



Microsoft

Ctrl-Alt-Incomplete: The Gaps in Microsoft's Climate Leadership

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Executive Summary

As one of the world's most valuable and influential technology companies,¹ Microsoft has a vast global reach, and its policies and strategies can set trends and standards across the industry. However, its remarkable growth, evidenced by a fourfold increase in stock price and market capitalization over the past five years,² has been built on a significant rise in its climate footprint, revealing substantial gaps in its climate policies.

This report scrutinizes the biggest source of Microsoft's climate pollution: its vast global supply chain, and focuses on the emissions and energy use

of 10 key suppliers. It sheds light on how Microsoft's supply chain contributes to the company's growing climate impacts and undermines its claims of climate leadership. In addition, it offers important insights that can help the company identify key areas for improvement, develop stronger partnerships with its suppliers, and ultimately drive more effective and comprehensive climate action across its entire business network. This proactive approach is not only vital for global climate change mitigation efforts, but also essential for maintaining Microsoft's reputation as a responsible and forward-thinking leader in the technology industry.

¹ Tom Warren, "Microsoft Briefly Overtakes Apple to Become the World's Most Valuable Company Again," The Verge, January 11, 2024, <https://www.theverge.com/2024/1/11/24034434/microsoft-apple-market-cap-business-valuable-company>.

² "Market Data," Market Data Center on The Wall Street Journal, 2024, <https://www.wsj.com/market-data.wall>

Key Findings:

- **Rapidly Increasing Climate Pollution:** Since its 2020 pledge to be “Carbon Negative by 2030”³, Microsoft’s publicly reported overall emissions have increased by 46%.
- **Escalating Supply Chain Emissions:** Operational emissions from the majority of Microsoft’s key suppliers are on the rise. But none of them has set a climate target that meets Microsoft’s requirement to cut their emissions by 55%.
- **Limited Use of Renewable Energy within Supply Chain:** Unlike Apple, its key competitor, Microsoft has not committed to powering its manufacturing with clean, renewable electricity. As a result, Microsoft’s key suppliers heavily rely on fossil fuels for electricity. Electricity from power purchase agreements (PPAs), which is likely to reduce reliance on fossil fuels, only accounts for 1% of electricity consumption of suppliers. And seven out of 10 suppliers have reported the use of problematic unbundled renewable energy certificates (RECs).

Recommendations:

- **Strengthen Climate Leadership:** Microsoft should step up as a leader in climate change mitigation by developing a clear and definitive plan for decarbonization and transitioning to 100% renewable energy within its supply chain by 2030.
- **Intensify Supplier Engagement and Compliance:** It is essential for Microsoft to actively engage with its key suppliers examined here, who contribute

to about 40% of its supply chain emissions, and ensure they align with the company’s 50% absolute greenhouse gas (GHG) emission reduction goals by 2030. It is also important that Microsoft keep transparency regarding energy usage, renewable energy consumption, and sourcing practices within its supply chain.

- **Focus on Renewable Energy Use:** Microsoft should prioritize local and additional renewable energy sources in its climate strategy rather than relying on RECs or other procurement options that do not contribute to decarbonizing the grid, and implement strict monitoring and reporting mechanisms to ensure its suppliers’ renewable energy purchases contribute to genuine decarbonization.

Overall, this report found that despite high-profile pledges to cut emissions, the climate impact of Microsoft’s extensive and energy-intensive supply chain continues to grow. Its current supply chain decarbonization commitments fall short of the standards set by its competitor, Apple. In order to walk the walk of Microsoft’s prominent position of climate and business leadership, the global IT giant must urgently address the expanding carbon footprint of manufacturing its laptops, tablets, and servers, especially the semiconductors that make them run. Microsoft needs to rectify gaps in its decarbonization strategy by working with its key suppliers to ensure that they are aligned with its emission reduction goals, and setting a robust 100% renewable energy target for its supply chain that meets the highest standards of renewable energy procurement.

³ Brad Smith, “Microsoft Will Be Carbon Negative by 2030,” Microsoft, January 16, 2020, <https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/>.



The Gaps in Microsoft's Climate Strategy

Recently, Microsoft surpassed Apple's market cap to become the world's most valuable public company,⁴ and maintains an active public position of corporate climate leadership on the world stage. This includes launching Microsoft Cloud for Sustainability⁵, taking the role as Strategic Technology Partner and Principal Sponsor of the 27th United Nations Climate Change Conference of the Parties (COP27)⁶, and making the first corporate commitment to remove all of its historic emissions by 2050⁷. Microsoft's position as a climate leader means that its policies and commitments have significant impacts within the tech industry and beyond.

However, the company has faced widespread criticism for important aspects of its climate strategy. Recently, Microsoft's purchase of carbon credits from the Kasigau Corridor project has raised concerns due to the project's association with significant human rights violations and the growing discredit of such purchases as a legitimate method for emissions reduction.⁸ Microsoft's continued collaboration with oil firms, leveraging artificial intelligence (AI) to enhance oil and gas extraction, raises further questions about climate leadership.⁹ Furthermore, Microsoft is looking at next-generation nuclear reactors to power its data centers and AI, which has caused concerns in the industry.¹⁰

⁴ Warren, "Microsoft Briefly Overtakes Apple to Become the World's Most Valuable Company Again."

⁵ "Microsoft Cloud for Sustainability | Microsoft," Microsoft, 2022, <https://www.microsoft.com/en-us/sustainability/cloud>.

⁶ "Microsoft Announces Participation as a Strategic Principal Sponsor of COP27," Microsoft, 2022, <https://news.microsoft.com/en-xm/2022/09/15/microsoft-announces-participation-as-a-strategic-principal-sponsor-of-cop27/>.

⁷ "Microsoft: Carbon Negative Goal | Global | UNFCCC," UNFCCC, 2023, <https://unfccc.int/climate-action/un-global-climate-action-awards/climate-neutral-now/microsoft-carbon-negative-goal>.

⁸ Maria Hengeveld, "Carbon Offsetting Project and Human Rights Abuse in Kenya," SOMO (blog), November 6, 2023, <https://www.somo.nl/offsetting-human-rights/>.

⁹ "Oil in the Cloud: How Tech Companies Are Helping Big Oil Profit from Climate Destruction" (Greenpeace, May 19, 2020), <https://www.greenpeace.org/usa/reports/oil-in-the-cloud/>, <https://www.greenpeace.org/usa/reports/oil-in-the-cloud/>.

¹⁰ Justine Calma, "Microsoft Is Going Nuclear to Power Its AI Ambitions," The Verge, September 26, 2023, <https://www.theverge.com/2023/9/26/23889956/microsoft-next-generation-nuclear-energy-smr-job-hiring>.

When it comes to addressing climate change, Microsoft has made some important commitments.

- **Climate Commitment:** The company has committed to reducing its Scope 1 and 2¹¹ emissions to near zero by 2025. From a 2020 baseline, Microsoft aims to reduce its Scope 3¹² emissions by more than half by 2030.¹³
- **Energy Transition Plan:** Microsoft has committed to operating on 100% renewable energy by 2025. 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 2030.¹⁴ However, Microsoft has not made a public commitment or plan to transition its supply chain to renewable energy.

Adopting a 24/7 renewable energy target is an important step towards effective decarbonization, superior to the annual matching measurement which can obscure significant underlying fossil fuel demand. However, Microsoft's pledge to achieve 24/7 carbon-free energy has faced criticism for potentially allowing the use of (existing) nuclear power and fossil fuels with carbon capture and storage.¹⁵ In addition, the carbon dioxide removal (CDR) and carbon capture and storage (CCS) projects¹⁶ proposed by Microsoft raise questions about their effectiveness and long-term reliability since they detract from the primary need to reduce emissions at the source.

¹¹ According to Greenhouse Gas Protocol, Scope 1 emissions are direct emissions that occur from sources owned or controlled by the company. And Scope 2 emissions are indirect emissions from the generation of purchased energy.

¹² According to Greenhouse Gas Protocol, Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

¹³ "2022 Environmental Sustainability Report" (Microsoft, 2023), <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RW15mgm>.

¹⁴ "Environmental Justice in Renewable Energy Procurement" (Microsoft, 2022), <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE5cgC0>.

¹⁵ Silke Mooldijk, Thomas Day, and Sybrig Smit, "Navigating the Nuances of Corporate Renewable Electricity Procurement: Spotlight on Fashion and Tech" (NewClimate Institute, 2024), <https://newclimate.org/resources/publications/navigating-the-nuances-of-corporate-renewable-electricity-procurement>.

¹⁶ "Carbon Management Technologies Set to Soar in Europe, with Proactive Policies Key in Unlocking Its Potential," Microsoft, November 20, 2023, <https://blogs.microsoft.com/eupolicy/2023/11/20/carbon-removal-management-technologies-ccs-beccs/>.



Slipping Through the Cracks: Policy Gaps Lead to Growing Emissions

Microsoft's publicly reported overall (Scope 1, Scope 2, and Scope 3) emissions have increased by 46%.

Microsoft has not yet fully implemented measures to decarbonize its operations and supply chain, which makes it lag behind industry peer Apple.¹⁷ Over the past three years, Microsoft's overall GHG emissions have surged significantly: its increase in emissions at a rate of 46%¹⁸ has surpassed its business growth of 39%^{19,20}. Such a disparity illustrates the gaps in Microsoft's climate strategies, rather than just being a byproduct of business expansion. More importantly,

it shows that **Microsoft's climate action does not line up with its commitments.**

For its direct operations, Microsoft's heavy climate footprint is primarily due to the emissions caused by generating the electricity required to power its cloud services, data centers, and an increasingly significant AI presence. In 2022 alone, Microsoft's direct operations consumed over 18 million MWh of electricity²¹, enough to power more than 1.5 million US homes for a year.²² However, its own operations, constitute approximately 3% of its total GHG emissions, represent just a fraction of its overall environmental impact.

The situation becomes even more problematic when considering the emissions from Microsoft's supply

¹⁷ Xixi Zhang, "Pathways to Decarbonization: Why IT Companies Can and Need to Do More to Reduce Supply Chain Carbon Emissions" (Stand.earth, October 16, 2023), <https://stand.earth/resources/pathways-to-decarbonization-why-it-companies-can-and-need-to-do-more-to-reduce-supply-chain-carbon-emissions/>.

¹⁸ "2022 Environmental Sustainability Report Data Fact Sheet" (Microsoft, 2023), <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RW13PLE>.

¹⁹ "Microsoft 2022 Annual Report" (Microsoft, 2023), <https://www.microsoft.com/investor/reports/ar22/index.html>.

²⁰ "Microsoft 2021 Annual Report" (Microsoft, 2022), <https://www.microsoft.com/investor/reports/ar21/index.html>.

²¹ "Microsoft 2023 CDP Report" (CDP, 2023).

²² OAR US EPA, "Greenhouse Gas Equivalencies Calculator," Data and Tools, August 28, 2015, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.

chain. The production of their Xbox, laptops, tablets, computers, and servers demands substantial amounts of electricity, especially for the fabrication of energy-intensive computer chips that are crucial for their functionality.

Nevertheless, **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.** The company reported that nearly 97% of its total annual emissions came from Scope 3,

where purchased products and services account for 47%.²³ This segment has shown a steady and troubling escalation over the past four years (see Figure 1). This trend highlights a critical area where Microsoft has failed to keep pace with its competitor Apple: the absence of clear, actionable goals for transitioning its supply chain to renewable energy along with a well-defined strategy for decarbonization. Without a clear plan to transition its energy-intensive manufacturing to clean, renewable energy, the company's supply chain emissions have continued to rise.

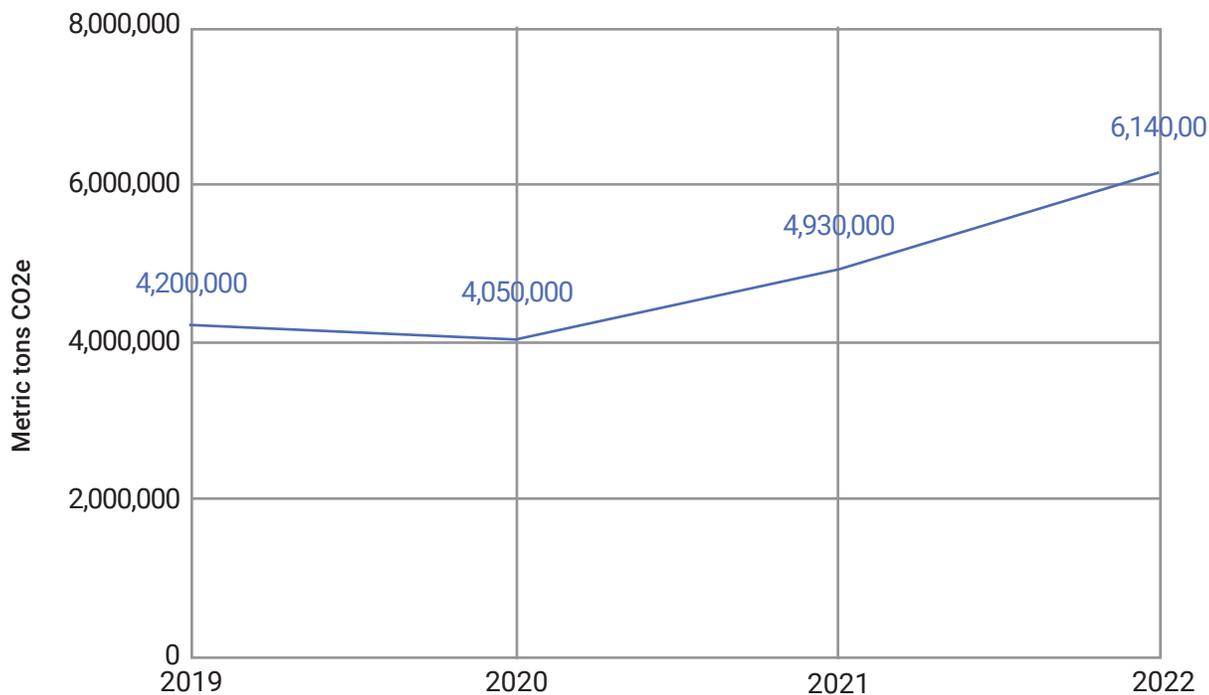


Figure 1. Microsoft's GHG emissions from purchased goods and services over the past four years²⁴

The lack of a definitive plan for reducing supply chain emissions not only hinders Microsoft's progress towards environmental sustainability, but also risks its reputation as a climate leader. In an era where corporate responsibility is increasingly valued,

companies are being judged not only by their financial success but also by the integrity of their sustainability efforts. As such, Microsoft's insufficient renewable energy target and action in the supply chain could have long-term implications for its brand image and consumer trust.

²³ "2022 Environmental Sustainability Report Data Fact Sheet."

²⁴ "Microsoft 2023 CDP Report."



Major Suppliers of Microsoft

The selected 10 suppliers comprising nearly 40% of Microsoft's Supply Chain.

Stand.earth compiled this report to evaluate the decarbonization efforts and energy transition progress within Microsoft's extensive supply chain. The team strategically selected 10 key suppliers who collectively account for almost 40% of Microsoft's supply-side transactions (see Table 1).²⁵ This selection was based on several critical factors including the scale of the relationship with Microsoft, geographical location of headquarters, production type and volume, annual revenue, market capitalization, workforce size, and their influence within the industry. The selected 10 companies include four headquartered in the United States, three in Taiwan, two in South Korea, and one in mainland China. These are the notable industry players: Advanced Micro Devices Inc. (AMD), Arista

Networks (Arista), Hon Hai Precision Industry Co., Ltd. (Hon Hai), Intel Corporation (Intel), Luxshare Precision Industry Co., Ltd. (Luxshare), NVIDIA Corporation (NVIDIA), PEGATRON Corporation (PEGATRON), Quanta Computer Inc. (Quanta), Samsung Electronics Co., Ltd. (Samsung), and SK hynix Inc. (SK hynix).

Stand.earth examined all these 10 suppliers' products and services, energy use, and GHG emissions profiles.²⁶ Arista and AMD were noted to have a substantial portion of their products provided by upstream suppliers, accordingly having more responsibility for supply chain management. Four suppliers – PEGATRON, Quanta, Samsung, and SK hynix – are deeply involved in the manufacturing of electronic components and semiconductors, a sector known for its significant energy demands and GHG emissions. The remaining four companies – Hon Hai, Intel, and Luxshare, and NVIDIA, are involved in energy-intensive production processes as well as procurement from upstream suppliers. To thoroughly evaluate the

²⁵ "Bloomberg Terminal," 2023.

²⁶ "Suppliers' 2023 CDP Reports" (CDP, 2023), <https://www.cdp.net/en>.

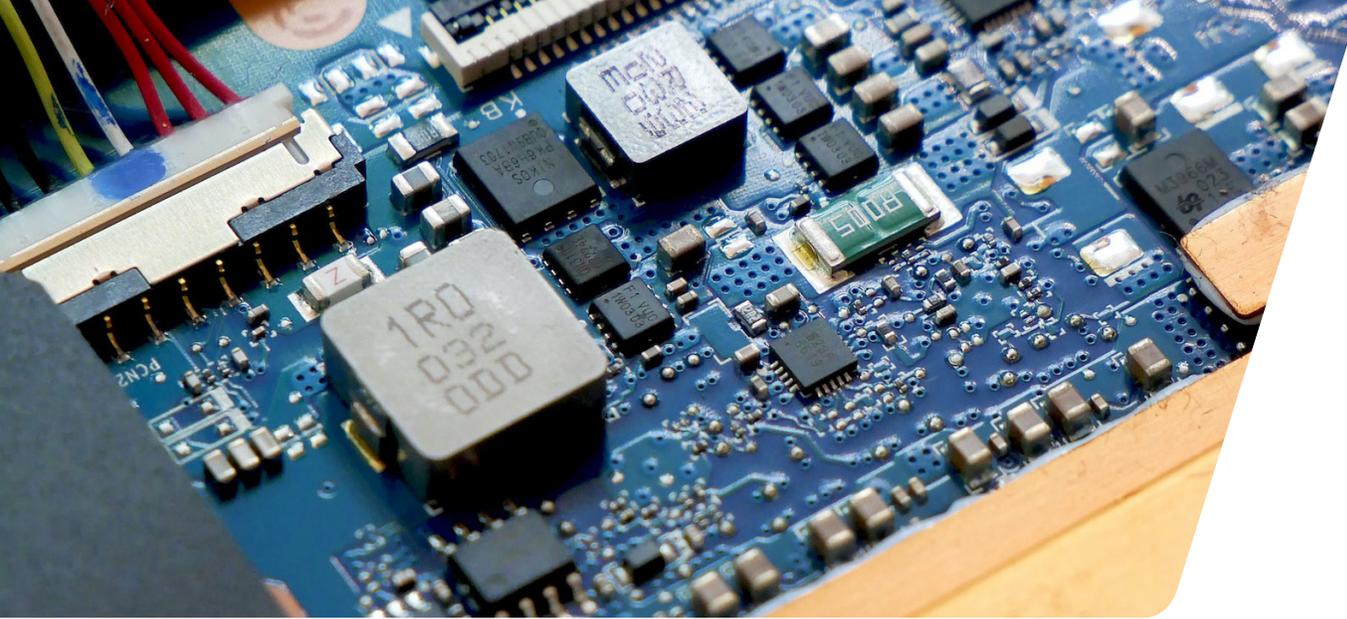
environmental responsibility of suppliers, the team conducts additional assessments on those whose emissions from purchased goods and services exceed 50%. This group includes six suppliers – AMD, Arista, Hon Hai, Intel, Luxshare, and NVIDIA, each of whom has responsibilities in managing both their own operations and supply chain (see Table 1).

The team gained a thorough insight into each supplier’s approach to reducing carbon emissions and transitioning to renewable energy sources, by rigorously scrutinizing and analyzing various publicly available information sources. This included corporate sustainability reports, ESG (Environmental, Social, and Governance) or CSR (Corporate Social Responsibility) reports, submissions to CDP, official company websites, social media profiles, and press releases. A peer review mechanism was implemented to validate the credibility and accuracy of the data and statements from these companies.

This comprehensive analysis serves not only as an assessment of the current state of supply chain decarbonization of Microsoft, but also highlights the diverse roles and responsibilities of different suppliers in the collective effort towards climate change mitigation. It underscores the need for tailored strategies that address the specific challenges and opportunities each supplier faces in their journey towards reduced carbon emissions and a more sustainable energy strategy. The report aims to inform and guide Microsoft in developing targeted interventions and collaborations to enhance the overall sustainability of its supply chain. By understanding the varied dynamics and environmental footprints of these key suppliers, Microsoft can more effectively strategize its approach to encourage, support, and take more robust climate action and energy transition practices among its suppliers.

Table 1. Selected 10 suppliers of Microsoft and assessment scope

Supplier Names	HQ Location	Assessment Scope
AMD	US	Operation and supply chain
Arista	US	Operation and supply chain
Hon Hai	Taiwan	Operation and supply chain
Intel	US	Operation and supply chain
Luxshare	Mainland China	Operation and supply chain
NVIDIA	US	Operation and supply chain
PEGATRON	Taiwan	Operation
Quanta	Taiwan	Operation
Samsung	South Korea	Operation
SK hynix	South Korea	Operation



Insufficient Climate Ambition of Microsoft's Key Suppliers

None of Microsoft's 10 suppliers have set ambitious GHG reduction targets.

Microsoft's supplier code of conduct requires its suppliers to set a minimum target of a 55% absolute reduction in emissions by 2030²⁷. Unfortunately, this report reveals a concerning lack of alignment with this requirement. **As of December 2023, not a single supplier among the ten examined had established emission reduction goals that aligned with Microsoft's mandate** (see Figure 2). This shortfall is particularly notable among high-profile suppliers like Arista, Intel, NVIDIA, Samsung, and SK Hynix, who have yet to set

targets validated as science-based by Science Based Targets initiative (SBTi).

This situation is illustrated in Figure 2, which contrasts Microsoft's requirements with the Scope 1 and 2 GHG reduction targets set by its ten suppliers for the year 2030. Among these, only AMD, Hon Hai, Intel, and Quanta have established decarbonization goals for their operations. However, Intel's target notably falls short of the requisite threshold. Notably, the other suppliers have not set any climate targets at all. This contrast sharply underscores the gap between Microsoft's climate goal requirement and the considerably less ambitious or nonexistent targets of its suppliers, highlighting a critical area for improvement in aligning corporate environmental strategies.

²⁷ "Microsoft Supplier Code of Conduct," 2023, <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4qa18>.

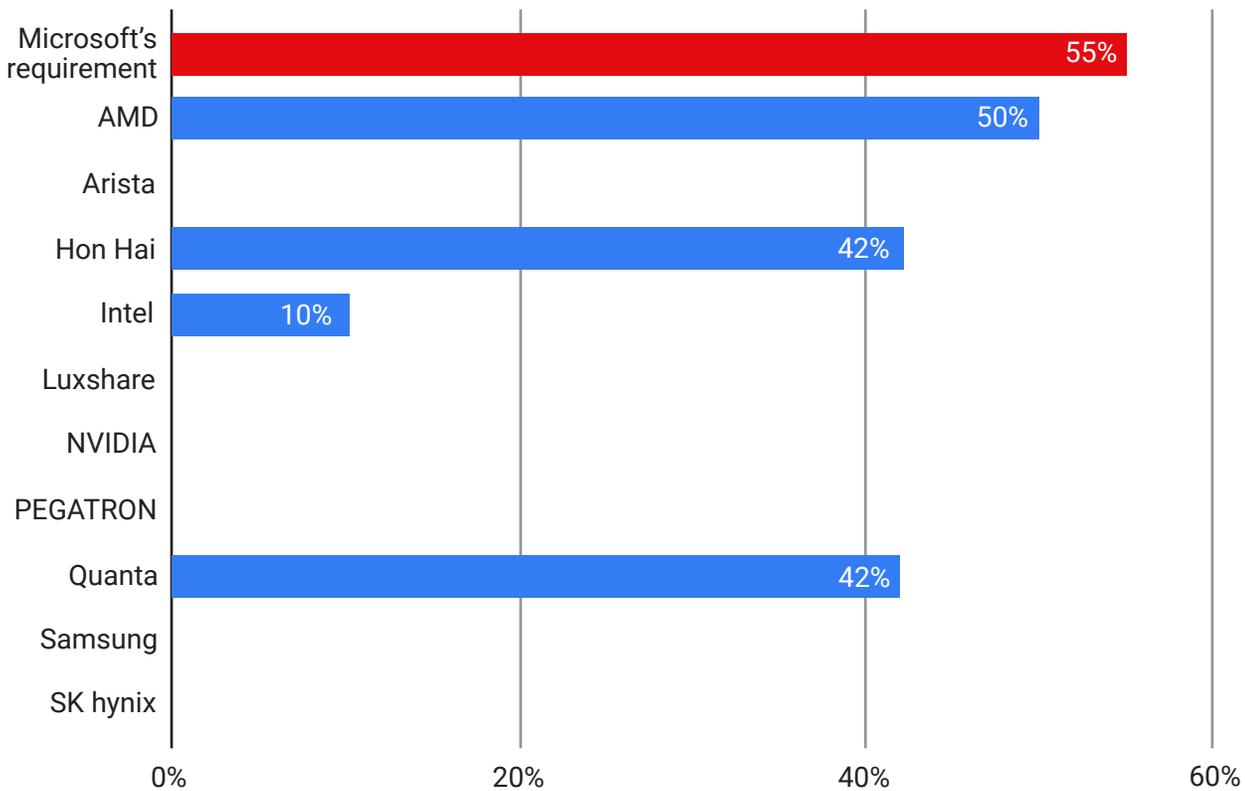


Figure 2. Microsoft's requirement and its 10 suppliers' Scope 1 and 2 GHG reduction targets by 2030²⁸

It is crucial to recognize that for suppliers like AMD, Arista, Hon Hai, Intel, Luxshare, and NVIDIA, who predominantly or entirely outsource their manufacturing, a commitment to Scope 1 and 2 emissions reduction alone does not adequately reflect true climate ambition. Therefore, the team extended the analysis to include the Scope 3 climate targets of these suppliers, with a specific focus on their upstream GHG emissions. This examination

revealed that only a few suppliers, namely Hon Hai and Intel, have established goals for supply chain decarbonization (see Figure 3). However, even these targets lack the ambition needed to keep global warming below 1.5 degrees Celsius, as defined in the 2015 Paris Agreement. This gap highlights the need for more aggressive and comprehensive climate action strategies among these suppliers.

²⁸ It is worth noting that Quanta sets the year to achieve its climate goals as 2032. For Hon Hai, its climate targets include Scope 1, 2 and 3.

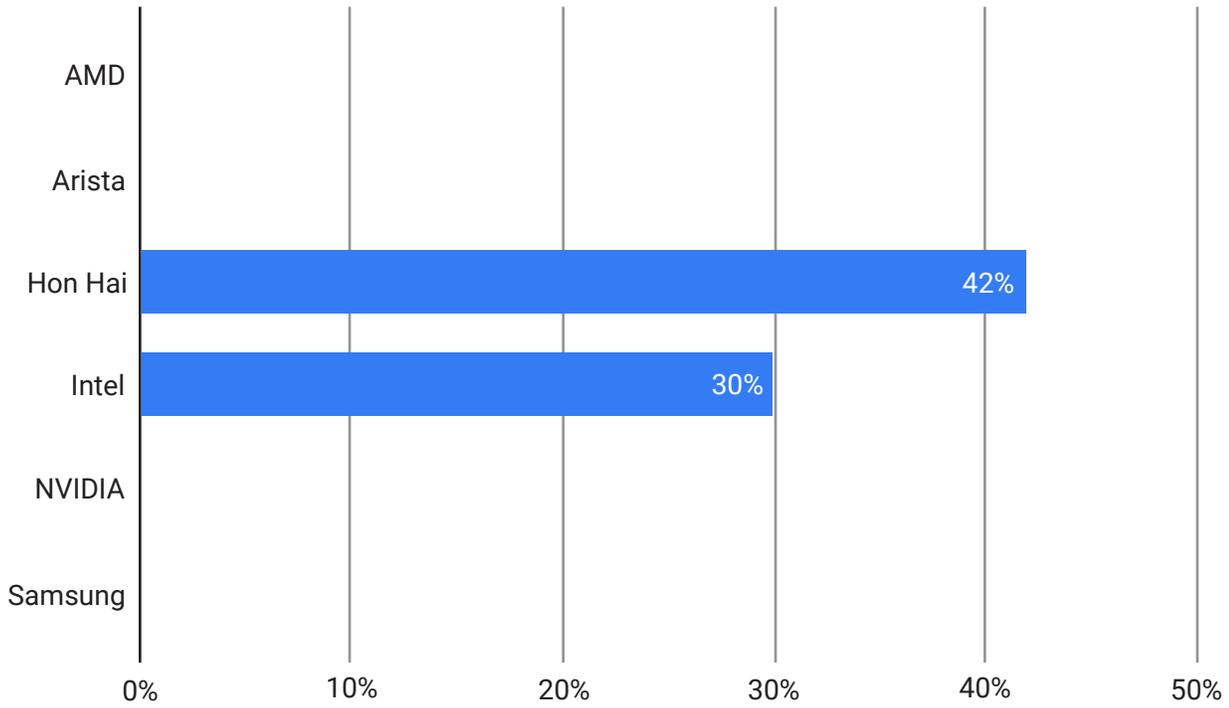


Figure 3. 6 suppliers' Scope 3 GHG reduction targets by 2030²⁹

The analysis above underscores a critical gap in the collective commitment to reduce emissions in Microsoft's supply chain. The insufficient climate ambition among key suppliers not only undermines Microsoft's environmental objectives but also

highlights a broader issue within the industry. Suppliers' reluctance or inability to set ambitious climate targets poses a significant challenge to Microsoft's sustainability goals.

²⁹ It is worth noting that Quanta sets the year to achieve its climate goals as 2032. For Hon Hai, its climate targets include Scope 1, 2 and 3.



Rising Emissions Trend in Microsoft's Supply Chain

Emissions from the majority of Microsoft's key suppliers are on the rise.

To comprehensively evaluate the effectiveness of Microsoft's supply chain decarbonization efforts, a detailed analysis was conducted focusing on the emissions stemming from its suppliers' own operations in recent years. It presents a concerning trend: **a significant majority of those assessed – AMD, Arista, Hon Hai, Intel, NVIDIA, Samsung, and SK hynix – have shown a consistent increase in their operational emissions from 2020 to 2022.**³⁰ Among them, AMD's increase is a striking 43%, and SK hynix's growth has reached a significant 21%.

This upward trajectory in emissions serves as a critical indicator of the environmental impact that Microsoft's supply chain is having. The data shows not only the current levels of emissions but also the trend over time, providing insight into whether these suppliers are progressing towards climate change mitigation or moving away from it. The increasing emissions trend among these key suppliers signals a pressing need for Microsoft to develop more robust and effective decarbonization strategies within the supply chain.

In addition, the team conducted a thorough analysis of emissions stemming from the purchased goods and services of six suppliers. **Among them, five suppliers – AMD, Arista, Hon Hai, Intel, and Luxshare – show a general upward trend in Scope 3 Category 1 emissions** (see Figure 5).³¹ Particularly striking is the case of Luxshare, where, within just one year,

³⁰ All data is extracted from suppliers' 2023 CDP report. Due to inconsistency, the data from sustainability, ESG, or CSR reports were used for NVIDIA and PEGATRON.

³¹ Please note that Luxshare is not included in the figure since its Scope 3 Category 1 emissions data for the year 2020 is unavailable.

emissions linked to its purchased goods and services have shown a remarkable surge, exceeding a 500% increase.³² For AMD, Arista, Hon Hai, and Intel, there has been a notable increase in Scope 3 Category 1 emissions over two years, with AMD seeing a 150% rise, Arista 90%, Hon Hai 20%, and Intel 7%.³³ This significant escalation underscores a substantial opportunity for Microsoft to enhance its supply chain management practices, along with its key suppliers, and reduce climate footprint.

The rise in emissions can be attributed to various factors, including the lack of a clear and actionable decarbonization plan, reliance on energy-intensive processes, and a slow adoption of renewable energy sources and energy-efficient technologies. This trend is particularly alarming in the context of global efforts to combat climate change, as it suggests that despite the growing awareness and initiatives for environmental sustainability, substantial challenges

remain in achieving tangible reductions in GHG emissions.

According to the analysis, Microsoft – a leading technology company with a large climate footprint – has not taken suitable action to drive climate change mitigation among its suppliers. The upward trend in emissions among Microsoft's suppliers underscores the need for a more proactive and collaborative approach to supply chain decarbonization. There is a clear opportunity for Microsoft to leverage its influence and resources to encourage and support its suppliers in adopting more sustainable practices. By taking decisive action and working closely with its suppliers, Microsoft can help create a shift towards more sustainable business practices, thereby making a meaningful contribution to global decarbonization efforts (see details in the section of *Strategic Recommendations for Enhancing Microsoft's Environmental Leadership*).

³² The data presented reflects the change occurring between 2021 and 2022.

³³ "Suppliers' 2023 CDP Reports."

Lackluster Energy Transition Goals of Microsoft's Suppliers

The renewable energy transition goals set by Microsoft's key suppliers are notably lackluster.

As a leading technology corporation operating in an energy-intensive sector with an expansive supply chain, Microsoft's commitment to exclusively use clean, renewable energy for its manufacturing processes, particularly emphasizing the phasing out of fossil fuels, could exert a significant influence across the entire industry. Unfortunately, Microsoft has not yet made definitive goals for transitioning its supply chain to renewable energy. Accordingly, the transition to renewable energy sources among Microsoft's key suppliers is progressing at a notably slow rate.

In 2022, the total electricity consumption of these 10 suppliers exceeded 64 million MWh³⁴, surpassing the entire energy usage of the Czech Republic³⁵. This staggering figure underscores the significant energy demands of these suppliers and highlights the broader implications of their consumption patterns on global energy resources. As a major client with considerable influence, Microsoft holds both the capacity and the responsibility to mandate that this huge energy demand in its supply chain is met through clean, renewable sources. Such a move by Microsoft could be an important step towards promoting sustainable energy practices across the industry.

Despite this considerable energy demand, only Intel and NVIDIA have committed to sourcing 100% of their electricity or energy from renewable resources across their global operations by 2030 or before (see Table 2).^{36,37}

³⁴ "Suppliers' 2023 CDP Reports."

³⁵ "World Energy Consumption Statistics," Enerdata, accessed January 13, 2024, <https://yearbook.enerdata.net/electricity/electricity-domestic-consumption-data.html>.

³⁶ "2022-23 Corporate Responsibility Report" (Intel, 2023), <https://csrreportbuilder.intel.com/pdfbuilder/pdfs/CSR-2022-23-Full-Report.pdf>.

³⁷ "NVIDIA Corporate Responsibility Report Fiscal Year 2023" (NVIDIA, 2023), <https://images.nvidia.com/aem-dam/Solutions/documents/FY2023-NVIDIA-Corporate-Responsibility-Report-1.pdf>.

Among companies whose energy consumption predominantly occurs at the supply chain stage, only AMD and Hon Hai have established targets for their primary suppliers' energy procurement. In contrast, the remaining companies have yet to make

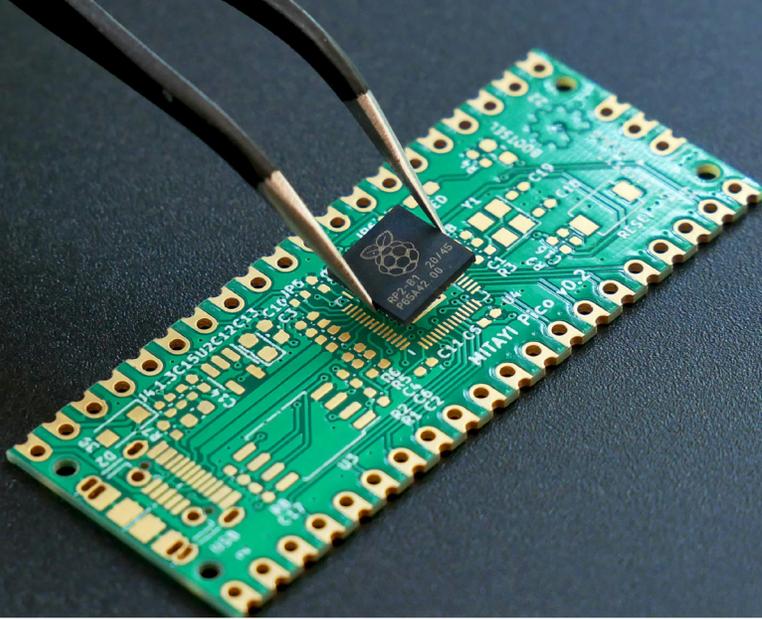
significant commitments towards transforming the energy practices within their supply chains, although renewable energy procurement goals of suppliers are critical in driving Microsoft's transition towards greener energy practices.

Table 2. Suppliers' energy transition goals

Supplier Names	Own operation		Supply chain	
	Renewable energy goal	Target year	Renewable energy goal	Target year
AMD	No		80% direct manufacturing suppliers to source renewable energy	2025
Arista	No		No	
Hon Hai	50%	2030	More than 45 key electronics suppliers to use 100% renewable energies	2025
Intel	100%	2030	No	
Luxshare	50%	2025	No	
NVIDIA	100%	2025	No	
PEGATRON	No		Not assessed	
Quanta	50%	2030	Not assessed	
Samsung	100%	2050	Not assessed	
SK hynix	100%	2050	Not assessed	

The absence of a definitive energy transition goal for its supply chain by Microsoft has evidently led to a lack of clear guidance on formulating energy transition goals or motivation among its suppliers to establish renewable energy targets, thereby resulting in slow progress. Given the huge energy

consumption of Microsoft's supply chain, committing to sourcing 100% renewable energy by 2030 within the entire supply chain can not only accelerate energy transition progress among its suppliers, but also encourage broader clean energy strategies across the technology sector.



Supply Chain Energy Sourcing Strategies Lack Integrity

Microsoft's key suppliers heavily rely on low-impact renewable electricity.

Establishing energy transition goals is a crucial initial step. It is more important that the energy procurement practices of key players in the supply chain are aligned to promote clean and renewable energy additional to the grid. The team therefore conducted a comprehensive analysis of the energy consumption, the proportion of renewable energy, and the energy sources of the 10 suppliers. The analysis reveals that, in Microsoft's supply chain, a self-claimed renewable energy ratio of 29%³⁸ is concerningly low (see Table 3).

When examining the composition of electricity, which is a significant part of energy consumption, the picture becomes more problematic. **Renewable electricity procurement of Microsoft's suppliers largely comes**

Table 3. Suppliers' renewable energy and self-claimed renewable energy in 2022³⁹

Supplier Names	Energy use (MWh)	Self-claimed renewable energy use (MWh)
AMD	207,572	66,105
Arista	20,863	4,877
Hon Hai	11,673,516	816,131
Intel	10,824,500	8,250,300
Luxshare	3,133,474	639,963
NVIDIA	496,901	194,544
PEGATRON	851,043	163,477
Quanta	907,421	217,655
Samsung	35,177,000	8,707,000
SK hynix	14,434,706	3,572,379

³⁸ "Suppliers' 2023 CDP Reports."

³⁹ "Suppliers' 2023 CDP Reports."

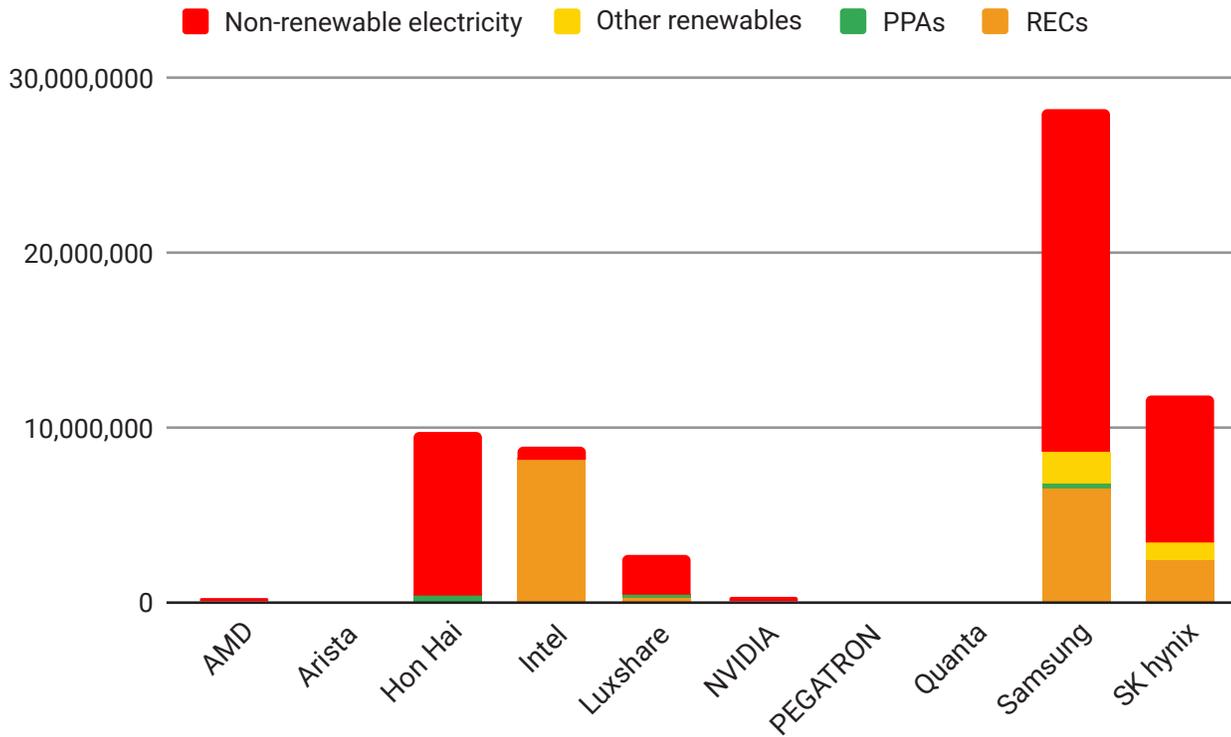


Figure 4. Supplier's electricity consumption from different sources⁴¹

from unbundled RECs, and very little is high-impact renewable electricity. Electricity procurement through PPAs constitutes only 1% of the total electricity consumption by these suppliers (see Figure 4).⁴⁰

A more detailed analysis on RECs indicates that **70% of the assessed suppliers have reported purchasing unbundled RECs for most of their renewable electricity** because this has the effect of artificially reducing their greenhouse gas emissions and increasing their reported percentages of renewable energy consumption. However, evidence suggests that the acquisition of these unbundled RECs does not contribute meaningfully to the addition of new renewable energy generation to the grid, nor

does it significantly aid in the reduction of actual emissions. It potentially masks actual carbon emissions and a continued reliance on, and demand for, fossil fuels.⁴²

AMD, Hon Hai, PEGATRON, and Samsung have explicitly reported pursuing REC purchases as part of their electricity procurement strategies and investment plans in their sustainability reports. These suppliers – especially US-based Intel, which holds the highest ratio of RECs – are effectively masking a growing emissions footprint from electricity consumption, both in their own operations and in Microsoft's supply chain (see Figure 5).

⁴⁰ "Suppliers' 2023 CDP Reports."

⁴¹ All data is extracted from suppliers' 2023 CDP report. Please note that Arista, PEGATRON, and Quanta did not disclose details of energy sources.

⁴² Zhang, "Pathways to Decarbonization."

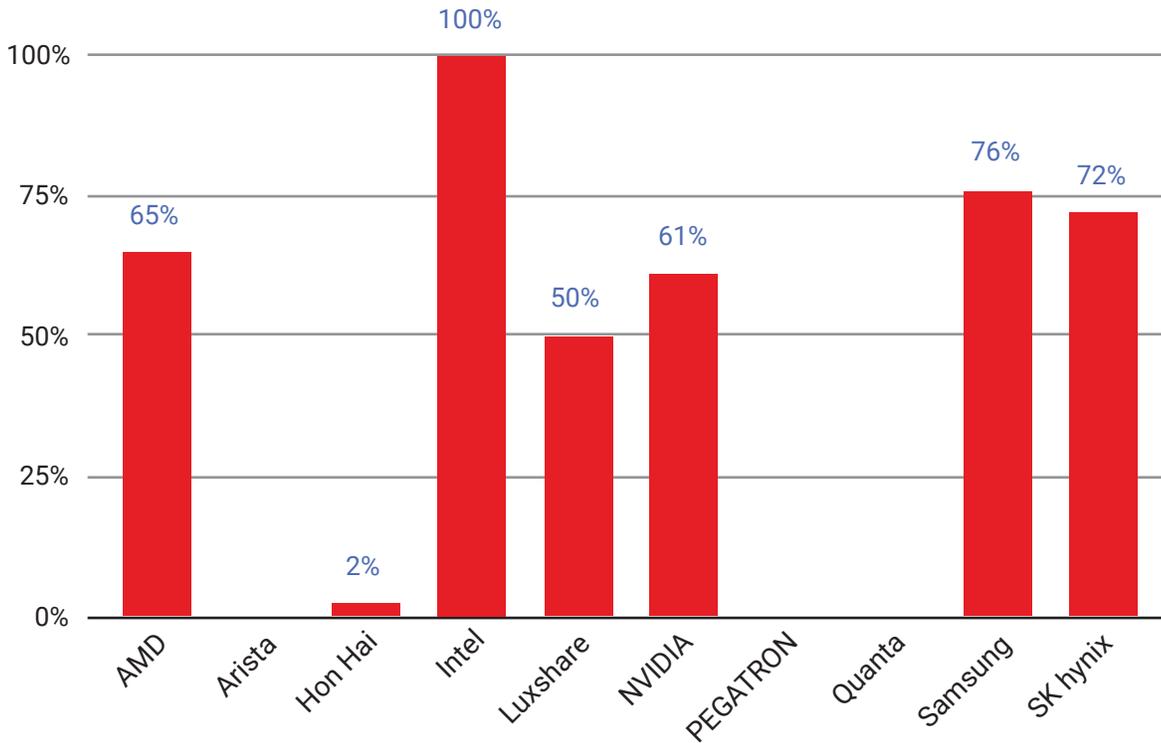


Figure 5. Percentage of unbundled RECs in suppliers' self-claimed renewable electricity consumption⁴³

Until recently, the prevalence of RECs in Microsoft's supply chain was echoed in its own renewable electricity purchases, undermining its claim of running on 100% renewables. Over the last few years, the company signed a number of large PPAs as part of a commitment to ultimately phasing out this ineffective method,⁴⁴ but in 2022 approximately 50% of its claimed renewable electricity was still derived from unbundled RECs.⁴⁵

The overall picture of Microsoft's 10 suppliers reveals a slow transition to renewables and heavy reliance

on traditional fossil-based energy sources. While the move towards renewable energy in Microsoft's supply chain is underway, there is a clear need for a more concerted and proactive effort. By implementing more stringent requirements for renewable energy usage in its supply chain and discontinuing support for unbundled RECs, both in its own operations and its supply chain, Microsoft has the potential to drive renewable electricity generation on a global scale. This strategic shift could position Microsoft as a leader in fostering sustainable energy practices within the tech industry.

⁴³ All data is extracted from suppliers' 2023 CDP report. Please note that Arista, PEGATRON, and Quanta did not disclose details of energy sources. Hon Hai did report the use of unbundled RECs, however, the percentage was too minimal to be represented in Figure 7.

⁴⁴ "2022 Environmental Sustainability Report."

⁴⁵ "Microsoft 2023 CDP Report."



Strategic Recommendations for Enhancing Microsoft's Environmental Leadership

If Microsoft is going to live up to its position of climate leadership, it is essential that the company approaches its supply chain with transparency and accountability. To show leadership in global decarbonization and meet stakeholder expectations, Stand.earth has three key strategic recommendations:

1. Strengthen Climate Leadership

As a leader in the technology sector, Microsoft has the responsibility and the capacity to actively combat climate change. This involves setting ambitious goals for supply chain decarbonization, coupled with a clear and actionable plan, and transitioning to 100% renewable energy by 2030 within the entire supply chain. More specifically, Microsoft is advised to undertake a comprehensive review and develop a robust climate and energy strategy. This strategy should include ambitious yet actionable goals for

reducing GHG emissions in the supply chain and prioritize renewable energy projects.

2. Intensify Supplier Engagement and Compliance

Given that the identified 10 suppliers contribute around 40% of Microsoft's supply chain emissions, it is essential for Microsoft to build close partnerships with these suppliers.⁴⁶ The relationship should focus on alignment with Microsoft's environmental requirements and climate targets. By supporting suppliers in setting measurable climate goals, sharing best practices, facilitating access to renewable energy resources, and offering training and workshops on reducing carbon footprints, Microsoft can significantly help its suppliers make and meet commitments to sustainability. If possible, the company is advised to conduct regular audits, publicly report on its

⁴⁶ It is calculated based on Microsoft's costs as a proportion of the suppliers' revenue and the total Scope 1, Scope 2 and Scope 3 Category 1 GHG emissions of each supplier.

supply chain energy use and sources, and employ accountability measures to ensure its suppliers stay on track to meet climate commitments and adopt renewable energy.

3. Focus on Renewable Energy Use

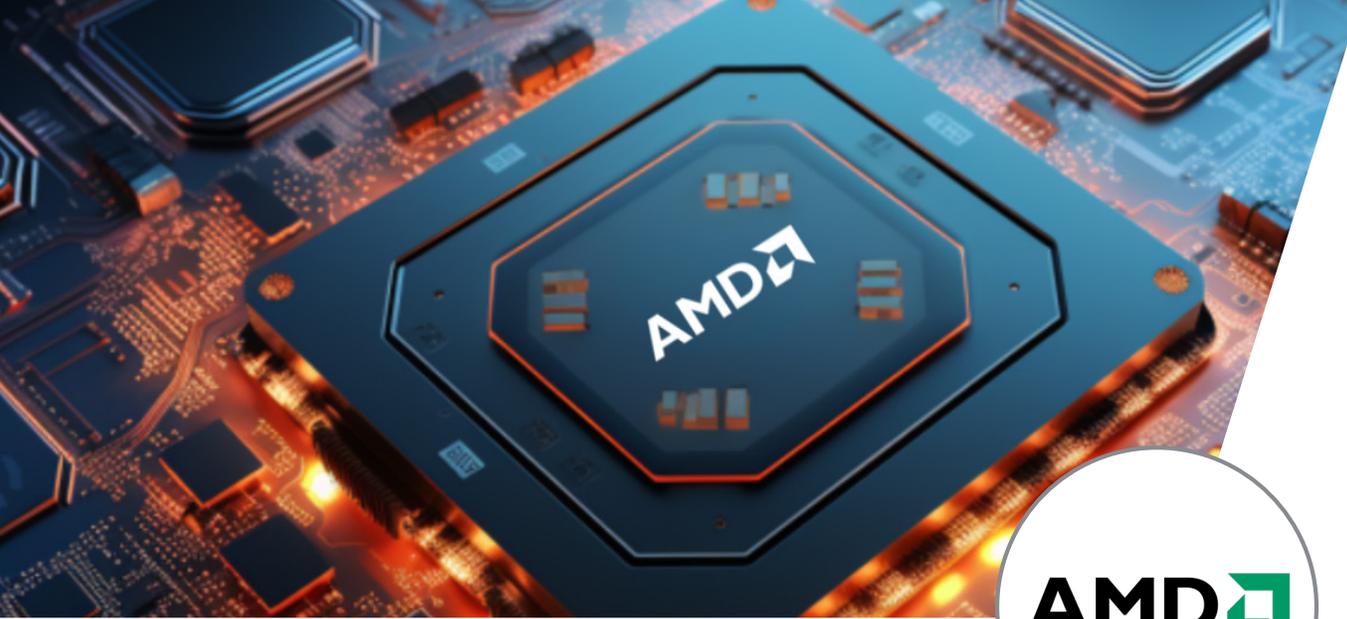
To lead by example, in its own operations, Microsoft should prioritize high-impact renewable energy sources as part of its climate strategy, and continue to move away from an overreliance on unbundled RECs and other less effective solutions. Moreover, incorporating sustainable energy source criteria into procurement processes and prioritizing suppliers who actively pursue PPAs or other high-impact strategies to bring additional local supply of renewable energy on to the grid, would further reinforce these efforts. If possible, the company is advised to

establish comprehensive monitoring and reporting mechanisms to verify that its suppliers are making substantial contributions to genuine renewable energy generation.

Ultimately, achieving meaningful reductions in GHG emissions requires a concerted and collaborative effort across the entire supply chain. Microsoft, as one of the most valuable companies in the world, has a unique opportunity to lead by example, inspiring and guiding its suppliers toward more ambitious climate action. Such initiatives would not only solidify Microsoft's reputation as a responsible and forward-thinking leader in the technology sector, but also enhance the sustainability of its supply chain. In the long run, it can play a pivotal role in driving industry-wide change and contributing to a more sustainable future.



Appendix 1: Supplier Fact Sheets



AMD^{47,48}

<p>Brief Introduction</p>	<p>AMD is a global semiconductor company headquartered in the United States. In 2022, AMD reported revenues of nearly 24 billion USD⁴⁹ and had a workforce of over 24,500 employees, of which 48% were of Asian ethnicity.</p> <p>AMD’s partnership with Microsoft accounts for transactions worth over 800 million USD.⁵⁰ The company acknowledges the importance of this relationship in its 10-Q report, stating “if we lose Microsoft Corporation’s support for our products or other software vendors do not design and develop software to run on our products, our ability to sell our products could be materially adversely affected.”⁵¹</p>
<p>Climate Targets</p>	<p>For its own operations, AMD has committed to reducing its Scope 1 and 2 absolute emissions by 50% by the year 2030, with 2020 as the base year. AMD aims to have 100% direct manufacturing suppliers to set science-based targets for their Scope 1 and 2 emissions goals by 2025, and has achieved 70% of this goal in 2022.</p>

⁴⁷ Unless specified otherwise, the data presented in this fact sheet is sourced from the company’s CDP or CRS report.

⁴⁸ “2022-23 Corporate Responsibility Report” (AMD, 2023), <https://www.amd.com/content/dam/amd/en/documents/corporate/cr/2022-23-amd-cr-report.pdf>.

⁴⁹ “Market Data.”

⁵⁰ “Bloomberg Terminal.”

⁵¹ “FORM 10-Q” (AMD, 2023), <https://ir.amd.com/sec-filings/content/0000002488-23-000195/0000002488-23-000195.pdf>.

Renewable Energy Targets	AMD has not set a specific renewable energy target for its own operations. It has reported evaluating ways to continue increasing renewable energy sourcing over the next three to five years and beyond, aligned with its business strategies. The company has set a goal to double the use of renewable energy by its primary foundry manufacturing suppliers from 2020 to 2025. In addition, AMD aims for 80% of its direct manufacturing suppliers to source renewable energy by 2025, and has achieved 68% in 2022.
Climate Actions	AMD has reported initiating programs to enhance visibility into its sub-tier suppliers and providing training focused on social responsibility, supply chain management, forced labor prevention, and air emissions management.
Renewable Energy Use	Between 2020 and 2022, AMD's global energy use increased by 7% from 199 GWh to 208 GWh according to its self-reported data. The increase of renewables is partly attributed to the availability of renewable energy sources in Taiwan, where a significant portion of AMD's wafers are manufactured. Although AMD reported that 36% of its electricity consumption was from renewable sources in 2022, it is noteworthy that 65% of this figure was attributed to the purchase of unbundled RECs in the US, Singapore, China, and India.


 ARISTA

 Arista^{52,53}

Brief Introduction	Arista is a computer networking company based in the United States, reporting a revenue of over 4 billion USD in 2022. ⁵⁴ With a workforce exceeding 3,600 employees, Arista has established a strong transactional relationship with Microsoft, contributing to 15% of its revenues, with transactions amounting to over 700 million USD. ⁵⁵
Climate Targets	Arista has not set specific climate targets, but reported developing Science-based Targets in 2023.
Renewable Energy Targets	Arista currently does not have a defined renewable energy target. But the company has reported engaging with local energy providers to procure electricity from renewable sources for its operations.
Climate Actions	Arista has not reported any meaningful climate action.
Renewable Energy Use	In 2022, Arista's direct electricity use was 5,115 MWh, and its indirect use was 5,713 MWh, with renewable electricity accounting for 31% of its consumption.

⁵² Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or CRS report.

⁵³ "Corporate Responsibility Report 2022" (Arista, 2023), https://www.arista.com/assets/data/pdf/Arista_CRR_2022.pdf.

⁵⁴ "Market Data."

⁵⁵ "Bloomberg Terminal."



Hon Hai^{56,57}

Brief Introduction	<p>Hon Hai, also known as Foxconn, is a multinational electronics contract manufacturer. Based in Taiwan, it achieved a revenue of 210 billion USD^{58,59} in 2022 and employed a massive workforce of nearly 926,000, reflecting its significant scale and impact in the sector.</p>
Climate Targets	<p>Hon Hai has committed to achieve net zero by 2050. The company aims to cut its absolute Scope 1, 2, and 3 GHG emissions by 21% by 2025, 42% by 2030, and 63% by 2035, using 2020 as the base year. The target for 2030 has received validation from SBTi.</p>
Renewable Energy Targets	<p>Hon Hai is planning for over 50% of its energy consumption to be from renewable sources by 2030. The company is also engaging its electronics suppliers, with an objective to have more than 45 of them commit to using 100% renewable energy for producing Hon Hai products by 2025. As of 2022, 12 key suppliers have already signed agreements to this effect.</p>

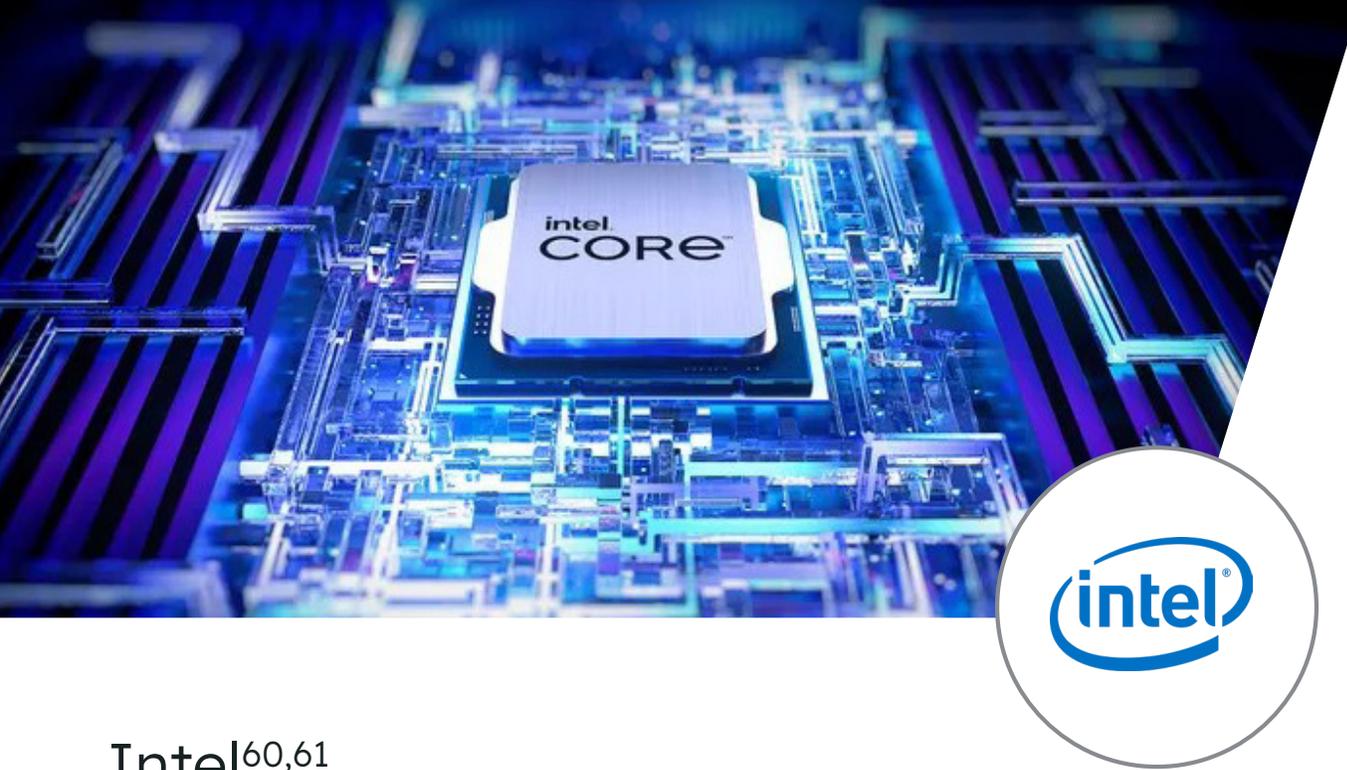
⁵⁶ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or CRS report.

⁵⁷ "2022 Sustainability Report" (Hon Hai, 2023), https://www.foxconn.com/s3/reports/CSR/EN/2022/HonHai_2022_Sustainability_Report_EN-Full.pdf.

⁵⁸ "Market Data."

⁵⁹ The currency conversion is based on the real-time exchange rate as of January 15, 2024.

Climate Actions	<p>Hon Hai announced plans to increase its procurement of green electricity for its factories in Taiwan in 2022. This initiative was further solidified through a memorandum of cooperation with Shinfox Energy, emphasizing its commitment to sustainable energy practices.</p> <p>Hon Hai has reported establishing a supplier carbon management system. This system mandates that suppliers provide third-party verified data on their carbon emissions and reductions. This includes detailed information on annual carbon emissions (categorized by Scope 1 and Scope 2), emissions per unit of output, progress towards annual carbon reduction targets, and updated data from net zero evaluations. This level of scrutiny and transparency is a crucial step in Hon Hai’s journey towards net-zero emissions.</p>
Renewable Energy Use	<p>Hon Hai’s journey towards renewable energy is still in its early stages. In 2022, the company reported purchasing nearly 10 million MWh of electricity, of which only 5% was derived from renewable sources. This reflects the considerable challenges confronting Hon Hai in its efforts to shift away from fossil fuels and transition towards more sustainable energy sources.</p>



Intel^{60,61}

<p>Brief Introduction</p>	<p>Intel Corporation, a multinational electronics contract manufacturer headquartered in the United States, reported a revenue of 63 billion USD in 2022.⁶² The company's workforce, totaling nearly 132,000 employees, reflects its significant global presence and influence in the technology sector.</p>
<p>Climate Targets</p>	<p>Intel has made a commitment to achieve net zero emissions by 2040. The company aims to reduce its absolute Scope 1 and Scope 2 GHG emissions by 10% and a 30% reduction in GHG emissions across its supply chain by 2030.</p>
<p>Renewable Energy Targets</p>	<p>Intel has committed to achieving 100% renewable electricity across its global operations by 2030.</p>
<p>Climate Actions</p>	<p>Intel has not detailed significant climate-related actions.</p>
<p>Renewable Energy Use</p>	<p>Intel has reported achieving 100% renewable electricity in its operations in the United States, European Union, Israel, and Malaysia, and is nearing this target in Costa Rica in 2022. Intel claimed to be focusing on expanding its renewable electricity purchases in Vietnam, China, and India, with a goal to reach at least 95% global renewable electricity usage in 2023. Although the company reported that 92% of its electricity consumption was from renewable sources in 2022, it is concerned that almost all of so-called renewables was attributed to the purchase of unbundled RECs.</p>

⁶⁰ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or CRS report.

⁶¹ "2022-23 Corporate Responsibility Report," 2023.

⁶² "Market Data."



Luxshare^{63,64}

Brief Introduction	Luxshare, an electronic components manufacturer headquartered in mainland China, reported a revenue of 30 billion USD in 2022. ^{65,66} The company's large workforce, comprising about 237,000 employees, underscores its significant role in the global electronics supply chain.
Climate Targets	Luxshare has committed to achieving net zero by 2050. The company has reported setting science-based climate targets. However, the specifics of these targets are yet to be disclosed, indicating an area for further transparency and commitment in their climate strategy.
Renewable Energy Targets	Luxshare has laid out a progressive plan to increase its use of clean energy. The company aims to enhance its clean energy utilization rate to 30% by 2023, 40% by 2024, and reach 50% by 2025.
Climate Actions	Luxshare has not detailed significant climate-related actions.
Renewable Energy Use	Luxshare has reported using 40,545 MWh of renewable energy in 2022, predominantly sourced from solar photovoltaic power generation. However, this figure represents only a small fraction, specifically 1%, of the company's total energy use. This highlights a considerable gap between the current renewable energy usage and the set targets, suggesting a need for accelerated efforts and investments in renewable energy projects. In terms of energy transition action, although Luxshare reported that 21% of its electricity consumption was from renewable sources in 2022, it is noteworthy that 50% of this figure was attributed to the purchase of unbundled RECs.

⁶³ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or sustainability report.

⁶⁴ "2022 Sustainability Report."

⁶⁵ "Market Data."

⁶⁶ The currency conversion is based on the real-time exchange rate as of January 15, 2024.



NVIDIA^{67,68}

<p>Brief Introduction</p>	<p>NVIDIA Corporation, a major force in the field of artificial intelligence hardware and software, is headquartered in the United States. In 2023, the company achieved a revenue of 27 billion USD⁶⁹ and employed over 26,000 people.</p> <p>Microsoft, the biggest consumer of NVIDIA, contributes to nearly 11 billion USD transactions with the company.⁷⁰ This underscores its prominence in Microsoft’s supply chain.</p>
<p>Climate Targets</p>	<p>NVIDIA has expressed its intention to align its Scope 1 and 2 emissions reduction with the global objective of limiting temperature rise to 1.5 degrees Celsius. However, the company is still in the process of establishing specific, quantifiable GHG emissions reduction targets for its operations and supply chain. NVIDIA has reported involving its main manufacturing suppliers in environmental sustainability, urging them to set science-based targets by the fiscal year 2026.</p>
<p>Renewable Energy Targets</p>	<p>NVIDIA aims to power all its global offices and data centers entirely with renewable energy by January 2025. While this target is specific to its own operations, NVIDIA has not yet set a renewable energy target for its supply chain, indicating an area for potential growth in its sustainability strategy.</p>
<p>Climate Actions</p>	<p>According to NVIDIA’s self report, over 60% of its suppliers have reported the use of renewable energy in the fiscal year 2023.</p>
<p>Renewable Energy Use</p>	<p>In terms of its own operations, NVIDIA reported using 194,544 MWh of renewable electricity in the fiscal year 2023. This includes both purchased and self-generated electricity, contributing to 44% of the company’s total electricity usage coming from renewable sources. However, it is noteworthy that 61% of this figure was attributed to the purchase of unbundled RECs.</p>

⁶⁷ Unless specified otherwise, the data presented in this fact sheet is sourced from the company’s CDP or CRS report.

⁶⁸ “NVIDIA Corporate Responsibility Report Fiscal Year 2023.”

⁶⁹ “Market Data.”

⁷⁰ “Bloomberg Terminal.”


PEGATRON

PEGATRON^{71,72}

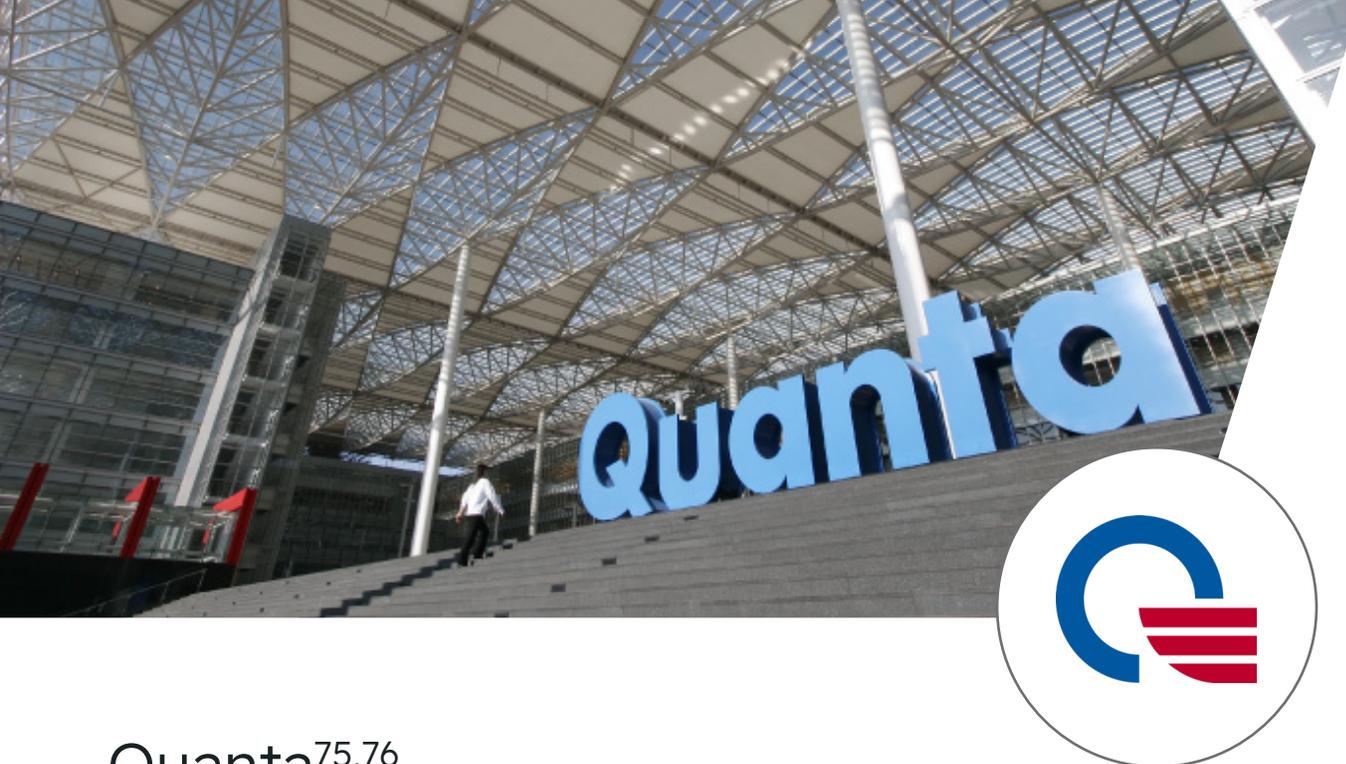
Brief Introduction	PEGATRON, headquartered in Taiwan, is an electronics manufacturing company. In 2022, the company reported revenues of 42 billion USD ^{73,74} and employed a workforce of approximately 64,000.
Climate Targets	PEGATRON has set a goal to reduce its GHG emissions by 25% per unit of revenue by 2030, using 2019 as the baseline year. However, the company has yet to establish absolute emissions reduction targets for its operations or supply chain, indicating an area for potential enhancement in its climate strategy.
Renewable Energy Targets	PEGATRON has not announced specific renewable energy targets.
Climate Actions	PEGATRON has not disclosed any significant climate-related actions.
Renewable Energy Use	PEGATRON has reported using 163,477 MWh of renewable electricity in 2022, which includes both purchased and self-generated power. This accounted for 13% of its total energy use, indicating a gradual shift towards sustainable energy sources. However, PEGATRON's approach to renewable energy primarily involves purchasing renewable energy and renewable energy certificates, especially for its mainland China plants.

⁷¹ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or CRS report.

⁷² "2022 PEGATRON Sustainability Report" (PEGATRON, 2023), https://www.pegatroncorp.com/files/backend/csr_file/2022%20Sustainability%20Report.pdf.

⁷³ "Market Data."

⁷⁴ The currency conversion is based on the real-time exchange rate as of January 15, 2024.



Quanta^{75,76}

Brief Introduction	Quanta, based in Taiwan, is a manufacturer of notebook computers and other electronic hardware. In 2022, the company achieved a revenue of 41 billion USD ^{77,78} and employed a substantial workforce of over 55,000.
Climate Targets	Quanta has committed to reducing its Scope 1 and 2 emissions by 42%, and Scope 3 emissions by 25% by the year 2032, using 2022 as the base year.
Renewable Energy Targets	Quanta has committed that half of its energy consumption will be derived from renewable sources by 2030.
Climate Actions	Quanta has not reported any meaningful climate action.
Renewable Energy Use	In a move towards its renewable energy goals, Quanta reported utilizing 217,655 MWh of renewable energy in 2022 across four of its factories. This accounts for 26% of the company's total energy use. However, the company's renewable electricity procurement largely relies on unbundled RECs.

⁷⁵ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or ESG report.

⁷⁶ "2022 Quanta Computer ESG Report" (Quanta, 2023), https://www.quantatw.com/Quanta/english/esg/ESG2022/Quanta_ESG_EN_2022.pdf.

⁷⁷ "Market Data."

⁷⁸ The currency conversion is based on the real-time exchange rate as of January 15, 2024.



Samsung^{79,80}

Brief Introduction	<p>Samsung, a multinational corporation based in South Korea, is a major player in the appliance and consumer electronics industry. The company has demonstrated its formidable presence in the global market with a revenue of 192 billion USD in 2023.^{81,82} Samsung's over 270,000 employees further emphasizes its significant role as a key player in the technology sector.</p>
Climate Targets	<p>Samsung has committed to achieve carbon neutrality by 2050. But the company has not yet established science-based climate targets for its operations or supply chain. This represents an area where the company can further strengthen its commitment to climate change mitigation.</p>
Renewable Energy Targets	<p>Samsung aims to achieve 100% transition to renewable energy at all of its business sites around the world. But the company has not specified renewable energy targets for its supply chain.</p>

⁷⁹ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or Sustainability report.

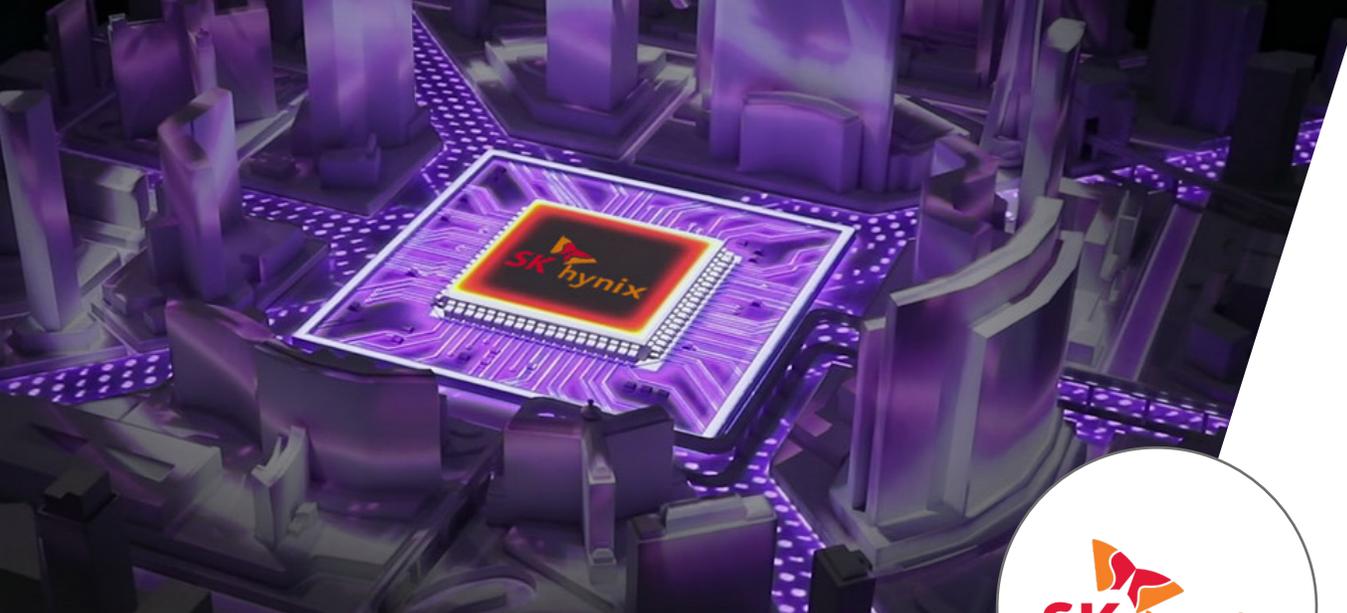
⁸⁰ "Samsung Electronics Sustainability Report 2023" (Samsung, 2023), https://www.samsung.com/global/sustainability/media/pdf/Samsung_Electronics_Sustainability_Report_2023_ENG.pdf.

⁸¹ "Market Data."

⁸² The currency conversion is based on the real-time exchange rate as of January 15, 2024.

Climate Actions	<p>Samsung has joined the RE100 initiative to reduce Scope 2 emissions. The company has also reported signing partnership agreements with Jeju Energy Corporation, Korea South-East Power, and Korea Southern Power to secure and expand the use of renewable energy in 2022.</p> <p>Samsung has disclosed its major supplier list, energy use, electricity consumption and GHG emissions data.⁸³ The company has also reported providing supplier training programs to support their climate action.</p>
Renewable Energy Use	<p>Samsung has reported achieving a transition to 100% renewable energy at its DX Division's business sites in Korea, Vietnam, India, and Brazil in 2022. However, many of Samsung's manufacturing sites, including those in the US, Hungary, Slovakia, Poland, Chennai, Vietnam, China, Brazil, and Mexico, still rely on the purchase of RECs to offset their energy usage. Unbundled RECs account for 23% of its electricity consumption in 2022.</p>

⁸³ "2022 Supplier List" (Samsung, 2022), https://image-us.samsung.com/SamsungUS/home/pdf/062822/2022_Supplier_List_220608_F.pdf.



SK hynix^{84,85}

Brief Introduction	SK hynix, headquartered in South Korea, is a memory chipmaker and semiconductor manufacturer. In 2022, the company reported a revenue of 33 billion USD ^{86,87} , with a workforce of nearly 35,500 employees.
Climate Targets	SK hynix aims to maintain absolute Scope 1 and 2 GHG emissions at the 2020 level by 2030. But the company has not set a science-based climate target for its supply chain, an area important for its climate strategy.
Renewable Energy Targets	SK hynix aims to achieve 100% renewable electricity consumption by 2050. As an interim milestone, the company has set a target to power 33% of its global operations with renewable electricity by 2030.
Climate Actions	SK hynix joined the RE100 initiative in 2020 and pledged to use 100% renewable energy by 2050. And the company has reported using various technologies to achieve energy efficiency. In addition, SK hynix has disclosed energy usage, electricity use and GHG emissions information.
Renewable Energy Use	In 2022, SK hynix has reported sourcing 100% of the electricity for its overseas facilities from renewable sources, resulting in 30% of its total electricity usage being renewable. However, it is concerning that 72% of this figure was attributed to the purchase of RECs. And the company acknowledges challenges in procuring renewable electricity in Korea, indicating an area for continued effort and improvement.

⁸⁴ Unless specified otherwise, the data presented in this fact sheet is sourced from the company's CDP or CRS report.

⁸⁵ "SK Hynix Sustainability Report 2023" (SK hynix, 2023), <https://mis-prod-koce-homepage-cdn-01-blob-ep.azureedge.net/web/attach/44070673739218236.pdf>.

⁸⁶ "Market Data."

⁸⁷ The currency conversion is based on the real-time exchange rate as of January 15, 2024.



Appendix 2: Acronyms

AI - artificial intelligence

CCS - carbon capture and storage

CDR - carbon dioxide removal

CSR - Corporate Social Responsibility

ESG - Environmental, Social, and Governance

GHG - greenhouse gas

PPA - power purchase agreement

REC - renewable energy certificate

SBTi - Science Based Targets initiative

Appendix 3: References

- “2022 Environmental Sustainability Report.” Microsoft, 2023. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RW15mgm>.
- “2022 Environmental Sustainability Report Data Fact Sheet.” Microsoft, 2023. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RW13PLE>.
- “2022 PEGATRON Sustainability Report.” PEGATRON, 2023. https://www.pegatroncorp.com/files/backend/csr_file/2022%20Sustainability%20Report.pdf.
- “2022 Quanta Computer ESG Report.” Quanta, 2023. https://www.quantatw.com/Quanta/english/esg/ESG2022/Quanta_ESG_EN_2022.pdf.
- “2022 Supplier List.” Samsung, 2022. https://image-us.samsung.com/SamsungUS/home/pdf/062822/2022_Supplier_List_220608_F.pdf.
- “2022 Sustainability Report.” Hon Hai, 2023. https://www.foxconn.com/s3/reports/CSR/EN/2022/HonHai_2022_Sustainability_Report_EN-Full.pdf.
- “2022-23 Corporate Responsibility Report.” Intel, 2023. <https://csrreportbuilder.intel.com/pdfbuilder/pdfs/CSR-2022-23-Full-Report.pdf>.
- “2022-23 Corporate Responsibility Report.” AMD, 2023. <https://www.amd.com/content/dam/amd/en/documents/corporate/cr/2022-23-amd-cr-report.pdf>.
- “Bloomberg Terminal,” 2023.
- Calma, Justine. “Microsoft Is Going Nuclear to Power Its AI Ambitions.” The Verge, September 26, 2023. <https://www.theverge.com/2023/9/26/23889956/microsoft-next-generation-nuclear-energy-smr-job-hiring>.
- “Corporate Responsibility Report 2022.” Arista, 2023. https://www.arista.com/assets/data/pdf/Arista_CRR_2022.pdf.
- Enerdata. “World Energy Consumption Statistics.” Accessed January 13, 2024. <https://yearbook.enerdata.net/electricity/electricity-domestic-consumption-data.html>.
- “Environmental Justice in Renewable Energy Procurement.” Microsoft, 2022. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE5cgC0>.
- “FORM 10-Q.” AMD, 2023. <https://ir.amd.com/sec-filings/content/0000002488-23-000195/0000002488-23-000195.pdf>.

- Hengeveld, Maria. "Carbon Offsetting Project and Human Rights Abuse in Kenya." SOMO (blog), November 6, 2023. <https://www.somo.nl/offsetting-human-rights/>.
- Market Data Center on The Wall Street Journal. "Market Data," 2024. <https://www.wsj.com/market-data>.
- Microsoft. "Carbon Management Technologies Set to Soar in Europe, with Proactive Policies Key in Unlocking Its Potential," November 20, 2023. <https://blogs.microsoft.com/eupolicy/2023/11/20/carbon-removal-management-technologies-ccs-beccs/>.
- Microsoft. "Microsoft Announces Participation as a Strategic Principal Sponsor of COP27," 2022. <https://news.microsoft.com/en-xm/2022/09/15/microsoft-announces-participation-as-a-strategic-principal-sponsor-of-cop27/>.
- Microsoft. "Microsoft Cloud for Sustainability | Microsoft," 2022. <https://www.microsoft.com/en-us/sustainability/cloud>.
- "Microsoft 2021 Annual Report." Microsoft, 2022. <https://www.microsoft.com/investor/reports/ar21/index.html>.
- "Microsoft 2022 Annual Report." Microsoft, 2023. <https://www.microsoft.com/investor/reports/ar22/index.html>.
- "Microsoft 2023 CDP Report." CDP, 2023.
- "Microsoft: Carbon Negative Goal | Global | UNFCCC." UNFCCC, 2023. <https://unfccc.int/climate-action/un-global-climate-action-awards/climate-neutral-now/microsoft-carbon-negative-goal>.
- "Microsoft Supplier Code of Conduct," 2023. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4qa18>.
- Mooldijk, Silke, Thomas Day, and Sybrig Smit. "Navigating the Nuances of Corporate Renewable Electricity Procurement: Spotlight on Fashion and Tech." NewClimate Institute, 2024. <https://newclimate.org/resources/publications/navigating-the-nuances-of-corporate-renewable-electricity-procurement>.
- "NVIDIA Corporate Responsibility Report Fiscal Year 2023." NVIDIA, 2023. <https://images.nvidia.com/aem-dam/Solutions/documents/FY2023-NVIDIA-Corporate-Responsibility-Report-1.pdf>.
- "Oil in the Cloud: How Tech Companies Are Helping Big Oil Profit from Climate Destruction." Greenpeace, May 19, 2020. <https://www.greenpeace.org/usa/reports/oil-in-the-cloud/>, <https://www.greenpeace.org/usa/reports/oil-in-the-cloud/>.
- "Samsung Electronics Sustainability Report 2023." Samsung, 2023. https://www.samsung.com/global/sustainability/media/pdf/Samsung_Electronics_Sustainability_Report_2023_ENG.pdf.
- "SK Hynix Sustainability Report 2023." SK hynix, 2023. <https://mis-prod-koce-homepage-cdn-01-blob-ep.azureedge.net/web/attach/44070673739218236.pdf>.
- Smith, Brad. "Microsoft Will Be Carbon Negative by 2030." Microsoft, January 16, 2020. <https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/>.
- "Suppliers' 2023 CDP Reports." CDP, 2023. <https://www.cdp.net/en>.
- US EPA, OAR. "Greenhouse Gas Equivalencies Calculator." Data and Tools, August 28, 2015. <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>.
- Warren, Tom. "Microsoft Briefly Overtakes Apple to Become the World's Most Valuable Company Again." The Verge, January 11, 2024. <https://www.theverge.com/2024/1/11/24034434/microsoft-apple-market-cap-business-valuable-company>.
- Zhang, Xixi. "Pathways to Decarbonization: Why IT Companies Can and Need to Do More to Reduce Supply Chain Carbon Emissions." Stand.earth, October 16, 2023. <https://stand.earth/resources/pathways-to-decarbonization-why-it-companies-can-and-need-to-do-more-to-reduce-supply-chain-carbon-emissions/>.

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