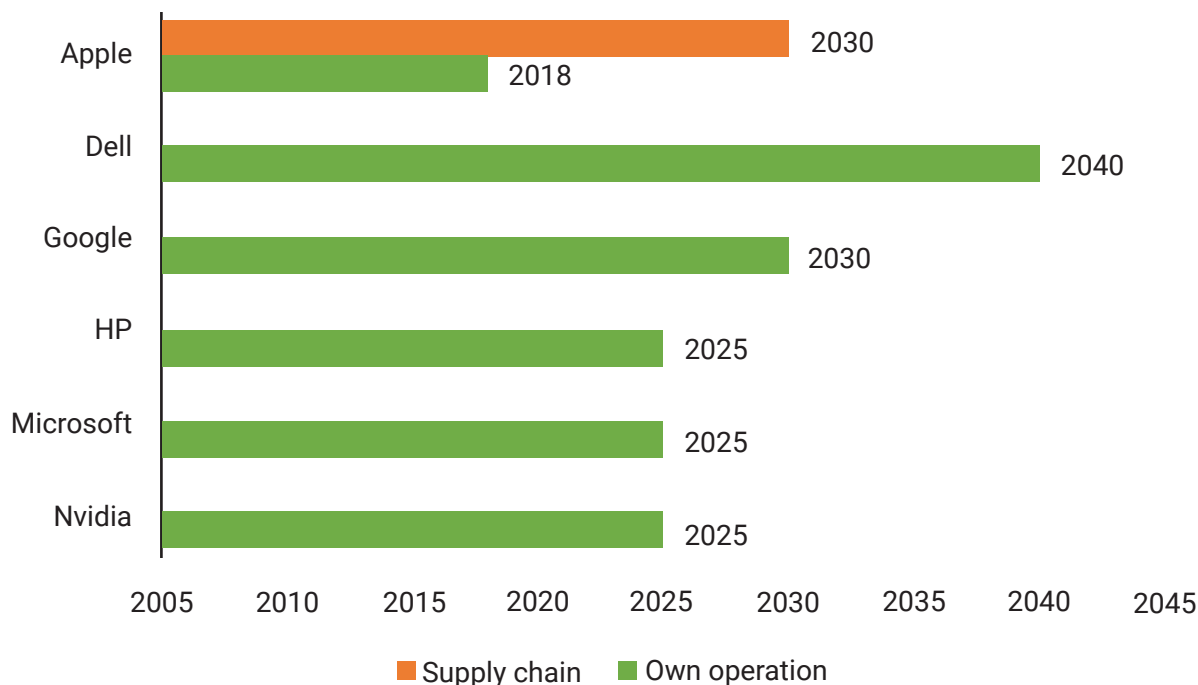

Figure 2. 100% renewable energy action and plan

[5]"Apple Advances Supplier Clean Energy Commitments," Apple Newsroom, September 12, 2023, https://www.apple.com/newsroom/2023/09/apple-advances-supplier-clean-energy-commitments/.
[6]"2022 HP Sustainable Impact Report," 2022, https://www8.hp.com/h20195/v2/GetPDF.aspx/c08636600.pdf.
[7]"2022 Apple ESG Report," 2022, https://s2.q4cdn.com/470004039/files/doc_downloads/2022/08/2022_Apple_ESG_Report.pdf.
[8]"Driving corporate renewable electricity procurement in Asia," Asia Clean Energy Coalition, n.d., https://asiacleanenergycoalition.com/en/.

Greenhouse Gas Emission Management

By setting clear climate targets and engaging with suppliers, Apple and HP have shown a downward trend in GHG emissions relating to purchased products and services. Despite setting supply chain decarbonization targets, Microsoft and Dell had significant increases in emissions relating to purchased products and services (see Figure 3). Among the six brands, Google has not separately published annual GHG data relating to purchased products and services. In a broad sense, there is still a lack of a specific roadmap for translating commitments into decarbonization actions, leaving a significant portion of GHG emissions in the supply chain unaddressed.

While the IT industry has acknowledged the necessity of supply chain decarbonization, as evidenced by making commitments and taking some commendable measures, brands need to take more proactive steps to ensure that they are on track to meet their decarbonization goals.
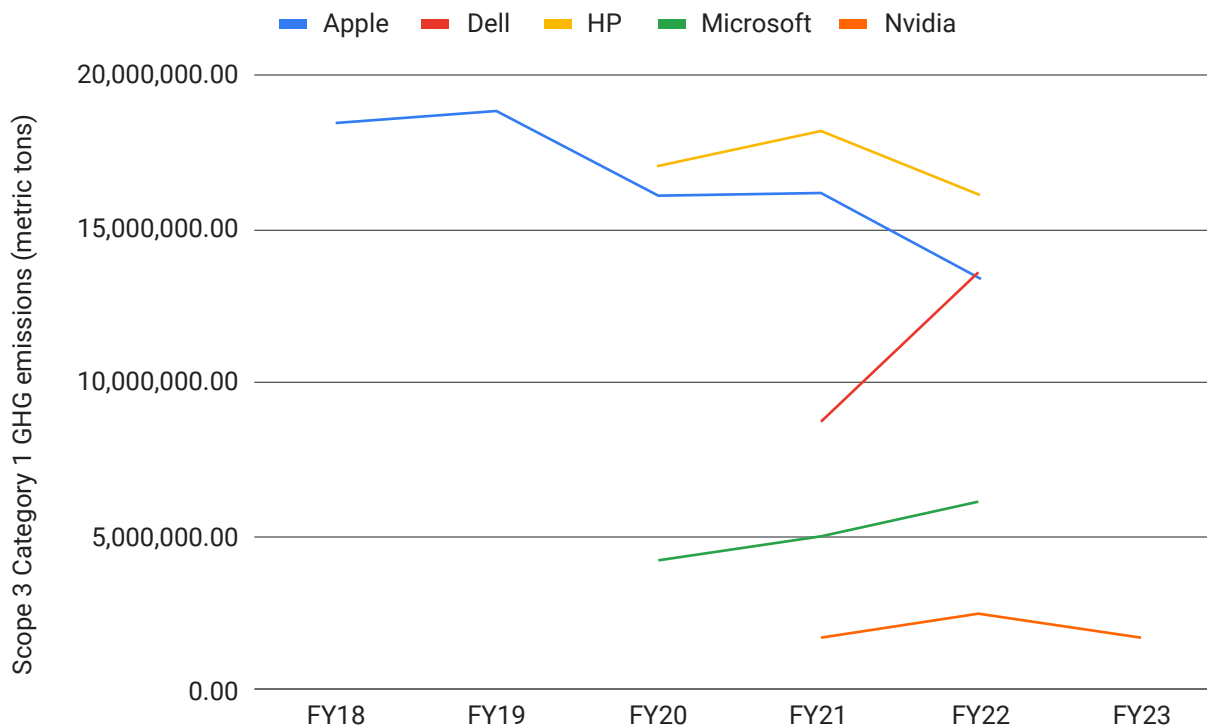

Figure 3. Changes of GHG emissions related to purchased products and services[9 10 11 12 13 14]

[9] "Apple Environmental Progress Report 2023," 2023,
   https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2023.pdf.
[10] "FY23 ESG Report."
[11] "2022 HP Sustainable Impact Report."
[12] "2022 Environmental Sustainability Report Data Fact Sheet," 2023,
   https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RW13PLE.
[13] "NVIDIA Corporate Responsibility Report Fiscal Year 2023," 2023, https://images.nvidia.com/aem-dam/Solutions/documents/
   FY2023-NVIDIA-Corporate-Responsibility-Report-1.pdf.
[14] A fiscal year is most commonly used for accounting purposes to prepare financial statements. Please note that not all fiscal years
   correspond with the calendar year. For different companies, the same fiscal year might correspond with different time periods.

Gaps in the IT Sector

In an era gripped by an escalating climate crisis, the IT industry confronts multifaceted challenges in achieving comprehensive decarbonization, due in part to the management of sprawling and complex international supply chains. Bridging identified and unrecognized gaps within the sector is pivotal, as it is not merely a matter of corporate responsibility but is fundamentally entwined with sustainable business continuity and leadership in the global market. The forthcoming analysis of five identified gaps underscores the urgency to develop a broad-based strategy to curtail emissions, showing a pathway toward tangible and impactful climate action.

Unambitious Decarbonization Targets and Unclear Roadmap

Although the majority of GHG emissions are known to happen at the manufacturing and production levels, the brands examined in this report still lacked the required level of ambition to decarbonize their supply chains. This gap highlights the need for more ambitious and proactive supply chain decarbonization target-setting, alongside comprehensive plans to meet these targets. More importantly, the rapid growth in supply chain emissions underscores the need for a proactive approach to decarbonization. Some brands have not developed specific and feasible pathways that can guide them to the decarbonization goals. Without an actionable roadmap, Dell and Microsoft have fallen short in addressing the rapid growth of emissions related to purchased goods and services.

Insufficient Financial Support and Incentives

While recognizing the importance of supplier engagement in achieving emission reductions, brands are not providing adequate financial support and incentives to suppliers. Only Apple has reported taking meaningful steps to provide financial support, knowledge transfer, or incentives to assist in the energy transition. Engaging with suppliers is crucial, but without substantial financial support and adequate knowledge transfer, the transition to renewable energy and emission reduction efforts will quickly stall out. It is worth noting that dominance and sizable market position does not necessarily correlate with the level of commitment to finance the decarbonization of their supply chain partners. Microsoft and Nvidia, with very high market cap and annual revenues, are still lagging behind in this regard.

Lack of Transparency and Action in Asia

The brands under study operate vast ecosystems, relying on intricate networks of suppliers and partners, particularly in Asian manufacturing hubs. Although many tech brands acknowledge the pivotal role of supplier engagement in emission reduction, a gap persists in addressing the distinct needs of suppliers situated in Asia — a region that not only holds paramount significance in the industry but is also disproportionately besieged by the climate crisis. Brands report supplier engagement, but it is rare to see them mention Asian suppliers and it is unclear about the full extent and nature of their engagement in Asia. This lack of specificity obscures the understanding of their climate initiatives in this region. The Asia-specific gap is twofold, encompassing both transparency and action. Addressing this gap requires establishing shared targets and strategies, crucial for driving substantial climate progress within the Asian supply chain network.

Unbundled Renewable Energy Certificates Dependency

Another gap lies in the over reliance on unbundled Renewable Energy Certificates (RECs) as a means to achieve carbon neutrality. Half of the brands examined have reported using unbundled RECs as a method of reducing GHG emissions during manufacturing. This dependence on unbundled RECs may hinder genuine progress in decarbonization efforts, as they may be transferred or sold separately from the power produced. The reliance on unbundled RECs presents a dual challenge. First, brands buying unbundled RECs typically acquire certificates from existing sources of renewable electricity. Numerous studies have indicated the purchase of unbundled RECs rarely results in the addition of renewable energy to the grid,[15][16][17] therefore failing to create new clean energy capacity or displace fossil-based electricity. Second, relying on RECs lets brands assert reduced GHG emissions, but these reductions may not reflect genuine emissions cuts,

as they're based on certificate purchases rather than direct emissions reduction efforts.[18] This leads to brands claiming clean energy goals without substantial real-world emissions cuts, allowing continued GHG emissions. Suppliers will certainly look first at what actions their largest customers have taken to advance their own environmental claims in considering what strategies to include in their own decarbonization plan. Of the six brands evaluated, only Apple and Google have consistently prioritized high impact renewable energy procurement strategies[19] in their own decarbonization plans. However, for their supply chain, Apple and HP allow their supplies to use RECs. Microsoft has promised to phase out RECs in the near future. But the specific roadmap and timeline are not yet clear.

Collaboration Gap

In the context of decarbonizing the IT industry supply chain, unified climate action remains underexplored. While Apple and Google have joined the Asia Clean Energy Coalition[20] to speed up renewable electricity procurement in Asia, there has been no meaningful action or joint efforts at scale across the IT industry. This underscores the need for sector leaders to collaborate on climate strategies, transcending competitive boundaries. By fostering industry-wide coordination, the sector can tackle shared obstacles like addressing intricate matters involved in supply chain decarbonization, achieving renewable energy targets, and keeping transparent in renewable sources.

While industry leaders are making strides and initiating actions, a more concerted, industry-wide effort is required to address the climate crisis effectively. The challenges of decarbonizing intricate supply chains, setting and achieving renewable energy targets, and ensuring transparency in renewable sourcing are shared among these industry leaders. Addressing these challenges can pave the way for more impactful climate progress within the IT sector and contribute substantially to global climate mitigation efforts.

15 Edward Holt, Jenny Sumner, and Lori Bird, "The Role of Renewable Energy Certificates in Developing New Renewable Energy Projects" (National Renewable Energy Laboratory, 2011), https://www.nrel.gov/docs/fy11osti/51904.pdf.

16 "Navigating the Nuances of Net-Zero Targets" (NewClimate Institute & Data-Driven EnviroLab, 2020), https://newclimate.org/resources/publications/navigating-the-nuances-of-net-zero-targets.

17 Anders Bjørn et al., "Renewable Energy Certificates Threaten the Integrity of Corporate Science-Based Targets," *Nature Climate Change* 12, no. 6 (June 2022): 539–46, https://doi.org/10.1038/s41558-022-01379-5.

18 Matthew Brander, Michael Gillenwater, and Francisco Ascui, "Creative Accounting: A Critical Perspective on the Market-Based Method for Reporting Purchased Electricity (Scope 2) Emissions," *Energy Policy* 112 (January 1, 2018): 29–33, https://doi.org/10.1016/j.enpol.2017.09.051.

19 "Supply Change."

20 "Driving corporate renewable electricity procurement in Asia."
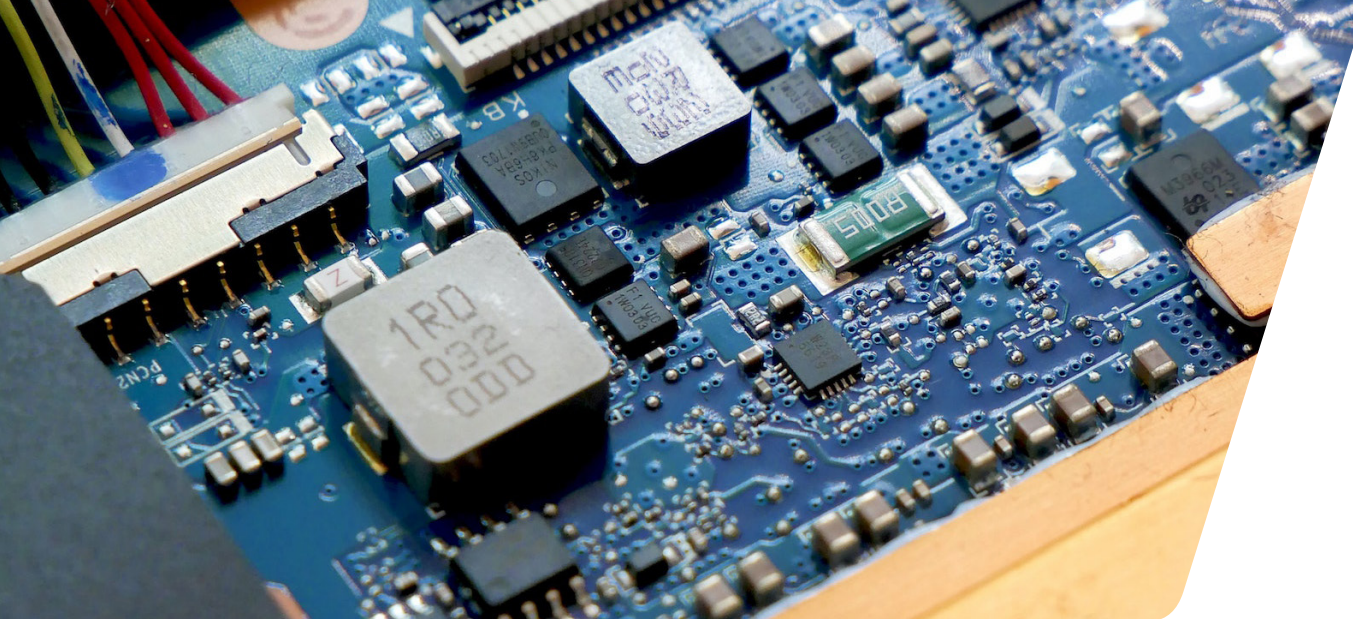
Pathway of Supply Chain Decarbonization

Isolation and misalignment between brands and suppliers often makes it difficult to address the growing emissions in supply chains and to deliver climate commitments. This highlights the importance of collaboration, with a critical step being the management of supply chain emissions via close engagement between IT brands and their suppliers to monitor and reduce GHG emissions. It is, therefore, paramount to ensure that the individual responsibilities of technology brands and their suppliers are mutually clear. This clarity provides a foundation for assessing progress toward achieving targets, accountability and transparency. This section explores how to develop a collaborative pathway that brands and suppliers can take forward as part of recognising and actioning their shared responsibilities (see Figure 4).

Commitment
- Adopt SBTi climate targets and 100% renewable energy by 2030
- Align on climate targets and agree on shared responsiilities

Capacity Building
- Create working groups to support shared suppliers
- Share industry experience and provide case studies

Partnership
- Make long-term investments and offer financial support
- Provide incentives for low-carbon manufacturing

Transparency
- Disclose decarbonization progress and energy use information
- Showcase collaborative efforts and achievements

Advocacy
- Leverage the dual influence to engage with local policy makers
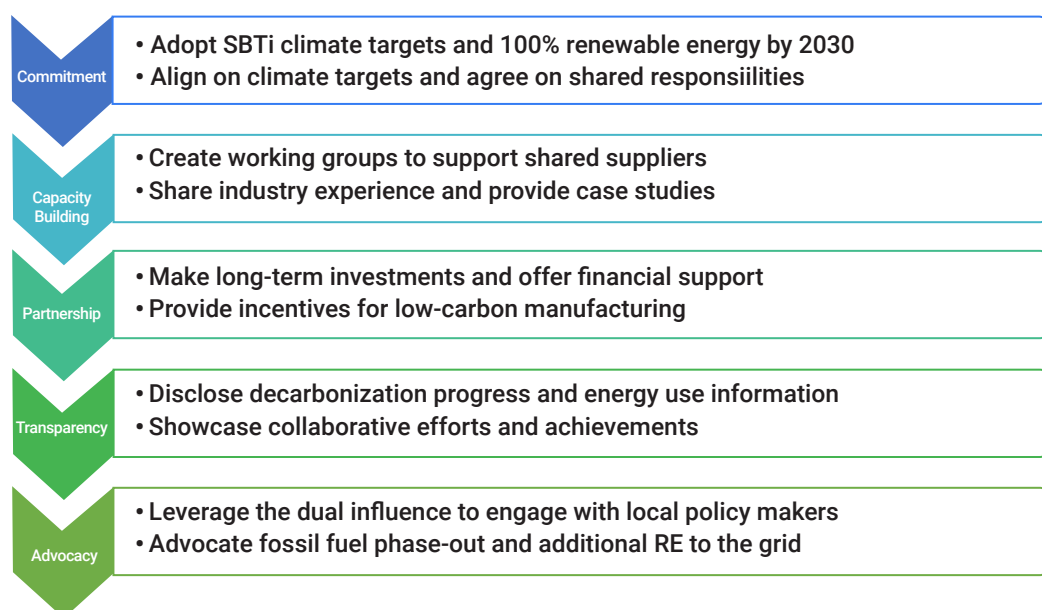- Advocate fossil fuel phase-out and additional RE to the grid

Figure 4. Pathway of shared responsibilities between IT brands and suppliers

Commitment

Brands and suppliers in the IT sector are encouraged to set SBTi-approved climate targets and make 100% renewable energy commitment by 2030. SBTi provides a clear and effective framework to align company targets with international climate goals, such as the Paris Agreement, ensuring that businesses consider climate-related risks and contribute to broader sustainability efforts. More importantly, SBTi excludes the use of offsets, which avoids misrepresenting the actual progress toward decarbonization and pollution reduction, and encourages companies to make actual changes to their operations, energy use, and business practices to reduce emissions.

According to SBTi, offsets shall not be counted as reductions toward meeting a near-term SBT. Instead, companies must account for reductions resulting from direct action within their operations or value chains.[21]

In addition, given that most suppliers' climate commitments lag significantly behind those of brands, brands may struggle to achieve their sustainability targets. Therefore, fostering collaboration along the supply chain are crucial steps. Brands and suppliers should co-develop a joint strategy for a just energy transition that reflects a longer term partnership toward decarbonisation and ensure they agree on shared responsibilities.

Capacity Building

To expedite progress in decarbonization, substantial investment in capacity building within the IT industry is imperative. IT brands encounter a myriad of challenges on their decarbonization path, including insufficient buyer power, a lack of data, subsidies and public financing for fossil fuels. Brands must initiate actions, collectively utilizing their leverage and influence, to advance an effective supply chain decarbonization process. In addition to inter-brand collaborations on information and tactic sharing, it is crucial that they engage in partnership with shared suppliers to fulfill key responsibilities required to advance an energy

transition. Brands and suppliers need to establish a common platform, involving other affected and pertinent stakeholders through a transparent and equitable process. Collaborative endeavors can pave the way for more significant, industry-wide advancements in supply chain decarbonization.

Brands and suppliers should build technical & managerial capacity and promote knowledge transfer initiatives to effectively deliver on their decarbonization targets. This encompasses facilitating access to expertise, providing training, and sharing best practices related to renewable solution deployment, GHG emission accounting and reporting, etc. Based on collaboration, different players – including upstream, midstream and downstream – can share decarbonization experience with each other and provide cases for reference and learning.

For instance, the European Outdoor Group (EOG), representing the outdoor industry, has demonstrated the power of sector-wide collaboration. EOG member brands, while operating in a different industry, share a parallel need to address the climate emergency. They have leveraged collective action to support shared suppliers, share best practices, and advocate for renewable energy policymaking. This collaboration serves as a noteworthy example of how sector-wide collaboration can drive progress.[22]

Partnership

Partnerships based on long-term investments are pivotal for supply chain decarbonization. It creates an environment conducive to collaboration, innovation, and shared responsibility, essential elements for navigating the transition to supply chain decarbonization. Brands and suppliers are encouraged to make long-term investments in energy transition in terms of capital, equipment, technology, knowledge, and human resources instead of focusing on lowest cost/highest margins. Long-term investment enables better planning and forecasting, allowing more effective integration of sustainability considerations into business strategies and operations. In this

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[21] "SBTi Corporate Manual," April 2023, https://sciencebasedtargets.org/resources/files/SBTi-Corporate-Manual.pdf.
[22] "European Outdoor Group," n.d., https://www.europeanoutdoorgroup.com/.

process, brands are encouraged to provide financial support to ensure their suppliers are not financially disadvantaged in the transition.

IT brands can motivate suppliers through various means, such as financial support, long-term investments, extended contract durations, and acknowledgment for achieving milestones. For example, brands can incentivize suppliers by establishing long-term contracts. This lays the groundwork for mutually beneficial relationships between brands and suppliers, which are pivotal for attaining meaningful and enduring progress in decarbonizing the supply chain.

Transparency

Ensuring transparency in reporting climate targets, actions, and energy use data stands as an important shared responsibility of brands and suppliers. Suppliers are encouraged to consistently disclose GHG emissions and energy use information to brands, regulators, and the public. Reporting progress against set targets is also essential, providing assurance that GHG emissions reduction objectives are being pursued effectively. Brands should also maintain a regular disclosure of energy use and emissions data to ensure accountability and alignment with the overarching decarbonization goal. Public disclosure ensures that both parties are on the same page and can collectively track their progress. It also fosters a sense of responsibility and accountability among brands and suppliers and allows stakeholders to monitor and assess their progress toward decarbonization goals.

In addition, brands and suppliers are encouraged to showcase collaborative efforts and achievements in the process of decarbonization. Brands and suppliers that disclose their sustainability efforts together can distinguish themselves in the market, influencing

policy makers while enhancing trust among consumers, investors, and other stakeholders.

Advocacy

Brands and suppliers are urged to collaborate and advocate for transformative changes that align with their decarbonization goals, leveraging their combined influence. When suppliers engage in significant public advocacy for just energy transition, it is crucial for brands to endorse and amplify it, fortifying the unified voice for decarbonization and energy transition. It is recommended to leverage advocacy as a powerful tool to create a supportive external environment for their shared goals.

Suppliers need to actively engage in advocacy initiatives, partnering with IT brands to influence policymakers and government institutions to endorse policies that facilitate the integration of renewable energy systems and the discontinuation of fossil fuels. This unified advocacy could accelerate their decarbonization journey and foster industry-wide transformation towards more sustainable and resilient business models.

In conclusion, this pathway[23] of shared responsibilities, with its foundation in mutual understanding and formal agreements, and the pillars of shared responsibility touching upon every facet of the collaborative journey, represents a holistic approach to supply chain decarbonization within the IT sector. By understanding their respective roles, establishing agreements, communicating with transparency, and advocating together for systemic change, IT brands, along with their suppliers, can jointly advance towards a future that is sustainable and ecologically sound.

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[23] This pathway was developed based on an analysis of the decarbonization progress and gaps of major technology companies and their suppliers, as well as an investigation of their responsibilities to themselves and each other. Analysis and investigations related to suppliers will be disclosed in subsequent reports conducted by Greenpeace East Asia.

Appendix

Methodology

The IT campaign team at Stand.earth developed the Responsibility Report to assess the progress made by consumer electronics brands to decarbonize their supply chains, specifically focusing on identifying the gaps in the industry and developing a shared responsibility pathway. This assessment builds upon the Supply Change[24] report, which Stand.earth and Greenpeace East Asia jointly published on November 4, 2022. Data collected for this report tracks developments in the sector over a 12-month period, with notable changes observed primarily in GHG emissions within the last five years.

The Responsibility Report evaluates the largest and most influential IT brands based in the United States. More specifically, it analyzes six leading IT brands on their commitments and actions to reduce fossil fuel consumption in their value chain in line with a 1.5°C emissions pathway as per the Paris Climate Accord. In addition to the five brands assessed in the Supply Chain report, Nvidia is included given its growing business and market cap over the past 12 months. This report prioritizes brands based on the following criteria: market reach, influence among peer brands, and production volume. This underscores a responsibility and an opportunity in leading the IT sector away from its reliance on fossil fuels.

To gain a comprehensive understanding of the supply chain decarbonization progress and gaps of the six IT brands, the team used publicly available information sources including corporate sustainability and annual reports, submissions to CDP, company websites, social media profiles, and press releases. To ensure the accuracy of company statements, the team distributed a survey and shared individual fact sheets to each brand named in this report prior to the publication. The team encouraged feedback and disclosure of any updates and additional public information not captured during data collection. As of September 30, 2023, only Apple, Dell and Google responded to Stand.earth's emails and requests for information.

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24 "Supply Change."

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Fact Sheets

Apple[25]

Financial Profile

With around 3 trillion USD market cap, Apple Inc (hereinafter Apple) stands as the most valuable company globally.[26] Its annual revenue for 2022 amounted to 394.33 billion USD.

Climate Targets

Apple has claimed to be carbon neutral in its global corporate operations and aims to reach carbon neutrality in the life cycle of its products by 2030. To this end, Apple aims to reduce emissions by 75% compared with fiscal year 2015 and balance the residual emissions with carbon removal — across the life cycle of all of its products by 2030.[27]

Renewable Energy Targets

Apple has reported generating or sourcing 100 percent renewable electricity for its corporate operations since 2018. Apple plans to transition its entire product value chain, including manufacturing and product use, to 100 percent clean electricity by 2030.[28]

GHG Emissions Change in Supply Chain

Apple reports overall Scope 3 emissions and breakdown of scope 3 categories annually.

In fiscal year 2022, the manufacturing of Apple products accounts for 65 percent of Apple's gross carbon footprint – down from 70 percent in fiscal year 2021 according. Its Scope 3 emissions and Scope 3 Category 1 emissions have generally shown a downward trend over the past 5 years.[29]

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25 The following information about Apple has been verified by the company.

26 "Companies Ranked by Market Cap," accessed July 18, 2023, https://companiesmarketcap.com/.

27 "Apple_CDP Climate Change Questionnaire 2022," 2022, https://www.apple.com/ca/environment/pdf/Apple_CDP-Climate-Change-Questionnaire_2022.pdf.

28 "Apple_CDP Climate Change Questionnaire 2022."

29 "Apple Environmental Progress Report 2023."

Decarbonization Progress in Supply Chain

Apple has reported implementing Supplier Energy Efficiency and Supplier Clean Energy Programs to reduce the energy used in its supply chain and help transition the remaining electricity to renewable sources.[30]

In October 2022, Apple called on its global supply chain to take new steps to address their greenhouse gas emissions and take a comprehensive approach to decarbonization. The company will evaluate the work of its major manufacturing partners to decarbonize their Apple-related operations — including running on 100 percent renewable electricity — and will track yearly progress. The company requires reporting on progress toward these goals — specifically Scope 1 and Scope 2 emissions reductions related to Apple production — and will track and audit annual progress. Apple claims to partner with suppliers that are working with urgency and making measurable progress toward decarbonization.[31]

Apple has reported investing in providing education and training through programs such as Clean Energy Academy. The program supplements Apple's Clean Energy Portal, which is available to all suppliers and provides training materials, resources, and country-specific information to guide suppliers in their transition to 100 percent renewable electricity. More than 170 suppliers in China, Japan, South Korea, and Vietnam have participated in Clean Energy Academy.[32] The academies offer updates on available energy procurement options in suppliers' markets, help suppliers prepare to participate in upcoming renewable energy pilots, and provide guidance from local experts on implementation. In 2022, Apple announced plans to donate these resources to create a first-of-its-kind public training platform that will be available to businesses — in Apple's supply chain and beyond — access to the resources and advocacy networks.[33]

Apple has reported providing financial support to accelerate the green transformation of the supply chain. The company claims it issued a total of $4.7 billion in green bonds since February 2016[34], including $589.7 million in renewable energy[35]. Apple has also reported joining efforts with other companies to provide $8.9 million to finance access to energy efficiency expertise and fund capital-intensive energy efficiency projects.[36]

Apple has been an active advocate alongside other companies for renewable energy policy reforms in key manufacturing countries, including Japan[37] and Vietnam[38]. Apple was also one of the founding members (along with Google) of the Asia Clean Energy Coalition, which convenes a diverse coalition of leading renewables private sector actors to influence key policy changes, thus enabling a variety of corporate procurement options for renewable energy.[39]

Renewable Energy Transition in Supply Chain

Apple has disclosed its renewable electricity use in its supply chain. Over the past five years, more renewable electricity has been used in the production process.[40]

[30] "Apple's Supplier Clean Energy Program Update," 2022, https://www.apple.com/environment/pdf/Apple_Supplier_Clean_Energy_Program_Update_2022.pdf.

[31] "Apple Calls on Global Supply Chain to Decarbonize by 2030," Apple Newsroom, October 25, 2022, https://www.apple.com/newsroom/2022/10/apple-calls-on-global-supply-chain-to-decarbonize-by-2030/.

[32] "2023 ANNUAL PROGRESS REPORT: People and Environment in Our Supply Chain," 2023, https://www.apple.com/supplier-responsibility/pdf/Apple_SR_2023_Progress_Report.pdf.

[33] "2023 ANNUAL PROGRESS REPORT: People and Environment in Our Supply Chain."

[34] "2022 Apple ESG Report."

[35] "Apple Annual Green Bond Impact Report Fiscal Year 2022 Update," 2023, https://s2.q4cdn.com/470004039/files/doc_downloads/additional_reports/2023/apple_greenbond_report_fy2022.pdf.

[36] "2023 ANNUAL PROGRESS REPORT: People and Environment in Our Supply Chain."

[37] "Global Businesses Urge Japanese Government to Accelerate Renewable Energy Goals," RE100, March 24, 2021, https://www.there100.org/japan-letter.

[38] "Joint Statement of Support for High Ambition Power Development Planning in Vietnam," 2021, https://static1.squarespace.com/static/5b7e51339772aebd21642486/t/619565dd1cf92a0d50c0013b/1637180894505/CEIA+Vietnam+Joint+Statement+to+GVN_2021.11.17.pdf.

[39] "2023 ANNUAL PROGRESS REPORT: People and Environment in Our Supply Chain."

[40] "2022 Apple ESG Report."

Apple claimed that, as of September 2023, more than 300 manufacturers have committed to using 100 percent clean energy for Apple production by 2030. New commitments from more than 50 suppliers in the U.S., Europe, and Asia have driven recent growth in Apple's Supplier Clean Energy Program, which now represents over 90 percent of the company's direct manufacturing spend.[41]

According to Apple, suppliers operating in 28 countries have committed to bringing over 20 gigawatts of renewable energy online through Apple's Supplier Clean Energy Program. Newly committed partners in advanced manufacturing technologies include Skyworks Solutions, Analog Devices, Cirrus Logic, and more in the United States, and Renesas

Electronics in Japan. The number of participating Korean suppliers has grown nearly 30% this year, to 23. In China, 14 more companies have pledged to use clean energy since April 2023, including Jingmen GEM, a supplier of key recycled material used in Apple products. Across Europe, companies including Sappi Limited, LeMur, and Schoeller Textil AG have recently joined, bringing the total to 34 suppliers. In 2022, the 13.7 gigawatts of renewable energy online in Apple's supply chain generated 23.7 million megawatt-hours of clean energy.[42]

Apple has reported applying an additional 0.6 million tons of RECs and 0.5 million metric tons of carbon offsets to proportionally cover electricity use and direct emissions, respectively, across its value chain.[43]

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[41] "Apple Advances Supplier Clean Energy Commitments."
[42] "Apple Advances Supplier Clean Energy Commitments."
[43] "2022 Apple ESG Report."

Dell[44]

Financial Profile

Dell Technologies (hereinafter Dell) is a leading global technology provider, generating annual revenue of 101.197 billion USD in FY2023 and maintaining a market capitalization of 40.68 billion USD.[45]

Climate Targets

Dell has committed to reaching net zero GHG emissions across Scopes 1, 2 and 3 by 2050. For the near-term targets, Dell aims to reduce by 50% scopes 1 and 2 GHG emissions by 2030. Dell has not yet set an overall Scope 3 reduction target. The company aims for a 45% reduction in its absolute emissions from purchased goods and services and a 30% reduction in its absolute emissions associated with the use of sold products by 2030.[46]

Renewable Energy Targets

Dell has reported that it will source 75% of electricity from renewable sources across all Dell Technologies facilities by 2030 — and 100% by 2040.[47] But it has not set any renewable energy targets — including renewable energy share or renewable energy capacity — for its supply chain by 2030.

GHG Emissions Change in Supply Chain

Dell does not report overall Scope 3 emissions annually. But it reports a breakdown of scope 3 categories annually.

Dell's carbon emissions associated with purchased goods and services have grown 56.35% from FY

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44 The following information about Dell has been verified by the company.
45 "Companies Ranked by Market Cap."
46 "FY23 ESG Report."
47 "FY23 ESG Report."

2021 to FY 2022.[48] The company attributes the year-over-year growth in emissions to improvements in supplier-reported emissions data and the business growth.

Decarbonization Progress in Supply Chain

Dell has reported launching an emissions supplier engagement program to collaborate with a strategic subset of suppliers and develop the roadmap that will help achieve its absolute reduction target in FY2023.[49]

Dell has reported encouraging its suppliers to report on emissions, set climate targets, and take measures to reduce emissions.[50] Dell claims it signed on to a CDP supply chain letter to encourage suppliers to achieve SBTi validation for their emissions targets.[51]

In FY2023, Dell reported providing support to 60 suppliers to improve energy efficiency by reviewing energy data, analyzing direct feedback from internal surveys and on-site visits, reviewing energy management systems, consulting on opportunities for improvements and sharing best practices.[52]

Renewable Energy Transition in Supply Chain

Dell has disclosed its renewable electricity use in its supply chain.

In FY2023, 1.5 million MWh renewable energy was claimed to be used in Dell's supply chain.[53] But the source of the renewable energy is unclear.

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[48] "FY23 ESG Report."
[49] "FY23 Environmental, Social and Governance - Supply Chain Sustainability," 2023, https://www.delltechnologies.com/asset/en-gb/solutions/business-solutions/briefs-summaries/delltechnologies-fy23-supply-chain-sustainability-summary.pdf.
[50] "FY23 Environmental, Social and Governance - Supply Chain Sustainability."
[51] This information was provided by Dell.
[52] "FY23 ESG Report."
[53] "FY23 ESG Report."
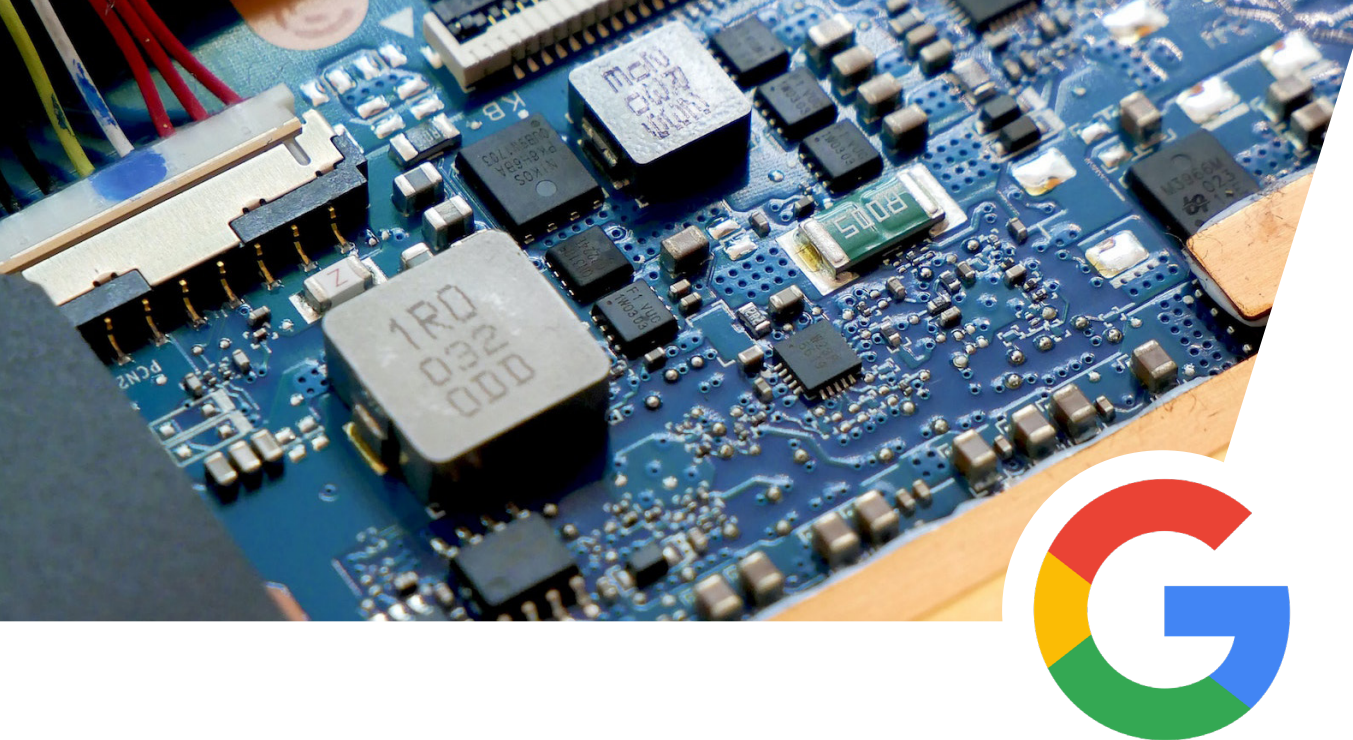
Google

Financial Profile

With a market cap of approximately 1.6 trillion USD, Google ranks among the top five most valuable companies globally.[54] It reported an annual revenue of 282.84 billion USD in 2022.

Climate Targets

Google has committed to achieving net-zero emissions across all of its operations and value chain by 2030.[55] The company aims to reduce 50% of its combined Scope 1 and 2 (market-based), and 3 absolute emissions versus the 2019 baseline before 2030.[56]

Renewable Energy Targets

Google committed to 100% renewables in 2012, and began matching its annual electricity demand globally for its offices and data centers with an equivalent amount supply in 2017. In 2022, Google committed to running its own operations on "carbon-free" energy (CFE) on every grid where it operates on a 24/7 basis by 2030.[57] [58] However, it has not set any renewable energy targets — including renewable energy share or renewable energy capacity — for its supply chain by 2030.

GHG Emissions Change in Supply Chain

Google reports overall Scope 3 emissions annually. But the company has not published emissions data related to purchased products and services separately.

Scope 3 emissions represent 75% of Google's carbon footprint.[59] Over the past five years, Google's supply chain emissions have shown a downward trend year by year.

Decarbonization Progress in Supply Chain

Google has reported providing training for key suppliers on setting ambitious GHG reduction and renewable electricity targets.[60]

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54 "Companies Ranked by Market Cap."
55 "2023 Environmental Report," 2023, https://www.gstatic.com/gumdrop/sustainability/google-2023-environmental-report.pdf.
56 "2023 Environmental Report."
57 Tracking Our Carbon-Free Energy Progress," Google Sustainability, n.d., https://sustainability.google/progress/energy/.
58 "Five Years of 100% Renewable Energy – and a Look Ahead to a 24/7 Carbon-Free Future," Google Cloud (blog), 2022, https://cloud.
       google.com/blog/topics/sustainability/5-years-of-100-percent-renewable-energy.
59 "2023 Environmental Report."
60 "2023 Environmental Report."

Google has reported working with suppliers to disclose climate data and more than 90% of its hardware suppliers (by spend) responded to CDP's Climate Change survey in 2022.[61] Of the suppliers invited to report to Google via CDP Supply Chain, 26% (58 suppliers) said they have renewable energy targets, and 12% (26 suppliers) reported having targets that are part of the RE100 initiative.[62]

Google mentioned public policy engagement and advocacy efforts in key manufacturing regions, but has not provided details.

Renewable Energy Transition in Supply Chain

Google claimed to install 2.4MW of new solar capacity as of 2021.[63] But the amount and proportion of renewable energy use in its supply chain remains unclear.

Google has reported working with key suppliers to encourage them to commit to procuring 100% renewable energy for their operations.[64] More specifically, Google claims that it has identified several promising carbon-free energy investment opportunities in Asia Pacific and will continue to focus on this area.[65] Google also has reported working to close its first renewable energy investment deal in a key Asia Pacific manufacturing region, working toward its broader goal to enable 5 GW of new carbon-free energy through investments in its key manufacturing regions by 2030. In 2022, Google signed agreements to invest approximately $350 million to support 0.5 GW of renewable energy projects towards the 5 GW total.[66] However, it is unclear how much it would be renewable based on their current definition of carbon-free energy[67], which allows non-renewable resources to be counted.

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[61] "2023 Environmental Report."
[62] "2023 Environmental Report."
[63] "Google Supplier Responsibility Report 2022," 2022, https://www.gstatic.com/gumdrop/sustainability/google-2022-supplier-responsibility-report.pdf.
[64] "2023 Environmental Report."
[65] "2023 Environmental Report."
[66] This information was provided by Google.
[67] "How We Can Accelerate Advanced Clean Energy Technologies," Google, September 14, 2023, https://blog.google/outreach-initiatives/sustainability/advanced-clean-energy-google-paper/.

HP

Financial Profile

HP is a leading global provider of personal computing and other access devices, generating revenue of 62.983 billion USD in 2022 and holding a market cap of 30.24 billion USD.[68]

Climate Targets

HP has committed to reducing by 50% of its value chain GHG emissions by 2030 compared to 2019, and achieving net zero emissions by 2040.[69] More specifically, the company plans to reduce Scope 1 and Scope 2 GHG emissions from global operations by 65% by 2025 compared to 2015.[70] In terms of supply chain, HP's goal is reducing first-tier production supplier and product transportation−related GHG emissions intensity by 10% by 2025 compared to 2015.[71]

Renewable Energy Targets

HP aims to use 100% renewable electricity in its own operations by 2025.[72] But the company has not set any renewable energy targets — including renewable energy share or renewable energy capacity — for its supply chain by 2030.

GHG Emissions Change in Supply Chain

HP reports overall Scope 3 emissions and breakdown of scope 3 categories annually.

HP's Scope 3 and Scope 3 category 1 emissions fell in 2022 after a rebound in 2021. Compared to 2020, its Scope 3 and Scope 3 category 1 emissions are down 9.27% and 5.54%, respectively.

68 "Companies Ranked by Market Cap."
69 "2022 HP Sustainable Impact Report Executive Summary," 2023, https://www.hp.com/us-en/sustainable-impact/2022-report/climate-action.html.
70 "2022 HP Sustainable Impact Report Executive Summary."
71 "2022 HP Sustainable Impact Report."
72 "2022 HP Sustainable Impact Report Executive Summary."

Decarbonization Progress in Supply Chain

HP has reported setting requirements for its production suppliers, including related to energy use and GHG emissions performance and disclosure.[73] HP has helped 43% of its production suppliers set climate targets.[74]

In 2022, HP claims it hosted procurement-driven workshops with 31 suppliers.[75]

Renewable Energy Transition in Supply Chain

In 2023, HP disclosed the percentage of renewable energy used by product suppliers in their total energy consumption for the first time.

HP has reported using less energy in the production process and increasing the proportion of renewable energy over the past three years.[76]

To offset GHG emissions in final assembly sites in China, HP has reported that the company and its suppliers purchased 1.1 million MWh of renewable electricity attribute certificates during 2022.[77] According to its net-zero plan, carbon credits will be used for a long time to offset emissions.

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[73] "2022 HP Sustainable Impact Report."
[74] "2022 HP Sustainable Impact Report."
[75] "2022 HP Sustainable Impact Report."
[76] "2022 HP Sustainable Impact Report."
[77] "2022 HP Sustainable Impact Report."

Microsoft

Financial Profile

Microsoft holds the position of the second most valuable company globally, with a market cap of 2.53 trillion USD.[78] It reported an annual revenue of 198.27 billion USD in 2022.

Climate Targets

Microsoft has committed to reducing its Scope 1 and 2 emissions to near zero by 2025. From a 2020 baseline, the company aims to reduce its Scope 3 emissions by more than half by 2030.

Renewable Energy Targets

Microsoft has committed to operating on 100% renewable energy by 2025. In addition, the company announced that it will have 100% of its electricity consumption, matched by zero carbon energy purchases 100% of the time, with co-benefits for under-resourced communities by 2030.[79] However, Microsoft has not yet made clear goals for the renewable energy transition of its supply chain, such as renewable energy share and renewable energy capacity by 2030.

GHG Emissions Change in Supply Chain

Microsoft reports overall Scope 3 emissions and breakdown of scope 3 categories annually.

Representing 96.71%[80] of Microsoft's annual emissions, supply chain emissions have ramped up over the past 3 years. Although the company attributes it to business growth, the reality is that GHG emissions

[78] "Companies Ranked by Market Cap."
[79] "Environmental Justice in Renewable Energy Procurement: Lessons Learned from Microsoft and Volt Energy Utility," 2022, https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE5cgC0.
[80] "2022 Environmental Sustainability Report," 2023, https://news.microsoft.com/wp-content/uploads/prod/sites/42/2023/05/2022-Environmental-Sustainability-Report.pdf.

(with a 45.21% increase[81]) are growing at a faster pace than business (with a 38.64% increase[82] [83]). In addition, emissions related to purchased goods and services have continued to grow within the same time frame.

Decarbonization Progress in Supply Chain

Microsoft has reported establishing a requirement in its supplier code of conduct mandating that suppliers set a minimum target of a 55% absolute reduction in emissions by 2030.[84]

Microsoft has reported 12 suppliers switching to renewable energy at request.[85]

Renewable Energy Transition in Supply Chain

Microsoft has not reported any information on renewable energy use in its supply chain.

Microsoft has reported purchasing unbundled RECs to offset a portion of the emissions footprint from its devices.[86] But it also committed to phase out the use of unbundled RECs in future years.[87]

[81] "2022 Environmental Sustainability Report Data Fact Sheet."
[82] "Microsoft 2022 Annual Report," 2023, https://www.microsoft.com/investor/reports/ar22/index.html.
[83] "Microsoft 2021 Annual Report," 2022, https://www.microsoft.com/investor/reports/ar21/index.html.
[84] "Microsoft Supplier Code of Conduct," 2023, https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4qa18.
[85] "2022 Environmental Sustainability Report."
[86] "2022 Environmental Sustainability Report."
[87] "2022 Environmental Sustainability Report."

Nvidia

Financial Profile

Nvidia Corporation (Hereinafter Nvidia) is an American-based technology company. Dominating the industry with a 70% market share in Graphics Processing Units (GPUs), Nvidia has ascended to become the sixth-largest company globally by market cap, boasting 1.045 trillion USD.[88] In 2022, the company generated an annual revenue of 26.914 billion USD.

Climate Targets

Nvidia reported setting its Scope 1 and 2 emissions in line with a 1.5 degrees Celsius global temperature rise. However, it is not clear how many absolute GHG emissions related to its operations will be reduced by 2030. For its supply chain, By FY26, Nvidia aims to engage manufacturing suppliers comprising at least 67% of its scope 3 category 1 GHG emissions (GHG Protocol-defined Purchased Goods and Services), with

the goal of effecting supplier adoption of science-based targets aligned with limiting temperature rise to 1.5 degrees Celsius.[89]

Renewable Energy Targets

Nvidia aims to achieve and maintain 100% renewable electricity for its own operation by 2025.[90] But the company has not yet made clear goals for the renewable energy transition of its supply chain.

GHG Emissions Change in Supply Chain

Nvidia reports overall Scope 3 emissions and breakdown of scope 3 categories annually.

Nvidia's Scope 3 and Scope 3 category 1 emissions fell in 2022 after a rebound in 2021. Still, its Scope 3 and Scope 3 Category 1 emissions in FY2023 are slightly higher than in FY2021.[91]

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88 "Companies Ranked by Market Cap."
89 "NVIDIA Corporate Responsibility Report Fiscal Year 2023."
90 "NVIDIA Corporate Responsibility Report Fiscal Year 2023."
91 "NVIDIA Corporate Responsibility Report Fiscal Year 2023."

Decarbonization Progress in Supply Chain

Nvidia has reported regularly tracking renewable energy performance and capability of its suppliers. In FY23, over 60% of suppliers reported renewable energy use.[92]
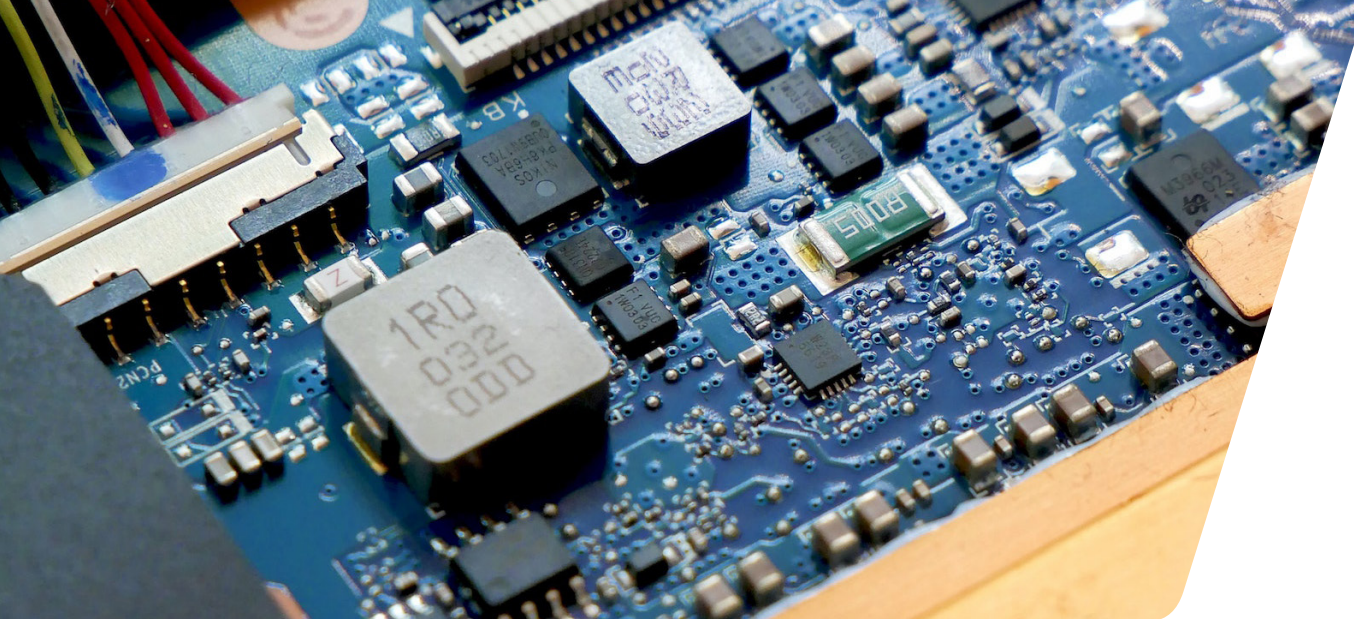
Renewable Energy Transition in Supply Chain

Nvidia has not reported any information on renewable energy use in its supply chain.

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[92] "NVIDIA Corporate Responsibility Report Fiscal Year 2023."

Acronyms

CFE - Carbon-Free Energy

EOG - European Outdoor Group

GHG - Greenhouse Gas

GPU - Graphics Processing Unit

IT - Information Technology

REC - Renewable Energy Certificates

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