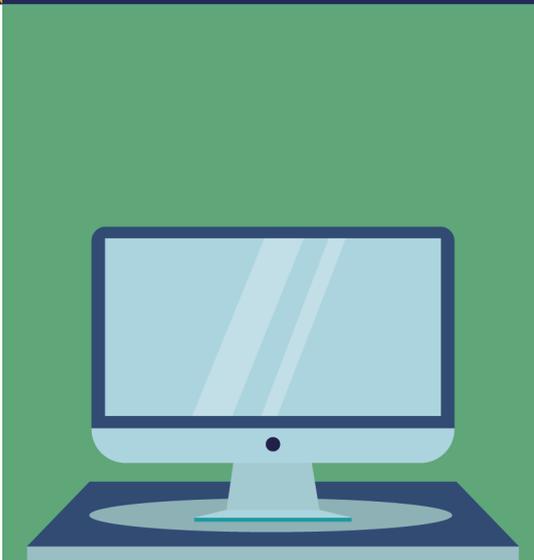


# Greening digital companies 2023

Monitoring emissions and  
climate commitments



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## Acronyms and abbreviations

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<b>DIB</b>	Digital Inclusion Benchmark
<b>FY</b>	fiscal year
<b>GHG</b>	greenhouse gas
<b>ICT</b>	information and communication technology
<b>ITU</b>	International Telecommunication Union
<b>kW, kWh</b>	kilowatt, kilowatt-hours
<b>MW, MWh</b>	megawatt, megawatt-hours
<b>Paris Agreement</b>	2015 agreement adopted by the parties to the 1992 United Nations Framework Convention on Climate Change
<b>PPA</b>	power purchase agreement
<b>REC</b>	renewable energy certificate
<b>SBTi</b>	Science Based Targets initiative
<b>TW, TWh</b>	terawatt, terawatt-hours
<b>WBA</b>	World Benchmarking Alliance

## Foreword

Digital transformation has brought both challenges and opportunities to the forefront of the global conversation on climate change and sustainability. This second edition of the Greening Digital Companies report by the International Telecommunication Union and the World Benchmarking Alliance focuses on the industry enabling this transformation and sheds light on the complex interplay between the digital industry and environmental challenges. Digital companies, on one hand, contribute to the global carbon footprint, contributing to climate change. On the other hand, they have the potential to be champions of environmental progress, thanks to their extensive adoption of renewable energy and the enabling technologies that help other sectors reduce their emissions.

This report documents the emission and energy use of 200 of the world's leading tech companies, assesses corporate climate data and targets, and highlights good practices for digital companies to reduce their environmental impact. It shows that, while digital companies are leaders in procuring renewable energy, rising electricity use, especially in data centers, presents challenges.

The report also addresses the complexities surrounding emissions calculations and highlights the need for transparency, stressing the importance of accurate and comprehensive reporting across all emission scopes and categories. Reporting practices vary and only few companies undergo third-party verification of their emissions inventory. As digital companies continue to expand their operations globally, their environmental responsibilities must align with their influence.

Today, we stand at a pivotal moment in the intersection of technology and sustainability. The insights presented here will serve as a compass, guiding businesses, policymakers, and international organizations towards actions that ensure sustainable digital transformation.

We invite you to explore the data, insights, and solutions presented in this report, and to join us in the collective effort to harness the power of technology for the betterment of our planet. Findings of the report will be used to identify recommendations and formulate calls for action and partners to be announced as part of ITU's Green Digital Action at COP28 from 30 November to 12 December 2023. The journey towards a greener, more sustainable future begins with understanding, and this report is a significant step in that direction.



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## Executive summary

Digital technology companies are playing a notable role in the race to a low-carbon transition. They are at the forefront of efforts to reduce greenhouse gas (GHG) emissions, with huge purchases of renewable energy, investment in carbon removal and issuance of green bonds. Furthermore, digital products and services have a significant enabling impact by giving other sectors the means to reduce their own emissions.

This joint report of the International Telecommunication Union (ITU) and the World Benchmarking Alliance (WBA) documents the emissions and energy use of 200 of the world's leading digital companies. It supports the implementation of target 2.5 of ITU's strategic plan for 2024-2027, "Significant improvement of ICTs' contribution to climate and environment action", in recognition of the contribution that GHG emissions from telecommunications/ICTs make to global emissions.

In addition to assessing the climate data and targets of leading technology companies, this report is intended as a resource to help companies learn from best practice to improve emissions reduction performance and accelerate the achievement of low-carbon operations. Further, given the size and number of the companies assessed – 200 organizations, of which 43 are in the Fortune Global 500 – it provides a good overview of operational emissions and electricity use by the ICT sector.

Digital technology companies have wide-ranging portfolios: some produce and sell equipment while others operate telecommunication networks or provide software and information technology services such as data centres and cloud computing. Each activity has different characteristics in terms of the type and scope of emissions and energy consumption. The total operational emissions of GHG by the companies surveyed exceeded 260 million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) in 2021, making up 0.8 per cent of total emissions from energy use worldwide. The digital technologies sector relies heavily on electricity, consuming over 480 terawatt-hours or 1.7 per cent of the world's electricity generation. Digital technology companies do not all calculate full upstream and downstream emissions, which makes it difficult to estimate their total carbon footprint.

Just nine companies account for one-half of the surveyed group's operational emissions (Scope 1 and 2 under the GHG Protocol). All nine are headquartered in Asia or the United States of America. Three are Chinese state-controlled telecommunication operators who also operate a significant number of data centres. Two are major cloud computing providers headquartered in the United States. The remainder are producers of semiconductors, which generate significant Scope 1 emissions. While Amazon and Alphabet purchase large amounts of renewable energy (Amazon is the largest corporate purchaser, and 100 per cent of Alphabet's electricity purchases are renewable) they do not receive it all and must resort to non-renewable energy, due to grid design limitations and geographic location. Transformation of grids and greater self-provision are the main options for them to increase the share of renewables in their energy use. Companies in East Asia have far to go in renewable energy purchases, largely owing to a lack of availability. Nevertheless, they should use their advocacy and scale to speed up deployment of renewables in their region.

The vast purchasing power of digital technology companies is already having a huge impact on scaling renewable energy markets across the world. The sector accounted for four of the top nine largest corporate purchasers of renewable energy in 2021, and around one-half of all renewable energy purchased that year. Of the companies surveyed in this report, two dozen purchase all their electricity from renewable sources. Digital companies are also working with suppliers to encourage them to use renewables in order to reduce their emissions.

The shift to renewables is taking place as overall electricity consumption in the tech sector continues to grow. While the list of the global top 20 corporate electricity consumers is dominated by the traditional heavily emitting industries (chemicals, construction, metals and mining, oil and gas, and utilities), the 4 exceptions are digital technology companies. The hunger for electricity is creating energy challenges in some countries, resulting in data centre moratoriums.

Carbon neutrality for fiscal year 2021 was claimed by 23 of the companies surveyed. Such claims need to be treated with caution, as transparency can be an issue.

In some cases, companies do not clearly explain what emissions are being offset nor the amount of offsets. Only eight of the companies surveyed had their carbon neutrality verified through an external assurance statement. More than two dozen others said they were targeting the interim milestone of carbon neutrality for 2030. A further 44 intend to move beyond carbon neutrality to achieve net zero by 2040, which is reached when all emissions that can be reduced have been eliminated and all other unavoidable emissions that make up a company's full carbon footprint are being removed from the atmosphere. As a result, GHG removal is becoming essential for emissions that cannot be abated. Several digital companies have signed long-term purchase agreements for carbon removal and storage. This is helping to scale biological and technological solutions to remove carbon from the atmosphere, such as direct air capture.

ICT solutions are playing a significant role by enabling reductions of carbon emissions in other sectors, but quantifying their contribution is not straightforward. It is important not to substitute that enabling role for actual emission reduction targets. For one thing, emission reductions can be verified, while enablement can only be estimated in relation to a hypothetical baseline. The enablement argument does not absolve the tech sector from addressing its own emissions, and further efforts are needed to comprehend its complex effect on emissions: it may provide the tools for reducing emissions, but in some cases it actually increases them, for example through rebound effects. More generally, it is difficult for companies to demarcate and ascertain the precise extent of their emissions. For instance, video conferencing makes it possible to reduce emissions because it reduces the need to commute, contributes to emissions enablement, however, it is not so clear as to whether and to what extent the enablement effect should be attributed to the telecom operator that provides the connectivity, or the manufacturing company that provides the hardware, or the software company that develops the video conferencing tools.

It is becoming increasingly clear that the lack of transparency is a problem in GHG emissions reporting. Thus, the GHG Protocol and GRI guidance

states that Scope 2 location-based emissions must be disclosed, with market-based emissions to be included *if applicable* (not as an option). However, some companies report only the market-based figure. This is generally lower and therefore misleading, as it does not reflect actual emissions from electricity consumption, for example. At the same time, although companies are becoming more proficient at compiling upstream and downstream emissions (i.e. Scope 3), without full inclusion the aggregated figures for Scope 1-3 emissions are unduly affected by outsourcing and insourcing. While this may be for reasonable reasons, for example, the company simply does not have the data, it is creating a challenge for reporting and comparability suffers. A strong argument can thus be made for judging a company's climate performance on its entire footprint rather than just the operational emissions (which is also required from the perspective of net zero targets). The majority of companies surveyed provided at least partial data on emissions and energy use. Two-thirds of those not disclosing any data at all were fully state-owned or private unlisted companies. Out of the 200 companies, 140 reported some categories of Scope 3. However, only 76 reported all relevant categories for their business. This is unfortunate given that companies have a responsibility for their full emissions footprint. Efforts are needed to encourage these companies to report their climate data fully.

Sixteen companies, all headquartered in Europe and the United States, were deemed to have demonstrated leading climate practices and performance. The transparency and quality of their climate data was high and over half had their climate data verified by third parties. Twelve in this group claimed carbon neutrality and had set a target date of 2030; all sixteen are targeting net zero by 2040. These companies generally include emissions from their entire value chain in their reductions targets and are working with suppliers to reduce emissions. All have above-average rates of renewable energy, and thirteen of them cover their electricity needs exclusively with renewables. If the other digital companies could emulate these leaders, the digital sector would be well on its way to being the greenest in the world.

## About ITU and WBA

This is the second edition of the “Greening digital companies” report produced by ITU and WBA.

ITU is the United Nations specialized agency in the field of telecommunications and information and communication technologies (ICTs). ITU has been given the mandate to develop a programme in response to the challenges of climate change and the growing quantities of e-waste globally. It is involved in climate change activities including research, capacity building and developing international standards. In its strategic plan for 2024-2027, ITU’s target 2.5 is “Significant improvement of ICTs’ contribution to climate and environment action”, as measured by concrete indicators including the global e-waste recycling rate and the contribution of telecommunications/ICTs to global GHG emissions. ITU develops standards that provide guidance on how to set science-based targets and achieve net zero emissions, including an emissions trajectory for ICT companies to reach the 1.5°C scenario in the Paris Agreement (Recommendation ITU-T L.1470), and guidance (in the form of two Supplements) on decarbonizing following a 1.5°C pathway for operators of mobile networks, fixed networks, data centres and manufacturers. Specific net zero guidance developed by ITU for ICT companies

(ITU-T L.1471) builds on net zero approaches by the Science Based Targets initiative (SBTi), the Race to Zero campaign and other projects. ITU has also developed technical standards that provide methodologies for assessing energy consumption and GHG emissions for ICT organizations (Recommendation ITU-T L.1420). This publication has been developed by the ITU Telecommunication Development Sector (ITU-D), for more information on ITU-D’s environment work, please visit: <https://www.itu.int/itu-d/sites/environment>.

WBA is a non-profit organization that assesses and ranks the performance of the world’s most influential companies on the United Nations Sustainable Development Goals. Data in this report were collected as part of WBA’s Digital Inclusion Benchmark, which annually assesses the world’s leading technology companies on their performance in enhancing access to digital technologies, improving digital skills, fostering trustworthy use, and innovating openly, inclusively and ethically. In addition, WBA produces the Climate and Energy Benchmark, which measures corporate progress against the Paris Agreement and covers 450 of the world’s most influential companies in high-emitting sectors such as the automotive, utilities, oil, gas and transport industries.

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# Climate impact of digital companies

Digital companies have a notable impact on the environment (e.g. extraction of raw materials, e-waste, greenhouse gas emissions, water use). In relation to climate change, digital companies can have negative impacts in terms of their carbon footprint, but also positive effects thanks to their large-scale purchases of renewable energy and the digital technology that enables other sectors to reduce emissions.

This report shares important insights on the current state of progress towards target 2.5 of ITU's strategic plan for 2024-2027: enhancing the role of ICTs in climate and environmental action and addressing the contribution of telecommunications/ICTs to global GHG emissions. The report thus helps advance the overarching goal of leveraging ICTs to make substantial improvements in green digital transformation.

In 2021, the 200 companies examined in the Digital Inclusion Benchmark (DIB)<sup>1</sup> process collectively produced Scope 1 and 2 operational GHG emissions of 262 million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e), amounting to 0.8 per cent of global emissions from energy use. The International Monetary Fund suggests that the price per tonne of carbon should be USD 75 to limit global warming.<sup>2</sup> At this price, these digital companies' GHG emissions equates to a negative economic impact of around USD 20 billion, which is more than the GDP of half of the world's countries. Given the known high environmental costs incurred from their operational emissions, and the additional cost due to their upstream and downstream emissions (often not tracked), it is crucial for digital companies to reduce their climate impact.

Telecommunication service providers contribute the most to Scope 1 and 2 location-based emissions, accounting for close to one-half of the total GHG operational emissions of the digital companies in the DIB survey (Figure 1.1, left); this is essentially due to their reliance on an extensive array of power-hungry network equipment and data centres. Where grid power is inadequate or unavailable, operators rely on diesel-generator-powered wireless base stations, which are particularly emissions-intensive.

Hardware companies are the second-largest group of emitters in the survey, contributing almost 40 per cent of total Scope 1 and 2 emissions. Notably, semiconductor manufacturers emit significant Scope 1 emissions (as well as using large amounts of water). The supply chain emissions of branded hardware companies greatly exceed their operational emissions, which underscores the need for full disclosure of these Scope 3 emissions.

IT services and software companies are the third-largest group of operational emitters in the survey. These companies tend to have relatively low emissions, but those that operate cloud and data centre services account for the bulk of emissions in this group.

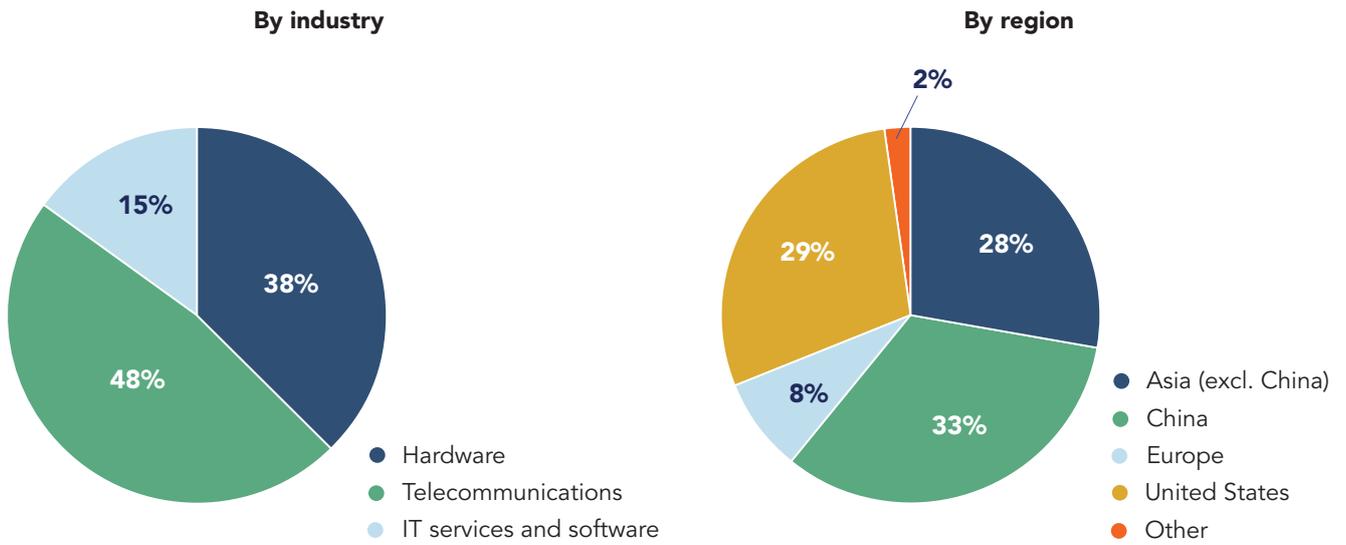
In terms of geography, companies headquartered in Asia accounted for almost half of the emissions of the surveyed companies (Figure 6.5, right). Chinese-headquartered companies alone made up one-third of the total. The region has been slow to take up climate change mitigation, and the emissions reduction targets of digital companies in Asia are relatively unambitious compared to those in Europe and the United States.<sup>3</sup>

1 WBA. 2023. Digital Inclusion Benchmark. <https://www.worldbenchmarkingalliance.org/digital-inclusion-benchmark/>

2 Simon Black, Ian Parry and Karlygash Zhunussova. 2021. More Countries Are Pricing Carbon, but Emissions Are Still Too Cheap." *IMF Blog*, 21 July. <https://www.imf.org/en/Blogs/Articles/2022/07/21/blog-more-countries-are-pricing-carbon-but-emissions-are-still-too-cheap>

3 Greenpeace Asia. 2021. *Race to green*. <https://www.greenpeace.org/static/planet4-eastasia-stateless/2021/12/a29b3a1d-race-to-green-report.pdf>

**Figure 1.1: Distribution of operational GHG emissions, DIB200 companies, 2021**

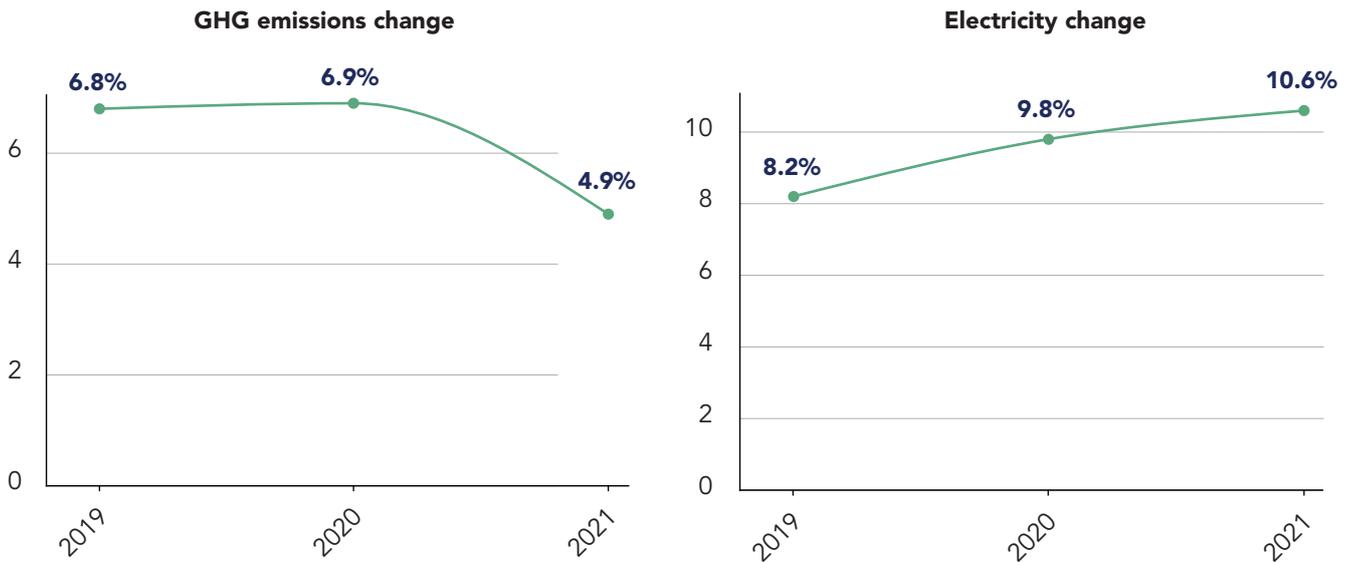


Note: Region refers to the location of company headquarters rather than where the emissions actually occur.

Based on the 100 companies that were originally benchmarked in 2018, both emissions and electricity use have been growing since then. What role COVID-19 played in that increase, given the boost that lockdown measures gave to the use of digital technologies, cannot be ascertained without further

years of data. However, while GHG emissions are tapering off (Figure 1.2 left), mainly due to greener grids – the average grid emissions factor for those 100 companies declined 11 per cent between 2018 and 2022 – the rate at which overall electricity use is increasing continues to go up (Figure 1.2 right).

**Figure 1.2: Year-on-year growth in GHG emissions and electricity consumption, 100 originally benchmarked countries**

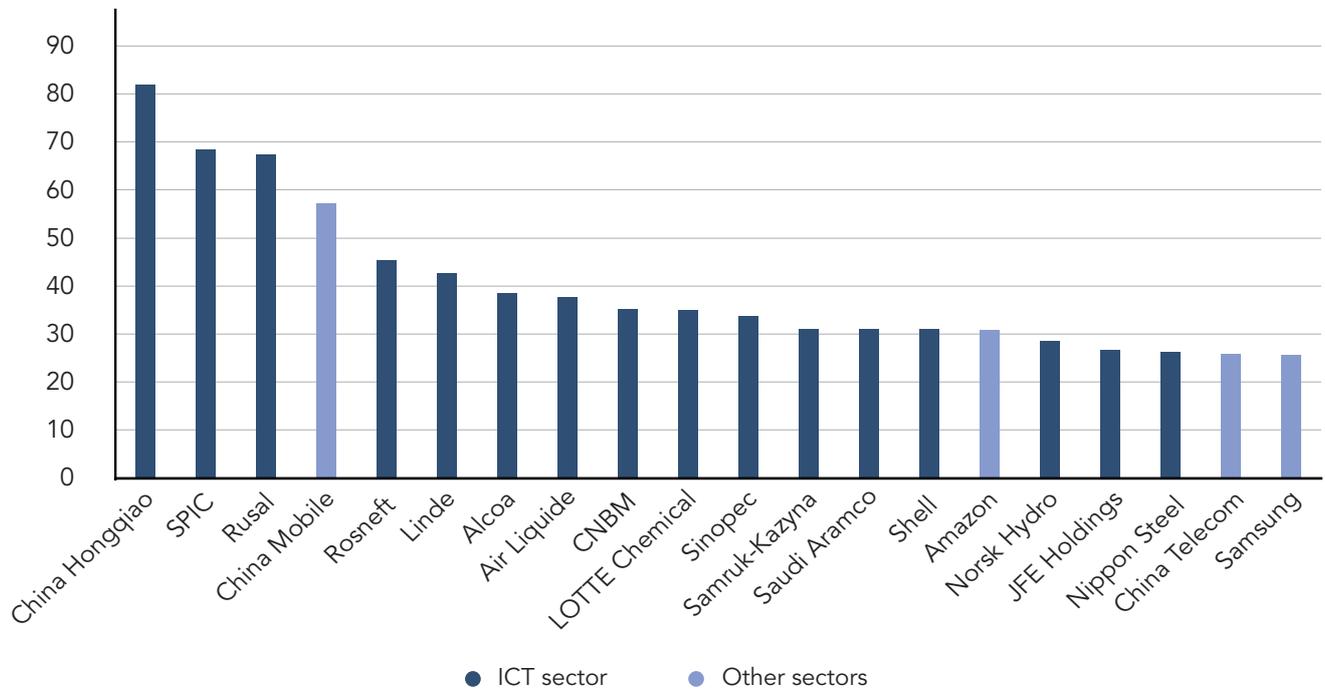


Rising electricity consumption is putting pressure on electric power grids. For example, Amsterdam, Dublin and Singapore, major data centre hubs, have become so concerned about emissions, electricity supply and prices that they have resorted to moratoriums on new data centres.<sup>4</sup> Notably, 4 digital companies are among the top 20 corporate consumers of electricity, the only ones outside the traditional high emitting industries (chemicals, construction, metals and mining, oil and gas, and utilities) (Figure 1.3).

In response to the rising electricity consumption of the ICT sector and pressure to reduce GHG emissions, digital companies have become leaders in renewable

energy procurement. In 2021, the ICT sector accounted for 60 per cent of all renewable energy purchases in the world (Figure 1.4, left). It is estimated that the surveyed companies account for 90 per cent of those purchases; almost half (45 per cent) of their electricity use in 2021 was from renewable purchases. Amazon, Alphabet (Google), Meta and Microsoft were among the world’s top corporate buyers of renewable energy in 2021 (Figure 1.4, right). The procurement of renewable energy by digital companies is pivotal not only because it contributes to the sectors’ emissions reduction and adds to electricity supply but also because it helps renewable energy markets reach a sustainable scale.

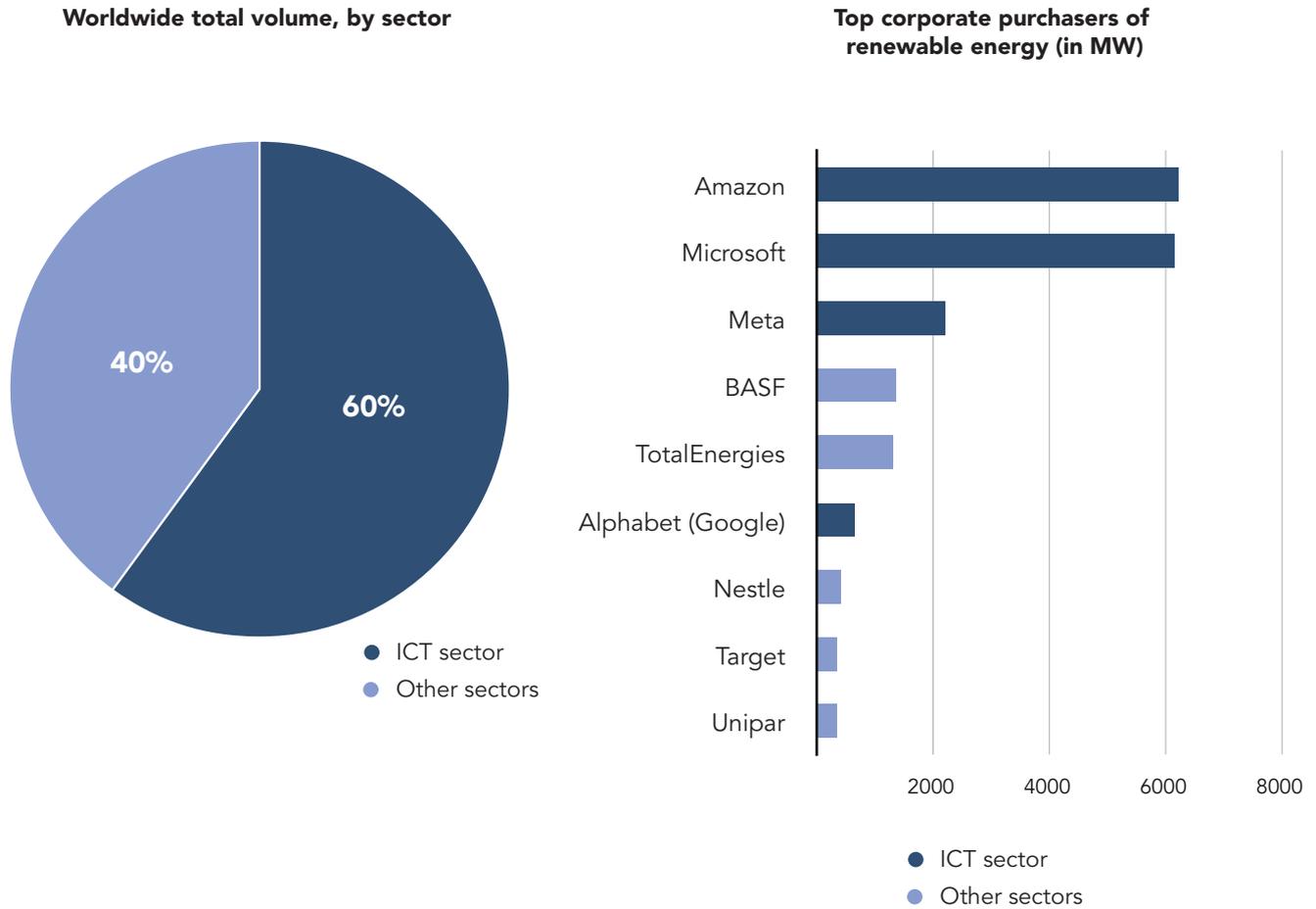
**Figure 1.3: Top 20 companies worldwide by electricity consumption (TWh), 2021**



Source: World Benchmarking Alliance SDG2000 database.

4 Afiq Fitri. 2022 "Inside the data centre moratorium movement." *Tech Monitor*, 13 October. <https://techmonitor.ai/technology/cloud/inside-the-data-centre-moratorium-movement>

**Figure 1.4: Volume of renewable sources in power purchase agreements by sector and top 10 corporate purchasers, 2021**



Source: International Energy Agency (IEA), <https://www.iea.org/data-and-statistics/charts/global-renewable-energy-power-purchase-agreements-by-sector-2010-2021> and “Corporate Clean Energy Buying Tops 30GW Mark in Record Year.” BloombergNEF, 31 January 2022. <https://about.bnef.com/blog/corporate-clean-energy-buying-tops-30gw-mark-in-record-year>

Carbon offsets are another tool for reducing GHG emissions. Companies purchase credits for projects that reduce emissions or remove carbon from the atmosphere. Offsetting can be contentious, due to concerns about verifiability and credibility of carbon offset projects, and due to the risk that major corporate emitters will purchase offsets in lieu of making the necessary emissions reductions. In recognition of these concerns, some digital companies are abandoning the use of offsets for carbon neutrality in favour of a net zero strategy, which requires exhausting all technical options for reducing emissions in the value chain, and only using permanent or like-for-like removals to

counterbalance any residual emissions and achieve net zero.

In addition to their role as major purchasers of renewable energy, digital companies have immense potential to contribute to decarbonization through enablement (see Chapter 3), the positive impact that digital technologies and services have by helping other sectors reduce their own emissions.<sup>5</sup> For instance, the provision of video conferencing and online access to government services facilitates remote working and thereby contributes to reducing emissions associated with commuting.

5 GSMA. 2018. *The Enablement Effect: The impact of mobile communications technologies on carbon emission reductions*. <https://www.gsma.com/betterfuture/enablement-effect>

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# Assessment

This chapter explores the various elements that make up the company climate assessment for the 200 corporations covered in the DIB.

## 2.1 Disclosure

Emissions data must be accurate and allow comparability to give confidence, given the prevalence of greenwashing. This section looks at the disclosure of the various emissions scopes and energy data and the advantages of dedicated environmental reports and assurance statements.

One challenge with corporate GHG inventories is that boundaries may change due to mergers and acquisitions or sales of subsidiaries. This complicates attempts to assess a company's performance over time. Targets are also affected, since the baseline year emissions may no longer be relevant. Another difficulty is that companies frequently restate their historical emissions in the light of better data or updated emissions factors. For these reasons it is critical to disclose a time series of emissions and energy data. It is helpful that some companies recalculate their historical emissions each year based on their current organizational structure. Thus, for its 2021 assessment Telefonica engaged an external assurer to recalculate its emissions for every year going back to 2015.<sup>6</sup>

### 2.1.1 Data availability

The majority of companies in the DIB use the scope categories of the GHG Protocol to compile their emissions (see Section 5.1). Almost all report GHG emissions, but completeness and quality of the data are variable. Thus, despite the requirement that the data should refer to the in-scope period (i.e. fiscal year 2021), some companies submitted data for earlier fiscal years; these were not scored. Out of the 200 companies, 30 did not disclose any climate-related data at all; one-half of these were unlisted or majority state-owned firms. GHG emissions for companies that did not disclose data were assessed to be immaterial for group totals.

### 2.1.2 Operational Scope 1 and 2 emissions

Companies should disclose Scope 1 and Scope 2 emissions, both location-based and market-based if applicable. Scope 1 refers to direct emissions using fuel purchased by the company. Figures for Scope 1 were provided by 163 out of the 200 companies. Scope 1 accounts for a minority of operational emissions for most companies. However, there were six whose Scope 1 total accounted for at least one-half of their total operational emissions: American Tower, BCE, GlobalFoundries, Microchip, Micron and Netflix. Three of them – GlobalFoundries, Microchip and Micron – are semiconductor companies, where chip manufacturing generates a significant amount of Scope 1 emissions. Two others, American Tower and BCE, are telecommunication firms, with relatively high emissions due to their reliance on diesel-powered base stations. BCE also operates a large fleet of service vehicles for the company's geographically dispersed main market in Canada, which partly accounts for its high Scope 1 emissions. Company vehicles also appear to account for most of the Scope 1 emissions for Netflix. Indeed, as companies reduce their electricity-based emissions, their vehicle fleets account for a greater proportion of emissions.

According to the GHG Protocol and the Global Reporting Initiative's standard GRI-305, companies are required to disclose Scope 2 location-based emissions in all cases, and market-based emissions only if applicable. Patchy compliance with this guidance is making Scope 2 emissions reporting increasingly opaque: some companies disclose only the market-based Scope 2 figure (typically lower than the location-based one), and the location-based figure is not in their Climate Disclosure Project (CDP) reporting (this is the case for Amazon, América Móvil and MTN). Other companies have always reported location-based figures, and market-based mechanisms such as renewable energy certificates (RECs) have not been available. In the future, all companies should follow the GHG Protocol guidance and clearly label their Scope 2 emissions as location-based, including the market-based figures if applicable. For greater transparency, reporting both should be recommended. It would also

<sup>6</sup> "Verification Statement of AENOR for Telefónica on the Inventory of greenhouse gas emissions corresponding to the year 2021." <https://www.telefonica.com/en/wp-content/uploads/sites/5/2022/03/declaracion-telefonica-global-EN-2021.pdf>

be advisable for companies to refer to the basis for market-based numbers (e.g. through the use of RECs or power purchase agreements (PPAs)).

Out of 167 companies reporting operational emissions data (Scope 1 and Scope 2), 25 disclosed market-based but not location-based emissions under Scope 2. For Scope 2 overall, 57 companies did not disclose location-based emissions and 32 did not disclose market-based emissions (Table 5.4).

### 2.1.3 Downstream and upstream Scope 3 emissions

Emissions under Scope 3, which includes 15 categories, are an integral part of a company's full emissions footprint, accounting for their upstream and downstream emissions. Scope 3 emissions originate

from sources owned or controlled by other entities in the value chain, such as suppliers of materials, third-party logistics providers, franchisees, etc. The reporting company's Scope 3 emissions represent the direct emissions of these other entities. For those companies that disclosed all relevant categories, Scope 3 emissions account for an average of 85 per cent of total emissions. Despite the importance of Scope 3, several companies did not report any of those emissions, or reported only a few of the more easily calculated categories, such as business travel or employee commuting. One challenge is knowing whether a company's reporting is incomplete, given that some categories may not be applicable to them. It is recommended therefore to list all 15 categories and provide an explanation for any that are considered not to be relevant, as NTT has done (see Table 2.1). In the current situation, it is hard to assess how complete Scope 3 disclosures are, so this value comes with uncertainties.

**Table 2.1: Detailed breakdown of Scope 3 emissions, NTT**

Scope Category	Scope and method of calculation	Emissions (ten thousand tons)		
		Fiscal 2019	Fiscal 2020	Fiscal 2021
GHG emissions	-	2 811	2 622	2 372
Scope 1 (direct emissions)	-	25	24	14.1
Scope 2 (indirect emissions from energy use)	-	436	375	275.6
Scope 3 (indirect emissions from the value chain)	-	2 350	2 223	2 082
Category 1 Purchased goods and services	Calculation based on the number of units and monetary value of purchases of devices and services sold to customers	599	624	455
Category 2 Capital goods	Calculation based on capital investment costs on telecommunications and other equipment	628	554	456
Category 3 Fuel- and energy-related activities not included in Scope 1 or 2	Calculation based on annual consumption by energy type	60	61	63
Category 4 Upstream transportation and distribution	Calculation based on weight and distance, or number of devices with regard to the transport of devices sold to customers	5	8	8

Scope Category	Scope and method of calculation	Emissions (ten thousand tons)		
		Fiscal 2019	Fiscal 2020	Fiscal 2021
Category 5 Water generated in operations	Calculation based on volume of waste by type	1	1	1
Category 6 Business travel	Calculation based on paid expenses for business travel	19	4	3
Category 7 Employee commuting	Calculation based on paid expenses for employee commuting	7	3	4
Category 8 Upstream leased asset* <sup>1</sup>	Excluded from calculation* <sup>1</sup>	-	-	-
Category 9 Downstream transportation and distribution* <sup>2</sup>	Excluded from calculation* <sup>2</sup>	-	-	-
Category 10 Processing of sold products* <sup>3</sup>	Excluded from calculation* <sup>3</sup>	-	-	-
Category 11 Use of sold products	Calculation based on number of services subscriptions, number of devices and monetary value of telecommunications services and devices used by customers	735	668	649
Category 12 End-of-life treatment of sold products	Calculation based on number of services subscriptions, number of devices and monetary value of communications devices used by customers	5	4	4
Category 13 Downstream leased assets	Calculation based on amount of electricity consumption such as equipment by other businesses Calculation based on average use of leased assets	75	74	164
Category 14 Franchises	Calculation based on total floor area of sales franchises	9	8	8
Category 15 Investments	Calculation based on Scope 1 and 2 emissions of investees in proportion to shareholding	207	214	268

\*1 we have excluded Category 8 (upstream leased assets) from the calculation because the fuel and electricity used by leased assets is included in Scope 1 and 2 calculations.

\*2 We have excluded Category 9 (downstream transportation and distribution) from the calculation because these emissions are almost entirely from our own transportation and use in our own facilities (included in Scope 1 and 2) or from outsourced transportation (included in Category 4).

\* 3 We have excluded Category 10 (processing of sold products) from the calculation because our main businesses involve no processing of intermediate products.

Source: NTT. 2022. *NTT Group Sustainability Report 2022*. <https://group.ntt/en/csr/data/report.html>

Out of the 200 companies, 140 report some categories under Scope 3, but only 76 report all relevant categories for their business. This is unfortunate given that companies have a responsibility for their full emissions footprint.

In some cases Scope 3 reporting can be prone to double counting, when two entities in the same value chain report the same emission (or take credit for the same emission reduction). The categories were designed to prevent this from happening. For the same reason, it is not possible to calculate a figure for total emissions by aggregating Scope 3 emissions from multiple companies. To ensure transparency, companies should indicate any instances of potential double counting when making claims about Scope 3 reductions. For example, they may choose to highlight collaborative efforts with partners rather than taking exclusive credit for Scope 3 emission reductions.<sup>7</sup> Accurate compilation of Scope 3 emissions can be problematic; for instance, emissions associated with purchased goods and services (Category 1) can only be calculated if suppliers provide the necessary data. The GHG Protocol and an upcoming ITU-T supplement for operators therefore present different approaches to calculating emissions. The simplest approach is based on economic modelling, which is less reliant on the specific actions of the operator. An approach that has been taken by some companies is to account separately for Scope 3 market-based and location-based emissions.

Control and comparability of Scope 3 emissions face a growing number of challenges. A change in business setup can change the scope under which

emissions are reported, without affecting the actual emissions. In some cases companies report reductions in their operational emissions when in fact all that has happened is that they have started reporting them under Scope 3 categories. For example, when a telecommunication operator leases facilities from a tower company, the energy used can be reported by the tower owner under Scope 1 and 2, while the network operator registers it under Scope 3 (category 1, purchased goods and services). Or the operator could account for the emissions tied to the energy it has purchased from the tower owner under Scope 1 and 2. Thus, in 2021 MTN reclassified some of its operational emissions as Scope 3 supply chain emissions, accounting for more than half its base station emissions in this way.<sup>8</sup> There is a similar lack of consistency with data centres. Some operators report all electricity-generated emissions as their own Scope 2 emissions, while others treat them as Scope 3 category 13 (downstream leased assets), in which case the tenant is supposed to report them as its own operational emissions. In 2021 Singtel showed a reduction of over 100 000 tCO<sub>2</sub>e in its operational Scope 2 emissions by reclassifying them as Scope 3.<sup>9</sup> Such practices highlight the importance of considering a company's entire emissions footprint as relevant.

Scope 3 data is indispensable for various types of analysis, particularly in regard to embedded emissions from supply chains and product use. This can provide a deeper understanding of the impact of digital company footprints, particularly for the major digital equipment brands that outsource a significant portion of their manufacturing (see Box 2.1).

7 See "Position on Scope 3 GHG emissions" at: <https://www.ibm.com/about/environment/scope3-position>

8 MTN. 2022. *Sustainability Report for the year ended 31 December 2021*. <https://www.mtn.com/wp-content/uploads/2022/04/MTN-Group-FY-21-Sustainability-Report.pdf>

9 Singtel Group. 2022. *Sustainability Report 2022*. <https://www.singtel.com/about-us/sustainability/sustainability-reports>

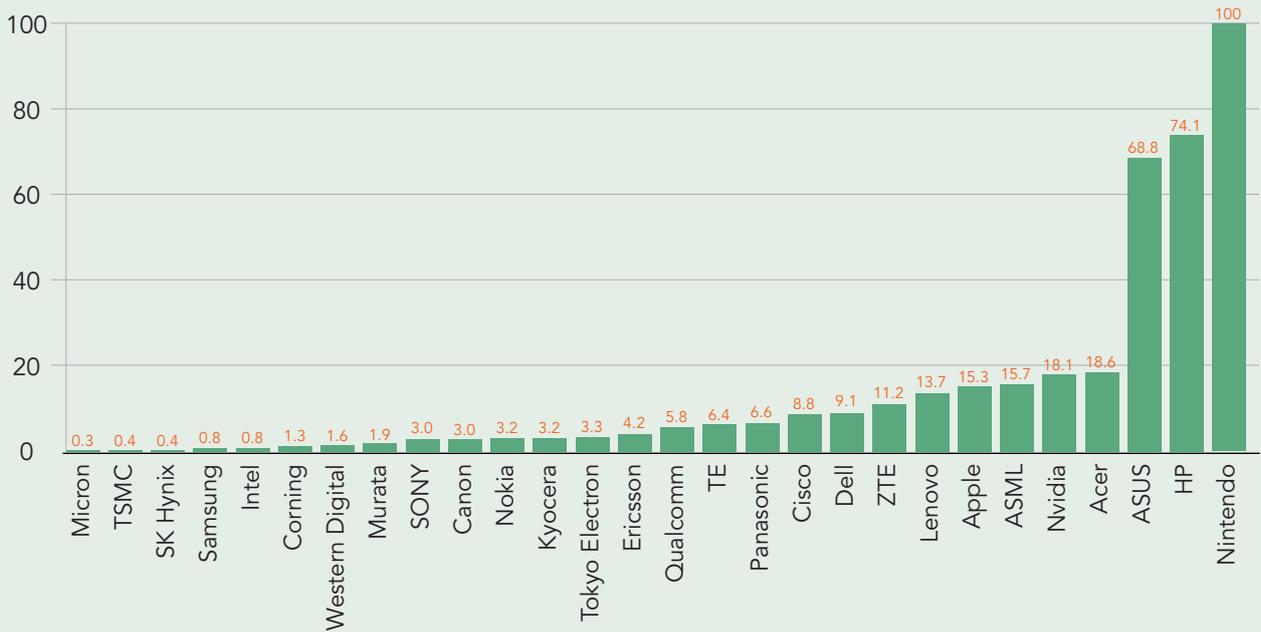
**Box 2.1: Supply chain emissions of ICT manufacturing companies<sup>10</sup>**

Manufacturers of branded digital goods (e.g. Nintendo, HP, Apple) tend to have relatively higher supply chain emissions (falling within Scope 3 category 1) and lower operational emissions (Scope 1 and 2, location-based). This is due to a high degree of outsourcing since Scope 3 category 1 emissions covers upstream emissions associated with the production of the purchased goods and services. Companies that manufacture equipment to make semiconductors (such as ASML) and fabless semiconductor companies (e.g. Nvidia) also have a relatively high proportion of their emissions in the supply chain. The intermediate goods companies that manufacture inputs to branded goods (e.g. TSMC, Corning), by contrast, have comparatively low supply chain emissions.

Some digital companies are members of the Responsible Business Alliance (RBA), which expects them to encourage their suppliers to establish a GHG reduction goal.<sup>11</sup> A handful of digital manufacturers include supply chain emissions reductions in their own targets (i.e. Apple, Cisco, Kyocera, Murata, Nokia and Ericsson).

The recent recognition of a healthy environment as a human right is a further impetus for companies in the digital hardware sector to be more proactive in encouraging their suppliers to reduce their emissions.<sup>12</sup>

**Ratio of supply chain to operational emissions of digital hardware companies, 2021.**



Note: Supply chain emissions refer to scope 3 category 1 (Purchased goods and services). Operational emissions refer to scope 1 and scope 2 (location based).

10 This box has been adapted from World Benchmarking Alliance (WBA). 2023. "Human rights, climate change and supply chains" in *Digital Inclusion Benchmark Insights Report*. <https://www.worldbenchmarkingalliance.org/research/2023-digital-inclusion-benchmark-insights-report>

11 Responsible Business Alliance Code of Conduct, Version 7.0 (2021). [https://www.responsiblebusiness.org/media/docs/RBACodeofConduct7.0\\_English.pdf](https://www.responsiblebusiness.org/media/docs/RBACodeofConduct7.0_English.pdf)

12 UN Human Rights Council. 2021. *The human right to a clean, healthy and sustainable environment*. <https://digitallibrary.un.org/record/3945636?ln=en>

## 2.1.4 Energy

Operational GHG emissions are calculated from direct and indirect energy use. Scope 1 relates to direct emissions from fuel used in various activities, which are often industry-specific. For instance, hydrocarbon fuels are extensively used in manufacturing operations and in telecommunications (where they power remote wireless base stations). Indirect, Scope 2 emissions are primarily associated with purchases of electricity from utilities, and in some cases gas for heating. Given the link between energy and emissions, it is critical to disclose both. Companies were asked about their overall energy use as well as electricity consumption and the share of purchased renewables in their total electricity consumption. Out of the 200 companies, 155 reported their electricity consumption and 128 gave the proportion of renewables purchased.

## 2.1.5 Additional reporting and assurance

Given the succinct and sometimes opaque nature of reporting on emissions and energy consumption in many cases, additional insight can be essential. For example, companies can issue a dedicated standalone environmental report, or they can make their CDP disclosure independently available to the public. This was in fact done by 31 of the companies surveyed.

Standalone environmental reports are important since they go beyond the constraints of an ESG report by featuring time series of climate data in standard units. They provide an opportunity to capture revisions to the data and present the methodologies followed in detail, and can give a broad perspective on the company's environmental performance by covering specific areas such as water use, waste and circularity.

Climate data disclosure is often plagued by errors such as the use of incorrect grid emissions factors or measurement units. This can be mitigated with third party verification of the GHG inventory, as 32 of the surveyed companies have done.<sup>13</sup> The assurance function should not be reduced to rubberstamping company disclosures but add an additional level of assurance,<sup>14</sup> with verification to clarify whether reported emissions are market-based, location-based or a combination of both. There are indeed examples where the reported data has been critically verified.<sup>15</sup> Still, some assurance statements fall short, particularly in disclosing both market-based and location-based Scope 2 emissions, something that is explicitly called for by the GHG Protocol and the GRI reporting standards.

## 2.2 Performance

This section looks at various metrics for assessing the performance of companies with respect to emissions and renewable energy. The guidance developed jointly by ITU, the GSM Association (GSMA), the Global Enabling Sustainability Initiative (GeSI) and the Science Based Targets initiative (SBTi) allows ICT companies to use intensity-based indicators (the amount of GHG produced per unit of production or revenue) to track performance, but only under certain conditions that ensure reductions in absolute terms. This does not prevent companies from using targets defined as intensities, so long as the absolute reduction target is in line with the trajectories defined in this sectoral target-setting approach, and performance in absolute terms is regularly monitored.

The most common intensity-based metric is the ratio of GHG emissions (Scope 1 and 2, location-based) to

13 A valid verification statement must specifically refer to GHG emissions and explicitly cite the data to confirm correctness (not a general assurance of an ESG report or a verification statement that fails to explicitly state the GHG emissions data).

14 For instance Deloitte qualifies the level of assurance for Spark New Zealand's GHG emissions as "limited" rather than "reasonable": "The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had we performed a reasonable assurance engagement. Accordingly, we do not express a reasonable assurance opinion about whether Spark New Zealand Limited's inventory report has been prepared, in all material respects, in accordance with the GHG Protocol." See: Spark. 2022. *Greenhouse Gas Inventory Report 2022*. <https://investors.sparknz.co.nz/FormBuilder/Resource/module/gXbeer80tkeL4nEaF-kwFA/Spark%20FY22%20Greenhouse%20Gas%20Inventory%20Report%20FINAL.pdf>

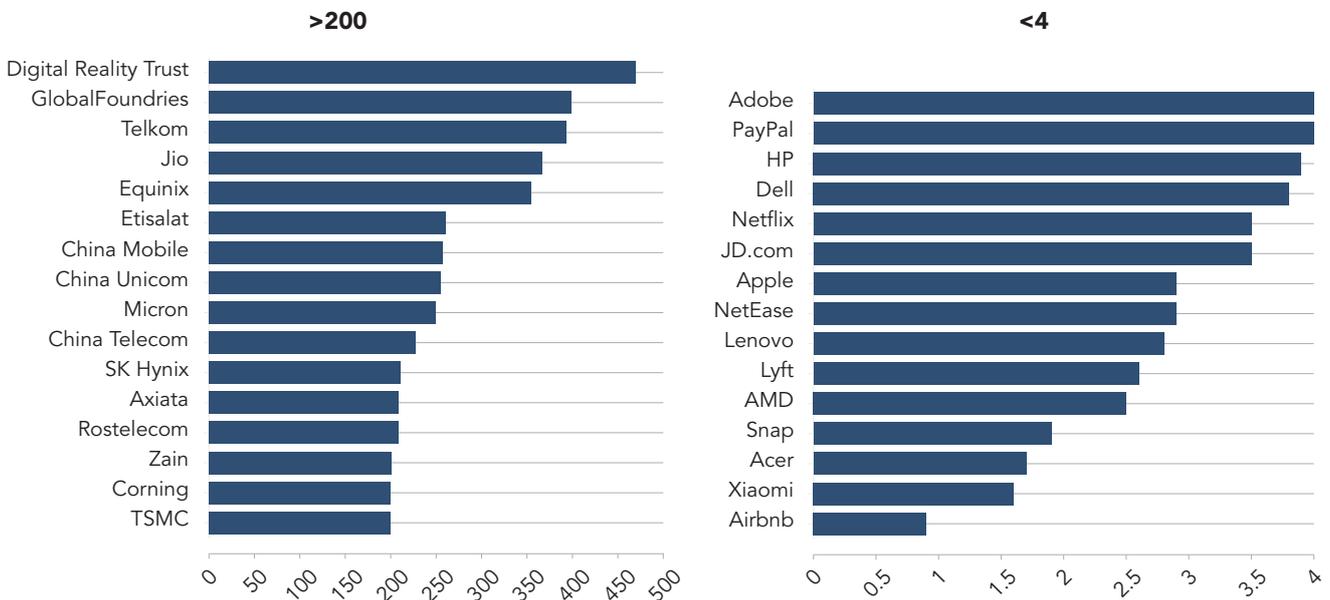
15 For instance, a verification of KDDI's Scope 3 emissions concluded that it lacked accuracy. See: Hiroshi Onoda. "Scope 3 Greenhouse gas emission verification report." 22 July 2022. [https://www.kddi.com/extlib/english/corporate/sustainability/efforts-environment/assurance/pdf/index\\_02.pdf](https://www.kddi.com/extlib/english/corporate/sustainability/efforts-environment/assurance/pdf/index_02.pdf)

revenue. The average for the surveyed companies was 65 tCO<sub>2</sub>e/USD million, with a median of 27 tonnes suggesting that a small number of companies with exceptionally high carbon-to-revenue intensities are skewing the statistics. Indeed, sixteen companies are particularly carbon-intensive, with a figure of 200 tCO<sub>2</sub>e/USD million or more for 2021 (Figure 2.1, left). These companies fall into three groups: 1) large data centre operators (e.g. Digital Realty Trust and Equinix); 2) telecommunication operators in low and middle-income countries (nine companies); and 3) manufacturers of digital inputs, primarily semiconductors, but also glass-based products such as fibre-optic cable and device screens (GlobalFoundries, Micron, SK hynix, Corning and TSMC). At the other end of the scale are 15 carbon-light companies with a carbon-to-revenue intensity of 4 tCO<sub>2</sub>e/USD million or less (Figure 2.1, right). This group consists of branded equipment vendors and fabless semiconductor companies who outsource most of their production (Xiaomi, Acer, AMD, Lenovo, Apple, Dell, HP) on the

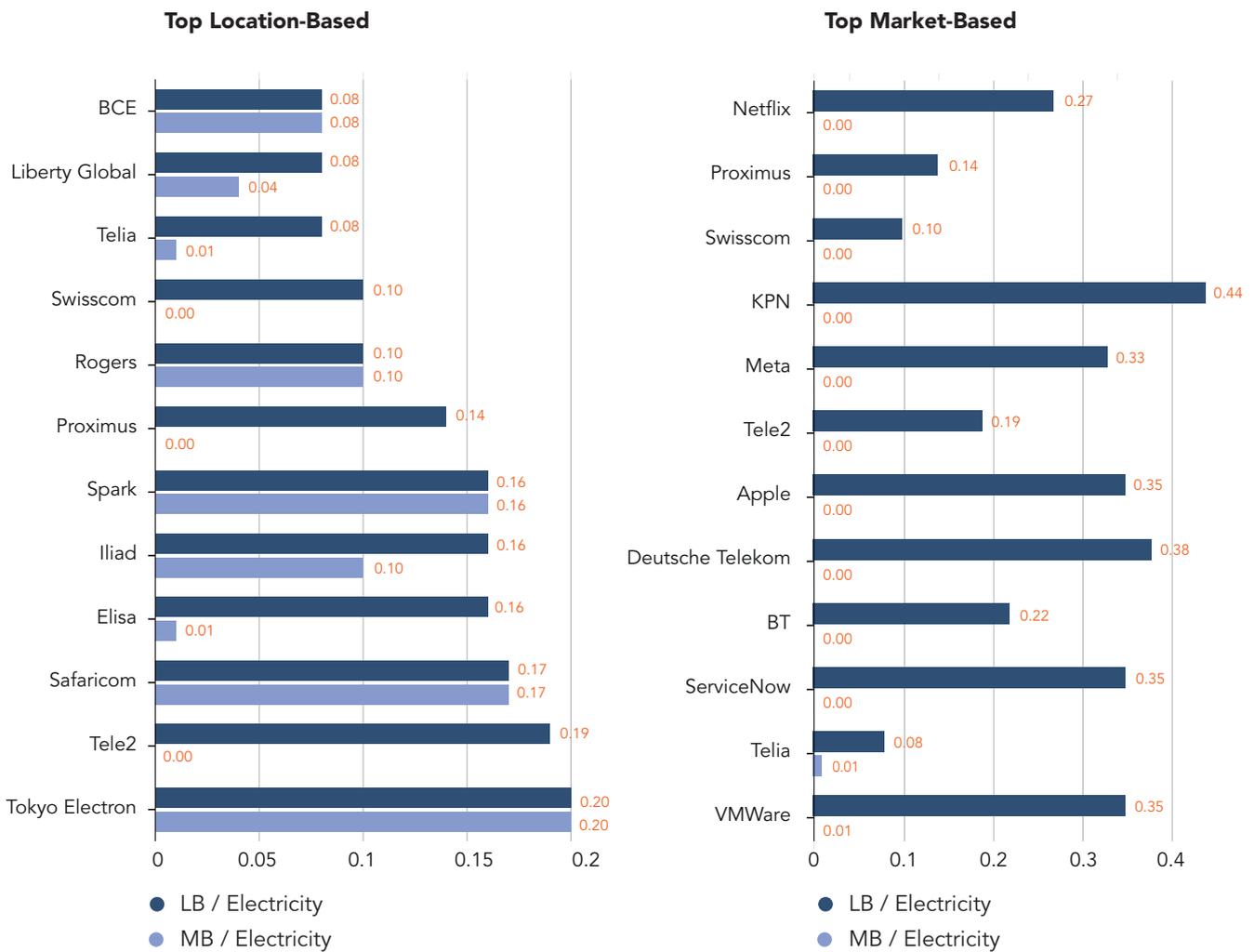
one hand, and streaming, ride hailing, goods and services, e-commerce and digital payment firms on the other (Airbnb, Snap, Lyft, JD.com, NetEase, Netflix, PayPal and Snap), in addition to one software publisher (Adobe).

Renewable energy is critical for reducing indirect emissions from electricity consumption. Two dozen companies reported they were purchasing renewables equivalent to their entire electricity consumption. Seven companies (Figure 2.2) have been able to fully match their renewable energy purchases to the grids they use, resulting in net zero Scope 2 market-based emissions (Airbnb, Cloudflare, KPN, Netflix, Proximus, Swisscom and Spotify). Note that some companies that do not purchase renewable energy and whose market-based Scope 2 emissions are therefore the same as their location-based emissions have cleaner operations than others, who report zero or low market-based emissions, thanks to the availability of relatively low-carbon energy from the grid.

**Figure 2.1: Operational carbon emissions (tCO<sub>2</sub>e) to revenue (USD million), 2021**



**Figure 2.2: Top companies by lowest grid emissions factors, location- (LB) and market-based (MB), 2021**



## 2.3 Targets

Targets are a concrete indication of a company’s commitment to reducing GHG emissions, albeit one that requires interpretation. For example, targets depend on the choice of base year and end year; they can extend very far back in time or very far forward into the future. Some targets are expressed in intensity-based rather than absolute figures. Some refer to operational emissions only, while others include all or part of Scope 3 emissions. Where offsetting is used, some companies use it to claim to have achieved carbon neutrality already, while others have named a target year for reaching this milestone. A number of companies have set themselves the target of achieving net zero in a given year. As Table 5.6 shows, 59 of the companies surveyed indicated that they had a carbon

neutrality target and 72 had a net zero target (with some companies having both). Though not considered in the assessment, some companies also adopt targets relating to use of renewable energy, or convince their suppliers to adopt such targets.

### 2.3.1 Choosing targets

A growing number of digital companies have adopted emissions reduction targets. At the end of fiscal year 2021, 126 companies had defined a reduction target for Scope 1 and Scope 2 emissions, while 56 had a non-intensity-based target for Scope 3. Baseline and target years varied: most commonly, 2019 was

chosen as the base year and 2030 as the target year. For companies that calculated Scope 2 market-based emissions, their target was almost always based on that (i.e. Scope 1 plus Scope 2 market-based). As a result, the main driver of emissions reduction was procurement of renewable electricity.

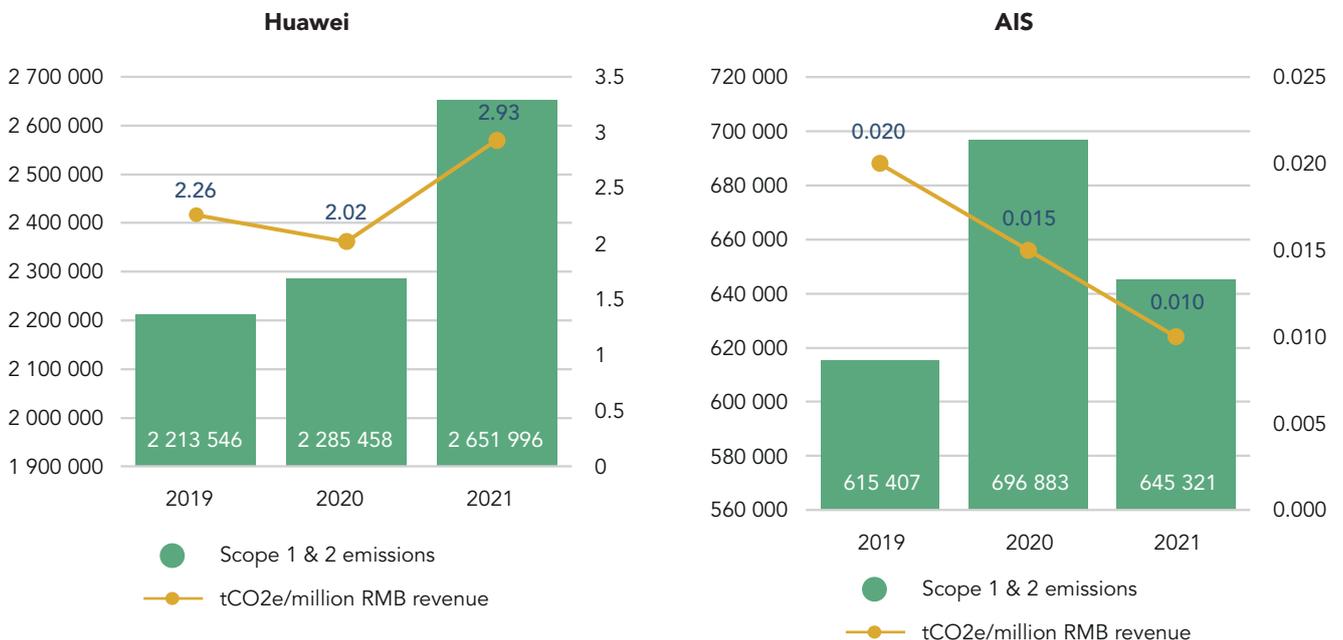
Companies sometimes revise targets, usually making them more ambitious. Thus, NTT in 2021 adopted a more ambitious target for reducing its Scope 1 and 2 emissions between 2018 and 2030, from 30 to 80 per cent, and added a Scope 3 target.<sup>16</sup>

Again, it should be borne in mind that corporate restructuring (e.g. mergers and spin-offs) affects targets, as does shifting emissions from Scopes 1 and 2 to Scope 3.

### 2.3.2 Quality

Emissions reduction targets can vary in measurement quality. Factors that influence this include whether the targets are intensity-based, and whether they have been submitted and approved by SBTi.<sup>17</sup> Nine companies have Scope 1 and 2 targets that are intensity-based, making it impossible to determine what their target year emissions are. Intensity-based targets do not necessarily mean that absolute emissions will be reduced. For instance, Chinese equipment vendor Huawei has an intensity-based target defined in terms of the emissions-to-revenue ratio. In 2019-2020 Huawei’s target metric declined but the company’s absolute emissions went up; and in 2021 the intensity measurement went up again, because Huawei’s revenue dropped (Figure 2.3, left). Thai telecommunications operator AIS has an intensity target, defined as the ratio of emissions to processed data. The intensity metric decreased in 2019-2020, and yet absolute emissions rose (Figure 2.3, right).

Figure 2.3: Intensity-based emissions reduction targets



16 NTT. 2021. NTT Group’s greenhouse gas emissions reduction target based on 1.5°C level approved by Science Based Targets initiative. <https://group.ntt/en/newsrelease/2021/12/03/211203a.html>

17 Science Based Targets. 2023. Ambitious corporate climate action. <https://sciencebasedtargets.org>

Companies were also assessed on whether they had submitted their targets to SBTi and whether the targets had been validated. SBTi verifies targets for alignment with the Paris Agreement (i.e. to what extent a target is consistent with keeping the rise in mean global temperature to 2°C to 1.5°C above pre-industrial levels). ITU along with SBTi, GeSI and GSMA, and with the participation of IEA, have published guidance for telecom operators and data centre companies on establishing science-based targets.<sup>18</sup> Over one-half of the companies (105) have submitted their targets to SBTi, and 66 of those have been validated.

### 2.3.3 Ambition

One indication of the ambition of a target is the number of years within which a company commits to reaching carbon neutrality or net zero. Net zero is a more well-defined and ambitious concept than carbon neutrality, requiring concrete reduction targets; it is already in place in 72 companies. A second edition of ITU-T L.1471 will be published in late 2023 providing guidance on setting net zero targets.<sup>19</sup> Further information on net zero is also given in the Net Zero Guidelines<sup>20</sup> of the International Organization for Standardization (ISO) and the 2022 report “Integrity Matters” by the High-Level Expert Group of the United Nations on the Net Zero Emissions Commitments of Non-State Entities.<sup>21</sup>

Companies are assessed on whether they have set a target year for carbon neutrality. Carbon neutrality is minimally defined as the elimination of all operational emissions (i.e. Scope 1 and market-based Scope 2) and means offsetting only within this scope.<sup>22</sup> It is anticipated that the forthcoming ISO 14068 standard

will require offsetting of Scope 1 through 3. Guidance suggests that Scope 1 and Scope 2 emissions should be reduced as much as feasible, purchasing carbon credits to offset only the residual emissions.<sup>23</sup> Some companies go further and include Scope 3 business travel and/or employee commuting in the boundary while a few include their entire footprint.

Carbon neutrality was claimed by 23 companies as of fiscal year 2021 (Table 2.2). Such claims need to be treated carefully, as transparency is often inadequate. In some cases, companies do not clearly explain what emissions are being offset nor the amount of offsets. Thus, only eight of the companies had their carbon neutrality verified through an assurance statement. In some cases the assurance statement dates from the year when they first became carbon neutral but there has been no subsequent verification, presumably on the assumption that once a company reaches carbon neutrality it will remain so. This is not always the case: Lyft, for example, was carbon neutral from September 2018 through June 2020 but not since then, after the company discontinued the purchase of carbon offsets.<sup>24</sup>

Types of offsets vary. Some are for GHG emission avoidance while others include carbon removal. Avoidance offsets require the offsets to be additional, meaning that the GHG reductions would not otherwise have occurred without purchase of the offset. Salesforce is noteworthy for disclosing the amount of its offsets differentiated by avoidance and carbon removal.<sup>25</sup>

A major omission in virtually all carbon neutrality claims is the price paid by the companies for offsets. Microsoft was the only company to disclose this information.<sup>26</sup> Voluntary carbon credits appear to undervalue the

18 ITU, GeSI, GSMA and SBTi. (2020). *Guidance for ICT Companies Setting Science Based Targets*. <https://www.itu.int/en/action/environment-and-climate-change/Documents/20200227-Guidance-ICT-companies-report.PDF>

19 ITU (2021). Recommendation ITU-T L.1471: Guidance and criteria for information and communication technology organizations on setting Net Zero targets and strategies <https://www.itu.int/rec/T-REC-L.1471>

20 ISO (2022). Net Zero Guidelines. <https://www.iso.org/netzero>

21 UN (2022). Integrity matters: Net zero commitments by businesses, financial institutions, cities and regions. [https://www.un.org/sites/un2.un.org/files/high-level\\_expert\\_group\\_n7b.pdf](https://www.un.org/sites/un2.un.org/files/high-level_expert_group_n7b.pdf)

22 ISO (2023). ISO/DIS 14068: Greenhouse gas management and climate change management and related activities — Carbon neutrality. <https://www.iso.org/standard/43279.html>

23 Note that other companies also buy carbon offsets though they do not buy enough to claim carbon neutrality.

24 Lyft. 2022. *Environmental, Social, & Corporate Governance Annual Report*. [https://s27.q4cdn.com/263799617/files/doc\\_downloads/2022/ESG-2022-Report\\_Final.pdf](https://s27.q4cdn.com/263799617/files/doc_downloads/2022/ESG-2022-Report_Final.pdf)

25 Salesforce. 2022. “Schedules of Selected Environmental, Equality and Social Value Metrics.” [https://s23.q4cdn.com/574569502/files/doc\\_governance/2022/Salesforce-ES-Schedules-FY22-EYReport.pdf](https://s23.q4cdn.com/574569502/files/doc_governance/2022/Salesforce-ES-Schedules-FY22-EYReport.pdf)

26 Microsoft. 2022. *Microsoft carbon removal: An update with lessons learned in our second year*. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4Q00D>

cost of carbon. The average global price for voluntary carbon credits in 2021 was only USD 3.82 per tCO<sub>2</sub>e, well below the recommendations of the High-Level Commission on Carbon Prices<sup>27</sup> and the carbon price of the European Union, USD 87 per tonne (in April 2022). Using the average voluntary credit price, the total value

of the offsets by the 23 carbon neutral companies would be USD 39 million. Using the EU price, it would be USD 880 million. It is unclear how many companies would purchase offsets to assert carbon neutrality if they had to pay a more realistic price for carbon.

**Table 2.2: Digital companies claiming carbon neutrality by offsetting, by year of becoming carbon neutral**

Company	Stated or assumed emissions offset	Offsets (tCO <sub>2</sub> e) 2021	Net (tCO <sub>2</sub> e) 2021	Carbon neutral year	Offsets verified
Alphabet	S1+S2MB+S3C6+S3C7	-2 004 205	-25 000	2007	No
Microsoft	S1+S2MB+S3C6	-292 106	17 434	2012	No
KPN	S1+S2LB	-232 675	0	2015	No
Proximus	S1+S2MB	-26 600	-2 106	2016	First year only
VMWare	Not stated	-43 812	-8 140	2018	First year only
Infosys	S1+S2MB+S3	-177 719	0	2019	Yes
Telstra	S1+S2LB+S3	-2 810 000	154 746	2020	First year only
Apple	S1+S2MB+S3C6+S3C7	-167 000	-600	2020	No
Booking Holdings	S1+S2MB			2020	No
Cloudflare	S1	-134	0	2020	No
Elisa	S1+S2MB+S3C6+S3C7+S3C5	-5 608	0	2020	No
Meta	S1+S2MB	-90 000	-33 000	2020	Yes
Salesforce	S1+S2MB+S3	-1 096 000	0	2020	Yes
Spotify	S1+S2MB	-682	0	2020	No
Swisscom	S1+S3C1*+S3C6+S3C5+S3C3	-38 950	0	2020	
Tele2	S1+S2MB+S3C6	-2 900	-4	2020	No

27 World Bank. 2022. *State and Trends of Carbon Pricing 2022*. <http://hdl.handle.net/10986/37455>

Company	Stated or assumed emissions offset	Offsets (tCO <sub>2</sub> e) 2021	Net (tCO <sub>2</sub> e) 2021	Carbon neutral year	Offsets verified
Telia	S1+S2MB+S3C6	-12 000	0	2020	No
Logitech	S1+S2MB+S3	-1 528 165	0	2021	Yes
ServiceNow	S1+s2MB+S3C6+S3C7	-13 190	0	2021	Yes
Ant	S1+S2	-23 160	0	2021	No
Netflix	S1+S2MB+S3	-1 529 312	0	2021	Yes
Palantir	S1+S2MB+S3	-13 500	-1 334	2021	No
Snap	S1+S2MB	-4 266	0	2021	No

### Legend

S1=Scope 1; S2LB= Scope 2 location-based; S2MB=Scope 2 market-based; S3=all relevant categories; S3C3=fuel and energy related emissions; S3C6=business travel; S3C7=employee commuting; S3C5=waste generated in operations; S3C1\*=purchased goods, only network equipment such as routers for Internet access and set-top boxes

Companies are also assessed on whether they have a target year for reaching net zero. ITU defines net zero as follows:

“State reached by an organization that has reduced its value chain emissions (scope 1, scope 2 and scope 3 emissions) following science-based pathways, with any remaining residual greenhouse gas (GHG) emissions attributable to that organization being fully neutralized by like-for-like removals (e.g., permanent removals for fossil carbon emissions) exclusively claimed by that organization...The term “residual” refers to residual emissions that remain technically unfeasible to be eliminated. For the ICT sector, such residual emissions shall align with or outperform the level of residual emissions as defined in [ITU-T L.1470].”<sup>28</sup>

Given that the global target for net zero is 2050 at the latest,<sup>29</sup> a net zero target year at least a decade earlier is considered ambitious; but that is the goal of 44 companies which have committed to reaching net zero by 2040.

A key requirement of net zero is neutralization, the elimination of residual emissions through permanent or like-for-like carbon removals annually from the net zero year. This is different from the voluntary avoidance offsets some companies have been using. To qualify for net zero, SBTi stipulates that removals may be used to neutralize up to 10 per cent of base year emissions.<sup>30</sup>

Achieving net zero will be challenging given the nascency of carbon removal technologies. Some

28 ITU. 2021. Recommendation ITU-T L.1471: *Guidance and criteria for information and communication technology organizations on setting Net Zero targets and strategies*. <https://www.itu.int/rec/T-REC-L.1471-202109-I/en>

29 United Nations. 2022. For a liveable climate: Net-zero commitments must be backed by credible action. <https://www.un.org/en/climatechange/net-zero-coalition>

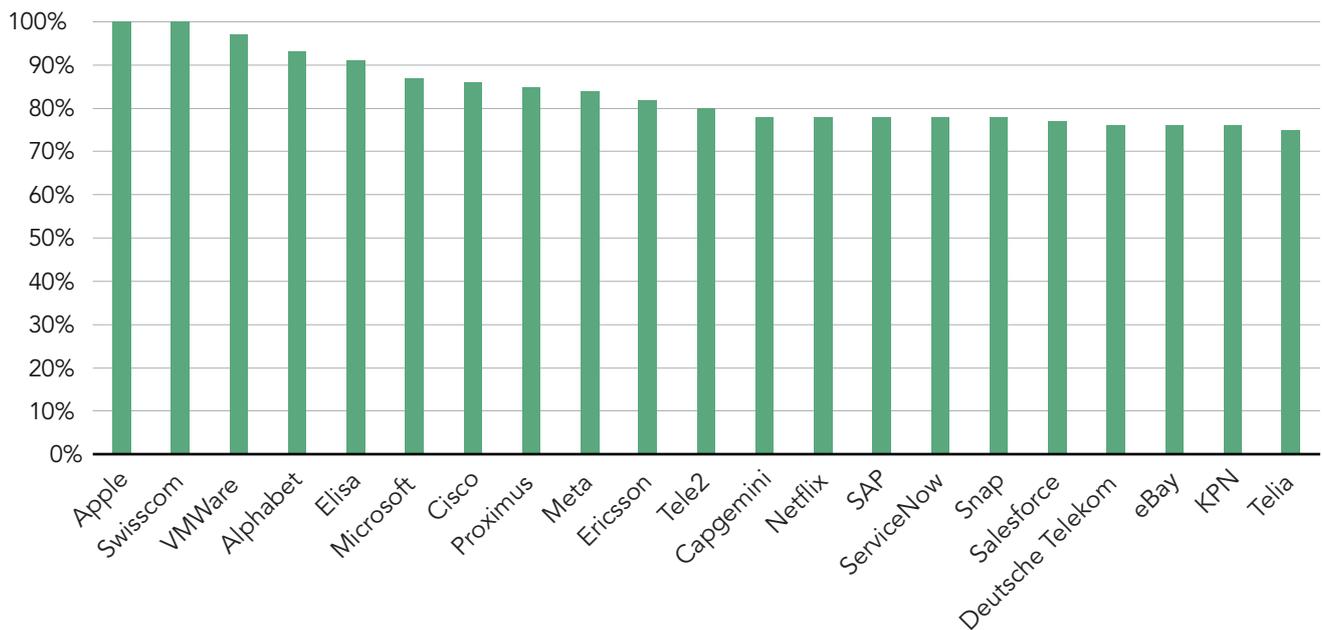
30 SBTi. 2023. *SBTi Corporate Net-Zero Standard*. <https://sciencebasedtargets.org/net-zero>

companies are working to remedy this through support of the carbon removal market. Microsoft is particularly active in pursuing carbon removal solutions, and has published guidelines.<sup>31</sup> It contracted the removal of the equivalent of 1.4 million tonnes of carbon during its 2022 fiscal year and is making multi-year commitments to scale the market. Examples of Microsoft’s carbon removal credits include elimination during industrial processes, such as producing biochar from lumber and recycling concrete.<sup>32</sup> Microsoft has also partnered with Danish renewable energy company Ørsted to remove 2.76 million tonnes of carbon over 11 years; the captured carbon will be stored at a reservoir in the North Sea.<sup>33</sup> Carbon removal is also supported by Frontier, a buyers club founded by Alphabet, Meta and other corporate partners. Its first purchase, covering the period 2023-2030, will capture over 100 000 tonnes a year and store it permanently underground.<sup>34</sup>

## 2.4 Assessment results

Companies were assessed on their data disclosure, targets and performance, and given a score out of 9. Two companies achieved the maximum possible score of 9 (Apple and Swisscom), while three others had a score between 8 and 9 (Alphabet, Elisa and VMWare). The median score was just 3.2, while 28 companies scored zero. Notably, the top performing companies (i.e. those with a minimum score of 6.8, or 75 per cent) are all headquartered in Europe or the United States (Figure 2.4). Companies from the other regions should be encouraged to improve their climate disclosure, targets and performance. Only 66 companies achieved a passing grade of 50 per cent or above.

**Figure 2.4: Companies scoring at least 75 per cent on the climate assessment**



31 Carbon Direct and Microsoft. n.d. *Criteria for high-quality carbon dioxide removal*. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RWGG6f>  
 32 Microsoft. 2022. *Microsoft carbon removal: An update with lessons learned in our second year*. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4QO0D>  
 33 “Ørsted awarded contract – will capture and store 430,000 tonnes of biogenic CO<sub>2</sub>.” News, 15 May 2023. <https://orsted.com/en/media/newsroom/news/2023/05/20230515676011>  
 34 “Frontier buyers sign first \$53M in offtake agreements with Charm Industrial.” Frontier, 18 May 2023. <https://frontierclimate.com/writing/first-offtake>

Apple and Swisscom were assessed as exemplary. Both publish standalone environmental reports featuring a time series of emissions and energy data as well as third party assurance statements. They disclose the full suite of emissions data (including Scope 1, Scope 2 – location-based and market-based – and Scope 3 with emissions for all relevant categories). The reports provide detailed descriptions of the methodologies used and, in the case of Apple, go beyond climate to also cover water use and waste, as well as steps to make its products greener. Apple also makes its CDP reports publicly available on its website.

Both companies demonstrated strong performance. Their metrics on intensity – the emissions-to-revenue ratio – are very low. In the case of Apple this is to some

extent due to significant outsourcing of manufacturing. In the case of Swisscom, it is the relatively green Swiss power grid (over 90 per cent powered by hydro and nuclear) that results in low Scope 2 location-based emissions. Both companies purchase 100 per cent renewable electricity, resulting in zero Scope 2 emissions from electricity.

They have strong emissions reduction targets, with SBTi endorsement for all Scope 3 targets. Both have been climate-neutral since 2020; Swisscom is targeting net zero by 2025 and Apple by 2030. One area where they could improve is providing more details about the offsets used to achieve climate neutrality, including the price paid for voluntary carbon credits.

# 3

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## **Enablement: the impact of digital technologies on GHG emission reductions**

ICTs have the potential to complement the decarbonization efforts of digital companies by, for example, offering digital solutions that improve energy efficiency, optimize inventory management and enhance business operations. They do this by reducing the need for travel and transportation through teleworking and videoconferencing, and by substituting physical products with digital information. These capabilities are collectively known as second-order or enablement effects.<sup>35</sup> The enablement impact arises when the use of digital services contributes to avoidance of emissions beyond the immediately relevant upstream and downstream emissions.<sup>36</sup> As the world becomes more digitized, the potential to avoid emissions thanks to ICT products and services will grow.

Several global studies have been conducted to estimate the GHG abatement potential of ICT; the figures range from 0.72 to 12 080 million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub>e) annually, while enablement factors range from 0.26 to 36.<sup>37,38,39,40,41,42,43</sup> A 2015 study by GeSI based on 12 use cases estimated that ICT-enabled solutions have the potential by 2030 to reduce worldwide emissions in various industries by up to 12 080 Mt CO<sub>2</sub>e, which is 9.7 times the size of the estimated direct emissions of the entire ICT sector. It is clear that global ICT adoption holds great promise in regard to bridging the gap between economic growth and GHG emissions, which are an important part of the overall environmental impact.<sup>44</sup> GSMA has estimated that mobile telecommunications have already enabled a reduction of over 2 135 MtCO<sub>2</sub>e, ten times the total CO<sub>2</sub> emissions produced by global mobile networks.<sup>45</sup>

### Box 3.1: What is the enablement factor?

The enablement factor is a metric that compares the GHG abatement potential of the ICT sector to its GHG footprint. A value greater than one indicates that the combined abatement potential of the considered use cases of the technology exceeds the emissions it generates, while a value less than one indicates that those effects are not sufficient to compensate for its GHG footprint.<sup>46</sup>

- 35 Liao, H-T., Pan, C-L., and Zhang, Y. (2023). Smart digital platforms for carbon neutral management and services: Business models based on ITU standards for green digital transformation. *Front. Ecol. Evol.*, March, 2023. <https://www.frontiersin.org/articles/10.3389/fevo.2023.1134381/full>
- 36 GSMA. 2018. *The Enablement Effect: The impact of mobile communications technologies on carbon emission reductions*. <https://www.gsma.com/betterfuture/enablement-effect>
- 37 Bieser, J. C. T., Hintemann, R., Hilty, L., and Beucker, S. 2023. A review of assessments of the greenhouse gas footprint and abatement potential of information and communication technology. *Environmental Impact Assessment Review*, 99 (2023) 107033. [https://www.zora.uzh.ch/id/eprint/228892/1/2023\\_A%20review%20of%20assessments%20of%20the%20greenhouse%20gas%20footprint%20and%20abatement%20potential%20of%20information%20and%20c.pdf](https://www.zora.uzh.ch/id/eprint/228892/1/2023_A%20review%20of%20assessments%20of%20the%20greenhouse%20gas%20footprint%20and%20abatement%20potential%20of%20information%20and%20c.pdf)
- 38 Hilty, L., Bieser, J., 2017. Opportunities and Risks of Digitalization for Climate Protection in Switzerland. University of Zurich. <https://doi.org/10.5167/uzh-141128>
- 39 GeSI, & Accenture Strategy, 2015. #SMARTer2030. *ICT Solutions for 21st Century Challenges*. <https://smarter2030.gesi.org/>
- 40 GeSI, & BCG, 2012. SMARTer 2020: The Role of ICT in Driving a Sustainable Future. GeSI, The Boston Consulting Group. [https://www.telenor.com/wp-content/uploads/2014/04/SMARTer-2020-The-Role-of-ICT-in-Driving-a-Sustainable-Future-December-2012\\_2.pdf](https://www.telenor.com/wp-content/uploads/2014/04/SMARTer-2020-The-Role-of-ICT-in-Driving-a-Sustainable-Future-December-2012_2.pdf)
- 41 GeSI, & Deloitte, 2019. Digital with Purpose – Delivering a SMARTer 2030. <https://gesi.org/research/download/36>
- 42 GeSI, The Climate Group, & McKinsey, 2008. SMART 2020. Enabling the Low Carbon Economy in the Information Age. GeSI, The Climate Group. [https://www.sustainabilityexchange.ac.uk/files/enabling\\_the\\_low\\_carbon\\_economy\\_in\\_the\\_information\\_age\\_1.pdf](https://www.sustainabilityexchange.ac.uk/files/enabling_the_low_carbon_economy_in_the_information_age_1.pdf)
- 43 Malmodin, J., Lund'en, D., 2018. The energy and carbon footprint of the global ICT and E&M sectors 2010–2015. *Sustainability* 10 (9), 3027. <https://doi.org/10.3390/su10093027>
- 44 GeSI, & Accenture Strategy, 2015. #SMARTer2030. *ICT Solutions for 21st Century Challenges*. <https://smarter2030.gesi.org/>
- 45 [https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA\\_Enablement\\_Effect.pdf](https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA_Enablement_Effect.pdf)
- 46 Bieser, J. C. T., Hintemann, R., Hilty, L., and Beucker, S. 2023. A review of assessments of the greenhouse gas footprint and abatement potential of information and communication technology. *Environmental Impact Assessment Review*, 99 (2023) 107033. [https://www.zora.uzh.ch/id/eprint/228892/1/2023\\_A%20review%20of%20assessments%20of%20the%20greenhouse%20gas%20footprint%20and%20abatement%20potential%20of%20information%20and%20c.pdf](https://www.zora.uzh.ch/id/eprint/228892/1/2023_A%20review%20of%20assessments%20of%20the%20greenhouse%20gas%20footprint%20and%20abatement%20potential%20of%20information%20and%20c.pdf)

Some of the 200 digital companies studied in this report have introduced the metric of enablement to showcase the extent to which their products and services contribute to emission reductions.<sup>47</sup> However, they lack a common methodology. Recommendation ITU-T L.1480<sup>48</sup> considers the impact of ICT solutions on GHG emissions in other sectors, addressing net second-order and higher-order effects. Nonetheless, enablement claims have met with criticism, including accusations of cherry-picking and the use of unsound assumptions and assessment methodologies. Clearly, more work is needed in this area to provide an empirical basis<sup>49, 50</sup> and to improve consistency, transparency, and comprehensiveness in assessing the long-term impact of GHG emissions across different contexts, taking into consideration user implementation, scale, and organizational perspectives.

While environmental impact reporting, especially in relation to carbon emissions, is becoming established among digital companies, calculating their enablement effect remains a fringe practice, restricted primarily to telecommunication operators.<sup>51</sup> Digital companies contribute to avoided emissions primarily through their products and services. Although the current disclosure landscape is disproportionately dominated by telecommunication companies, it does provide some insight into the enablement effect of digital companies more generally. For instance, by providing Internet connectivity, telcos have enabled remote working, which has led to reduced emissions from passenger vehicle usage. The incorporation of IoT sensors for buildings, logistics and fleet management lowers emissions by improving efficiency and preventing energy waste. For companies delivering online content network services, such as Cloudflare, optimizing the network routing processes has also reduced emissions.<sup>52</sup>

The general lack of disclosure on this aspect by digital companies may be attributed to the absence of a unified industry-wide standard, which makes it challenging for digital companies to define and calculate the impact on emissions in other sectors from using their products and services. This is in contrast to the telecommunication industry, where there is much more disclosure, possibly because ITU and GSMA have published relevant guidance. Moreover, the hypothetical nature of this type of comparison (involving a reference scenario that supposes the ICT solution did not exist) makes it more difficult to handle in an accounting situation. This has been detailed in Recommendation ITU-T L.1480 and in the recent guidance on avoided emissions from the World Business Council for Sustainable Development (WBCSD).

Again, it is difficult for companies to demarcate and ascertain the size of the emission reductions they can plausibly claim. For instance, while it is indisputable that video conferencing reduces the need to commute and thus enables emissions reduction, it is not clear to what extent the enablement effect should be credited to the telecom operator who provides the connectivity, the manufacturer who provides the hardware, or the software company who provides the video conferencing tools.

Some companies calculate an “enablement factor”, the ratio of how much GHG emission avoidance has been enabled to operational or total carbon footprint (Table 3.1). The use of enabling factors has also met with criticism, particularly from the research community, which sees it as promoting a biased perspective. The cherry-picking argument holds strong validity here. Comparing only the positive contributions of a service without considering its full environmental footprint is an imbalanced approach. In this connection it

47 <https://ghgprotocol.org/blog/do-we-need-standard-calculate-%E2%80%9Cavoided-emissions%E2%80%9D>

48 ITU. 2022. *Enabling the Net Zero transition: Assessing how the use of ICT solutions impacts GHG emissions of other sectors (L.1480)*. [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17698](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17698)

49 Bremer, C. et al., (2023). *Assessing Energy and Climate Effects of Digitalization: Methodological Challenges and Key Recommendations*. <https://www.networkdee.org/publications/assessing-energy-and-climate-effects-of-digitalization%3A-methodological-challenges-and-key-recommendations>

50 Bieser, J. et al., (2023). *A review of assessments of the greenhouse gas footprint and abatement potential of information and communication technology*. *Environmental Impact Assessment Review*. Vol.99. <https://www.sciencedirect.com/science/article/pii/S0195925522002992>

51 The enablement effect is known under several names including scope 4, abatement, handprint, avoided emissions. These concepts are more or less well defined. [ITU-T L.1480](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17698) speaks of positive net second-order effects.

52 Cloudflare (2021). *Understand and reduce your carbon impact with Cloudflare*. <https://blog.cloudflare.com/understand-and-reduce-your-carbon-impact-with-cloudflare/>

is crucial to acknowledge that considerations such as the share of investments should be taken into account, as emphasized by WBCSD.<sup>53</sup> Furthermore, it is important to note that many calculations overlook contextual factors such as incentive structures and policy frameworks when assessing the potential emission reductions. These contextual elements play a significant role and should be duly considered in order to arrive at a comprehensive analysis.

In lieu of calculating enablement effects, some companies are filing qualitative reports on potential areas of enablement and setting targets. Thus, Alibaba mentions that its “Carbon Eye” product allows city governments to monitor, track and analyse carbon emissions and carbon trading, facilitating decision-making and regulation processes. It has also set itself the target of facilitating a reduction of 1.5 gigatonnes of GHG emissions across the Alibaba digital ecosystem by 2035.<sup>54</sup>

**Table 3.1: Enablement factor of digital companies, 2021**

Company	Operational emissions (million tCO <sub>2</sub> e)	Enablement effects (million tCO <sub>2</sub> e)	Enablement Factor (Enablement effects ÷ operational emissions)
AT&T	6.2	37.9	6.1
Deutsche Telekom	4.9	25.6	5.3
Telefonica	1.4	8.7	6.2
Verizon	3.9	16.4	4.2
Vodafone	2.0	15.6	7.9
Telstra	1.1	2.7	2.4
KPN	0.2	0.5	2.2
Swisscom	0.1	0.9	14.8
Proximus	0.1	0.5	7.0
Telia	0.1	0.6	6.2
<b>Total</b>	<b>19.9</b>	<b>108.8</b>	<b>5.5</b>

Note: Operational emissions include Scope 1 and Scope 2, location-based.

53 WBCSD (2023). Guidance on avoided emissions: helping business drive innovations and scale solutions toward net zero. World Business Council for Sustainable Development. <https://www.wbcsd.org/content/wbc/download/15909/229494/1>

54 Alizila. 2021. Alibaba Pledges Carbon Neutrality by 2030 and 1.5 Gigatons of Decarbonization Across Ecosystem by 2035. <https://www.alizila.com/alibaba-pledges-carbon-neutrality-by-2030-and-1-5-gigatons-of-decarbonization-across-ecosystem-by-2035/>

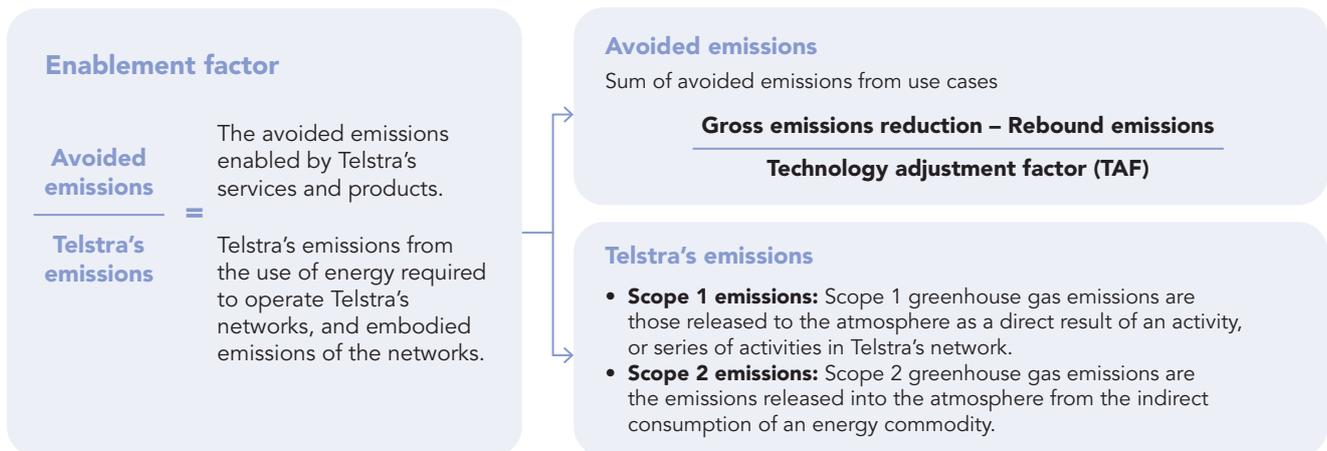
With the current level of disclosures, the estimated total enablement effect for all 200 surveyed companies is 1.35 billion tCO<sub>2</sub>e,<sup>55</sup> just 20 per cent of GSMA’s estimation. The huge disparity could be due to the fact that only 10 telecom operators were included in this calculation, which limits the ability to estimate and capture the average enablement factor accurately; however, it could also be that there are multiplied enablement effects when different products and services are combined to support specific use cases.

Companies such as Telstra have refined their methodology by including (1) the calculation of **rebound emissions**, which reflects how adoption of a technology that permits emission reductions can actually result in increased emissions, and (2) a **technology adjustment factor (TAF)** to capture the extent to which the emissions avoided by each use case can be attributed to Telstra (Figure 3.1).

Regarding the methodologies used by companies in disclosing their enablement effects, the starting point is often to identify key use cases where their products and services generate relevant impact.

For telecommunication operators, an important use case is their provision of network connectivity. Many digital companies are identifying their own enablement impact alongside their initiatives to reduce their carbon footprint. Some telecommunication operators calculate their enablement effects in addition to their operational emissions (‘enablement factor’). Deutsche Telekom incorporates all three scopes to calculate an enablement factor (Box 3.2). The major contributors to enablement from the 200 digital companies surveyed are remote working, video conferencing, and the use of smart sensors in the building and transportation sectors.

Figure 3.1: Telstra’s enablement factor calculation

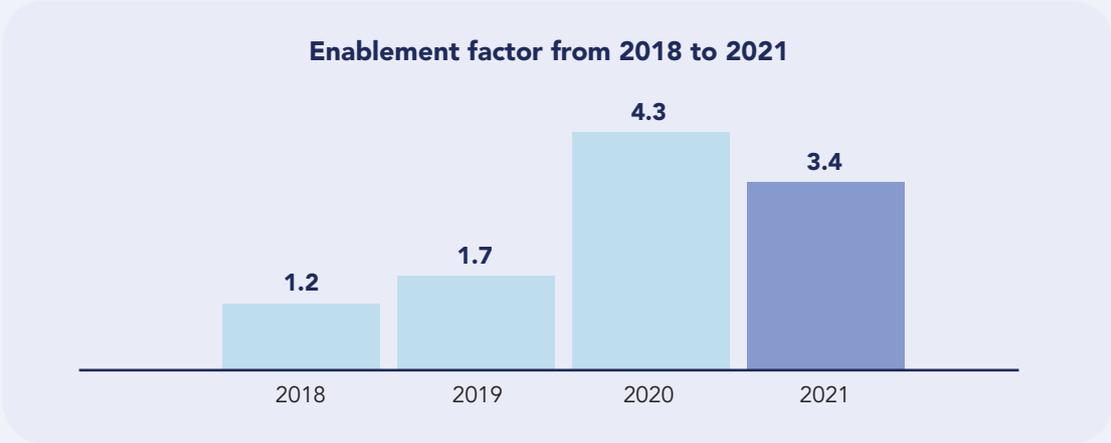
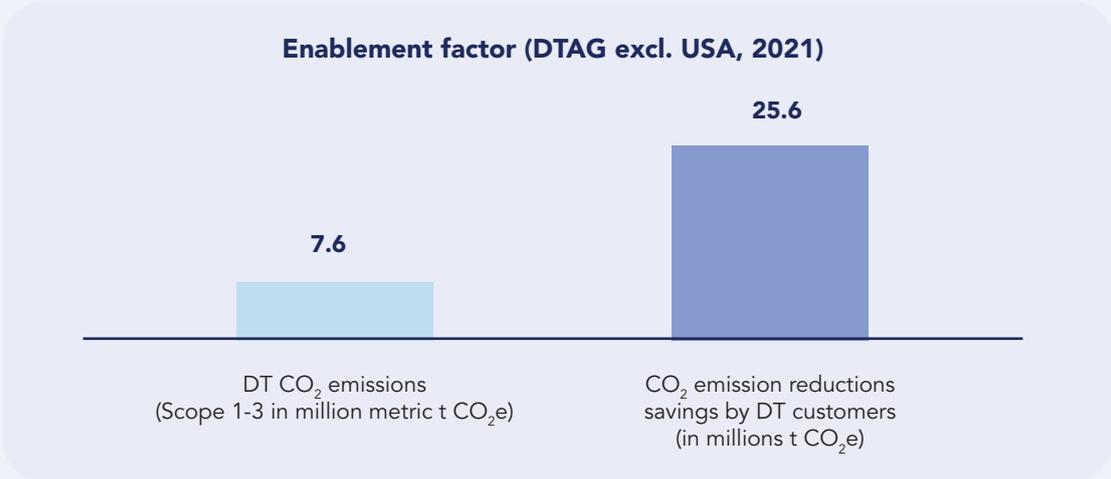


Source: Telstra and Deloitte. 2022. *Enabling positive climate action: The impact of Telstra's digital technologies.* [https://exchange.telstra.com.au/wp-content/uploads/2022/08/2207022\\_Telstra-Enablement-Report\\_FINALv3\\_Design.pdf](https://exchange.telstra.com.au/wp-content/uploads/2022/08/2207022_Telstra-Enablement-Report_FINALv3_Design.pdf)

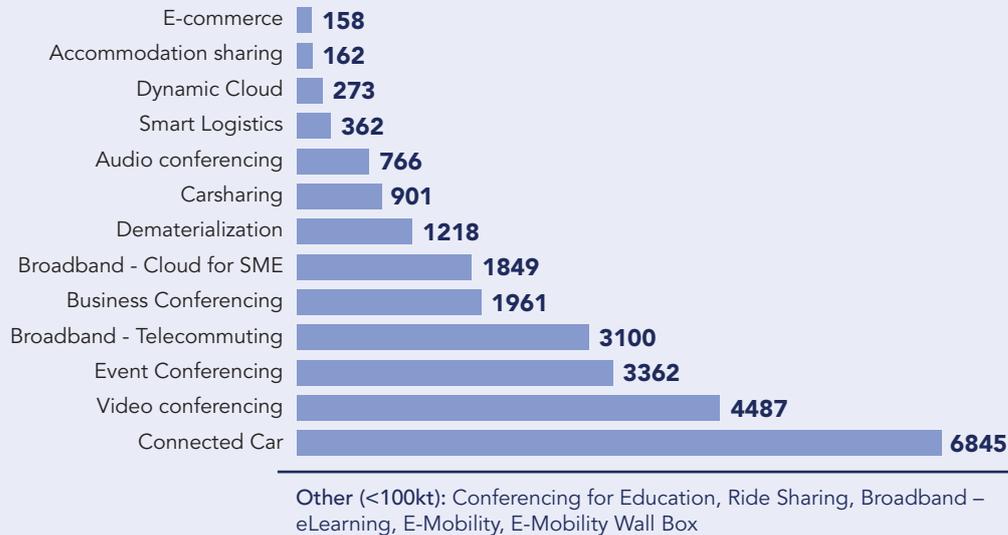
55 Emissions of all DIB200 companies = 249 899 964;. Average enablement ratio for companies with data= 5.5; Estimated avoided emissions from DIB200 = 5.5 \* 249 899 964 = 1.4 billion; GSMA estimation of avoided emissions = 7 billion; 1.4/7 \* 100% = 20%.

### Box 3.2: Deutsche Telekom enablement factor

Since 2014, Deutsche Telekom has conducted assessments to determine its enablement factor and calculate the positive CO<sub>2</sub> effects resulting from the utilization of their products by customers. In Germany in 2021, the positive CO<sub>2</sub> effects enabled by their customers exceeded their own CO<sub>2</sub> emissions by 380 per cent (enablement factor of 4.8). The decrease from the previous year (7.1) can be attributed to improvements in their survey methodology and a reduced number of users for their videoconference solutions. In Germany, the largest CO<sub>2</sub> reduction potential is associated with connected cars, with 6.8 million tonnes of CO<sub>2</sub>, followed by video conferencing with 4.5 million tonnes of CO<sub>2</sub>. Their cloud computing services offer the greatest savings potential, allowing customers to reduce their CO<sub>2</sub> emissions by up to 80 per cent by using more efficient servers, energy-efficient data centres, and higher infrastructure capacity utilization. At the European scale, Deutsche Telekom calculated that the positive CO<sub>2</sub> effects surpassed the company's CO<sub>2</sub> emissions by 237 per cent (enablement factor of 3.37). In absolute terms, the utilization of their products and solutions by customers resulted in nearly 26 million tonnes of CO<sub>2</sub> reduction in 2021.



**Extract: positive CO2 effects facilitated for our customers  
(in metric kt CO<sub>2</sub>e)**



Source: Deutsche Telekom. 2022. [Corporate Responsibility Report 2021](#).

## 3.1 Digital enabling mechanisms

To limit global warming to 1.5°C and achieve a 50 per cent reduction in emissions by 2030, the use of digital technologies plays a vital role in decarbonization efforts. Four categories of enabling mechanisms - smart buildings, smart energy, smart transport, and smart living and working - are discussed below with case studies from digital companies.

### 3.1.1 Smart buildings

Digital technologies play a crucial role in facilitating emissions reductions in buildings through improved energy efficiency and support for behaviour changes that can reduce gas and electricity consumption. Key technologies include building management systems, smart meters, and smart control systems for heating, ventilation, and air conditioning (HVAC) systems.

**Box 3.3: Telstra’s calculation of enablement effects**

In its calculation of enablement effects, Telstra identified two key use cases relevant to smart buildings. The use case for smart HVAC control systems is described below.

**Smart HVAC control systems**

In Australia, HVAC is a significant source of building emissions, accounting for an average of 24.7 million tCO<sub>2</sub> per year (equivalent to 50 per cent of total energy consumption by commercial buildings). A smart HVAC control system helps increase energy efficiency by regulating temperature with its sensors and a control centre fitted with sensors for optimal HVAC measurements. The system relies on communication between sensors and the control centre, and this is made possible thanks to Internet connectivity provided by Telstra. This allows the systems to operate remotely, helping to reduce emissions.

In 2021, Telstra provided connectivity to around one-third of smart HVAC-enabled buildings in Australia. This resulted in a contribution to emission avoidance in that year estimated at 552 000 tCO<sub>2</sub>e. The breakdown of Telstra’s calculation methodology is as follows (Fig A1. Smart HVAC control systems parameters):

- Emissions from commercial buildings with HVAC = 0.5 x 0.1 x 494 MtCO<sub>2</sub>e = 24.7 MtCO<sub>2</sub>e
- Reduction in emissions from smart HVAC = 0.2 x 24.7 MtCO<sub>2</sub>e = 4.94 MtCO<sub>2</sub>e
- Telstra’s share of avoided emissions = % share of connectivity \* reduction in emissions due to smart HVAC / tech adjustment factor = 0.335 x 4.94 MtCO<sub>2</sub>e ÷ 3 = 552 000 tCO<sub>2</sub>e

**Fig A1. Smart HVAC control systems parameters**

Parameters used to calculate Telstra’s avoided emissions from HVAC control systems

Parameter	Value	Source
Annual carbon emissions in Australia	494 MtCO <sub>2</sub> e	DISER, <i>National Greenhouse Gas Inventory Update</i> , March 2021
Share of energy consumption from commercial buildings	10%	DISER, <i>Commercial buildings</i> , 2021
Decrease in building energy consumption from HVAC	50%	DISER, <i>HVAC</i> , 2021
Smart HVAC adoption, F21	70%	Industry consultation, 2022
Smart HVAC adoption, F31	90%	Industry consultation, 2022
Reduction in emissions from smart HVAC (compared to standard HVAC) <sup>(a)</sup>	20%	Carbon Trust, <i>Advanced metering for SMEs</i> , 2007.

Parameter	Value	Source
Technology adjustment factor	3 technologies	<ul style="list-style-type: none"> <li>• Temperature control device</li> <li>• Internet connectivity</li> <li>• Smart HVAC system (e.g. thermostat, air conditioner, heat controller, sensors)</li> </ul>
Attribution to Telstra	1 of 3 technologies	Telstra's estimated market share for internet connectivity in commercial buildings

Notes: A 2013 study by Pacific Northwest National Laboratory in the United States suggests that energy savings can range between 24% and 35%, so 20% is considered a conservative estimate.

### 3.1.2 Smart transport

Improving efficiencies with smart transport and storage logistics can deliver savings on fuel, electricity and heating requirements, offering an opportunity for substantial emissions reductions. In combination

with increased use of telecommuting and videoconferencing, it can significantly reduce transportation requirements and associated emissions.

#### Box 3.4: Smart logistics, Fujitsu

Fujitsu works with a number of cities, including Hamburg, Montreal, and Dublin, to reduce traffic emissions by providing relevant technological solutions. In collaboration with the Hamburg Port Authority, for instance, it deploys the Fujitsu quantum-inspired Digital Annealer, a tool that recommends optimal travel routes based on existing road infrastructure and real-time data. As one of the busiest ports in Europe, Hamburg handles up to 20 000 trucks daily, with a significant potential for congestion, delays and high local pollution emissions. Digital Annealer uses real-time data from an array of public and private sources to achieve reductions in traffic congestion (up to 15 per cent reduction observed in travel time for cars and trucks in the supply chain) and CO<sub>2</sub> emissions (9 per cent).<sup>56,57</sup>

56 Fujitsu. 2022. How Smart Cities are Driving down Air Pollution with Smart Traffic Flow Optimization. FUJITSU BLOG – Global. <https://corporate-blog.global.fujitsu.com/fgb/2022-05-17/01/>

57 Fujitsu. 2021. Fujitsu Quantum-Inspired Optimization Services Cut Traffic Jams and CO<sub>2</sub> Emissions at Hamburg Port. Fujitsu EMEA <https://www.fujitsu.com/emeia/about/resources/news/press-releases/2021/emeia-08122021-fujitsu-quantum-inspired-optimization-services-cut-traffic-jams-and-co2-emissions-at-hamburg-port.html>

### 3.1.3 Smart energy

ICT-enabled solutions promise to improve the efficiency of electric power grids and facilitate the shift to renewable energy sources, thus keeping CO<sub>2</sub> emissions down and improving resilience and sustainability. They allow operators to meet the challenges associated with aging infrastructure and the uncertainties associated

with using local and renewable sources, something that is particularly important in low and middle-income countries.<sup>58, 59, 60</sup> Table 3.2 illustrates how some of the surveyed digital companies are recognizing the enablement function of smart energy management.

**Table 3.2: Examples of smart energy enablement claims and activities from digital companies<sup>61</sup>**

Company	Description
Verizon	In 2022, Verizon's solutions facilitated energy reduction, resulting in the avoidance of 15.2 million metric tons of CO <sub>2</sub> e emissions of customers emissions, equivalent to removing 3.3 million cars from the road for a year. Over the past five years, their solutions have enabled the avoidance of 73 million metric tons of CO <sub>2</sub> e emissions. <sup>62</sup> Specific to energy management, Verizon report 868 metric tons of CO <sub>2</sub> e avoided thanks to smart building management and 2 229 754 tonnes from smart meters and demand response units. <sup>63</sup>
Alphabet (Google)	From 2011 to 2021, Google's Nest thermostats have collectively saved customers over 86 billion kWh of energy, enough to power the city of San Francisco for more than 17 years. <sup>64</sup>
Microsoft	Microsoft promotes sustainability through Smart Places, by leveraging IoT and AI to optimize resource efficiency in buildings, campuses, and cities. With Azure IoT and data-driven technologies, predictive monitoring enables organizations to optimize energy management, enhance equipment performance, and reduce carbon emissions. <sup>65</sup> Some digital companies are investing in market-enabling technologies, for example, Microsoft's corporate social responsibility (CSR) report states that by deploying smart thermostats across its 2020 portfolio, energy savings of 55 000 MWh were achieved in that one year alone, the equivalent of 5.5 million gallons of gasoline, representing a carbon reduction of 68 000 Mt CO <sub>2</sub> e. <sup>66</sup>

58 Finland Ministry of Transport and Communications. 2020. The ICT sector, climate, and the environment. [https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162473/LVM\\_2020\\_14.pdf?sequence=1&isAllowed=y](https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162473/LVM_2020_14.pdf?sequence=1&isAllowed=y)

59 GSMA. 2019. The Enablement Effect: The impact of mobile communications technologies on carbon emission reductions. [https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA\\_Enablement\\_Effect.pdf](https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA_Enablement_Effect.pdf)

60 GeSI. 2023. ICT Solutions for 21st Century Challenges. <https://smarter2030.gesi.org>

61 The numbers presented in this table (and the report in general) follow different methodologies. The application of ITU-T L.1480 may yield different results and lead to discrepancies. The data reported reflects publicly available information and is not an endorsement of a specific enablement methodology. Several steps towards more rigorous assessments of enablement effects have been taken in 2022, in particular with the publication of ITU-T L.1480, but also with the WBCSD guidelines on avoiding emissions, which focus on the eligibility of claims. For the future, these frameworks bring the possibility to develop a better and more balanced understanding of the potential of ICT to reduce GHG emissions.

62 Verizon. 2022. ESG Report 2022. <https://www.verizon.com/about/sites/default/files/Verizon-2022-ESG-Report.pdf>

63 Verizon. 2022. ESG Report 2022, p.25 <https://www.verizon.com/about/sites/default/files/Verizon-2022-ESG-Report.pdf>

64 Google. 2022. Environment Report 2022. <https://www.gstatic.com/gumdrop/sustainability/google-2022-environmental-report.pdf>

65 Microsoft. 2021. Environmental Sustainability Report: From pledges to progress. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4RwfV>

66 Microsoft. 2021. Environmental Sustainability Report: From pledges to progress. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4RwfV>

Company	Description
Infosys	Infosys prioritizes energy efficiency across its extensive office space by using smart automation and remote monitoring to optimize operations, particularly in data centres, which account for 11 per cent of its global power consumption. This has resulted in reliable and efficient performance with a weighted average Power Usage Effectiveness (PUE) of 1.67. <sup>67</sup> Infosys and BP have created an integrated Energy as-a-Service (EaaS) solution. The aim is to offer comprehensive management of customers' energy assets and services, so that they can access reliable low-carbon energy and improve energy efficiency without the need for additional infrastructure investments. In cooperation with a high-tech manufacturer, Infosys established a central command centre for remote monitoring, and transformed their physical spaces into low-energy-footprint facilities with digital experiences. This allowed them to achieve significant energy savings, reduce costs and avoid carbon emissions. Data-driven monitoring and resource management of approximately 1 700 million kWh of energy consumption over the past eight years has led to cost savings of \$185 million and the prevention of 1.45 million tons of carbon emissions. <sup>68</sup>
Huawei	Huawei and China Southern Power Grid are collaborating to pilot a wireless broadband-enabled smart grid. This innovative grid incorporates automatic distribution, measurement, video surveillance, and emergency communication, resulting in energy savings, reduced emissions, and a 5 per cent cost reduction for China Southern Power Grid. Additionally, the grid enhances power supply reliability and sets the groundwork for smart homes. <sup>69,70</sup>
Safaricom	Safaricom implemented measures in 20 data centres and over 6 000 access sites, achieving temperature reductions of up to 5 degrees Celsius, and deploying smart power solutions and deep battery cycling. An intelligent shutdown system by radio access based on machine learning was piloted and achieved energy savings of 20 per cent across 36 sites and 16 per cent in the rest. Additionally, automated energy reporting using Microsoft Power BI has been put in place, and data centre infrastructure management (DCIM) tools have been deployed at two data centres for real-time monitoring and control of energy consumption. <sup>71</sup>

Note: Calculations based on company methodologies and thus not necessarily comparable.

Source: Company reports.

### 3.1.4 Smart living and working

Digital technologies are facilitating changes in behaviour, leading to the avoidance of emissions through personal lifestyle choices. Smart living refers to the use of smart devices and smartphone apps that help individuals reduce their carbon footprint.

For example, consumers connect to sellers via the Internet, purchasing goods online rather than physically travelling to stores.<sup>72</sup> Software can be used to develop packaging that generates less waste and conserves resources.<sup>73</sup> But the greatest potential for reducing emissions in smart living and working comes from the ability to engage in remote activities, eliminating the necessity for travel.

67 Infosys. 2023. PAS2060 Qualifying Explanatory Statement. <https://www.infosys.com/global-resource/18/carbon-neutrality-declaration2023.pdf>

68 PAC and Infosys. 2021. Where Decarbonization Meets Digital Transformation. How Infosys is helping businesses to accelerate their Net Zero initiatives. <https://www.infosys.com/about/corporate-responsibility/decarbonization-meets-digital-transformation.pdf>

69 Huawei. 2019. China Southern Power Grid: Energy supply gets smart with AI. <https://www.huawei.com/ch-en/huaweitech/publication/winwin/34/southern-power-grid-energy-supply-gets-smart-with-ai>

70 GeSI and Accenture Strategy. 2015. #SMARTer2030 – ICT Solutions for 21st Century Challenges. [https://smarter2030.gesi.org/downloads/Chapter\\_Energy.pdf](https://smarter2030.gesi.org/downloads/Chapter_Energy.pdf)

71 Safaricom. 2022. Partnering for Growth: Transforming Lives. 2022 Sustainable Business Report. <https://www.safaricom.co.ke/images/Downloads/2022-Safaricom-Sustainability-Report.pdf>

72 It is crucial to consider the complete scenario, as the carbon footprint of a product also includes emissions from shipping, especially when goods are sourced from distant locations instead of purchasing locally.

73 GeSI and Boston Consulting Group. 2012. GeSI SMARTer 2020: The Role of ICT in Driving a Sustainable Future. [https://www.telenor.com/wp-content/uploads/2014/04/SMARTer-2020-The-Role-of-ICT-in-Driving-a-Sustainable-Future-December-2012\\_2.pdf](https://www.telenor.com/wp-content/uploads/2014/04/SMARTer-2020-The-Role-of-ICT-in-Driving-a-Sustainable-Future-December-2012_2.pdf)

The ability to work remotely has transformed global employment and redefined the concept of a physical workplace, especially in recent years with COVID-19. Dell's study in the Connect Workplace programme suggested that remote work saves over one tonne of CO<sub>2</sub>e per employee annually. This has reduced the total carbon emissions of Dell's employee base in the USA by around 35 000 metric tonnes of CO<sub>2</sub>e per year. Additionally, employees save an average of 796 litres of fuel, a value of USD 12 million. Through the programme, Dell also saved USD 21 million in real estate and reduced emissions by 9 800 tonnes of CO<sub>2</sub>e.<sup>74</sup> These benefits will have increased in recent years due to a growing remote workforce. Digital technology enables remote business operations, reducing travel emissions for meetings and daily commuting. Working from home also leads to energy savings in office buildings and typically outweighs the additional electricity use at home (a rebound effect), resulting in overall carbon savings from avoided commuting.<sup>75</sup>

When aggregating enablement effects, it is crucial to avoid double counting. For example, while the videoconferencing software that enables remote work is supplied by a vendor, remote working also depends on connectivity, which is provided by telecommunication operators. Careless aggregation of enablement effects can lead to the unintended duplication of emissions reductions, which can distort the overall calculation. Properly assigning enablement effects ensures transparency and accuracy in measuring the environmental impact of digital technologies. It is important to note that enablement claims, by their nature, will always be double counted in terms of Scope 1-3 emissions by other parties, in a manner that is similar to how Scope 3 emissions are double counted. For this reason, attribution and aggregation are interconnected topics. To ensure transparent and rigorous approaches, studies and assessments should carefully take into account and manage the complexities of assessing ICT solutions, addressed in ITU-T L.1480.

### Box 3.5: Comparison of carbon emissions avoidance by video conference providers

**Zoom:** Zoom's remote working solutions have significantly contributed to reducing carbon emissions by millions of metric tonnes, and they remain committed to further reducing commuting-related emissions by making it easier to embrace the hybrid work model and reduce business travel.<sup>76</sup>

**Webex (Cisco):** Cisco conducted a lifecycle assessment of the impact of using a WebEx Desk Pro device instead of commuting, for several cities around the world. It considered scenarios of remote work and virtual meetings to replace commuting and long-distance travel. The emissions from the entire lifecycle of a single WebEx Desk Pro device, including production and five years of use, are offset by the emissions that are saved by avoiding just one long-haul flight trip.<sup>77</sup>

**Verizon:** Verizon report that their telecommuting solution has avoided 7 451 247 tCO<sub>2</sub>e from travelling to work, but without specifying which solution it was (possibly BlueJeans).<sup>78</sup>

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- 74 Dell. 2016. The Sustainability Benefits of the Connected Workplace. [https://i.dell.com/sites/csdocuments/Corporate\\_corp-Comm\\_Documents/en/telecommute-study.pdf](https://i.dell.com/sites/csdocuments/Corporate_corp-Comm_Documents/en/telecommute-study.pdf)
- 75 GSMA. 2019. The Enablement Effect: The impact of mobile communications technologies on carbon emission reductions. [https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA\\_Enablement\\_Effect.pdf](https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA_Enablement_Effect.pdf)
- 76 Zoom, ESG Report 2022, p. 21. <https://investors.zoom.us/static-files/0ddac6eb-3901-4f86-95c2-898bee9c8b95>
- 77 CISCO. 2023. See "Product Sustainability" at: [https://www.cisco.com/c/m/en\\_us/about/csr/esg-hub/environment/product-sustainability.html#climate-change-potential](https://www.cisco.com/c/m/en_us/about/csr/esg-hub/environment/product-sustainability.html#climate-change-potential)
- 78 Verizon, 2022. ESG Report 2022. <https://www.verizon.com/about/sites/default/files/Verizon-2022-ESG-Report.pdf>

**Teams (Microsoft):** The Carbon Avoidance Screen in Microsoft Teams shows carbon emissions saved in remote meetings based on distance. The intention is to enable a reduction of travel for meetings, and the feature was to be tested with select customers in 2022.<sup>79</sup> No specific data was found in relation to emissions avoided from using Skype.

**DingTalk (Alibaba):** DingTalk, an application by Alibaba, promotes remote work and collaboration, leading to emissions reduction through work-from-home arrangements and video conferencing.<sup>80</sup> No data was provided on the emissions saved. Likewise, no data was found about Google Meet.

There are challenges with these enablement examples. One is the risk of double counting, as discussed earlier. Another is the choice of the (hypothetical) alternative scenario, particularly the transportation savings. Not everyone drives a hydrocarbon-fuelled car to work; on the contrary, the proportion of electric vehicles is growing (although they still need to be charged from the grid). A third challenge is the overall rebound effect from greater electricity use (as well as gas heating during cold temperatures), which is often overlooked.<sup>81</sup> This affects both user and data centre emissions.

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79 Microsoft. 2021. Environmental Sustainability Report: From Pledges to Progress. <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4RwfV>

80 Alibaba. 2022. ESG Report 2022. <https://data.alibabagroup.com/ecms-files/1452422558/5feb0e46-f04b-4d9c-9568-e4a5912db37e.pdf>

81 Partners. n.d. Pitfalls of emissions enablement. <https://stlpartners.com/articles/sustainability/pitfalls-of-emissions-enablement/>

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# Conclusions

**Decreasing transparency.** GHG emissions reporting suffers increasingly from transparency issues. According to the GHG Protocol guidance, disclosing Scope 2 location-based emissions is mandatory, while market-based emissions should only be included if applicable. However, some companies only report the generally lower market-based figure, which can be misleading as it does not accurately reflect their actual emissions from electricity consumption. Furthermore, as companies increasingly consider upstream and downstream emissions (Scope 3), the incomplete inclusion of market-based emissions can lead to spurious reporting of aggregated Scope 1-3 emissions when activities are outsourced or insourced, moving them from one scope or category to another. For example, the GHG Protocol has different boundaries for purchased and leased goods, adding to potential fluctuations over time. Changes being proposed to the GHG Protocol would enhance market-based accounting rules, specifically regarding the utilization of RECs, and introduce an additionality requirement for market-based Scope 2 emissions. The proposed revisions have implications for the use of RECs in emissions reporting, including concerns about additionality and the need for stricter rules for their use. More specific reporting of electricity use when referring to RECs, PPAs, etc. would help to evaluate market-based values.

Lack of transparency is a challenge for comparability, and a strong argument for judging a company's climate performance on its entire footprint rather than just its operational emissions – something that is in any event required from the perspective of net zero targets. Again, reporting Scope 3 emissions by

category would increase the accuracy and hence the value of such reports. The net zero guidance of ISO and best reporting practices already require this, as it is crucial for assessing the quality of Scope 3 reporting and maximizing its value. Without the suggested full coverage, the evaluation of Scope 3 reporting becomes challenging, and its value remains limited. The majority of companies surveyed provided at least partial data on emissions and energy use. Two-thirds of those not disclosing any data were fully state-owned or private unlisted companies. Efforts are needed to encourage these companies to disclose data.

**Just nine companies account for one-half of the operational emissions of the surveyed group.** All nine are headquartered in Asia or the United States. Three are Chinese state-controlled telecommunication operators who also operate a significant number of data centres. Two are major cloud computing providers headquartered in the United States. The remainder are producers of semiconductors which generate significant Scope 1 emissions. While Amazon and Alphabet purchase large amounts of renewable energy (Amazon is the largest corporate purchaser and 100 per cent of Alphabet's electricity purchases are renewable) they do not receive it all, due to grid design. Transformation of grids and greater self-provision are the main options for them to increase the share of renewables in the energy they use. Companies in East Asia have far to go in renewable energy purchases, largely owing to a lack of availability. Nevertheless, they should use their advocacy and scale to speed up deployment of renewables in their region.

**Table 4.1: Top nine digital companies by operational emissions, 2021**

Company	Headquarters	Region	Industry	Operational emissions tCO <sub>2</sub> e million	Share of DIB 200 operational emissions
China Mobile	China	East Asia	Telecoms	34	13%
Amazon	United States	North America	Services and software	*	8.6%
Samsung	Korea, Rep.of	East Asia	Hardware	20	7.5%

Company	Headquarters	Region	Industry	Operational emissions tCO <sub>2</sub> e million	Share of DIB 200 operational emissions
China Telecom	China	East Asia	Telecommunications	15	5.8%
China Unicom	China	East Asia	Telecommunications	13	4.8%
TSMC	Taiwan, China	East Asia	Hardware	11	4.2%
SK Hynix	Korea, Rep. of	East Asia	Hardware	8	3.0%
Micron	United States	North America	Hardware	7	2.6%
Alphabet	United States	North America	Services and software	7	2.5%
				<b>138</b>	<b>52%</b>

Note: Operational emissions refer to Scope 1 and Scope 2, location-based.

\* Estimated position, as Amazon does not disclose location-based Scope 2 emissions.

**Growing electricity use by digital companies is posing energy capacity challenges.** Expanding electricity use from growing digitalization is putting pressure on electric power grids. Some locations have imposed moratoriums on the construction of new data centres, and new data centres are being required to meet stringent energy efficiency standards or provide for their own source of renewable energy. The latter can be a challenge due to opposition to large solar and wind farms or a lack of land. Solutions need to be found or the pace of global digitalization could be slowed.

**ICT solutions are playing a significant role in reducing carbon emissions, but quantifying the effect is tricky.** It is important to acknowledge that different solutions may target the same emissions reductions, leading to potential overlaps if the various reduction claims are simply added up without

consideration of their interconnection. To ensure transparent and rigorous approaches, studies and assessments should take into account and manage the complexities of assessing ICT solutions addressed in [ITU-T L.1480](#).<sup>82,83</sup> To prevent double counting, clearer attribution and limitations in aggregating claims are indispensable. Allocation, given its complexity and value-based foundation, is not yet widely embraced. While several companies reported enablement effects, there is a lack of consensus regarding its overall magnitude. However, with the emergence of new, more rigorous methodologies, it is expected that this field will mature, ensuring accurate assessments and avoiding exaggerated claims. It is also important not to substitute that enabling role for actual emission reduction targets. For one thing, emission reductions can be verified, while enablement can only be estimated in relation to a hypothetical baseline.

82 Coroamă, V. C., Bergmark, P., Höjer M., and Malmodin, J. (2020). A Methodology for Assessing the Environmental Effects Induced by ICT Services: Part I: Single Services. ICT4S2020: Proceedings of the 7th International Conference on ICT for Sustainability, June 2020, Pages 36–45. <https://dl.acm.org/doi/10.1145/3401335.3401716>

83 Bergmark, P., Coroamă, V. C., Höjer M., and Donovan, C. (2020). A Methodology for Assessing the Environmental Effects Induced by ICT Services: Part II: Multiple Services and Companies. ICT4S2020: Proceedings of the 7th International Conference on ICT for Sustainability, June 2020, Pages 46–55. <https://dl.acm.org/doi/10.1145/3401335.3401711>

Moreover, there is a risk of rebound effects.<sup>84</sup> While ICT presents opportunities to enable emissions reductions in other sectors, there is insufficient evidence to support the achievement of the significant and sustained carbon savings required by 2050. ICT is a general-purpose technology which could both avoid and add emissions, depending on the use to which it is put. While ICT may facilitate lower-carbon living, it alone cannot lead to carbon reductions and may even contribute to rebound effects and higher overall emissions. The enablement argument does not absolve the ICT sector from addressing its own emissions, and further efforts are needed to comprehend its complex impact on emissions avoided and emissions added – including rebound effects.

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84 Jan C.T. Bieser, Ralph Hintemann, Lorenz M. Hilty and Severin Beucker. 2023. "A review of assessments of the greenhouse gas footprint and abatement potential of information and communication technology." *Environmental Impact Assessment Review*, March. <https://www.sciencedirect.com/science/article/pii/S0195925522002992#bi0005>

# 5

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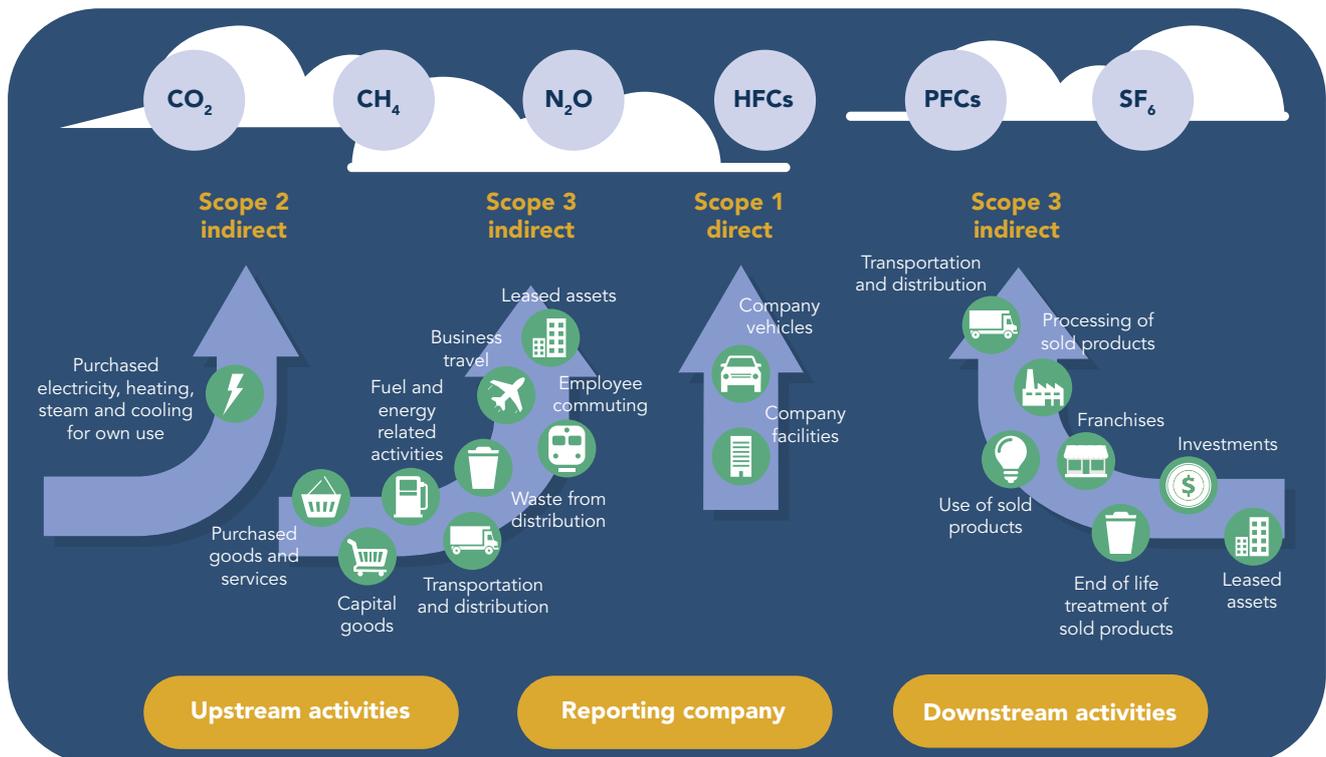
# Annex

## 5.1 GHG emissions methodology

A wide range of emissions-related standards provide methodologies to assess and report emissions, energy use and GHG emissions, such as Recommendation ITU-T L.1420<sup>85</sup> and guidance from the International Organization for Standardization (ISO 14064).<sup>86</sup> In addition, most companies follow the Greenhouse

Gas Protocol (a corporate accounting and reporting standard) to calculate their carbon dioxide equivalent (CO<sub>2</sub>e) emissions,<sup>87</sup> for which specific ICT sector guidance has been published.<sup>88</sup> The protocol identifies three scopes in reference to GHG emissions (Figure 5.1).

**Figure 5.1: Emissions scopes**



Adapted from: <https://ghgprotocol.org/standards/scope-3-standard>

**Scope 1** emissions are those resulting directly from the company operations, such as the purchase and use of diesel and other fuels.

The main driver of emissions in this scope is electricity supplied to office buildings, factories, telecommunication infrastructure and data centres.

**Scope 2** refers to indirect emissions not controlled by the company, such as those provided by utility companies (e.g. electricity, heat, cooling or steam).

In 2015, new guidance for Scope 2 emissions was published.<sup>89</sup> It is designed to account for the difference between the type of electricity companies purchase

85 ITU. 2012. Recommendation ITU-T L.1420: Methodology for energy consumption and greenhouse gas emissions impact assessment of information and communication technologies in organizations. <https://www.itu.int/rec/T-REC-L.1420>

86 ISO. 2018. Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals <https://www.iso.org/standard/66453.html>

87 World Business Council for Sustainable Development and World Resources Institute. 2004. A Corporate Accounting and Reporting Standard (Revised Edition). <https://ghgprotocol.org/corporate-standard>

88 GeSI and Carbon Trust. 2017. ICT Sector Guidance built on the GHG Protocol Product Life Cycle Accounting and Reporting Standard. <https://ghgprotocol.org/sites/default/files/GHGP-ICTSG%20-%20ALL%20Chapters.pdf>

89 World Business Council for Sustainable Development and World Resources Institute. 2015. GHG Protocol Scope 2 Guidance: An amendment to the GHG Protocol. [https://ghgprotocol.org/scope\\_2\\_guidance](https://ghgprotocol.org/scope_2_guidance)

(market-based) and what they actually receive over the grid (location-based). This was partly an effort to recognize that while some companies were paying for renewable energy, the electricity grid was not always supplying them with it. The revised guidance recommends increasing demands for renewable energy to stimulate growth in the supply of such energy. The reasoning is that renewable energy purchased by companies, even if it is not used by them, will be used elsewhere, thereby contributing to reducing overall emissions.

This report shows both Scope 2 emission types. According to the GHG Protocol, companies are supposed to disclose both market-based and location-based emissions. Note that market-based emissions can be higher than location-based for some emission sources. This happens when the attributes of the

renewable energy purchased cannot be proven. In that case, companies have to use the residual mix emission factor, which can be higher than the location-based grid emissions factor. The residual mix is the sum of all electricity on a grid whose source cannot be ascertained.<sup>90</sup>

**Scope 3** refers to upstream and downstream emissions related to a company’s activities.<sup>91</sup> One example is emissions from a supplier to whom a digital hardware companies has outsourced its production activity. Another is product-use emissions, from devices such as computers and smartphones sold by digital companies. Note that while Scope 3 emissions are part of a company’s overall footprint, they are not part of the company’s operational emissions and are mostly attributable to another company. There are 15 categories of Scope 3 emissions (Table 5.1).

**Table 5.1: Scope 3 upstream and downstream activities (by category)**

Upstream activities	Downstream activities
Category 1: Purchased goods and services	Category 9: Downstream transportation and distribution
Category 2: Capital goods	Category 10: Processing of sold products
Category 3: Fuel- and energy-related emissions <sup>92</sup>	Category 11: Use of sold products
Category 4: Upstream transportation and distribution	Category 12: End-of-life treatment of sold products
Category 5: Waste generated in operations	Category 13: Downstream leased assets
Category 6: Business travel	Category 14: Franchises
Category 7: Employee commuting	Category 15: Investments
Category 8: Upstream leased assets	

Source: World Resources Institute and World Business Council for Sustainable Development. 2011. *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*. <https://ghgprotocol.org/standards/scope-3-standard>

Many companies disclose their emissions and energy use in reference to the Global Reporting Initiative (GRI) disclosure standards 302 (ENERGY <sup>93</sup>) and 305 (EMISSIONS<sup>94</sup>).

90 For an example of how the residual mix is calculated and used in Ireland see: Commission for Regulation of Utilities. 2021. *Fuel Mix Disclosure 2020*. [https://www.cru.ie/document\\_group/fuel-mix-and-co2-emissions-disclosure-2/](https://www.cru.ie/document_group/fuel-mix-and-co2-emissions-disclosure-2/)  
 91 World Business Council for Sustainable Development and World Resources Institute. 2013. *Technical Guidance for Calculating Scope 3 Emissions*. <https://ghgprotocol.org/scope-3-calculation-guidance-2>  
 92 This category is usually to be considered when deriving aggregated emissions of a company at a sector level for other purposes than company accounting in line with ITU Recommendations (such as ITU-T L.1420).  
 93 GRI. 2018. GRI 302: ENERGY 2016. <https://www.globalreporting.org/standards/media/1009/gri-302-energy-2016.pdf>  
 94 GRI. 2018. GRI 305: EMISSIONS 2016. <https://www.globalreporting.org/standards/media/1012/gri-305-emissions-2016.pdf>

## 5.2 Assessment approach

Companies were assessed in three areas: target (existence of an emissions reduction target, target quality, and target ambition), data (availability, clarity and verification) and performance. Each of the three assessment areas had a maximum of three points so the highest possible overall score was nine. Note that the assessment was made on information collected for the DIB relating to fiscal year 2021. Companies were provided an opportunity to review their data.

### 5.2.1 Target

**Target:** Company has a time-bound commitment to reduce emissions (0.25 points). The target must be its own (not a government-imposed target, for example) and apply to the entire corporate organization (not merely a subsidiary in a group). The target must clearly specify the target year and the baseline year for measuring progress.

**Quality:** The target is not intensity-based (0.25 points). The target has been submitted to SBTi for review (0.25 points). The target has been validated by SBTi (0.25 points).

**Ambition:** Company is already carbon-neutral (i.e. residual Scope 1 and 2 market-based emissions are matched by offsets) or aims to achieve operational carbon neutrality by 2030 (0.5 points) and net zero for the company's full footprint (i.e. Scope 1 and Scope 2, market-based, and all relevant categories in Scope 3) by 2040 (0.5 points).

### 5.2.2 Data

**Availability:** Company discloses Scope 1, Scope 2 location-based and market-based emissions (0.5). Company discloses Scope 3 emissions (0.5 points); Scope 3 includes all relevant categories (0.5 points). Company discloses electricity consumption (0.25 points) and share of renewables in electricity consumption (0.25 points). The data must cover the entire corporate organization.

**Reporting:** Company has a dedicated environmental report or makes its CDP climate report publicly available (0.5 points). To qualify as an environmental report, all emissions scopes must be disclosed in detail, including Scope 2, market-based and location-based, and all applicable Scope 3 categories must be disclosed, with justification for those which are considered as not relevant.

**Verification:** Evidence of third-party verification of emissions data (0.5 points). The verification statement must restate the emissions.

### 5.2.3 Performance

The share of renewables in total electricity consumption, as a fraction (maximum 1 point).

The proportion of GHG emissions (location-based) to USD revenue, normalized to a one-point scale (maximum 1 point).

The proportion of GHG emissions (market-based) to electricity use, normalized to a one-point scale (maximum 1 point).

## 5.2.4 Assessment example

The example below shows how the assessment was calculated for Swisscom.

**Table 5.2: Assessment calculation for Swisscom**

	Max points	Score	Evidence
<b>Target</b>	<b>3</b>	<b>3</b>	
Target: Company has a time bound commitment to reduce emissions	0.25	0.25	"Using 1 January 2020 as the baseline, Swisscom has set itself the goal of reducing its emissions by a total of 47 per cent for all scopes by 2030."
Company has a time bound, non-intensity target for Scope 3	0.25	0.25	"...all scopes"
Scope 3 target includes all categories	0.25	0.25	"...all scopes"
Quality: The commitment is not intensity-based	0.25	0.25	Yes, absolute reduction
Target accepted by SBTi	0.25	0.25	Yes. See: <a href="https://sciencebasedtargets.org/companies-taking-action#dashboard">https://sciencebasedtargets.org/companies-taking-action#dashboard</a>
Target approved by SBTi	0.25	0.25	"Major telecommunications provider Swisscom commits to reduce its scope 1 GHG emissions by 10 per cent, its scope 2 GHG emissions by 100 per cent, and its scope 3 GHG emissions by 18 per cent, all by 2020 from 2013 levels."
Ambition: Already carbon neutral	0.25	0.25	"Swisscom has significantly reduced its CO <sub>2</sub> emissions again in 2021 and intends to reduce them further. The remaining emissions from operations have been offset since 2020, making Swisscom's operations climate-neutral."
Already carbon neutral or aims for carbon neutrality by 2030	0.25	0.25	
Aims for Net Zero by 2040	1.00	1.00	"In addition to these CO <sub>2</sub> reductions, Swisscom intends to offset its emissions from 2022 onwards and achieve net zero in as early as 2025."

	Max points	Score	Evidence
<b>Data</b>	<b>3</b>	<b>3</b>	
<b><u>Data availability:</u></b>	<b><u>2.0</u></b>	<b><u>2.0</u></b>	
Scope 1 (tCO <sub>2</sub> e)			14 429
Scope 2 Location-based	0.5	0.5	45 814
Scope 2 Market-based			0
Scope 3	0.5	0.5	275 962
Scope 3 - All relevant categories	0.5	0.5	Categories 1-9, 11-12 & 15. Categories 10, 13 and 14 are not relevant for Swisscom.
Electricity (MWh)	0.25	0.25	464 865
Renewable electricity (%)	0.25	0.25	100
<b><u>Reporting:</u></b>	<b><u>1</u></b>	<b><u>1</u></b>	
The company has a dedicated climate report	0.5	0.5	<i>Swisscom climate report in accordance with ISO 14064</i>
<b><u>Verification:</u></b>	<b><u>0.5</u></b>	<b><u>0.5</u></b>	
Third-party verification of emissions data	0.5	0.5	SGS verification statement included in climate report.
<b>Performance</b>	<b>3</b>	<b>3</b>	
The share of renewables in electricity scaled to a maximum of 1	1	1	Value 100 normalized to 100/100 = 1. Highest is best.
The proportion of GHG emissions (location based) to USD revenue normalized to a 1 point scale*	1	1	2020 revenues (millions): USD 274,514. scope 2 location-based GHG / Revenue = 3.24. Lowest is best.
The proportion of Scope 2 emissions (market based) to electricity use normalized to a 1 point scale*	1	1	Value 0. Lowest is best.
<b>TOTAL POINTS</b>	<b>9</b>	<b>9</b>	

Note: \* Normalized based on the quartile group that the number falls in for the 200 companies. The highest quarter is scored 1, the second-highest 0.66, the second-lowest 0.33 and the lowest 0. Source: Swisscom. 2022. *Swisscom climate report in accordance with ISO 14064*. [https://reports.swisscom.ch/download/2021/en/swisscom\\_klimabericht\\_2021\\_en.pdf](https://reports.swisscom.ch/download/2021/en/swisscom_klimabericht_2021_en.pdf)

**Table 5.3: Company overview**

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Acer	PT_00017	Acer Incorporated	TWN	East Asia & Pacific	Hardware	Ending 31.12	11 385
Activision Blizzard	PT_02157	Activision Blizzard, Inc.	USA	North America	IT services & software	Ending 31.12	8 803
Adobe	PT_00024	Adobe, Inc.	USA	North America	IT services & software	Ending on Friday nearest 30.11	15 790
Airbnb	PT_00055	Airbnb, Inc.	USA	North America	IT services & software	Ending 31.12	5 992
AIS	PT_00026	Advanced Info Service Plc	THA	East Asia & Pacific	Telecommunications	Ending 31.12	5 670
Akamai	PT_00058	Akamai Technologies Inc	USA	North America	IT services & software	Ending 31.12	3 461
Alibaba	PT_00069	Alibaba Group Holding Ltd	CHN	East Asia & Pacific	IT services & software	Beginning 01.04	132 258
Alphabet	PT_00075	Alphabet Inc.	USA	North America	IT services & software	Ending 31.12	257 637
Altice	PT_00078	Altice France Holding SA	FRA	Europe & Central Asia	Telecommunications	Ending 31.12	13 060
Amazon	PT_00081	Amazon.Com, Inc.	USA	North America	IT services & software	Ending 31.12	469 822
AMD	PT_00027	Advanced Micro Devices, Inc.	USA	North America	Hardware	Ending last Saturday in Dec.	16 434
América Móvil	PT_00085	América Móvil, S.A.B. De C.V.	MEX	Latin America & Caribbean	Telecommunications	Ending 31.12	35 237
American Tower	PT_00094	American Tower Corporation	USA	North America	IT services & software	Ending 31.12	9 357
Amphenol	PT_00100	Amphenol Corporation	USA	North America	Hardware	Ending 31.12	10 876
Analog Devices	PT_00105	Analog Devices, Inc.	USA	North America	Hardware	Ending 30.10	7 318
Ant	PT_02052	Ant Group Co., Ltd.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	...
Apple	PT_00125	Apple Inc.	USA	North America	Hardware	Ending last Saturday in Sep.	365 817
Applied Materials	PT_00126	Applied Materials, Inc.	USA	North America	Hardware	Ending 31.10	23 063
ASML	PT_00146	ASML Holding NV	NLD	Europe & Central Asia	Hardware	Ending 31.12	21 895

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Asus	PT_00153	AsusTek Computer Inc.	TWN	East Asia & Pacific	Hardware	Ending 31.12	19 102
AT&T	PT_00154	AT&T Inc.	USA	North America	Telecommunications	Ending 31.12	168 864
ATH	PT_02064	Amalgamated Telecom Holdings Ltd	FJI	East Asia & Pacific	Telecommunications	Beginning 01.04	309
Axiata	PT_00173	Axiata Group Berhad	MYS	East Asia & Pacific	Telecommunications	Ending 31.12	6 256
Baidu	PT_00179	Baidu, Inc.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	19 301
BBK Electronics	PT_00228		CHN	East Asia & Pacific	Hardware		...
BCE	PT_00230	BCE Inc.	CAN	North America	Telecommunications	Ending 31.12	18 759
Bezeq	PT_02065	Bezeq The Israeli Telecommunication Corp Ltd	ISR	Middle East & North Africa	Telecommunications	Ending 31.12	2 731
Bharti Airtel	PT_00250	Bharti Airtel Limited	IND	South Asia	Telecommunications	Beginning 01.04	15 767
Block	PT_01650	Block, Inc.	USA	North America	IT services & software	Ending 31.12	17 661
BOE	PT_00264	BOE Technology Group Co Ltd	CHN	East Asia & Pacific	Hardware	Ending 31.12	34 002
Booking Holdings	PT_00268	Booking Holdings Inc.	USA	North America	IT services & software	Ending 31.12	10 958
Broadcom	PT_00282	Broadcom Inc.	USA	North America	Hardware	Ending on Sunday closest to Oct. 31	27 450
BT	PT_00284	BT Group plc	GBR	Europe & Central Asia	Telecommunications	Beginning 01.04	28 562
ByteDance	PT_00291	ByteDance Ltd	CHN	East Asia & Pacific	IT services & software		...
Canon	PT_00312	Canon Inc.	JPN	East Asia & Pacific	Hardware	Ending 31.12	32 012
Capgemini	PT_02156	Capgemini SE	FRA	Europe & Central Asia	IT services & software	Ending 31.12	21 365
China Mobile	PT_00379	China Mobile Limited	CHN	East Asia & Pacific	Telecommunications	Ending 31.12	131 513
China Satellite	PT_00394	China Satellite Communications Co., Ltd.	CHN	East Asia & Pacific	Telecommunications		...
China Telecom	PT_00402	China Telecom Corporation Limited	CHN	East Asia & Pacific	Telecommunications	Ending 31.12	68 148

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
China Unicom	PT_00405	China Unicom (Hong Kong) Limited	CHN	East Asia & Pacific	Telecommunications	Ending 31.12	50 830
Chunghwa Telecom	PT_00420	Chunghwa Telecom Co., Ltd.	TWN	East Asia & Pacific	Telecommunications	Ending 31.12	7 512
Cisco	PT_00427	Cisco Systems, Inc.	USA	North America	Hardware	Ending last Saturday in July	49 818
Citrix	PT_00431	Citrix Systems, Inc.	USA	North America	IT services & software	Ending 31.12	3 217
Cloudflare	PT_00439	Cloudflare, Inc.	USA	North America	IT services & software	Ending 31.12	656
Cogent	PT_00449	Cogent Communications Holdings, Inc.	USA	North America	Telecommunications	Ending 31.12	590
Cognizant	PT_02155	Cognizant Technology Solutions Corporation	USA	North America	IT services & software	Ending 31.12	18 507
Comcast	PT_00454	Comcast	USA	North America	Telecommunications	Ending 31.12	116 385
Corning	PT_00478	Corning Incorporated	USA	North America	Hardware	Ending 31.12	14 082
Delivery Hero	PT_00538	Delivery Hero Group	DEU	Europe & Central Asia	IT services & software	Ending 31.12	6 889
Dell	PT_00539	Dell Technologies Inc.	USA	North America	Hardware	Beginning after last Friday in Jan.	101 197
Deutsche Telekom	PT_00550	Deutsche Telekom AG	DEU	Europe & Central Asia	Telecommunications	Ending 31.12	127 993
DiDi	PT_00554	DiDi Global Inc.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	26 950
Digicel	PT_00556	Digicel Group Ltd.	JAM	Latin America & Caribbean	Telecommunications	Beginning 01.04	1 500
Digital Realty Trust	PT_00558	Digital Realty Trust, Inc.	USA	North America	IT services & software	Ending 31.12	4 428
eBay	PT_00594	eBay Inc.	USA	North America	IT services & software	Ending 31.12	10 420
EchoStar	PT_00596	EchoStar Corporation	USA	North America	Hardware	Ending 31.12	1 986
Elisa	PT_00616	Elisa Corporation	FIN	Europe & Central Asia	Telecommunications	Ending 31.12	2 350
Equinix	PT_00634	Equinix, Inc.	USA	North America	IT services & software	Ending 31.12	6 636

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Ericsson	PT_00637	Telefonaktiebolaget LM Ericsson	SWE	Europe & Central Asia	Hardware	Ending 31.12	27 076
Ethio Telecom	PT_00643		ETH	Sub-Saharan Africa	Telecommunications	Ending 30.06	1 264
Etisalat	PT_00623	Emirates Telecommunications Group Company PJSC	ARE	Middle East & North Africa	Telecommunications	Ending 31.12	1 456
Eutelsat	PT_00649	Eutelsat Communications	FRA	Europe & Central Asia	Telecommunications	Ending 30.06	1 355
Far EasTone	PT_00665	Far EasTone Telecommunications Co Ltd	TWN	East Asia & Pacific	Telecommunications	Ending 31.12	3 045
Foxconn	PT_00854	Hon Hai Precision Industry Co., Ltd	TWN	East Asia & Pacific	Hardware	Ending 31.12	213 922
GlobalFoundries	PT_00755	GLOBALFOUNDRIES, Inc.	USA	North America	Hardware	Ending 31.12	6 585
Globe	PT_00756	Globe Telecom, Inc.	PHL	East Asia & Pacific	Telecommunications	Ending 31.12	3 406
GoTo	PT_00759	PT GoTo Gojek Tokopedia	IDN	East Asia & Pacific	IT services & software	Ending 31.12	317
Grab	PT_00765	Grab Holdings Inc.	SGP	East Asia & Pacific	IT services & software	Ending 31.12	675
GTT	PT_00799	GTT Communications, Inc.	USA	North America	Telecommunications	Ending 31.12	...
HCL	PT_00824	HCL Technologies Ltd.	IND	South Asia	IT services & software	Beginning 01.04	11 587
HP	PT_00863	HP Inc.	USA	North America	Hardware	Ending 31.10	63 487
HPE	PT_02166	Hewlett Packard Enterprise Company	USA	North America	IT services & software	Ending 31.10	27 784
Huawei	PT_00867	Huawei Investment & Holding Co., Ltd.	CHN	East Asia & Pacific	Hardware	Ending 31.12	98 730
IBM	PT_00883	International Business Machines Corporation	USA	North America	IT services & software	Ending 31.12	57 350
iFlytek	PT_00887	Iflytek Co., Ltd.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	2 839
Iliad	PT_00890	iliad S.A.	FRA	Europe & Central Asia	Telecommunications	Ending 31.12	8 926
Infineon	PT_02128	Infineon Technologies AG	DEU	Europe & Central Asia	Hardware	Ending 30.09	13 012
Infosys	PT_00905	Infosys Limited	IND	South Asia	IT services & software	Beginning 01.04	16 456

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Inmarsat	PT_00911	Inmarsat Global Limited	GBR	Europe & Central Asia	Telecommunications	Ending 31.12	1 352
Intel	PT_00913	Intel Corporation	USA	North America	Hardware	Ending last Saturday in Dec.	79 000
Iridium	PT_00930	Iridium Communications Inc.	USA	North America	Telecommunications	Ending 31.12	615
JD.com	PT_00956	JD.com, Inc.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	147 589
Jio	PT_02039	Reliance Jio Infocomm Limited	IND	South Asia	Telecommunications	Beginning 01.04	10 496
JOYY	PT_00977	JOYY Inc	CHN	East Asia & Pacific	IT services & software	Ending 31.12	2 619
Jumia	PT_00982	Jumia Technologies AG	NGA	Sub-Saharan Africa	IT services & software	Ending 31.12	178
Juniper Networks	PT_00983	Juniper Networks, Inc.	USA	North America	Hardware	Ending 31.12	4 735
KDDI	PT_00157	KDDI Corporation	JPN	East Asia & Pacific	Telecommunications	Beginning 01.04	49 628
KEYENCE	PT_01005	Keyence Corp	JPN	East Asia & Pacific	Hardware	Beginning 01.04	6 881
KPN	PT_01029	Koninklijke KPN N.V.	NLD	Europe & Central Asia	Telecommunications	Ending 31.12	7 202
KT	PT_02044	KT Corporation	KOR	East Asia & Pacific	Telecommunications	Ending 31.12	21 765
Kyocera	PT_01042	Kyocera Corp	JPN	East Asia & Pacific	Hardware	Beginning 01.04	16 756
Lam Research	PT_01051	Lam Research Corporation	USA	North America	Hardware	Beginning after last Sunday in June	17 227
Largan Precision	PT_02159	Largan Precision Co Ltd	TWN	East Asia & Pacific	Hardware	Ending 31.12	1 676
Lenovo	PT_02040	Lenovo Group Limited	HKG	East Asia & Pacific	Hardware	Beginning 01.04	71 618
LG	PT_02042	LG Electronics, Inc.	KOR	East Asia & Pacific	Hardware	Ending 31.12	65 319
Liberty Global	PT_01073	Liberty Global plc	GBR	Europe & Central Asia	Telecommunications	Ending 31.12	10 311
Liquid Telecom	PT_02066	Liquid Intelligent Technologies	GBR	Europe & Central Asia	Telecommunications		...
Logitech	PT_01087	Logitech International S.A.	CHE	Europe & Central Asia	Hardware	Beginning 01.04	5 481

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Lumen	PT_00337	Lumen Technologies, Inc.	USA	North America	Telecommunications	Ending 31.12	19 687
Lyft	PT_01107	Lyft Inc	USA	North America	IT services & software	Ending 31.12	3 208
MediaTek	PT_01145	MediaTek Inc	TWN	East Asia & Pacific	Hardware	Ending 31.12	17 609
MegaFon	PT_01147	JSC MegaFon	RUS	Europe & Central Asia	Telecommunications	Ending 31.12	4 809
Meituan	PT_01151	Meituan Dianping	CHN	East Asia & Pacific	IT services & software	Ending 31.12	27 772
Mercado Libre	PT_01153	Mercado Libre, Inc.	ARG	Latin America & Caribbean	IT services & software	Ending 31.12	7 069
Meta	PT_00662	Meta Platforms, Inc.	USA	North America	IT services & software	Ending 31.12	117 929
Microchip	PT_01170	Microchip Technology Inc	USA	North America	Hardware	Beginning 01.04	6 821
Micron Technology	PT_01171	Micron Technology, Inc.	USA	North America	Hardware	Ending on the Thursday nearest 31.08	27 705
Microsoft	PT_01172	Microsoft Corporation	USA	North America	IT services & software	Ending 30.06	168 088
Millicom	PT_01175	Millicom International Cellular S.A.	LUX	Europe & Central Asia	Telecommunications	Ending 31.12	4 617
MTN	PT_01208	MTN Group Limited	ZAF	Sub-Saharan Africa	Telecommunications	Ending 31.12	12 290
MTS	PT_01191	Mobile Telesystems Public Joint Stock Company	RUS	Europe & Central Asia	Telecommunications	Ending 31.12	7 256
Murata	PT_01213	Murata Manufacturing Co Ltd	JPN	East Asia & Pacific	Hardware	Beginning 01.04	16 515
Naspers	PT_01221	Naspers Limited	ZAF	Sub-Saharan Africa	IT services & software	Beginning 01.04	7 940
Naver	PT_01239	NAVER Corporation	KOR	East Asia & Pacific	IT services & software	Ending 31.12	5 960
NEC	PT_01241	NEC Corporation	JPN	East Asia & Pacific	IT services & software	Beginning 01.04	27 463
Nepal Telecom	PT_01243	Nepal Doorsanchar Company Ltd.	NPL	South Asia	Telecommunications	Ending around mid June/ July	357
NetApp	PT_01246	Netapp, Inc.	USA	North America	Hardware	Beginning after last Friday in April	6 318

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
NetEase	PT_01247	NETEASE, INC.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	13 582
Netflix	PT_01248	Netflix, Inc.	USA	North America	IT services & software	Ending 31.12	29 698
Nintendo	PT_02043	Nintendo Co., Ltd.	JPN	East Asia & Pacific	Hardware	Beginning 01.04	15 447
Nokia	PT_01286	Nokia Corporation	FIN	Europe & Central Asia	Hardware	Ending 31.12	26 118
NTT	PT_01278	Nippon Telegraph and Telephone Corporation	JPN	East Asia & Pacific	Telecommunications	Beginning 01.04	110 764
NVIDIA	PT_01317	Nvidia Corporation	USA	North America	Hardware	Beginning after last Sunday in January	26 914
NXP	PT_01319	Nxp Semiconductors NV	NLD	Europe & Central Asia	Hardware	Ending 31.12	11 063
Ola	PT_01333	ANI Technologies Private Limited	IND	South Asia	IT services & software		...
Omantel	PT_01336	Oman Telecommunications Company (S.A.O.G)	OMN	Middle East & North Africa	Telecommunications	Ending 31.12	6 608
Ooredoo	PT_01341	Ooredoo Q.P.S.C.	QAT	Middle East & North Africa	Telecommunications	Ending 31.12	8 214
Oracle	PT_01343	Oracle Corporation	USA	North America	IT services & software	Beginning 01.06	42 440
Orange	PT_01344	Orange SA	FRA	Europe & Central Asia	Telecommunications	Ending 31.12	50 026
OTE	PT_00833	Hellenic Telecommunications Organization S.A.	GRC	Europe & Central Asia	Telecommunications	Ending 31.12	3 963
Palantir	PT_02045	Palantir Technologies Inc.	USA	North America	IT services & software	Ending 31.12	1 542
PalTel	PT_01368	Palestine Telecommunications Company P.L.C.	PSE	Middle East & North Africa	Telecommunications	Ending 31.12	484
Panasonic	PT_01369	Panasonic Corp	JPN	East Asia & Pacific	Hardware	Beginning 01.04	67 324
PayPal	PT_01373	PayPal Holdings, Inc.	USA	North America	IT services & software	Ending 31.12	25 371
PCCW	PT_01375	PCCW Limited	HKG	East Asia & Pacific	Telecommunications	Ending 31.12	4 975
Pinduoduo	PT_01406	Pinduoduo Inc.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	14 566

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
PLDT	PT_01411	PLDT Inc.	PHL	East Asia & Pacific	Telecommunications	Ending 31.12	3 924
Proximus	PT_01435	Proximus Group	BEL	Europe & Central Asia	Telecommunications	Ending 31.12	6 514
Qualcomm	PT_01454	QUALCOMM Incorporated	USA	North America	Hardware	Ending last Sunday in Sep.	33 566
Rakuten	PT_01460	Rakuten, Inc.	JPN	East Asia & Pacific	IT services & software	Ending 31.12	15 324
Rogers	PT_01494	Rogers Communications Inc.	CAN	North America	Telecommunications	Ending 31.12	11 724
Rostelecom	PT_01502	Rostelecom PJSC	RUS	Europe & Central Asia	Telecommunications	Ending 31.12	7 876
Safaricom	PT_01515	Safaricom PLC	KEN	Sub-Saharan Africa	Telecommunications	Beginning 01.04	2 719
Salesforce	PT_01521	salesforce.com, inc.	USA	North America	IT services & software	Beginning 02.01	26 492
Samsung	PT_01528	Samsung Electronics Co., Ltd.	KOR	East Asia & Pacific	Hardware	Ending 31.12	244 416
SAP	PT_01536	SAP SE	DEU	Europe & Central Asia	IT services & software	Ending 31.12	32 755
Seagate	PT_01556	Seagate Technology Public Limited Company	IRL	Europe & Central Asia	Hardware	Typically from end of June	10 681
ServiceNow	PT_02046	ServiceNow, Inc.	USA	North America	IT services & software	Ending 31.12	5 896
SES	PT_01564	SES S.A.	LUX	Europe & Central Asia	Telecommunications	Ending 31.12	2 096
Sina	PT_01608	SINA Corporation	CHN	East Asia & Pacific	IT services & software	Ending 31.12	...
Singtel	PT_01611	Singapore Telecommunications Limited	SGP	East Asia & Pacific	Telecommunications	Beginning 01.04	11 447
SK Hynix	PT_02005	SK hynix Inc.	KOR	East Asia & Pacific	Hardware	Ending 31.12	37 587
SK Telecom	PT_02006	SK Telecom Co., Ltd.	KOR	East Asia & Pacific	Telecommunications	Ending 31.12	14 641
Skyworks	PT_02160	Skyworks Solutions, Inc.	USA	North America	Hardware	Ending Friday closest to 30.09	5 109
Snap	PT_01625	Snap Inc.	USA	North America	IT services & software	Ending 31.12	4 117
SoftBank	PT_01632	SoftBank Group Corp.	JPN	East Asia & Pacific	Telecommunications	Beginning 01.04	56 688

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Sonatel	PT_02047	Groupe Sonatel	SEN	Sub-Saharan Africa	Telecommunications	Ending 31.12	2 045
Sony	PT_01636	Sony Corporation	JPN	East Asia & Pacific	Hardware	Beginning 01.04	90 401
SpaceX	PT_01644	Space Exploration Technologies Corp.	USA	North America	Hardware		...
Spark	PT_01645	Spark New Zealand Limited	NZL	East Asia & Pacific	Telecommunications	Ending 30.06	2 548
Spotify	PT_01648	Spotify Technology S.A.	SWE	Europe & Central Asia	IT services & software	Ending 31.12	11 374
stc	PT_01543	Saudi Telecom Company	SAU	Middle East & North Africa	Telecommunications	Ending 31.12	16 911
Stripe	PT_02067		USA	North America	IT services & software		...
Sudatel	PT_01681	Sudatel Telecommunications Group Ltd	SDN	Sub-Saharan Africa	Telecommunications		...
Swisscom	PT_01711	Swisscom Ltd	CHE	Europe & Central Asia	Telecommunications	Ending 31.12	12 289
Tata Communications	PT_02041	Tata Communications Limited	IND	South Asia	Telecommunications	Beginning 01.04	2 263
TCL	PT_01737	TCL Electronics Holdings Limited	CHN	East Asia & Pacific	Hardware	Ending 31.12	9 633
TE	PT_01740	TE Connectivity Ltd	CHE	Europe & Central Asia	Hardware	Ending last Friday in September	14 923
TEL	PT_01793	Tokyo Electron Ltd	JPN	East Asia & Pacific	Hardware	Beginning 01.04	18 258
Tele2	PT_01744	Tele2 AB	SWE	Europe & Central Asia	Telecommunications	Ending 31.12	3 122
Telecom Egypt	PT_01746	Telecom Egypt Company SAE	EGY	Middle East & North Africa	Telecommunications	Ending 30.06	2 371
Telecom Italia	PT_01747	Telecom Italia S.P.A.	ITA	Europe & Central Asia	Telecommunications	Ending 31.12	18 019
Telefonica	PT_01748	Telefónica, S.A.	ESP	Europe & Central Asia	Telecommunications	Ending 31.12	46 208
Telenor	PT_01751	Telenor ASA	NOR	Europe & Central Asia	Telecommunications	Ending 31.12	12 834

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Telia	PT_01753	Telia Company AB	SWE	Europe & Central Asia	Telecommunications	Ending 31.12	10 296
Telkom	PT_01754	Telkom SA SOC Ltd	ZAF	Sub-Saharan Africa	Telecommunications	Beginning 01.04	2 893
Telkom Indonesia	PT_01750	Telecommunications Indonesia	IDN	East Asia & Pacific	Telecommunications	Ending 31.12	10 009
Telstra	PT_01756	Telstra Corporation Limited	AUS	East Asia & Pacific	Telecommunications	Ending 30.06	16 209
Tencent	PT_01760	Tencent Holdings Limited	CHN	East Asia & Pacific	IT services & software	Ending 31.12	86 840
Texas Instruments	PT_01769	Texas Instruments Incorporated	USA	North America	Hardware	Ending 31.12	18 340
Toshiba TEC	PT_02154	Toshiba TEC Corp	JPN	East Asia & Pacific	Hardware	Beginning 01.04	4 058
Transsion	PT_01818	Shenzhen Transsion Holdings Co Ltd	CHN	East Asia & Pacific	Hardware	Ending 31.12	7 661
TSMC	PT_01722	Taiwan Semiconductor Manufacturing Company Limited	TWN	East Asia & Pacific	Hardware	Ending 31.12	56 653
Türk Telekom	PT_01825	Türk Telekomunikasyon AS	TUR	Europe & Central Asia	Telecommunications	Ending 31.12	3 873
Twilio	PT_02048	Twilio Inc.	USA	North America	IT services & software	Ending 31.12	2 842
Twitter	PT_01828	Twitter, Inc.	USA	North America	IT services & software	Ending 31.12	5 077
Uber	PT_01831	Uber Technologies, Inc.	USA	North America	IT services & software	Ending 31.12	17 455
United Internet	PT_01848	United Internet AG	DEU	Europe & Central Asia	Telecommunications	Ending 31.12	6 643
Veon	PT_01877	VEON Ltd.	NLD	Europe & Central Asia	Telecommunications	Ending 31.12	7 788
Verizon	PT_01878	Verizon Communications Inc	USA	North America	Telecommunications	Ending 31.12	133 613
Viettel	PT_01884	Viettel Group	VNM	East Asia & Pacific	Telecommunications	Ending 31.12	11 831
VMware	PT_02051	Vmware, Inc.	USA	North America	IT services & software	Beginning Saturday nearest 31.01	12 851
Vodafone	PT_01896	Vodafone Group Plc	GBR	Europe & Central Asia	Telecommunications	Beginning 01.04	53 624

Company	WBA ID	Filing name	HQ ISO	Region	Industry	Fiscal Year	Revenue USD m, FY2021
Western Digital	PT_01925	Western Digital Corporation	USA	North America	Hardware	Ending on Friday nearest 30.06	16 922
Xiaomi	PT_01961	Xiaomi Corporation	CHN	East Asia & Pacific	Hardware	Ending 31.12	50 901
Yandex	PT_01970	Yandex NV	RUS	Europe & Central Asia	IT services & software	Ending 31.12	4 836
Yunji	PT_01984	Yunji Inc.	CHN	East Asia & Pacific	IT services & software	Ending 31.12	334
Zain	PT_01986	Mobile Telecommunications Company K.S.C.P.	KWT	Middle East & North Africa	Telecommunications	Ending 31.12	5 067
Zoom	PT_02049	Zoom Video Communications, Inc.	USA	North America	IT services & software	Beginning 01.02	4 100
ZTE	PT_01998	ZTE Corporation	CHN	East Asia & Pacific	Hardware	Ending 31.12	17 755

**Table 5.4: Emissions, tCO<sub>2</sub>e, FY2021**

Company	Scope 1	Scope 2 Location-based	Scope 2 Market-based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
Acer	4 551	14 817	8 746	2 099 472	2 118 840	99%	Yes
Activision Blizzard	1 300	22 000	22 000	252 000	275 300	92%	
Adobe	4 923	58 907	30 460	424 343	488 173	87%	Yes
Airbnb	807	4 874	0	254 867	260 548	98%	Yes
AIS	8 931	636 390	636 390	...	...	...	
Akamai	63	219 220	105 320	123 150	...	...	Yes
Alibaba	926 779	4 445 238	4 445 238	7 877 422	13 249 439	59%	Yes
Alphabet	45 073	6 576 239	1 823 132	9 503 000	16 124 312	59%	Yes
Altice	13 549	...	54 281	80 393	...	...	
Amazon	12 110 000	...	4 070 000	55 360 000	...	...	Yes
AMD	2 892	38 956	21 733	12 241 304	12 283 152	99.7%	Yes
América Móvil	299 494	...	2 190 890	2 645 826	...	...	
American Tower	636 157	494 760	486 410	3 647 198	...	...	
Amphenol	38 057	349 458	364 338	410 590	...	...	
Analog Devices	161 405	252 073	159 734	...	...	...	Yes
Ant	5 639	...	17 521	...	...	...	
Apple	55 200	1 003 246	2 780	23 130 000	24 188 446	96%	Yes
Applied Materials	43 982	149 301	49 290	...	...	...	
ASML	19 300	165 100	20 100	8 800 000	8 984 400	98%	
Asus	85	...	15 568	1 324 592	...	...	Yes
AT&T	997 129	5 212 703	4 550 580	1 833 277	...	...	
ATH	...	...	...	...	...	...	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
Axiata	74 017	1 235 817	1 235 817	...	...	...	
Baidu	16 407	601 740	601 740	1 173 461	...	...	Yes
BBK Electronics	...	...	...	...	...	...	
BCE	139 187	136 535	136 535	1 861 651	2 137 373	87%	Yes
Bezeq	18 860	67 212	67 212	...	...	...	
Bharti Airtel	49 216	978 672	978 672	4 666 584	5 694 472	82%	
Block	3 091	...	12 363	293 625	...	...	
BOE	...	...	...	...	...	...	
Booking Holdings	838	...	518	117 390	...	...	
Broadcom	127 714	164 600	164 692	...	...	...	
BT	180 779	560 839	7 133	3 075 045	3 816 663	81%	
ByteDance	...	...	...	...	...	...	
Canon	114 456	875 482	875 482	6 626 000	7 615 938	87%	
Capgemini	10 622	89 935	53 818	556 842	657 399	85%	
China Mobile	240 000	33 580 000	33 580 000	...	...	...	
China Satellite	...	...	...	...	...	...	
China Telecom	280 000	15 180 000	15 180 000	...	...	...	
China Unicom	530 000	12 440 000	12 440 000	...	...	...	
Chunghwa Telecom	17 887	716 979	716 979	1 456 835	2 191 702	66%	Yes
Cisco	26 694	579 445	147 801	23 025 124	23 631 263	97%	Yes
Citrix	3 344	...	15 928	257 938	...	...	
Cloudflare	134	15 488	0	...	...	...	Yes
Cogent	...	15 327	13 733	...	...	...	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
Cognizant	10 600	97 882	62 903	1 190 951	1 299 433	92%	Yes
Comcast	519 288	1 551 747	1 279 751	...	...	...	
Corning	694 000	2 128 000	2 488 331	6 629 504	9 451 504	70%	
Delivery Hero	3 717	...	45 659	3 433 629	...	...	
Dell	45 600	337 600	158 100	17 658 700	...	...	Yes
Deutsche Telekom	218 731	4 635 217	27 850	14 775 963	19 629 911	75%	
DiDi	...	...	...	...	...	...	
Digicel	...	...	...	...	...	...	
Digital Realty Trust	20 327	2 055 473	1 304 987	1 903 567	3 979 367	48%	Yes
eBay	5 558	118 095	41 757	4 751 876	4 875 529	97%	Yes
EchoStar	...	...	...	...	...	...	
Elisa	597	53 588	2 444	204 400	258 585	79%	
Equinix	50 700	2 307 600	254 800	1 504 000	3 862 300	39%	
Ericsson	38 000	139 000	58 000	34 637 000	34 814 000	99%	
Ethio Telecom	...	...	...	...	...	...	
Etisalat	60 853	319 144	319 144	82	...	...	
Eutelsat	504	...	6 130	87 759	...	...	
Far EasTone	9 577	...	247 128	98 760	...	...	
Foxconn	237 946	5 982 836	5 982 836	...	...	...	
GlobalFoundries	1 715 613	908 902	791 302	863 848	...	...	
Globe	49 766	457 303	65 636	...	...	...	
GoTo	1 483	4 712	4 712	37 144	...	...	
Grab	-	10 718	6 385	1 484 864	1 495 582	99%	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
GTT	...	...	...	...	...	...	
HCL	19 503	136 338	136 338	241 117	396 958	61%	
HP	48 700	198 200	110 800	28 300 000	28 546 900	99%	
HPE	30 302	276 042	132 468	9 451 800	9 758 144	97%	
Huawei	55 141	2 596 855	2 596 855	4 638 800	7 290 796	64%	
IBM	91 955	668 612	411 211	663 390	...	...	Yes
iFlytek	...	...	...	...	...	...	
Iliad	5 326	201 365	123 928	813 404	...	...	
Infineon	270 564	838 391	630 885	1 079 792	...	...	
Infosys	8 965	...	51 717	117 037	...	...	
Inmarsat	696	10 515	8 839	130 838	...	...	
Intel	2 181 000	3 820 000	1 093 000	28 863 000	34 864 000	83%	Yes
Iridium	227	6 849	6 875	926 015	...	...	
JD.com	238 775	271 067	271 067	1 906 567	...	...	
Jio	490 000	3 360 000	3 360 000	4 550 000	...	...	
JOYY	...	...	...	...	...	...	
Jumia	...	...	...	9 438	...	...	
Juniper Networks	6 855	98 531	36 290	3 603 582	...	...	
KDDI	27 679	1 618 657	1 496 547	5 060 478	6 706 814	75%	
KEYENCE	...	...	...	...	...	...	
KPN	13 209	219 466	-	805 725	...	...	
KT	38 094	1 305 870	1 305 870	475 558	...	...	Yes
Kyocera	134 942	935 454	780 884	4 772 013	5 842 409	82%	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
Lam Research	50 664	109 627	56 521	6 685 680	6 845 971	98%	Yes
Largan Precision	...	...	...	...	...	...	
Lenovo	6 069	191 778	21 160	12 324 408	12 522 255	98%	Yes
LG	333 000	819 000	819 000	63 170 435	...	...	
Liberty Global	14 231	81 223	37 984	36 903	...	...	Yes
Liquid Telecom	...	...	...	...	...	...	
Logitech	566	...	895	1 526 704	...	...	Yes
Lumen	222 798	1 595 964	1 558 352	2 226 892	...	...	
Lyft	2 044	6 167	795	2 978 819	2 987 030	99.7%	Yes
MediaTek	5 326	61 992	61 992	...	...	...	
MegaFon	...	...	...	...	...	...	
Meituan	...	...	...	...	...	...	
Mercado Libre	343 554	...	1 151	938 861	...	...	
Meta	55 000	3 080 000	2 000	5 651 000	8 786 000	64%	Yes
Microchip	407 724	305 162	305 162	22 231	...	...	
Micron	3 459 483	3 448 513	3 961 500	2 155 135	9 063 131	24%	
Microsoft	123 704	4 745 197	163 935	13 785 000	18 653 901	74%	
Millicom	33 161	146 525	146 525	2 202 250	2 381 936	92%	
MTN	308 399	...	825 170	4 103 038	...	...	
MTS	37 517	...	574 107	452 184	...	...	
Murata	260 000	1 102 000	1 140 000	4 362 000	5 724 000	76%	Yes
Naspers	5	...	31	118	...	...	
Naver	525	78 350	78 350	...	...	...	Yes

Company	Scope 1	Scope 2 Location-based	Scope 2 Market-based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
NEC	22 000	302 000	302 000	6 535 000	6 859 000	95%	
Nepal Telecom	...	...	...	...	...	...	
NetApp	2 182	...	44 983	1 019 269	...	...	
NetEase	6 855	32 213	32 213	273 506	...	...	
Netflix	62 815	42 291	0	1 466 497	...	...	Yes
Nintendo	346	...	4 740	3 227 899	...	...	
Nokia	114 456	377 300	224 500	40 634 700	41 126 456	99%	
NTT	141 000	...	2 760 000	20 820 000	...	...	Yes
Nvidia	4 612	133 569	78 210	2 701 477	2 839 658	95%	Yes
NXP	387 446	...	659 363	12 116	...	...	
Ola	...	...	...	...	...	...	
Omantel	16 161	151 225	151 225	...	...	...	
Ooredoo	303 692	312 197	312 197	...	...	...	
Oracle	9 489	647 826	450 700	580 031	...	...	
Orange	324 023	1 199 593	978 642	6 475	...	...	
OTE	25 379	251 719	76	751 575	...	...	
Palantir	166	...	1 365	10 635	...	...	
PalTel	...	...	...	...	...	...	
Panasonic	338 000	1 862 000	1 723 000	98 050 000	100 250 000	98%	
PayPal	2 600	99 000	11 700	10 100	...	...	
PCCW	6 548	186 406	186 406	1 236	...	...	
Pinduoduo	...	...	...	...	...	...	
PLDT	43 420	607 301	607 301	1 037 319	...	...	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
Proximus	24 494	47 355	0	392 811	464 660	85%	
Qualcomm	106 659	264 521	171 932	4 179 987	4 551 167	92%	Yes
Rakuten	1 647	241 308	169 935	1 903 043	2 145 998	89%	Yes
Rogers	27 398	106 356	106 356	30 959	...	...	
Rostelecom	173 249	1 462 888	1 462 888	70 326	...	...	
Safaricom	27 617	37 140	37 140	1 805	...	...	
Salesforce	6 000	286 000	86 000	1 004 000	...	...	Yes
Samsung	7 604 000	12 566 000	9 796 000	...	...	...	Yes
SAP	96 300	115 500	43 300	137 100	...	...	
Seagate	355 206	871 685	749 492	11 056 100	12 282 991	90%	Yes
ServiceNow	1 401	33 880	434	178 416	...	...	Yes
SES	1 813	24 039	19 813	169 777	195 629	87%	
Sina	...	...	...	...	...	...	
Singtel	6 322	534 550	488 358	7 316 678	7 857 550	93%	
SK Hynix	2 628 921	5 302 908	5 009 544	3 432 777	11 364 606	30%	
SK Telecom	6 286	1 045 114	1 024 604	4 384 495	5 435 895	81%	Yes
Skyworks	36 792	...	...	...	...	...	
Snap	3 688	4 004	578	179 841	...	...	Yes
SoftBank	12 052	708 450	708 450	8 685 602	9 406 104	92%	
Sonatel	8 750	84 208	84 208	...	...	...	
Sony	211 000	1 051 836	984 000	16 160 000	17 422 836	93%	Yes
SpaceX	...	...	...	...	...	...	
Spark	2 142	19 428	19 428	4 127	...	...	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
Spotify	682	...	0	352 372	...	...	
STC	11 194	878 604	878 604	...	...	...	
Stripe	...	...	...	...	...	...	
Sudatel	...	...	...	...	...	...	
Swisscom	14 429	45 814	0	275 962	336 205	82%	Yes
Tata Comm.	4 744	88 308	88 308	97 392	190 444	51%	
TCL	10 994	...	88 932	...	...	...	
TE	71 479	460 536	289 859	3 799 670	...	...	Yes
Tele2	2 443	44 604	151	183 286	230 333	80%	
Telecom Egypt	...	...	...	...	...	...	
Telecom Italia	127 810	442 597	442 597	5 276 892	...	...	
Telefonica	183 231	1 212 174	353 506	2 072 159	3 467 564	60%	Yes
Telenor	150 000	943 418	954 515	4 040 000	5 133 418	79%	Yes
Telia	6 000	89 000	5 000	1 006 000	...	...	
Telkom	55 466	1 081 108	1 081 108	...	...	...	
Telkom Indonesia	30 408	1 710 202	1 710 202	...	...	...	
Telstra	31 869	1 092 011	1 092 011	1 840 866	2 964 746	62%	
Tencent	19 000	2 349 000	2 349 000	2 743 000	...	...	
Texas Instruments	1 040 450	1 262 328	1 042 874	...	...	...	Yes
Tokyo Electron	12 000	74 000	74 000	24 453 000	24 539 000	99.6%	
Toshiba TEC	3 100	45 500	45 500	...	...	...	
Transsion	357	13 931	13 931	...	...	...	

Company	Scope 1	Scope 2 Location- based	Scope 2 Market- based	Scope 3	Total footprint	Scope 3 (% of footprint)	Verified by 3rd party
TSMC	2 151 937	9 196 964	8 152 497	6 049 256	17 398 157	35%	Yes
Türk Telekom	130 576	529 284	529 284	10 184	...	...	
Twilio	802	5 924	4 072	244 846	251 572	97%	
Twitter	...	...	...	...	...	...	
Uber	735	145 309	87 219	13 074 236	13 220 280	99%	Yes
United Internet	2 626	...	13 123	11 046	...	...	
Veon	...	...	...	...	...	...	
Verizon	310 145	3 554 155	3 222 342	15 267 192	19 131 492	80%	Yes
Viettel	...	...	...	...	...	...	
VMWare	2 685	65 859	1 025	343 685	412 229	83%	Yes
Vodafone	277 000	1 980 000	820 000	9 200 000	11 457 000	80%	
Western Digital	46 152	998 989	929 883	9 865 889	10 911 030	90%	Yes
Xiaomi	9 097	73 723	73 723	...	...	...	
Yandex	111 000	146 000	146 000	490 169	...	...	
Yunji	...	...	...	...	...	...	
Zain	412 014	608 107	608 107	655 244	...	...	
Zoom	460	22 282	9 198	43 834	66 576	66%	
ZTE	79 182	725 424	725 424	98 683 525	99 488 132	99%	

**Table 5.5: Energy use, FY2021**

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
Acer	31 480	31 480	45	0.471
Activision Blizzard	63 848	57 585	0	0.382
Adobe	242 113	218 530	60	0.270
Airbnb	...	...	100	...
AIS	1 318 495	1 273 035	1	0.500
Akamai	612 518	612 498	61	0.358
Alibaba	8 786 584	7 065 101	7	0.629
Alphabet	18 571 659	18 238 390	100	0.361
Altice	936 710	901 900	10	...
Amazon	...	30 880 000	85	...
AMD	108 000	101 000	27	0.386
América Móvil	6 484 591	5 122 825	21	...
American Tower	3 392 130	913 348	3	0.542
Amphenol	...	687 817	14	0.508
Analog Devices	...	568 005	39	0.444
Ant	...	...	...	...
Apple	3 271 257	2 854 000	100	0.352
Applied Materials	565 823	434 021	57	0.344
ASML	...	469 167	92	0.352
Asus	...	32 597	...	...
AT&T	16 978 058	13 962 861	17	0.373
ATH	...	...	...	...

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
Axiata	...	1 867 638	...	0.662
Baidu	...	673 829	...	0.893
BBK Electronics	...	...	...	...
BCE	2 381 743	1 823 736	57	0.075
Bezeq	...	143 310	...	0.469
Bharti Airtel	...	1 238 825	28	0.790
Block	57 135	57 135	-	...
BOE	...	...	...	...
Booking Holdings	...	95 157	100	...
Broadcom	...	348 302	...	0.473
BT	2 740 000	2 557 746	100	0.219
ByteDance	...	...	...	...
Canon	2 487 222	1 899 722	4	0.461
Capgemini	255 734	185 300	58	0.485
China Mobile	...	57 308 000	...	0.586
China Satellite	...	...	...	...
China Telecom	...	25 870 117	...	0.587
China Unicom	...	20 400 000	...	0.610
Chunghwa Telecom	1 569 238	1 426 811	6	0.503
Cisco	1 628 000	1 515 700	85	0.382
Citrix	...	...	...	...
Cloudflare	...	...	100	...

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
Cogent	...	...	...	...
Cognizant	179 212	...	...	...
Comcast	...	4 180 378	16	0.371
Corning	9 560 543	5 695 736	3	0.374
Delivery Hero	...	...	76	...
Dell	1 063 000	909 000	55	0.371
Deutsche Telekom	...	12 270 000	100	0.378
DiDi	...	...	...	...
Digicel	...	178 476	1	...
Digital Realty Trust	...	9 271 130	64	0.222
eBay	401 652	372 881	90	0.317
EchoStar	...	...	...	...
Elisa	347 694	326 832	100	0.164
Equinix	7 297 154	7 140 000	95	0.323
Ericsson	631 000	580 000	67	0.240
Ethio Telecom	...	...	...	...
Etisalat	743 226	613 503	...	0.520
Eutelsat	...	...	0	...
Far EasTone	...	613 480	0	...
Foxconn	...	9 364 000	...	0.639
GlobalFoundries	4 250 452	3 057 752	-	0.297
Globe	...	728 901	...	0.627

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
GoTo	...	5 753	...	0.819
Grab	16 653	16 653	43	0.644
GTT	...	...	...	...
HCL	252 540	252 540	18	0.540
HP	697 058	491 272	54	0.403
HPE	...	599 729	49	0.460
Huawei	...	4 228 000	7	0.614
IBM	3 804 164	3 233 539	64	0.207
iFlytek	...	...	...	...
Iliad	...	1 240 000	...	0.162
Infineon	...	2 029 350	...	0.413
Infosys	...	172 428	54	...
Inmarsat	37 608	34 396	26	0.306
Intel	11 600 000	9 600 000	80	0.398
Iridium	...	19 198	-	0.357
JD.com	...	443 819	...	0.611
Jio	6 696 867	6 132 698	0	0.548
JOYY	...	...	...	...
Jumia	...	...	...	...
Juniper Networks	...	262 812	...	0.375
KDDI	...	3 638 802	10	0.445
KEYENCE	...	...	...	...

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
KPN	592 222	502 000	100	0.437
KT	3 005 461	2 838 091	0	0.460
Kyocera	...	1 942 369	...	0.482
Lam Research	402 344	401 940	54	0.273
Largan Precision	...	...	...	...
Lenovo	...	323 663	3	0.593
LG	...	1 514 000	5	0.541
Liberty Global	1 165 640	1 045 270	92	0.078
Liquid Telecom	...	...	...	...
Logitech	30 506	28 324	94	...
Lumen	5 222 928	4 337 429	7	0.368
Lyft	...	20 674	100	0.298
MediaTek	...	123 491	-	0.502
MegaFon	...	...	...	...
Meituan	...	...	...	...
Mercado Libre	...	51 105	...	...
Meta	10 275 833	9 421 000	100	0.327
Microchip	989 118	804 153	5	0.379
Micron	10 418 311	7 784 153	0	0.443
Microsoft	13 481 863	12 969 393	100	0.366
Millicom	747 660	646 667	3	0.227
MTN	1 948 756	1 116 866	...	...
MTS	...	1 793 200	0	...

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
Murata	3 309 593	2 786 000	21	0.396
Naspers	...	...	-	...
Naver	...	45 561	0	1.720
NEC	805 120	682 545	9	0.442
Nepal Telecom	...	...	...	...
NetApp	...	193 517	...	...
NetEase	64 422	48 944	...	0.658
Netflix	156 555	156 555	100	0.270
Nintendo	...	24 845	41	...
Nokia	1 058 959	892 000	53	0.423
NTT	...	6 860 000	22	...
Nvidia	424 997	406 682	38	0.328
NXP	...	1 601 593	31	...
Ola	...	...	...	...
Omantel	...	161 248	...	0.938
Ooredoo	...	534 370	...	0.584
Oracle	1 955 843	1 907 057	49	0.340
Orange	4 915 905	4 466 890	36	0.269
OTE	...	...	100	...
Palantir	...	...	...	...
PalTel	...	...	...	...
Panasonic	...	3 433 700	7	0.542
PayPal	256 600	248 629	91	0.398

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
PCCW	362 495	358 193	...	0.520
Pinduoduo	...	...	...	...
PLDT	...	845 813	...	0.718
Proximus	436 389	328 000	100	0.144
Qualcomm	...	496 477	35	0.533
Rakuten	466 683	457 822	21	0.527
Rogers	1 181 282	1 054 905	44	0.101
Rostelecom	4 448 304	3 224 728	13	0.454
Safaricom	...	220 479	83	0.168
Salesforce	...	771 000	100	0.371
Samsung	...	25 767 000	21	0.488
SAP	844 600	447 100	100	0.258
Seagate	1 737 001	1 661 532	83	0.525
ServiceNow	...	97 970	100	0.346
SES	89 700	84 759	36	0.284
Sina	...	...	...	...
Singtel	...	805 170	6	0.664
SK Hynix	...	9 947 781	3	0.533
SK Telecom	2 308 519	2 275 650	0	0.459
Skyworks	...	412 497	8	...
Snap	...	12 849	100	0.312
SoftBank	2 262 843	2 262 843	30	0.313

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
Sonatel	133 050	117 810	6	0.715
Sony	...	2 439 167	15	0.431
SpaceX	...	...	...	...
Spark	...	124 690	...	0.156
Spotify	...	...	100	...
STC	...	1 343 432	...	0.654
Stripe	...	...	...	...
Sudatel	...	...	...	...
Swisscom	533 738	464 865	100	0.099
Tata Communications	172 939	143 924	13	0.614
TCL	218 050	147 718	...	...
TE	1 328 692	1 118 892	28	0.412
Tele2	252 893	231 463	100	0.193
Telecom Egypt	...	...	...	...
Telecom Italia	...	2 193 844	53	0.202
Telefonica	6 106 625	5 815 665	79	0.208
Telenor	3 345 579	2 714 400	...	0.348
Telia	1 166 000	1 066 710	100	0.083
Telkom	...	...	...	...
Telkom Indonesia	2 079 728	1 946 218	...	0.879
Telstra	1 583 579	1 445 793	-	0.755
Tencent	4 375 253	4 308 960	2	0.545

Company	Total energy consumption (MWh)	Electricity consumption (MWh)	Renewable electricity purchased (%)	Average grid emissions factor (tCO <sub>2</sub> e / MWh)
Texas Instruments	3 185 749	2 698 803	19	0.468
Tokyo Electron	...	377 432	60	0.196
Toshiba TEC	...	82 620	...	0.551
Transsion	...	...	...	...
TSMC	19 192 000	18 080 000	9	0.509
Türk Telekom	1 416 380	1 218 419	0	0.434
Twilio	21 141	18 043	41	0.328
Twitter	...	...	...	...
Uber	...	329 732	41	0.441
United Internet	...	201 196	...	...
Veon	...	...	...	...
Verizon	11 334 029	9 871 939	7	0.360
Viettel	...	...	...	...
VMWare	198 891	190 468	100	0.346
Vodafone	5 926 000	5 616 000	77	0.353
Western Digital	2 101 031	1 941 400	14	0.515
Xiaomi	...	144 627	...	0.510
Yandex	940 135	474 580	...	0.308
Yunji	...	...	...	...
Zain	...	1 020 691	1	0.596
Zoom	...	...	...	...
ZTE	1 119 304	889 549	-	0.815

Table 5.6: Targets

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
Acer	Yes	No	2019	2030	-50%	...	...	Committed	...	...
Activision Blizzard	No	No	...	...	...	Yes	Yes	...	...	2050
Adobe	Yes	No	2018	2025	-35%	Yes	No	Targets set	...	...
Airbnb	Yes	No	2021	2030	-100%	No	...	Targets set	...	2030
AIS	Yes	Yes	...	...	...	...	...	...	...	...
Akamai	Yes	No	2021	2030	-100%	...	...	Committed	2030	...
Alibaba	Yes	No	2020	2030	-100%	No	...	Committed	2030	...
Alphabet	Yes	No	2019	2030	-100%	Yes	Yes	Committed	2007	2030
Altice	Yes	No	2020	2030	-50%	...	...	...	2040	...
Amazon	Yes	...	...	...	...	...	...	Committed	...	2040
AMD	Yes	No	2020	2030	-50%	No	...	Targets set	...	...
América Móvil	Yes	No	2019	2030	-52%	Yes	Yes	Targets set	...	2050
American Tower	Yes	No	2019	2035	-40%	Yes	Yes	Targets set	...	...
Amphenol	Yes	Yes	...	...	...	...	...	...	...	...
Analog Devices	Yes	No	2019	2030	-50%	No	No	Targets set	2030	2050
Ant	No	No	...	...	...	...	...	...	2021	...
Apple	Yes	No	2019	2030	-62%	Yes	Yes	Targets set	2020	2030
Applied Materials	Yes	No	2019	2030	-50%	...	...	Committed	...	...
ASML	Yes	No	2019	2025	...	No	No	Targets set	2025	...
Asus	Yes	No	2020	2030	-50%	No	...	Committed	...	...
AT&T	Yes	No	2015	2030	-63%	No	...	Targets set	2035	...

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
ATH	No	No	...	...	...	...	...	...	...	...
Axiata	Yes	No	2020	2030	-45%	...	...	Committed	...	2050
Baidu	Yes	No	2020	2030	-100%	...	...	...	2030	...
BBK Electronics	No	...	...	...	...	...	...	...	...	...
BCE	Yes	No	2020	2030	-57%	Yes	No	Committed	2025	...
Bezeq	No	...	...	...	...	...	...	...	...	2050
Bharti Airtel	Yes	No	2020	2030	-50%	Yes	Yes	Targets set	...	...
Block	No	...	2021	2030	-100%	Yes	Yes	Committed	...	2030
BOE	...	...	...	...	...	...	...	...	...	...
Booking Holdings	Yes	No	2019	2030	-95%	...	...	Committed	2020	2040
Broadcom	No	...	...	...	...	...	...	...	...	...
BT	Yes	Yes	...	...	...	No	...	Targets set	2030	2040
ByteDance	No	...	...	...	...	...	...	...	...	...
Canon	Yes	Yes	2008	2030	-50%	No	Yes	Committed	...	2050
Capgemini	Yes	No	2019	2040	-90%	Yes	No	Targets set	2025	2040
China Mobile	Yes	Yes	...	...	...	...	...	...	...	...
China Satellite	No	...	...	...	...	...	...	...	...	...
China Telecom	No	...	...	...	...	...	...	...	...	...
China Unicom	No	...	...	...	...	...	...	...	...	...
Chunghwa Telecom	Yes	No	2020	2030	-50%	...	...	Committed	...	2050
Cisco	Yes	No	2019	2030	-90%	Yes	No	Targets set	2025	2040
Citrix	Yes	No	2019	2030	-30%	Yes	Yes	Committed	...	...

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
Cloudflare	No	...	...	...	...	...	...	...	2020	...
Cogent	No	...	...	...	...	...	...	...	...	...
Cognizant	Yes	No	2019	2030	-50%	Yes	No	Committed	2030	2040
Comcast	No	No	2019	2035	-100%	No	No	...	2035	...
Corning	Yes	No	2021	2028	-30%	...	...	Committed	...	...
Delivery Hero	No	...	...	...	...	...	...	...	...	...
Dell	Yes	No	2020	2030	-50%	Yes	No	Targets set	...	2050
Deutsche Telekom	Yes	No	2017	2030	-90%	Yes	Yes	Targets set	2025	2040
DiDi	No	...	...	...	...	...	...	...	...	...
Digicel	No	...	...	...	...	...	...	...	...	...
Digital Realty Trust	Yes	Yes	2018	2030	-24%	No	...	Targets set	...	...
eBay	Yes	No	2019	2030	-90%	Yes	No	Targets set	...	...
EchoStar	No	...	...	...	...	...	...	...	...	...
Elisa	Yes	No	2019	2030	-42%	Yes	Yes	Targets set	2020	2040
Equinix	Yes	No	2019	2030	-50%	Yes	No	Targets set	2030	...
Ericsson	Yes	No	2016	2022	-35%	Yes	No	Targets set	2030	2040
Ethio Telecom	No	...	...	...	...	...	...	...	...	...
Etisalat	Yes	...	...	...	...	...	...	...	2050	...
Eutelsat	No	...	...	...	...	...	...	...	...	...
Far EasTone	Yes	No	2016	2030	-20%	Yes	Yes	Targets set	...	...
Foxconn	Yes	No	2020	2030	-42%	...	...	Targets set	...	2050
Global-Foundries	Yes	No	2020	2030	-25%	...	...	...	...	...

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
Globe	Yes	No	2021	2030	-50%	...	...	Committed	...	2050
GoTo	Yes	No	2021	2030	-100%	...	...	Committed	...	2030
Grab	No	...	...	...	...	...	...	...	2040	...
GTT	No	...	...	...	...	...	...	...	...	...
HCL	Yes	No	2020	2030	-50%	Yes	Yes	Targets set	...	2040
HP	Yes	No	2015	2025	-60%	No	...	Targets set	2025	2040
HPE	Yes	No	2020	2030	-70%	...	...	Targets set	...	2040
Huawei	Yes	Yes	...	...	...	...	...	...	...	...
IBM	Yes	No	2010	2025	-65%	Yes	No	...	...	2030
iFlytek	No	...	...	...	...	...	...	...	...	...
Iliad	Yes	No	2020	2035	...	...	...	Committed	...	...
Infineon	Yes	No	2019	2025	-70%	No	No	...	2030	...
Infosys	Yes	No	2020	2025	-13%	Yes	Yes	Targets set	2019	...
Inmarsat	Yes	No	2019	2030	-64%	Yes	Yes	Targets set	...	...
Intel	Yes	No	2019	2040	-10%	No	No	...	2040	...
Iridium	No	...	...	...	...	...	...	...	...	...
JD.com	No	Yes	...	...	...	...	...	...	...	...
Jio	Yes	No	2020	2028	-76%	Yes	No	Targets set	...	2035
JOYY	No	...	...	...	...	...	...	...	...	...
Jumia	No	...	...	...	...	...	...	...	...	...
Juniper Networks	Yes	No	2018	2035	-43%	...	...	...	...	...
KDDI	Yes	No	2019	2030	-50%	...	Yes	Targets set	2030	2050

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
KEYENCE	No	...	...	...	...	...	...	...	...	...
KPN	Yes	No	2010	2030	-100%	Yes	Yes	Targets set	2015	2040
KT	Yes	No	2007	2030	-35%	...	...	...	...	2050
Kyocera	Yes	No	2020	2031	-46%	Yes	Yes	Targets set	...	...
Lam Research	Yes	No	2019	2025	-25%	No	No	Committed	...	2050
Largan Precision	No	...	...	...	...	...	...	...	...	...
Lenovo	Yes	No	2019	2030	-50%	No	No	Targets set	...	2050
LG	Yes	No	2017	2030	-50%	No	No	Targets set	2030	...
Liberty Global	Yes	No	2019	2030	-50%	Yes	No	Targets set	2030	...
Liquid Telecom	No	...	...	...	...	...	...	...	...	...
Logitech	Yes	...	...	...	...	Yes	Yes	Committed	2021	...
Lumen	Yes	No	2018	2025	-18%	Yes	Yes	Targets set	...	...
Lyft	Yes	...	...	...	...	...	...	Committed	...	...
MediaTek	No	...	...	...	...	...	...	...	...	...
MegaFon	No	...	...	...	...	...	...	...	...	...
Meituan	No	...	...	...	...	...	...	...	...	...
Mercado Libre	No	...	...	...	...	...	...	...	...	...
Meta	Yes	No	2021	2030	-100%	Yes	Yes	Committed	2020	2030
Microchip	Yes	No	2018	2030	-50%	...	...	...	...	2040
Micron	Yes	Yes	...	...	...	...	...	...	...	2050
Microsoft	Yes	No	2020	2030	-100%	Yes	Yes	Targets set	2012	2030
Millicom	Yes	No	2020	2030	-50%	Yes	Yes	Targets set	...	2050

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
MTN	Yes	No	2019	2030	-47%	Yes	Yes	Committed	...	2040
MTS	No	...	...	...	...	...	...	...	...	...
Murata	Yes	No	2019	2030	-46%	...	...	Targets set	...	...
Naspers	Yes	No	...	2022	-100%	Yes	No	...	2022	...
Naver	Yes	No	2020	2030	-60%	No	...	...	...	2040
NEC	Yes	No	2018	2031	-55%	Yes	No	Targets set	...	2050
Nepal Telecom	No	...	...	...	...	...	...	...	...	...
NetApp	No	...	...	...	...	...	...	Committed	...	...
NetEase	No	...	...	...	...	...	...	...	...	...
Netflix	Yes	No	2019	2030	-46%	No	No	Targets set	2021	2022
Nintendo	No	...	...	...	...	...	...	...	...	...
Nokia	Yes	No	2019	2030	-50%	Yes	Yes	Targets set	...	2050
NTT	Yes	No	2019	2030	-80%	Yes	No	Targets set	2040	...
Nvidia	No	...	...	...	...	...	...	...	...	...
NXP	Yes	No	2021	2027	-35%	No	No	Committed	2035	...
Ola	No	...	...	...	...	...	...	...	...	...
Omantel	No	...	...	...	...	...	...	...	...	...
Ooredoo	No	...	...	...	...	...	...	...	...	...
Oracle	Yes	No	2020	2030	-50%	Yes	No	...	...	2050
Orange	Yes	No	2018	2025	-30%	Yes	Yes	Targets set	...	2040
OTE	Yes	No	2017	2025	-95%	...	...	...	...	...
Palantir	...	...	...	...	...	...	...	Committed	2021	...

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
PalTel	No	...	...	...	...	...	...	...	...	...
Panasonic	Yes	No	2013	2030	-46%	...	...	Targets set	2030	2050
PayPal	Yes	No	2019	2025	-25%	Yes	No	Targets set	...	...
PCCW	Yes	No	2018	2025	-34%	No	No	...	...	...
Pinduoduo	No	...	...	...	...	...	...	...	...	...
PLDT	Yes	No	2019	2030	-40%	...	...	...	...	...
Proximus	Yes	No	2015	2025	-30%	Yes	Yes	Targets set	2016	2040
Qualcomm	Yes	No	2020	2030	-50%	Yes	Yes	Committed	...	2040
Rakuten	No	...	...	...	...	...	...	Committed	2023	2023
Rogers	Yes	No	2011	2025	-25%	...	...	Committed	...	...
Rostelecom	No	...	...	...	...	...	...	...	...	...
Safaricom	Yes	No	2017	2030	-43%	Yes	Yes	Targets set	...	...
Salesforce	Yes	No	2018	2030	-50%	Yes	No	Targets set	2020	...
Samsung	No	...	...	...	...	...	...	...	...	...
SAP	Yes	No	2016	2025	-40%	Yes	Yes	Targets set	2025	2030
Seagate	Yes	...	...	...	...	...	...	Targets set	...	...
ServiceNow	Yes	No	2019	2026	-70%	No	No	Targets set	2021	2030
SES	...	...	...	...	...	...	...	Committed	...	2050
Sina	No	...	...	...	...	...	...	...	...	...
Singtel	Yes	No	2015	2030	-40%	Yes	Yes	Targets set	...	2050
SK Hynix	Yes	...	...	...	...	...	...	...	...	2050
SK Telecom	Yes	No	2020	2030	-48%	Yes	Yes	Committed	...	2050

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
Skyworks	Yes	No	2018	2030	-30%	No	No	...	...	...
Snap	Yes	No	2019	2025	-25%	No	No	Targets set	2021	2030
SoftBank	Yes	No	2021	2030	-100%	...	...	...	...	...
Sonatel	No	...	...	...	...	...	...	...	...	2040
Sony	Yes	No	2018	2035	-72%	Yes	No	Targets set	...	2040
SpaceX	No	...	...	...	...	...	...	...	...	...
Spark	Yes	No	2020	2030	-56%	No	...	Targets set	...	...
Spotify	No	...	...	...	...	...	...	...	2020	2030
STC	Yes	...	...	...	...	...	...	Committed	...	2050
Stripe	No	...	...	...	...	...	...	...	...	...
Sudatel	No	...	...	...	...	...	...	...	...	...
Swisscom	Yes	No	2020	2030	-47%	Yes	Yes	Targets set	2020	2025
Tata Communications	...	No	2022	2030	-53%	No	...	...	...	...
TCL	No	...	...	...	...	...	...	...	...	...
TE	Yes	No	2020	2030	-40%	...	...	Committed	...	...
Tele2	Yes	No	2019	2029	-100%	...	...	Targets set	2020	2035
Telecom Egypt	No	...	...	...	...	...	...	...	...	...
Telecom Italia	Yes	No	2019	2030	-75%	Yes	No	Targets set	2030	2040
Telefonica	Yes	No	2015	2030	-80%	No	...	Targets set	...	2040
Telenor	Yes	No	2019	2024	-34%	...	...	Targets set	...	...
Telia	Yes	No	2018	2025	-50%	Yes	No	Targets set	2020	...

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
Telkom	Yes	...	2021	2035	-100%	...	...	Committed	2035	2040
Telkom Indonesia	No	...	...	...	...	...	...	...	...	...
Telstra	Yes	No	2019	2030	-50%	Yes	Yes	Targets set	2020	...
Tencent	Yes	No	2021	2030	-100%	Yes	Yes	...	2030	...
Texas Instruments	Yes	No	2015	2025	-25%	...	...	...	...	...
Tokyo Electron	Yes	No	2019	2030	-70%	...	...	Committed	2040	2050
Toshiba TEC	Yes	No	2019	2030	-70%	Yes	Yes	Targets set	2030	...
Transsion	No	...	...	...	...	...	...	...	...	...
TSMC	Yes	Yes	2010	2030	-30%	...	...	...	...	2050
Türk Telekom	Yes	No	2020	2023	-35%	...	...	...	...	...
Twilio	No	...	...	...	...	...	...	...	...	...
Twitter	No	...	...	...	...	...	...	Committed	...	...
Uber	Yes	...	...	...	...	...	...	Committed	...	...
United Internet	No	...	...	...	...	...	...	...	...	...
Veon	No	...	...	...	...	...	...	...	...	2050
Verizon	Yes	No	2019	2030	-53%	Yes	Yes	Targets set	...	2035
Viettel	No	...	...	...	...	...	...	...	...	...
VMWare	Yes	No	2019	2030	-50%	Yes	No	Targets set	2018	2030
Vodafone	Yes	No	2020	2030	-95%	Yes	Yes	Targets set	2030	2040
Western Digital	Yes	No	2020	2030	-42%	No	...	Targets set	...	...
Xiaomi	Yes	Yes	...	...	...	...	...	...	...	...
Yandex	No	...	...	...	...	...	...	...	...	...

Company	Emissions reduction target for Scope 1&2	Intensity-based	Base year	End year	Reduction	Includes Scope 3	Includes all Scope 3 categories	SBTi	Carbon neutral year	Net zero year
Yunji	No	...	...	...	...	...	...	...	...	...
Zain	No	...	...	...	...	...	...	...	...	...
Zoom	No	...	...	...	...	...	...	...	...	...
ZTE	No	...	...	...	...	...	...	...	...	...

Note: Target status at FY2021. SBTi column shows whether the target has been furnished (committed) to SBTi and whether it has been approved (targets set).

**Table 5.7: Assessment score**

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Apple	9.0	100%	3.00	3.00	3.00
Swisscom	9.0	100%	3.00	3.00	3.00
VMWare	8.8	97%	2.75	3.00	3.00
Alphabet	8.4	93%	2.75	3.00	2.66
Elisa	8.2	91%	3.00	2.50	2.66
Cisco	8.0	89%	2.50	3.00	2.51
Microsoft	7.8	87%	3.00	2.50	2.33
Ericsson	7.7	85%	2.50	2.50	2.67
Proximus	7.7	85%	3.00	2.00	2.66
Meta	7.6	84%	2.75	2.50	2.33
Netflix	7.3	81%	2.25	2.00	3.00
SAP	7.3	81%	2.75	1.50	3.00
ServiceNow	7.3	81%	2.25	2.00	3.00
Snap	7.3	81%	2.25	2.00	3.00
Capgemini	7.2	80%	2.50	2.50	2.24
Tele2	7.2	80%	2.50	2.00	2.66
Telefonica	7.1	79%	2.00	3.00	2.12
Deutsche Telekom	7.1	79%	2.75	2.00	2.33
HP	7.0	77%	2.25	2.50	2.20
KPN	6.8	76%	3.00	1.50	2.33
eBay	6.8	76%	1.25	3.00	2.56

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
BT	6.7	74%	2.00	2.00	2.66
Adobe	6.5	72%	1.25	3.00	2.26
Vodafone	6.5	72%	2.75	2.00	1.76
Liberty Global	6.4	71%	1.50	2.00	2.92
Salesforce	6.4	71%	1.75	2.00	2.66
Airbnb	6.3	69%	2.00	2.25	2.00
Telia	6.3	69%	1.75	1.50	3.00
IBM	6.2	69%	1.75	2.50	1.96
ASML	6.2	69%	1.25	2.00	2.92
PayPal	6.2	68%	1.25	2.00	2.91
Qualcomm	6.1	68%	2.25	2.50	1.34
Lyft	6.0	67%	0.50	2.50	3.00
BCE	6.0	66%	1.25	2.50	2.23
Equinix	6.0	66%	1.50	2.50	1.95
AMD	5.9	66%	1.00	3.00	1.93
Nokia	5.9	65%	1.50	2.50	1.85
HPE	5.8	65%	2.00	2.00	1.81
Verizon	5.7	64%	2.50	2.50	0.73
Uber	5.6	62%	0.50	3.00	2.07
Lenovo	5.5	61%	1.00	2.50	2.03
Telecom Italia	5.5	61%	2.50	1.50	1.52
Dell	5.5	61%	1.25	2.00	2.21

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Inmarsat	5.4	60%	1.50	2.00	1.92
Sony	5.4	60%	2.25	2.00	1.14
Acer	5.4	60%	0.75	2.50	2.11
HCL	5.3	59%	2.50	2.00	0.84
Booking Holdings	5.3	58%	2.25	1.00	2.00
Cognizant	5.3	58%	2.25	2.00	1.00
Rakuten	5.2	58%	1.50	2.50	1.20
Logitech	5.2	58%	1.25	2.00	1.94
Safaricom	5.2	57%	1.50	1.50	2.15
Lam Research	5.1	57%	0.75	2.50	1.86
Akamai	5.1	57%	1.00	2.50	1.60
Tokyo Electron	5.0	56%	0.75	2.00	2.26
Seagate	4.9	55%	0.75	3.00	1.16
Orange	4.9	54%	2.50	1.00	1.35
Applied Materials	4.8	54%	0.75	1.50	2.57
Western Digital	4.8	53%	1.00	3.00	0.80
Intel	4.8	53%	0.50	2.50	1.80
SK Telecom	4.6	51%	1.25	3.00	0.33
Oracle	4.6	51%	0.75	2.00	1.81
Digital Realty Trust	4.6	51%	0.75	2.50	1.30
Nvidia	4.5	50%	0.00	2.50	2.04
Millicom	4.5	50%	1.50	2.00	1.02

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Amazon	4.5	50%	1.50	1.50	1.51
SES	4.4	49%	0.25	2.50	1.68
Spark	4.4	49%	1.00	1.75	1.66
Rogers	4.4	48%	0.75	1.50	2.10
NEC	4.3	48%	1.25	2.00	1.08
KDDI	4.3	47%	1.50	2.00	0.76
Infosys	4.2	47%	2.00	1.00	1.20
Analog Devices	4.1	46%	1.25	1.50	1.38
Bharti Airtel	4.1	46%	1.50	2.00	0.61
Murata Manufacturing	4.0	45%	1.00	2.50	0.54
TE Connectivity	4.0	45%	0.75	2.00	1.27
Telstra	4.0	44%	2.00	2.00	0.00
Kyocera	3.9	43%	1.50	1.75	0.66
Lumen	3.9	43%	1.50	2.00	0.40
Alibaba	3.9	43%	1.00	2.50	0.40
Singtel	3.9	43%	1.50	2.00	0.39
Microchip	3.9	43%	1.50	2.00	0.38
AT&T	3.8	43%	1.00	2.00	0.83
NTT	3.8	42%	1.25	2.00	0.55
Jio	3.8	42%	2.25	1.50	0.00
Spotify	3.8	42%	1.50	1.25	1.00
Iliad	3.7	41%	0.75	1.25	1.66

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Corning	3.6	40%	0.75	2.50	0.36
Activision Blizzard	3.6	40%	0.75	1.50	1.33
Telenor	3.6	40%	1.00	2.25	0.33
Twilio	3.6	40%	0.00	1.50	2.07
MTN	3.5	39%	2.25	1.25	0.00
Panasonic	3.5	39%	1.25	1.50	0.73
Canon	3.5	38%	0.75	2.00	0.70
Grab	3.4	38%	0.00	2.00	1.42
GoTo	3.4	38%	1.50	1.25	0.66
Chunghwa Telecom	3.3	37%	0.75	2.50	0.06
SoftBank	3.3	37%	0.50	1.50	1.29
Tata Communications	3.2	36%	0.25	2.50	0.46
Naver	3.2	35%	1.50	1.00	0.66
KT	3.2	35%	0.50	2.00	0.66
GlobalFoundries	3.2	35%	0.50	2.00	0.66
Juniper Networks	3.1	34%	0.50	1.25	1.32
América Móvil	3.0	34%	1.50	1.00	0.54
American Tower	3.0	34%	1.50	1.50	0.03
Texas Instruments	3.0	34%	0.50	2.00	0.52
LG	3.0	33%	1.25	1.00	0.71
TSMC	2.9	32%	0.00	2.50	0.42

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Block	2.9	32%	1.25	1.00	0.66
Cloudflare	2.9	32%	0.50	0.75	1.66
NXP	2.9	32%	0.75	1.50	0.64
Türk Telekom	2.8	31%	0.50	2.00	0.33
Far EasTone	2.8	31%	1.50	1.00	0.33
Baidu	2.8	31%	0.75	1.75	0.33
ZTE	2.8	31%	0.00	2.50	0.33
Micron	2.8	31%	0.25	2.50	0.00
OTE	2.8	31%	0.50	1.25	1.00
Comcast	2.7	30%	0.25	1.00	1.48
Infineon	2.7	30%	0.75	1.25	0.66
Toshiba TEC	2.7	30%	1.75	0.25	0.66
Huawei	2.7	29%	0.25	2.00	0.40
Altice	2.6	29%	0.50	1.00	1.10
Tencent	2.6	29%	0.75	1.50	0.35
Nintendo	2.6	29%	0.00	1.50	1.07
Mercado Libre	2.5	28%	0.25	1.25	1.00
Zoom	2.5	28%	0.00	1.50	1.00
Iridium	2.5	28%	0.00	1.50	0.99
Asus	2.3	26%	0.75	1.25	0.33
SK Hynix	2.3	25%	0.25	2.00	0.03
Citrix	2.3	25%	1.25	1.00	0.00

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
JD.com	2.3	25%	0.00	1.25	1.00
Naspers	2.3	25%	1.00	1.25	0.00
NetEase	2.3	25%	0.00	1.25	1.00
Yandex	2.2	25%	0.00	1.25	0.99
Amphenol	2.2	25%	0.25	1.50	0.47
Foxconn	2.1	23%	1.00	0.75	0.33
PCCW	2.1	23%	0.50	1.25	0.33
Samsung	2.0	23%	0.00	1.50	0.54
Globe	2.0	22%	0.25	0.75	1.00
Telkom	2.0	22%	1.50	0.50	0.00
Xiaomi	2.0	22%	0.25	0.75	1.00
Rostelecom	2.0	22%	0.00	1.50	0.46
Sonatel	1.9	21%	1.00	0.50	0.39
MTS	1.8	20%	0.00	1.50	0.33
MediaTek	1.8	20%	0.00	0.50	1.33
Delivery Hero	1.8	20%	0.25	0.75	0.76
PLDT	1.8	19%	0.50	1.25	0.00
United Internet	1.8	19%	0.00	0.75	1.00
Broadcom	1.7	19%	0.00	0.75	0.99
NetApp	1.7	18%	0.25	0.75	0.66
AIS	1.6	18%	0.25	1.00	0.34
Zain	1.5	17%	0.00	1.50	0.01

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Axiata	1.5	17%	0.75	0.75	0.00
Etisalat	1.5	17%	0.25	1.25	0.00
Bezeq	1.4	16%	0.00	0.75	0.66
Omantel	1.4	16%	0.00	0.75	0.66
Skyworks	1.1	12%	0.50	0.50	0.08
STC	1.1	12%	0.50	0.25	0.33
China Mobile	1.0	11%	0.25	0.75	0.00
Palantir	1.0	11%	0.50	0.50	0.00
Transsion	1.0	11%	0.00	0.00	1.00
Eutelsat	0.8	8%	0.00	0.75	0.00
China Telecom	0.8	8%	0.00	0.75	0.00
China Unicom	0.8	8%	0.00	0.75	0.00
TCL	0.8	8%	0.00	0.75	0.00
Digicel	0.5	6%	0.00	0.50	0.01
Ant	0.5	6%	0.50	0.00	0.00
Jumia	0.5	6%	0.00	0.50	0.00
ATH	0.3	3%	0.25	0.00	0.00
Ooredoo	0.3	3%	0.00	0.25	0.00
Telkom Indonesia	0.3	3%	0.00	0.25	0.00
Twitter	0.3	3%	0.25	0.00	0.00
BBK Electronics	0.0	0%	0.00	0.00	0.00
BOE	0.0	0%	0.00	0.00	0.00

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
ByteDance	0.0	0%	0.00	0.00	0.00
China Satellite	0.0	0%	0.00	0.00	0.00
Cogent	0.0	0%	0.00	0.00	0.00
DiDi	0.0	0%	0.00	0.00	0.00
EchoStar	0.0	0%	0.00	0.00	0.00
Ethio Telecom	0.0	0%	0.00	0.00	0.00
GTT	0.0	0%	0.00	0.00	0.00
iFlytek	0.0	0%	0.00	0.00	0.00
JOYY	0.0	0%	0.00	0.00	0.00
KEYENCE	0.0	0%	0.00	0.00	0.00
Largan Precision	0.0	0%	0.00	0.00	0.00
Liquid Telecom	0.0	0%	0.00	0.00	0.00
MegaFon	0.0	0%	0.00	0.00	0.00
Meituan	0.0	0%	0.00	0.00	0.00
Nepal Telecom	0.0	0%	0.00	0.00	0.00
Ola	0.0	0%	0.00	0.00	0.00
PalTel	0.0	0%	0.00	0.00	0.00
Pinduoduo	0.0	0%	0.00	0.00	0.00
Sina	0.0	0%	0.00	0.00	0.00
SpaceX	0.0	0%	0.00	0.00	0.00
Stripe	0.0	0%	0.00	0.00	0.00
Sudatel	0.0	0%	0.00	0.00	0.00

Company	Total score (out of 9 points)	TOTAL score (%)	Target score (out of 3 points)	Data score (out of 3 points)	Performance score (out of 3 points)
Telecom Egypt	0.0	0%	0.00	0.00	0.00
Veon	0.0	0%	0.00	0.00	0.00
Viettel	0.0	0%	0.00	0.00	0.00
Yunji	0.0	0%	0.00	0.00	0.00

Table 5.8: Sources

Company	Emissions and energy data	Link	CDP disclosure on their website?
Acer	Sustainability Report 2021	<a href="https://www.acer-group.com/userfiles/2021_Acer_Sustainability_Report.pdf">https://www.acer-group.com/userfiles/2021_Acer_Sustainability_Report.pdf</a>	-
Activision Blizzard	ESG Report 2021	<a href="https://ourcommitments.activisionblizzard.com/content/dam/atvi/activisionblizzard/ab-touchui/our-commitments/docs/2021_ESG_REPORT.pdf">https://ourcommitments.activisionblizzard.com/content/dam/atvi/activisionblizzard/ab-touchui/our-commitments/docs/2021_ESG_REPORT.pdf</a>	-
Adobe	CSR Report 2021	<a href="https://www.adobe.com/corporate-responsibility/corporate-responsibility-reports.html">https://www.adobe.com/corporate-responsibility/corporate-responsibility-reports.html</a>	Yes
Airbnb	Corporate Sustainability Update	<a href="https://s26.q4cdn.com/656283129/files/doc_downloads/governance_doc_updated/2022/Airbnb-Corporate-Sustainability-Update_September-2022.pdf">https://s26.q4cdn.com/656283129/files/doc_downloads/governance_doc_updated/2022/Airbnb-Corporate-Sustainability-Update_September-2022.pdf</a>	-
AIS	Sustainability Report 2021	<a href="https://investor.ais.co.th/misc/sustainability/20220218-advanc-srd-2021-en.pdf">https://investor.ais.co.th/misc/sustainability/20220218-advanc-srd-2021-en.pdf</a>	-
Akamai	Sustainability Report 2021	<a href="https://www.akamai.com/resources/research-paper/akamai-sustainability-report-2021">https://www.akamai.com/resources/research-paper/akamai-sustainability-report-2021</a>	Yes
Alibaba	ESG Report 2022	<a href="https://data.alibabagroup.com/ecms-files/1452422558/5feb0e46-f04b-4d9c-9568-e4a5912db37e.pdf">https://data.alibabagroup.com/ecms-files/1452422558/5feb0e46-f04b-4d9c-9568-e4a5912db37e.pdf</a>	-
Alphabet	Environmental Report 2022	<a href="https://www.gstatic.com/gumdrop/sustainability/google-2022-environmental-report.pdf">https://www.gstatic.com/gumdrop/sustainability/google-2022-environmental-report.pdf</a>	Yes
Altice	NFPS 2021	<a href="https://alticefrance.com/sites/default/files/pdf/Altice%20France%20Non-Financial%20Performance%20Statement%202021.pdf">https://alticefrance.com/sites/default/files/pdf/Altice%20France%20Non-Financial%20Performance%20Statement%202021.pdf</a>	-
Amazon	Sustainability Report 2021	<a href="https://sustainability.aboutamazon.com/2021-sustainability-report.pdf">https://sustainability.aboutamazon.com/2021-sustainability-report.pdf</a>	-
AMD	ESG Data Tables	<a href="https://www.amd.com/en/corporate-responsibility/esg-data-tables">https://www.amd.com/en/corporate-responsibility/esg-data-tables</a>	Yes
América Móvil	Sustainability Report 2021	<a href="https://s22.q4cdn.com/604986553/files/doc_downloads/2022/07/AM-2021-SUSTAINABILITY-REPORT-(AI).pdf">https://s22.q4cdn.com/604986553/files/doc_downloads/2022/07/AM-2021-SUSTAINABILITY-REPORT-(AI).pdf</a>	-
American Tower	Sustainability Report 2021	<a href="https://bit.ly/3yRnT3g">https://bit.ly/3yRnT3g</a>	-
Amphenol	Sustainability Report 2021	<a href="https://www.amphenol.com/docs/sustainability-report">https://www.amphenol.com/docs/sustainability-report</a>	-
Analog Devices	ESG Report 2021	<a href="https://www.analog.com/media/en/company-csr/2021-esg-report.pdf#page=93">https://www.analog.com/media/en/company-csr/2021-esg-report.pdf#page=93</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Ant	Sustainability Report 2021	<a href="https://gw.alipayobjects.com/os/bmw-prod/df8f-cbe5-e60b-4ce7-9be4-55fb408b6f67.pdf">https://gw.alipayobjects.com/os/bmw-prod/df8f-cbe5-e60b-4ce7-9be4-55fb408b6f67.pdf</a>	-
Apple	Environmental Progress Report covering fiscal year 2021	<a href="https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2022.pdf">https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2022.pdf</a>	Yes
Applied Materials	Sustainability Report Annex 2021	<a href="https://www.appliedmaterials.com/content/dam/site/company/csr/doc/2021_Sustainability_Annex-F.pdf">https://www.appliedmaterials.com/content/dam/site/company/csr/doc/2021_Sustainability_Annex-F.pdf</a>	Yes
ASML	Annual Report 2021	<a href="https://www.asml.com/-/media/asml/files/investors/financial-results/a-results/2021/asml-annual-report-us-gaap-2021-unsvf2.pdf?rev=dc3209d-dcdd045589fa34b43e30e6cbf">https://www.asml.com/-/media/asml/files/investors/financial-results/a-results/2021/asml-annual-report-us-gaap-2021-unsvf2.pdf?rev=dc3209d-dcdd045589fa34b43e30e6cbf</a>	-
Asus	Sustainability Report 2021	<a href="https://csr.asus.com/english/file/ASUS_Detailed_2021_EN.pdf">https://csr.asus.com/english/file/ASUS_Detailed_2021_EN.pdf</a>	-
AT&T	Webpage - AT&T Issue Briefs	<a href="https://about.att.com/csr/home/reporting/issue-brief/greenhouse-gas-emissions.html">https://about.att.com/csr/home/reporting/issue-brief/greenhouse-gas-emissions.html</a>	Yes
ATH	Annual Report 2022	<a href="http://www.ath.com.fj/images/ath2022annualreport.pdf">http://www.ath.com.fj/images/ath2022annualreport.pdf</a>	-
Axiata	Sustainability and National Contribution Report 2021	<a href="https://axiata.listedcompany.com/misc/Sustainability_and_National_Contribution_Report_2021.pdf">https://axiata.listedcompany.com/misc/Sustainability_and_National_Contribution_Report_2021.pdf</a>	-
Baidu	Environmental, Social and Governance Report 2021	<a href="https://esg.baidu.com/resource/1ecd4e3f-d8ac-6f2c-8dd5-556f11239ccc/Baidu%202021%20Environmental,%20Social%20and%20Governance%20Report.pdf">https://esg.baidu.com/resource/1ecd4e3f-d8ac-6f2c-8dd5-556f11239ccc/Baidu%202021%20Environmental,%20Social%20and%20Governance%20Report.pdf</a>	-
BBK Electronics			-
BCE	Corporate Responsibility Report 2021	<a href="https://www.bce.ca/responsibility/overview/2021-cr-report.pdf">https://www.bce.ca/responsibility/overview/2021-cr-report.pdf</a>	-
Bezeq	ESG Report 2021	<a href="https://ir.bezeq.co.il/static-files/dd92615b-6c31-4d7c-a47d-3b2b93b372b7">https://ir.bezeq.co.il/static-files/dd92615b-6c31-4d7c-a47d-3b2b93b372b7</a>	-
Bharti Airtel	Integrated Report 2021-22	<a href="https://assets.airtel.in/teams/simplycms/web/docs/Airtel-Integrated_Report_and_Annual_Financial_Statements_2022.pdf">https://assets.airtel.in/teams/simplycms/web/docs/Airtel-Integrated_Report_and_Annual_Financial_Statements_2022.pdf</a>	-
Block	Corporate Social Responsibility Report 2021	<a href="https://s29.q4cdn.com/628966176/files/doc_downloads/2022/Block-2021-Corporate-Social-Responsibility-Report-(1).pdf">https://s29.q4cdn.com/628966176/files/doc_downloads/2022/Block-2021-Corporate-Social-Responsibility-Report-(1).pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
BOE			-
Booking Holdings	Sustainability Report Performance Data 2021	<a href="https://www.bookingholdings.com/wp-content/uploads/2022/08/BKNG-Performance-Data-Table-2021.pdf">https://www.bookingholdings.com/wp-content/uploads/2022/08/BKNG-Performance-Data-Table-2021.pdf</a>	-
Broadcom	Environmental, Social & Governance Report 2021	<a href="https://docs.broadcom.com/doc/environment-social-governance-report">https://docs.broadcom.com/doc/environment-social-governance-report</a>	-
BT	ESG Addendum to the BT Group plc Manifesto Report 2022	<a href="https://www.bt.com/bt-plc/assets/documents/digital-impact-and-sustainability/our-report/report-archive/2022/2022-esg-addendum.pdf">https://www.bt.com/bt-plc/assets/documents/digital-impact-and-sustainability/our-report/report-archive/2022/2022-esg-addendum.pdf</a>	-
ByteDance			-
Canon	Sustainability Report 2022	<a href="https://global.canon/en/csr/report/pdf/canon-sus-2022-e.pdf">https://global.canon/en/csr/report/pdf/canon-sus-2022-e.pdf</a>	-
Capgemini	Environmental Sustainability Report 2022	<a href="https://www.capgemini.com/wp-content/uploads/2022/08/EnvironmentalSustainabilityReport-Final1-27th-July.pdf">https://www.capgemini.com/wp-content/uploads/2022/08/EnvironmentalSustainabilityReport-Final1-27th-July.pdf</a>	
China Mobile	Sustainability Report 2021	<a href="https://www.chinamobileltd.com/en/ir/reports/ar2021/sd2021.pdf">https://www.chinamobileltd.com/en/ir/reports/ar2021/sd2021.pdf</a>	-
China Satellite			-
China Telecom	Corporate Social Responsibility Report 2021	<a href="https://www.chinatelecom-h.com/en/ir/report/csr2021.pdf">https://www.chinatelecom-h.com/en/ir/report/csr2021.pdf</a>	-
China Unicom	Sustainability Report 2021	<a href="https://www.chinaunicom.com.hk/en/esg/report_csr2021.php">https://www.chinaunicom.com.hk/en/esg/report_csr2021.php</a>	-
Chunghwa Telecom	Webpage - GHG Emissions	<a href="https://www.cht.com.tw/en/home/cht/esg/environmental-sustainability/ghg-emissions">https://www.cht.com.tw/en/home/cht/esg/environmental-sustainability/ghg-emissions</a>	-
Cisco	Webpage - Strategy, goals, and emissions data	<a href="https://www.cisco.com/c/m/en_us/about/csr/esg-hub/environment/goals.html">https://www.cisco.com/c/m/en_us/about/csr/esg-hub/environment/goals.html</a>	
Citrix	Corporate Social Responsibility 2021	<a href="https://www.citrix.com/content/dam/citrix/en_us/documents/about/final-csre-book-citrix-year-in-review-2021.pdf">https://www.citrix.com/content/dam/citrix/en_us/documents/about/final-csre-book-citrix-year-in-review-2021.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Cloudflare	Impact Report 2021	<a href="https://cf-assets.www.cloudflare.com/slt-3lc6tev37/1vmmNMaaktXDk5iHxxDdCj/69b-5d6a2c239888446bfadea1a10b89b/Cloudflare_Impact_Report_2021.pdf">https://cf-assets.www.cloudflare.com/slt-3lc6tev37/1vmmNMaaktXDk5iHxxDdCj/69b-5d6a2c239888446bfadea1a10b89b/Cloudflare_Impact_Report_2021.pdf</a>	-
Cogent			-
Cognizant	ESG Report 2021	<a href="https://www.cognizant.com/en_us/about/documents/2021-esg-report.pdf">https://www.cognizant.com/en_us/about/documents/2021-esg-report.pdf</a>	-
Comcast	Carbon Footprint Data Report 2022	<a href="https://www.cmcsa.com/static-files/89eb56eb-5c34-4490-a4f4-8860f4b1f787">https://www.cmcsa.com/static-files/89eb56eb-5c34-4490-a4f4-8860f4b1f787</a>	-
Corning	Sustainability Report 2021	<a href="https://www.corning.com/media/worldwide/global/documents/2021_Sustainability_Report_Corning_Incorporated.pdf">https://www.corning.com/media/worldwide/global/documents/2021_Sustainability_Report_Corning_Incorporated.pdf</a>	Yes
Delivery Hero	Annual Report 2021	<a href="https://ir.deliveryhero.com/media/document/35f8a680-3a33-44e4-b1a0-0b750e751b60/assets/DE000A2E4K43-JA-2021-EQ-E-01.pdf">https://ir.deliveryhero.com/media/document/35f8a680-3a33-44e4-b1a0-0b750e751b60/assets/DE000A2E4K43-JA-2021-EQ-E-01.pdf</a>	-
Dell	Environmental, Social and Governance Report 2022	<a href="https://www.delltechnologies.com/asset/en-in/solutions/business-solutions/briefs-summaries/delltechnologies-fy22-esg-report.pdf">https://www.delltechnologies.com/asset/en-in/solutions/business-solutions/briefs-summaries/delltechnologies-fy22-esg-report.pdf</a>	-
Deutsche Telekom	Corporate Responsibility Report 2021	<a href="https://www.cr-report.telekom.com/2021/sites/default/files/pdf/cr_en_2021_dt_final.pdf">https://www.cr-report.telekom.com/2021/sites/default/files/pdf/cr_en_2021_dt_final.pdf</a>	-
DiDi			-
Digicel			-
Digital Realty Trust	Environmental, Social and Governance Report 2021	<a href="https://go2.digitalrealty.com/rs/087-YZJ-646/images/Report_Digital_Realty_2206_ESG_Report.pdf?_ga=2.96164955.61116089.1663563952-564209867.1663563952">https://go2.digitalrealty.com/rs/087-YZJ-646/images/Report_Digital_Realty_2206_ESG_Report.pdf?_ga=2.96164955.61116089.1663563952-564209867.1663563952</a>	-
eBay	Impact Report 2021	<a href="https://static.ebayinc.com/assets/Uploads/Documents/eBay-Impact-2021-Report.pdf">https://static.ebayinc.com/assets/Uploads/Documents/eBay-Impact-2021-Report.pdf</a>	Yes
EchoStar			-
Elisa	Sustainability Report 2021	<a href="https://elisa.com/corporate/investors/results-centre/previous-annual-reports/">https://elisa.com/corporate/investors/results-centre/previous-annual-reports/</a>	-
Equinix	Sustainability Report 2021	<a href="https://www.equinix.com/content/dam/eqxcorp/en_us/documents/resources/infopapers/ip_2021_sustainability_highlights_en_april2022.pdf">https://www.equinix.com/content/dam/eqxcorp/en_us/documents/resources/infopapers/ip_2021_sustainability_highlights_en_april2022.pdf</a>	Yes

Company	Emissions and energy data	Link	CDP disclosure on their website?
Ericsson	Annual Report 2021	<a href="https://www.ericsson.com/4943ad/assets/local/investors/documents/2021/annual-report-2021-en.pdf">https://www.ericsson.com/4943ad/assets/local/investors/documents/2021/annual-report-2021-en.pdf</a>	Yes
Ethio Telecom			-
Etisalat	Sustainability Report 2021	<a href="https://eand.com/en/system/com/assets/docs/general/eand-sustainability-report-en-2021.pdf">https://eand.com/en/system/com/assets/docs/general/eand-sustainability-report-en-2021.pdf</a>	-
Eutelsat	Universal Registration Document 2021-22	<a href="https://www.eutelsat.com/files/PDF/investors/2021-22/EutelSat2022_GB_BAT2.pdf">https://www.eutelsat.com/files/PDF/investors/2021-22/EutelSat2022_GB_BAT2.pdf</a>	-
FarEasTone	Sustainability Report 2021	<a href="https://corporate.fetnet.net/content/dam/fetnet/user_resource/corp/documents/en/csr/report-download/csr-report/2021_CSRReport_en.pdf">https://corporate.fetnet.net/content/dam/fetnet/user_resource/corp/documents/en/csr/report-download/csr-report/2021_CSRReport_en.pdf</a>	-
Foxconn	Sustainability Report 2021	<a href="https://www.honhai.com/s3/reports/CSR/EN/2021/HonHai_2021_Sustainability%20Report_EN.pdf">https://www.honhai.com/s3/reports/CSR/EN/2021/HonHai_2021_Sustainability%20Report_EN.pdf</a>	-
GlobalFoundries	Corporate Responsibility Report 2022	<a href="https://gf.com/wp-content/uploads/2022/06/GF-CRR-22.pdf#page=66">https://gf.com/wp-content/uploads/2022/06/GF-CRR-22.pdf#page=66</a>	Yes
Globe	Integrated Report 2021	<a href="https://www.globe.com.ph/content/dam/globe/brie/AboutUs/sustainability/integrated-report/Globe-2021-Integrated-Report.pdf">https://www.globe.com.ph/content/dam/globe/brie/AboutUs/sustainability/integrated-report/Globe-2021-Integrated-Report.pdf</a>	-
GoTo	Sustainability Report 2021	<a href="https://assets.tokopedia.net/asts/goto/GoTo_Sustainability%20Report%202021_ENG.pdf">https://assets.tokopedia.net/asts/goto/GoTo_Sustainability%20Report%202021_ENG.pdf</a>	-
Grab	ESG Report 2021	<a href="https://assets.grab.com/wp-content/uploads/media/si/reports/Grab-ESG-Report-2021.pdf">https://assets.grab.com/wp-content/uploads/media/si/reports/Grab-ESG-Report-2021.pdf</a>	-
GTT			-
HCL	Sustainability Report 2022	<a href="https://www.hcltech.com/sites/default/files/document/open/FY2022_HCL_Sustainability_Report.pdf">https://www.hcltech.com/sites/default/files/document/open/FY2022_HCL_Sustainability_Report.pdf</a>	-
HP	Sustainable Impact Report 2021	<a href="https://www8.hp.com/h20195/v2/GetPDF.aspx/c08228880.pdf">https://www8.hp.com/h20195/v2/GetPDF.aspx/c08228880.pdf</a>	Yes
HPE	Data Summary 2021	<a href="https://www.hpe.com/us/en/collaterals/collateral.a50006143.html?rpv=cpf&amp;parentPage=/us/en/living-progress/report.html">https://www.hpe.com/us/en/collaterals/collateral.a50006143.html?rpv=cpf&amp;parentPage=/us/en/living-progress/report.html</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Huawei	Sustainability Report 2021	<a href="https://www-file.huawei.com/-/media/corp2020/pdf/sustainability/sustainability-report-2021-en.pdf">https://www-file.huawei.com/-/media/corp2020/pdf/sustainability/sustainability-report-2021-en.pdf</a>	-
IBM	ESG Report Addendum 2021	<a href="https://www.ibm.com/impact/pdf/IBM_2021_ESG_Report_Addendum.pdf">https://www.ibm.com/impact/pdf/IBM_2021_ESG_Report_Addendum.pdf</a>	Yes
iFlytek			-
Iliad	Universal Registration Document 2021	<a href="http://iliad-strapis3.fr-par.scw.cloud/ILIAD_URD_15062022_ENG_2473b2c06c.pdf">http://iliad-strapis3.fr-par.scw.cloud/ILIAD_URD_15062022_ENG_2473b2c06c.pdf</a>	-
Infineon	Sustainability at Infineon 2021	<a href="https://www.infineon.com/dgdl/Sustainability+at+Infineon+Supplementing+the+Annual+Report+2021.pdf?fileId=8ac78c8b7d507352017d6b57a9f6016c">https://www.infineon.com/dgdl/Sustainability+at+Infineon+Supplementing+the+Annual+Report+2021.pdf?fileId=8ac78c8b7d507352017d6b57a9f6016c</a>	-
Infosys	Carbon neutrality declaration 2022	<a href="https://www.infosys.com/global-resource/18/carbon-neutrality-declaration2022.pdf">https://www.infosys.com/global-resource/18/carbon-neutrality-declaration2022.pdf</a>	-
Inmarsat	ESG Report 2021	<a href="https://www.inmarsat.com/en/sustainability/protecting-the-planet.html">https://www.inmarsat.com/en/sustainability/protecting-the-planet.html</a>	Yes
Intel	Corporate Responsibility Report 2021-22	<a href="https://csrreportbuilder.intel.com/pdfbuilder/pdfs/CSR-2021-22-Full-Report.pdf">https://csrreportbuilder.intel.com/pdfbuilder/pdfs/CSR-2021-22-Full-Report.pdf</a>	-
Iridium	Environmental, Social and Governance 2021	<a href="https://www.iridium.com/wp-content/uploads/2022/04/2021-Iridium-ESG-Report.pdf">https://www.iridium.com/wp-content/uploads/2022/04/2021-Iridium-ESG-Report.pdf</a>	-
JD.com	Environmental, Social and Governance Report 2021	<a href="https://ir.jd.com/system/files-encrypted/nasdaq_kms/assets/2022/05/24/11-43-02/2021%20JD.com%20Environmental%20Social%20and%20Governance%20Report.pdf">https://ir.jd.com/system/files-encrypted/nasdaq_kms/assets/2022/05/24/11-43-02/2021%20JD.com%20Environmental%20Social%20and%20Governance%20Report.pdf</a>	-
Jio	Integrated Annual Report 2021-22	<a href="https://www.ril.com/ar2021-22/pdf/RIL_Integrated%20Annual%20Report%202022_06.08.2022_Web_Final_10MB.pdf">https://www.ril.com/ar2021-22/pdf/RIL_Integrated%20Annual%20Report%202022_06.08.2022_Web_Final_10MB.pdf</a>	-
JOYY			-
Jumia			-
Juniper Networks	Corporate Social Responsibility Report 2022	<a href="https://www.juniper.net/content/dam/www/assets/factsheet/us/en/2022/corporate-social-responsibility-report-2022.pdf">https://www.juniper.net/content/dam/www/assets/factsheet/us/en/2022/corporate-social-responsibility-report-2022.pdf</a>	-
KDDI	Integrated Sustainability and Financial Report 2022	<a href="https://www.kddi.com/extlib/files/english/corporate/ir/ir-library/sustainability-integrated-report/pdf/kddi_sir2022_e.pdf">https://www.kddi.com/extlib/files/english/corporate/ir/ir-library/sustainability-integrated-report/pdf/kddi_sir2022_e.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
KEYENCE	Annual Report 2022	<a href="https://www.keyence.com/download/directDownload/?asrc=BWpAlcemrFbhREgaHhamz8mEin-h9fUrb">https://www.keyence.com/download/directDownload/?asrc=BWpAlcemrFbhREgaHhamz8mEin-h9fUrb</a>	-
KPN	Integrated Annual Report 2021	<a href="https://ir.kpn.com/download/companies/koninkpnnv/Results/KPN_Integrated_Annual_Report_2021.pdf">https://ir.kpn.com/download/companies/koninkpnnv/Results/KPN_Integrated_Annual_Report_2021.pdf</a>	-
KT	ESG Report 2022	<a href="https://corp.kt.com/eng/archive/ipgrpt/attach/2022/2022_ENG_Archive.pdf">https://corp.kt.com/eng/archive/ipgrpt/attach/2022/2022_ENG_Archive.pdf</a>	-
Kyocera	Webpage - ESG Data Sheets	<a href="https://global.kyocera.com/sustainability/esg_data/index.html">https://global.kyocera.com/sustainability/esg_data/index.html</a>	-
Lam Research	Environmental, Social, and Governance Report 2021	<a href="https://www.lamresearch.com/esg-report/">https://www.lamresearch.com/esg-report/</a>	-
Largan Precision			-
Lenovo	Environmental, Social and Governance Report 2021/22	<a href="https://doc.irasia.com/listco/hk/lenovo/annual/2022/esr.pdf">https://doc.irasia.com/listco/hk/lenovo/annual/2022/esr.pdf</a>	-
LG	ESG Fact Book 2021-2022	<a href="https://www.lg.com/global/images/sustainability-report/2021-2022_LGE_SR_FACT_BOOK(EN).pdf">https://www.lg.com/global/images/sustainability-report/2021-2022_LGE_SR_FACT_BOOK(EN).pdf</a>	-
Liberty Global	Corporate Responsibility Report 2021	<a href="https://www.libertyglobal.com/wp-content/uploads/2022/07/Liberty-Global-2021-Corporate-Responsibility-Report.pdf">https://www.libertyglobal.com/wp-content/uploads/2022/07/Liberty-Global-2021-Corporate-Responsibility-Report.pdf</a>	-
Liquid Telecom			-
Logitech	Impact Report 2022	<a href="https://www.logitech.com/content/dam/logitech/en/sustainability/pdf/resources/fy22-impact-report-portrait.pdf">https://www.logitech.com/content/dam/logitech/en/sustainability/pdf/resources/fy22-impact-report-portrait.pdf</a>	-
Lumen	CDP Climate Change Response 2022	<a href="https://assets.lumen.com/is/content/Lumen/lumen-technologies-cdp-climate-change-questionnaire?Creativeid=77da4b57-0b5a-4b09-8d9c-9ec5adf0636c">https://assets.lumen.com/is/content/Lumen/lumen-technologies-cdp-climate-change-questionnaire?Creativeid=77da4b57-0b5a-4b09-8d9c-9ec5adf0636c</a>	Yes
Lyft	ESG Report 2022	<a href="https://s27.q4cdn.com/263799617/files/doc_downloads/2022/ESG-2022-Report_Final.pdf">https://s27.q4cdn.com/263799617/files/doc_downloads/2022/ESG-2022-Report_Final.pdf</a>	-
MediaTek	Sustainability Report 2021	<a href="https://d86o2zu8ugzlg.cloudfront.net/mediatek-craft/reports/CSR/2021-MediaTek-Sustainability-Report.pdf">https://d86o2zu8ugzlg.cloudfront.net/mediatek-craft/reports/CSR/2021-MediaTek-Sustainability-Report.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
MegaFon			-
Meituan	Annual Report 2021	<a href="http://media-meituan.todayir.com/20220419164002405410215762_en.pdf">http://media-meituan.todayir.com/20220419164002405410215762_en.pdf</a>	-
Mercado Libre	Impact Report 2021	<a href="https://investor.mercadolibre.com/sustainability/">https://investor.mercadolibre.com/sustainability/</a>	-
Meta	Sustainability Report 2021	<a href="https://sustainability.fb.com/wp-content/uploads/2022/06/Meta-2021-Sustainability-Report.pdf">https://sustainability.fb.com/wp-content/uploads/2022/06/Meta-2021-Sustainability-Report.pdf</a>	-
Microchip	Sustainability Report 2021	<a href="https://ww1.microchip.com/downloads/aemDocuments/documents/corporate-responsibility/sustainability/2021-Microchip-Sustainability-Report_web.pdf">https://ww1.microchip.com/downloads/aemDocuments/documents/corporate-responsibility/sustainability/2021-Microchip-Sustainability-Report_web.pdf</a>	Yes
Micron	Sustainability Report 2022	<a href="https://media-www.micron.com/-/media/client/global/documents/general/about/2022/2022_micron_sustainability-report.pdf?la=en&amp;rev=73eb9f80d0044ef28afcf80b9e71c198">https://media-www.micron.com/-/media/client/global/documents/general/about/2022/2022_micron_sustainability-report.pdf?la=en&amp;rev=73eb9f80d0044ef28afcf80b9e71c198</a>	Yes
Microsoft	Environmental Sustainability Report 2021	<a href="https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4Rwfv">https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4Rwfv</a>	Yes
Millicom	Annual Report 2021	<a href="https://www.millicom.com/media/4889/mic-2021ar.pdf">https://www.millicom.com/media/4889/mic-2021ar.pdf</a>	-
MTN	Sustainability Report 2021	<a href="https://group.mtn.com/wp-content/uploads/2022/04/MTN-SD-2021_interactive.pdf">https://group.mtn.com/wp-content/uploads/2022/04/MTN-SD-2021_interactive.pdf</a>	-
MTS	Sustainability Report 2021	<a href="https://storage.demo.dev.qsupport.ru/mts_ir/images/documents/MTS_Sustainability_report_2021.pdf">https://storage.demo.dev.qsupport.ru/mts_ir/images/documents/MTS_Sustainability_report_2021.pdf</a>	-
Murata	Webpage - ESG data collection	<a href="https://corporate.murata.com/en-us/csr/esg_data#id2">https://corporate.murata.com/en-us/csr/esg_data#id2</a>	-
Naspers	Integrated Annual Report 2022	<a href="https://presspage-production-content.s3.amazonaws.com/uploads/2659/4.naspersannualreportfy22.pdf?10000">https://presspage-production-content.s3.amazonaws.com/uploads/2659/4.naspersannualreportfy22.pdf?10000</a>	-
Naver	Integrated Report 2021	<a href="https://www.navercorp.com/navercorp_/ir/sustainabilityReport/NAVER_2021_ESG_ENG.pdf">https://www.navercorp.com/navercorp_/ir/sustainabilityReport/NAVER_2021_ESG_ENG.pdf</a>	-
NEC	Sustainability Report 2022	<a href="https://www.nec.com/en/global/csr/pdf/2022_report.pdf">https://www.nec.com/en/global/csr/pdf/2022_report.pdf</a>	-
Nepal Telecom			-

Company	Emissions and energy data	Link	CDP disclosure on their website?
NetApp	ESG Report 2021	<a href="https://www.netapp.com/pdf.html?item=/media/60152-netapp-2021-esg-report.pdf">https://www.netapp.com/pdf.html?item=/media/60152-netapp-2021-esg-report.pdf</a>	-
NetEase	ESG Report 2021	<a href="https://ir.netease.com/system/files-encrypted/nasdaq_kms/assets/2022/06/30/2-12-27/NTES%202021%20ESG%20Report%20EN.pdf">https://ir.netease.com/system/files-encrypted/nasdaq_kms/assets/2022/06/30/2-12-27/NTES%202021%20ESG%20Report%20EN.pdf</a>	-
Netflix	Environmental Social and Governance Report 2021	<a href="https://s22.q4cdn.com/959853165/files/doc_downloads/2022/03/30/2021-SASB-Report-FINAL.pdf">https://s22.q4cdn.com/959853165/files/doc_downloads/2022/03/30/2021-SASB-Report-FINAL.pdf</a>	-
Nintendo	Webpage - Environmental Data	<a href="https://www.nintendo.co.jp/csr/en/esg_data/index.html?active-topics=topics01">https://www.nintendo.co.jp/csr/en/esg_data/index.html?active-topics=topics01</a>	-
Nokia	People & Planet Report 2021	<a href="https://www.nokia.com/sites/default/files/2022-03/nokia-people-and-planet-2021-sustainability-report.pdf">https://www.nokia.com/sites/default/files/2022-03/nokia-people-and-planet-2021-sustainability-report.pdf</a>	Yes
NTT	Sustainability Report 2022	<a href="https://group.ntt/en/csr/data/pdf/sustainability_report_2022_databook_all.pdf">https://group.ntt/en/csr/data/pdf/sustainability_report_2022_databook_all.pdf</a>	-
Nvidia	Corporate Responsibility Report 2022	<a href="https://images.nvidia.com/aem-dam/en-zz/Solutions/csr/FY2022-NVIDIA-Corporate-Responsibility.pdf">https://images.nvidia.com/aem-dam/en-zz/Solutions/csr/FY2022-NVIDIA-Corporate-Responsibility.pdf</a>	-
NXP	Webpage - Emissions	<a href="https://www.nxp.com/company/about-nxp/sustainability-and-esg/environment/emissions:EMIS-SIONS">https://www.nxp.com/company/about-nxp/sustainability-and-esg/environment/emissions:EMIS-SIONS</a>	-
Ola			-
Omantel	Sustainability Report 2021	<a href="https://www.omantel.om/wcm/connect/b3e3dc3c-6457-40c2-8753-258e4d6d2e55/Sustainability+Report_Omantel_2021-Eng.pdf?MOD=AJPERES&amp;CVID=o61e1u0">https://www.omantel.om/wcm/connect/b3e3dc3c-6457-40c2-8753-258e4d6d2e55/Sustainability+Report_Omantel_2021-Eng.pdf?MOD=AJPERES&amp;CVID=o61e1u0</a>	-
Ooredoo	Annual Report 2021	<a href="https://www.ooredoo.com/wp-content/uploads/2022/08/Annual-Report-2021-English.pdf">https://www.ooredoo.com/wp-content/uploads/2022/08/Annual-Report-2021-English.pdf</a>	-
Oracle	Corporate Citizenship Data Sheet 2022	<a href="https://www.oracle.com/a/ocom/docs/corporate/citizenship/ccr-datasheet.pdf">https://www.oracle.com/a/ocom/docs/corporate/citizenship/ccr-datasheet.pdf</a>	Yes
Orange	Universal Registration Document 2021	<a href="https://www.orange.com/sites/orangecom/files/documents/2022-04/Universal%20Registration%20Document%202021.pdf">https://www.orange.com/sites/orangecom/files/documents/2022-04/Universal%20Registration%20Document%202021.pdf</a>	-
OTE	Integrated Report 2021	<a href="https://www.cosmote.gr/otegroup_company/sustainability/reports/ote/eng/2021.pdf">https://www.cosmote.gr/otegroup_company/sustainability/reports/ote/eng/2021.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Palantir	Carbon Report 2021	<a href="https://www.palantir.com/assets/xrfr7uok-pv1b/2RUjBXnWaACcOwXE4PGW-M1/7779fd434bb798ffc728f4d023e60037/Palantir_2021_Carbon_Report.pdf">https://www.palantir.com/assets/xrfr7uok-pv1b/2RUjBXnWaACcOwXE4PGW-M1/7779fd434bb798ffc728f4d023e60037/Palantir_2021_Carbon_Report.pdf</a>	-
PalTel			-
Panasonic	Webpage - Environment	<a href="https://holdings.panasonic/global/corporate/sustainability/environment/governance/data.html">https://holdings.panasonic/global/corporate/sustainability/environment/governance/data.html</a>	-
PayPal	Global Impact Report 2021	<a href="https://s202.q4cdn.com/805890769/files/doc_downloads/global-impact/PayPal-2021-Global-Impact-Report.pdf">https://s202.q4cdn.com/805890769/files/doc_downloads/global-impact/PayPal-2021-Global-Impact-Report.pdf</a>	Yes
PCCW	ESG Report 2021	<a href="https://www.pccw.com/sustainability/esg-report/index.page">https://www.pccw.com/sustainability/esg-report/index.page</a>	-
Pinduoduo			-
PLDT	Sustainability Report 2021	<a href="https://cms.pldt.com/drupal/sites/default/files/irannualandsustainablereports/SR%202021_Final_2.pdf">https://cms.pldt.com/drupal/sites/default/files/irannualandsustainablereports/SR%202021_Final_2.pdf</a>	-
Proximus	Integrated Annual Report 2021	<a href="http://www.proximus.com/dam/jcr:fe70d77f-3748-4e35-8b7b-42502187ce80/proximus-integrated-annual-report-2021_en.pdf">http://www.proximus.com/dam/jcr:fe70d77f-3748-4e35-8b7b-42502187ce80/proximus-integrated-annual-report-2021_en.pdf</a>	-
Qualcomm	Corporate Responsibility Report 2021	<a href="https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/2021-qualcomm-corporate-responsibility-report.pdf">https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/2021-qualcomm-corporate-responsibility-report.pdf</a>	-
Rakuten	Corporate Report 2021	<a href="https://global.rakuten.com/corp/investors/assets/doc/documents/ar_2021_all.pdf">https://global.rakuten.com/corp/investors/assets/doc/documents/ar_2021_all.pdf</a>	-
Rogers	ESG Data Supplement 2021	<a href="https://about.rogers.com/wp-content/uploads/ESG_Data_Supplement_2021.pdf">https://about.rogers.com/wp-content/uploads/ESG_Data_Supplement_2021.pdf</a>	-
Rostelecom	ESG Information 2021	<a href="https://www.company.rt.ru/en/ir/results_and_presentations/esg_information/ESG_information_2021_Eng.pdf">https://www.company.rt.ru/en/ir/results_and_presentations/esg_information/ESG_information_2021_Eng.pdf</a>	-
Safaricom	Sustainability Business Report 2022	<a href="https://www.safaricom.co.ke/images/Downloads/2022-Safaricom-Sustainability-Report.pdf">https://www.safaricom.co.ke/images/Downloads/2022-Safaricom-Sustainability-Report.pdf</a>	-
Salesforce	Schedules of Selected Environmental, Equality and Social Value Metrics 2022	<a href="https://s23.q4cdn.com/574569502/files/doc_governance/2022/Salesforce-ES-Schedules-FY22-EYReport.pdf">https://s23.q4cdn.com/574569502/files/doc_governance/2022/Salesforce-ES-Schedules-FY22-EYReport.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Samsung	Sustainability Report 2022	<a href="https://images.samsung.com/is/content/samsung/assets/global/ir/docs/sustainability_report_2022_en.pdf">https://images.samsung.com/is/content/samsung/assets/global/ir/docs/sustainability_report_2022_en.pdf</a>	-
SAP	Integrated Report 2021	<a href="https://www.sap.com/docs/download/investors/2021/sap-2021-integrated-report.pdf">https://www.sap.com/docs/download/investors/2021/sap-2021-integrated-report.pdf</a>	-
Seagate	CDP Climate Change 2022	<a href="https://www.seagate.com/files/www-content/global-citizenship/environmental/files/cdp-climate-2022-response.pdf">https://www.seagate.com/files/www-content/global-citizenship/environmental/files/cdp-climate-2022-response.pdf</a>	Yes
ServiceNow	Global Impact Report 2022	<a href="https://www.servicenow.com/company/global-impact.html">https://www.servicenow.com/company/global-impact.html</a>	-
SES	CDP Climate Change 2022	<a href="https://www.ses.com/sites/default/files/2023-04/SES_CDP_ClimateChangeQuestionnaire_2022.pdf">https://www.ses.com/sites/default/files/2023-04/SES_CDP_ClimateChangeQuestionnaire_2022.pdf</a>	Yes
Sina			-
Singtel	Sustainability Report 2022	<a href="https://cdn.aws.singtel.com/sustainabilityreport/2022/assets/pdf/downloads/Singtel-Group-Sustainability-Report-2022.pdf">https://cdn.aws.singtel.com/sustainabilityreport/2022/assets/pdf/downloads/Singtel-Group-Sustainability-Report-2022.pdf</a>	-
SK Hynix	Sustainability Report 2022	<a href="https://mis-prod-koce-homepage-cdn-01-blob-ep.azureedge.net/web/static_file/11067731656291865.pdf">https://mis-prod-koce-homepage-cdn-01-blob-ep.azureedge.net/web/static_file/11067731656291865.pdf</a>	-
SK Telecom	Annual Report 2021	<a href="https://www.sktelecom.com/img/eng/annual/20220721/SKTelecomAnnualReport2021English.pdf">https://www.sktelecom.com/img/eng/annual/20220721/SKTelecomAnnualReport2021English.pdf</a>	Yes
Skyworks	Sustainability Report 2021	<a href="https://www.skyworksinc.com/-/media/SkyWorks/Documents/Brochures/SustainabilityReport2021.pdf">https://www.skyworksinc.com/-/media/SkyWorks/Documents/Brochures/SustainabilityReport2021.pdf</a>	-
Snap	CitizenSnap Report 2022	<a href="https://storage.googleapis.com/snap-inc/citizen-snap/2022_CitizenSnap_Report.pdf">https://storage.googleapis.com/snap-inc/citizen-snap/2022_CitizenSnap_Report.pdf</a>	-
SoftBank	Webpage - ESG Data	<a href="https://group.softbank/en/sustainability/esg_data#1">https://group.softbank/en/sustainability/esg_data#1</a>	-
Sonatel	CSR Report 2021	<a href="https://sonatel.sn/wp-content/uploads/2022/10/Rapport_RSE-2021_V10_-24_10_2022.pdf">https://sonatel.sn/wp-content/uploads/2022/10/Rapport_RSE-2021_V10_-24_10_2022.pdf</a>	-
Sony	Sustainability Report 2022	<a href="https://www.sony.com/en/SonyInfo/csr/library/reports/SustainabilityReport2022_E.pdf">https://www.sony.com/en/SonyInfo/csr/library/reports/SustainabilityReport2022_E.pdf</a>	-
SpaceX			-
Spark	Greenhouse Gas Inventory Report 2022	<a href="https://investors.sparknz.co.nz/FormBuilder/Resource/_module/gXbeer80tkeL4nEaF-kwFA/Spark%20FY22%20Greenhouse%20Gas%20Inventory%20Report%20FINAL.pdf">https://investors.sparknz.co.nz/FormBuilder/Resource/_module/gXbeer80tkeL4nEaF-kwFA/Spark%20FY22%20Greenhouse%20Gas%20Inventory%20Report%20FINAL.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Spotify	Equity and Impact Report 2021	<a href="https://s29.q4cdn.com/175625835/files/doc_downloads/gov-docs/Spotify_Sustainability_Report_2021.pdf">https://s29.q4cdn.com/175625835/files/doc_downloads/gov-docs/Spotify_Sustainability_Report_2021.pdf</a>	-
STC	Sustainability Report 2021	<a href="https://sustainability.stc.com.sa/cdn/upload_001234567892.pdf">https://sustainability.stc.com.sa/cdn/upload_001234567892.pdf</a>	-
Stripe	Webpage - Climate	<a href="https://stripe.com/climate">https://stripe.com/climate</a>	-
Sudatel			-
Swisscom	2021 climate report in accordance with ISO 14064	<a href="https://reports.swisscom.ch/download/2021/en/swisscom_klimabericht_2021_en.pdf">https://reports.swisscom.ch/download/2021/en/swisscom_klimabericht_2021_en.pdf</a>	
Tata Communications	Sustainable Development Report 2022	<a href="https://www.tatacommunications.com/apps/online-sustainable-development-report-2022/Tata-CommsSR_2022.pdf">https://www.tatacommunications.com/apps/online-sustainable-development-report-2022/Tata-CommsSR_2022.pdf</a>	Yes
TCL	Environmental, Social and Governance Report 2021	<a href="https://doc.irasia.com/listco/hk/tclelectronics/annual/2021/esr.pdf">https://doc.irasia.com/listco/hk/tclelectronics/annual/2021/esr.pdf</a>	-
TE	Corporate Responsibility Report 2021	<a href="https://www.te.com/content/dam/te-com/documents/about-te/corporate-responsibility/global/TEConnectivityCorporateResponsibilityReport2021.pdf">https://www.te.com/content/dam/te-com/documents/about-te/corporate-responsibility/global/TEConnectivityCorporateResponsibilityReport2021.pdf</a>	-
Tele2	Annual and Sustainability Report 2021	<a href="https://www.tele2.com/files/Main/3372/3535259/tele2-annual-and-sustainability-report-2021.pdf">https://www.tele2.com/files/Main/3372/3535259/tele2-annual-and-sustainability-report-2021.pdf</a>	-
Telecom Egypt			-
Telecom Italia	Sustainability Report 2021	<a href="https://www.gruppotim.it/content/dam/gt/sostenibilit%C3%A0/doc-bilanci/Sustainability-Report-2021.pdf">https://www.gruppotim.it/content/dam/gt/sostenibilit%C3%A0/doc-bilanci/Sustainability-Report-2021.pdf</a>	-
Telefonica	Consolidated Annual Report 2021	<a href="https://www.telefonica.com/en/wp-content/uploads/sites/5/2022/03/consolidated-management-report-2021.pdf">https://www.telefonica.com/en/wp-content/uploads/sites/5/2022/03/consolidated-management-report-2021.pdf</a>	Yes
Telenor	Webpage - Key ESG figures	<a href="https://www.telenor.com/sustainability/reporting-our-performance/key-esg-figures/">https://www.telenor.com/sustainability/reporting-our-performance/key-esg-figures/</a>	-
Telia	Annual and Sustainability Report 2021	<a href="https://www.teliacompany.com/globalassets/telia-company/documents/reports/2021/annual/telia-company-annual-and-sustainability-report-2021_1103.pdf">https://www.teliacompany.com/globalassets/telia-company/documents/reports/2021/annual/telia-company-annual-and-sustainability-report-2021_1103.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Telkom	Integrated Report 2022	<a href="https://www.telkom.co.za/ir/apps_static/ir/pdf/financial/pdf/Telkom_Integrated_Report_2022.pdf">https://www.telkom.co.za/ir/apps_static/ir/pdf/financial/pdf/Telkom_Integrated_Report_2022.pdf</a>	-
Telkom Indonesia	Sustainability Report 2021	<a href="https://www.telkom.co.id/data/lampiran/1650968279871_Sustainability%20Report%20Telkom%202021.pdf">https://www.telkom.co.id/data/lampiran/1650968279871_Sustainability%20Report%20Telkom%202021.pdf</a>	-
Telstra	Sustainability Report 2022	<a href="https://www.telstra.com.au/aboutus/community-environment/reports">https://www.telstra.com.au/aboutus/community-environment/reports</a>	-
Tencent	Environmental, Social and Governance Report 2021	<a href="https://static.www.tencent.com/uploads/2022/04/19/e4114e693e-75636c18e8170735ed50c6.pdf">https://static.www.tencent.com/uploads/2022/04/19/e4114e693e-75636c18e8170735ed50c6.pdf</a>	-
Texas Instruments	Corporate Citizenship Report 2021	<a href="https://www.ti.com/lit/ml/szso067/szso067.pdf?ts=1662745423969&amp;ref_url=https%253A%252F%252Fwww.ti.com%252Fabout-ti%252Fcitizenship-community%252Foverview.html">https://www.ti.com/lit/ml/szso067/szso067.pdf?ts=1662745423969&amp;ref_url=https%253A%252F%252Fwww.ti.com%252Fabout-ti%252Fcitizenship-community%252Foverview.html</a>	Yes
Tokyo Electron	Sustainability Report 2022	<a href="https://www.tel.com/sustainability/report/q0u4d-k00000000a7-att/sr2022_all_e.pdf">https://www.tel.com/sustainability/report/q0u4d-k00000000a7-att/sr2022_all_e.pdf</a>	-
Toshiba TEC	Integrated Report 2022	<a href="https://www.toshibatec.com/company/ir/material/pdf/integrated_report2022.pdf">https://www.toshibatec.com/company/ir/material/pdf/integrated_report2022.pdf</a>	-
Transsion	Environmental, Social and Governance Report 2021	<a href="http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-04-26/688036_20220426_24_X4L3kELR.pdf">http://static.sse.com.cn/disclosure/listedinfo/announcement/c/new/2022-04-26/688036_20220426_24_X4L3kELR.pdf</a>	-
TSMC	Sustainability Report 2021	<a href="https://esg.tsmc.com/download/file/2021_sustainabilityReport/english/e-all.pdf">https://esg.tsmc.com/download/file/2021_sustainabilityReport/english/e-all.pdf</a>	-
Türk Telekom	CDP Disclosure 2022	<a href="https://www.ttyatirimciliskileri.com.tr/media/fwch-cef3/cdp-2022.pdf">https://www.ttyatirimciliskileri.com.tr/media/fwch-cef3/cdp-2022.pdf</a>	Yes
Twilio	Impact and DEI report 2021	<a href="https://twilio.org/impact/2021-report.pdf">https://twilio.org/impact/2021-report.pdf</a>	-
Twitter	Webpage - Accelerating our climate commitments on Earth Day	<a href="https://blog.twitter.com/en_us/topics/company/2022/accelerating-our-climate-commitments-on-earth-day">https://blog.twitter.com/en_us/topics/company/2022/accelerating-our-climate-commitments-on-earth-day</a>	-
Uber	ESG Report 2022	<a href="https://uber.app.box.com/s/7otjxo7978mio4x-59kqovh47doppg4w?ucllick_id=210f7870-dddd-4e2b-bee4-caf7a97794ad">https://uber.app.box.com/s/7otjxo7978mio4x-59kqovh47doppg4w?ucllick_id=210f7870-dddd-4e2b-bee4-caf7a97794ad</a>	-
United Internet	Sustainability Report 2021	<a href="https://report.united-internet.de/fileadmin/geschaeftsbericht/2021/United_Internet_Sustainability_Report_2021.pdf">https://report.united-internet.de/fileadmin/geschaeftsbericht/2021/United_Internet_Sustainability_Report_2021.pdf</a>	-

Company	Emissions and energy data	Link	CDP disclosure on their website?
Veon	Webpage - Committed to environmental sustainability and social responsibility	<a href="https://www.veon.com/we-are-veon/sustainability">https://www.veon.com/we-are-veon/sustainability</a>	-
Verizon	ESG Report 2021	<a href="https://www.verizon.com/about/sites/default/files/Verizon-2021-ESG-Report.pdf">https://www.verizon.com/about/sites/default/files/Verizon-2021-ESG-Report.pdf</a>	-
Viettel			-
VMWare	ESG Report 2022	<a href="https://www.vmware.com/content/dam/digital-marketing/vmware/en/pdf/docs/vmware-esg-report-2022.pdf">https://www.vmware.com/content/dam/digital-marketing/vmware/en/pdf/docs/vmware-esg-report-2022.pdf</a>	Yes
Vodafone	Annual Report 2022	<a href="https://investors.vodafone.com/sites/vodafone-ir/files/2022-05/Vodafone%202022%20Annual%20Report.pdf#page=49">https://investors.vodafone.com/sites/vodafone-ir/files/2022-05/Vodafone%202022%20Annual%20Report.pdf#page=49</a>	-
Western Digital	Sustainability Report 2021	<a href="https://documents.westerndigital.com/content/dam/doc-library/en_us/assets/public/western-digital/collateral/cert/western-digital-FY2021-sustainability-report.pdf">https://documents.westerndigital.com/content/dam/doc-library/en_us/assets/public/western-digital/collateral/cert/western-digital-FY2021-sustainability-report.pdf</a>	Yes
Xiaomi	Annual Report 2021	<a href="https://ir.mi.com/static-files/b85f34c0-0010-4a8c-94b9-269d8cd4eca4">https://ir.mi.com/static-files/b85f34c0-0010-4a8c-94b9-269d8cd4eca4</a>	-
Yandex	Tables & Annexes Sustainability Progress Report 2021	<a href="https://ir-docs.s3.yandex.net/sustainability/2021%20Yandex%20Sustainability%20Progress%20Report%20ENG.pdf">https://ir-docs.s3.yandex.net/sustainability/2021%20Yandex%20Sustainability%20Progress%20Report%20ENG.pdf</a>	-
Yunji			-
Zain	Sustainability Report 2021	<a href="https://zain.com/SR2021/wp-content/uploads/2022/03/Sustainability-Report-2021-EN.pdf">https://zain.com/SR2021/wp-content/uploads/2022/03/Sustainability-Report-2021-EN.pdf</a>	-
Zoom	Environmental, Social and Governance Report 2022	<a href="https://investors.zoom.us/static-files/Oddac6eb-3901-4f86-95c2-898bee9c8b95">https://investors.zoom.us/static-files/Oddac6eb-3901-4f86-95c2-898bee9c8b95</a>	-
ZTE	Sustainability Report 2021	<a href="https://res-www.zte.com.cn/mediares/zte/Files/PDF/white_book/2021_ZTE_EN.pdf">https://res-www.zte.com.cn/mediares/zte/Files/PDF/white_book/2021_ZTE_EN.pdf</a>	Yes



**World  
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Alliance**

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