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Race to Green

Scoring Tech Companies from China, Japan and South Korea on their Climate Action and Renewable Energy Use



GREENPEACE

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Race to **Green**



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EXECUTIVE

SUMMARY

Introduction

In 2021, East Asia experienced another year of historic extreme weather events, with devastating flooding in China¹ and heat waves in South Korea² and Tokyo.³ Climate change is now a major force in our daily lives, and the technology sector is an important and growing source of emissions.

Rapid growth in East Asia's technology sector has resulted in a sharp increase in electricity consumption and significant contribution to the region's greenhouse gas (GHG) emissions. This report assesses climate commitments and emissions reductions by 30 of the region's major tech companies. The total electricity consumption of these 30 companies rivals that of Thailand.⁴ Unfortunately, most electricity consumed by major tech companies in East Asia is still generated from burning fossil fuels, primarily coal and gas.

Last autumn, China, Japan and South Korea pledged to achieve carbon neutrality/net zero by mid-century (2060 in China; 2050 in Japan and South Korea). For the region's tech companies, adopting 100% renewable energy use is necessary to sustain growth in the face of growing pressure to reduce emissions. For this reason, corporate renewable energy commitments provide more than a mere brand reputation advantage; they are key to a company's core growth strategy.

Yet while the tech sector brands itself as the industry of the future, major tech companies in East Asia are only just beginning to increase their renewable energy use and develop strategies to reduce GHG emissions. By contrast, case studies from around the world underline that the tech industry has the potential to act as a leading force in the energy transition and to forge a model for corporate renewable energy use across all sectors.

This report tracks renewable energy commitments and follow-through by 30

1. Gan, N., & Wang, Z., 2021. (2021). Death Toll Rises as Passengers Recount Horror of China Subway Flood. Retrieved October 25, from <https://edition.cnn.com/2021/07/22/china/zhengzhou-henan-china-flooding-update-intl-hnk/index.html>

2. Herald corp. (2021). Livestock animal heatwave battle... 220,000 chickens and 5,000 pigs died. Retrieved October 25, from <http://news.heraldcorp.com/view.php?ud=20210728000407>

3. Gunia, A. (2021). Everyone Knew Tokyo Would Be One of the Hottest Olympics Ever. It's Still Taking a Brutal Toll. Retrieved October 25, from <https://time.com/6085237/olympics-extreme-heat/>

4. IEA. Retrieved October 25, from <https://www.iea.org/fuels-and-technologies/electricity>

of East Asia's leading technology companies. Companies were selected from the 2019 Forbes Top 100 Digital Companies list, with consideration to domestic market value and social impact. Ranking criteria and evaluation methodology were developed by Greenpeace East Asia (GPEA).

The ranking assesses each company's climate commitment, climate action, transparency and climate advocacy. The authors hope that a rubric to measure each company's progress will encourage the region's tech giants to strengthen their contributions to national, regional and global climate efforts. Maximum GHG emissions reductions can be realized if all companies commit to and achieve 100% renewable energy use across the supply chain by or before 2030.

Key Findings

Overall

No company included in the ranking scored higher than a C+. None of the ranked companies have committed to 100% renewable energy use across the supply chain by 2030 and taken the necessary steps toward meeting this goal.

Sony received the highest overall grade on the ranking as a result of the company's commitment to achieve 100% renewable energy by 2040, pledge to reduce GHG emissions across the supply chain (scope 1-3), relatively high level of data transparency, and renewable energy advocacy efforts. However, Sony has made little progress towards increasing its renewable energy use, with renewable energy still accounting for only 7% of the company's total power consumption, according to Sony's 2021 sustainability report.⁵

Leading global brands Samsung Electronics, Xiaomi, and Alibaba were among the lowest scoring companies in the ranking, receiving D or D- grades. All three companies have yet to issue global 100% renewable energy pledges or GHG emission reduction targets. Xiaomi and Alibaba also performed poorly in the data transparency category.

5. Sony. (2021). Sony Sustainability Report 2021. Retrieved October 25, from https://www.sony.com/en/SonyInfo/csr/library/reports/SustainabilityReport2021_E.pdf

Climate Commitments

Only two ranked companies have pledged to achieve 100% renewable energy by or before 2030: Yahoo Japan (2023), and Rakuten (2025). Neither of the two companies has issued the same commitment across their supply chain.

In many cases, companies have set target dates to achieve 100% renewable energy that are decades in the future, far too late to accelerate East Asia's energy transition. LG Electronics and four other ranked companies pledged to reach 100% renewable energy by 2050, much later than the average for RE100⁶ companies (2028).⁷ None of the 10 major Chinese companies⁸ included in the ranking have issued 100% renewable energy commitments, compared to half of ranked companies from Japan and four ranked companies from South Korea. Yet in all cases, existing 100% renewable energy commitments do not include the entire supply chain, which can account for the majority of a company's total emissions.

Few companies have pledged to reduce emissions across their entire supply chain. 18 out of 30 ranked companies pledged to achieve carbon neutrality or net zero within three decades (by 2050), including Panasonic and LG Electronics. Yet only three companies - Sony, Toshiba and Hitachi - have included supply chain emissions in their targets.

Climate Action

Few companies have followed through on their commitments with real action. Nearly half of ranked companies have issued net zero or carbon neutrality pledges, and one third have set targets for renewable energy use. However, only two companies, Rakuten and GDS, have achieved renewable energy usage rates of 20% or higher.

Ranked companies continue to opt for renewable energy sourcing methods that are characterized by high limitations and low impacts. 90% of ranked companies continue to rely on rooftop solar and unbundled renewable energy certificates (RECs) to transition to 100% renewable energy. Ranked

6. RE100 is a global initiative bringing together the world's most influential businesses driving the transition to 100% renewable electricity.

7. Daul, J. (2021). No more excuses for climate inaction. Retrieved October 25, from https://www.koreatimes.co.kr/www/opinion/2021/07/794_307195.html

8. JD Logistic, the former logistics arm of JD.com, committed to 100% renewable energy by 2030. JD.com has yet to issue such a commitment.

companies could instead increase their use of Power Purchase Agreements (PPAs), contracts that allow companies to buy renewable electricity directly from producers. PPAs are available in all three countries and are more effectively able to meet the high electricity demand of major tech companies and contribute to the expansion of local renewable energy development.

Transparency

70% of ranked companies disclosed scope 3 emissions. **The remaining 30% include Tencent, Alibaba and Naver.**

Only four ranked companies disclosed data from outside the country where they are headquartered. These companies are: Sony, Canon, Renesas Electronics, and LG Electronics.

Advocacy

Seven major Japanese tech companies, including Sony and Panasonic, collaborated to petition Japan's government to increase its 2030 renewable energy capacity target to 50%.⁹ Tencent has requested China's government to remove barriers to corporate renewable energy procurement and encourage investment in large-scale renewable energy projects. **By contrast, ranked tech companies in South Korea, including Samsung Electronics, LG Electronics, and SK Hynix, have not publicly advocated to strengthen renewable energy policies.**

Recommendations

Tech companies can utilize the following approaches to reduce their emissions:

- Set targets to achieve 100% renewable energy across the supply chain by 2030.
- Set ambitious GHG emission reduction targets that include the entire

⁹ Japan Climate Initiative. (2021). 92 corporations calling on the Japanese government to raise its 2030 renewable energy target to 40-50%. Retrieved November 5, from <https://japanclimate.org/english/news-topics/re2030increment/>

supply chain (scope 3) and are not reliant on the use of carbon offsets. Companies should also work towards zero GHG emissions, or as near zero emissions as possible, with short-term targets in place along the way.

- Choose impactful renewable energy procurement methods, such as PPAs, which are trackable and contribute to national renewable energy capacity.
- Disclose climate and energy data across the supply chain by abiding by a data disclosure framework that includes scope 3 emissions.
- Utilize status as industry leaders to advocate for climate mitigation and renewable energy-friendly policies.

RANKING

	Overall Grade	Commitment	Action	Transparency	Advocacy
	C+	C	C	B+	A-
	C	C-	C	C+	A-
	C	C-	D+	C+	A-
	C-	C-	C	B+	F
	C-	C-	C+	C-	F
	C-	D	D+	C+	B+
	C-	F	C	C+	A-
	C-	D-	C-	B	A-
	C-	D+	C	C+	F
	C-	D+	D	C+	A-
	D+	D	D+	C-	A-
	D+	C-	D	C-	C+
	D+	D+	D	C+	D-
	D+	D-	D+	C	B+
	D+	D	D	B+	D-

	Overall Grade	Commitment	Action	Transparency	Advocacy
	D+	D+	F	C+	D-
	D+	F	D-	C	A+
	D+	F	D+	C	B+
	D	D-	D	C+	F
	D	D-	D-	C	B+
	D	F	D	C	D-
	D	D	D-	C	F
	D	F	C	C	F
	D-	F	C-	F	B-
	D-	F	D	C+	F
	D-	D-	D-	F	C+
	D-	F	D	C	F
	D-	F	D	D+	F
	F	F	D	D	F
	F	F	D-	D+	F

TECH INDUSTRY

GHG EMISSIONS

Many of the world’s biggest tech brands are headquartered in East Asia. Following recent climate pledges from the governments of China, Japan, and South Korea, tech companies in the region face growing pressure to contribute to national, regional and global climate efforts.

However, as East Asia’s tech industry expands, electricity consumption from the sector continues to skyrocket. Electricity usage from the global tech sector is expected to grow by nearly 70% by 2030, reaching 3200TWh.¹⁰ The electricity consumption of the 30 companies included in this ranking exceeds Thailand’s total 2019 electricity consumption.¹¹ As the majority of East Asia’s electricity is generated from fossil fuels,¹² the tech industry is a major source of GHG emissions.

Evolution of IT Energy Demand (TWh)

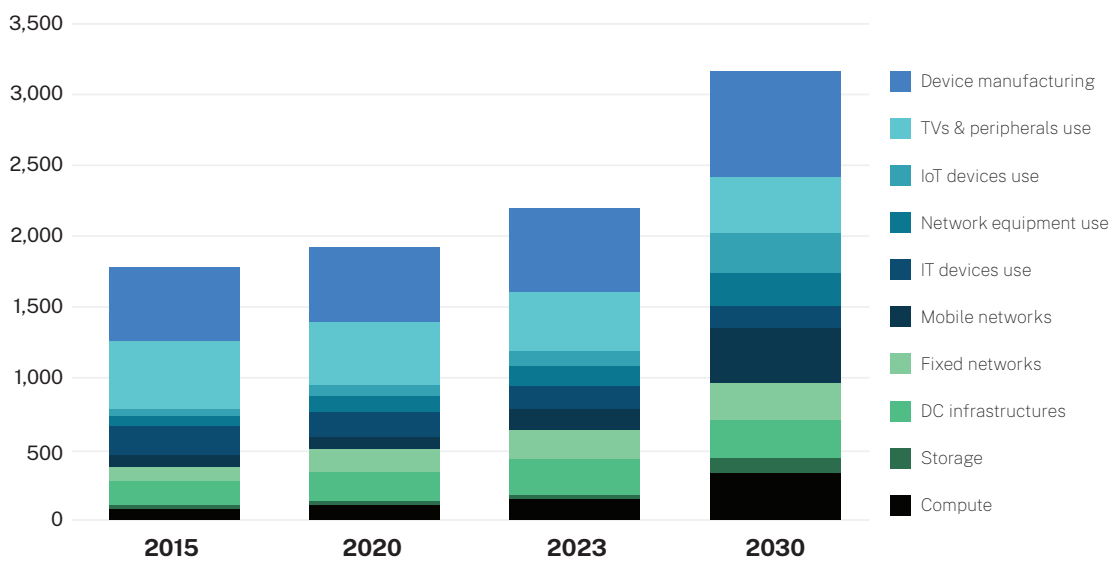


Figure 1. Evolution of tech sector electricity demand (Source: Schneider Electric)

¹⁰. Schneider Electric. (2021). Digital Economy and climate impact. Retrieved November 8.

¹¹. IEA. Retrieved October 25, from <https://www.iea.org/fuels-and-technologies/electricity>

¹². Greenpeace. (2014). GreenGadgets: Designing the Future. Retrieved October 25, from <https://www.greenpeace.org/static/planet4-international-stateless/21980e69-green-gadgets.pdf>

Tech is one of China's fastest-growing industries and is a major driver of the national economy. Greenpeace has estimated that electricity usage from China's data center industry will increase by two-thirds by 2023.¹³ However, given that 61% of the industry's electricity is generated from coal, the failure to launch effective renewable interventions is forecast to result in the sector emitting 193 million tonnes of GHG emissions by 2035.¹⁴

In 2018, Japan's domestic tech sector contributed 44.2 trillion JPY to the country's GDP, accounting for 8.7% of Japan's GDP by industry.¹⁵ However, Japan's technology sector is a major consumer of electricity. Total electricity consumption by Japan's tech sector in 2019¹⁶ exceeded that of New Zealand in 2020.¹⁷ 75% of Japan's electricity is still generated from fossil fuels.¹⁸

Likewise, South Korea's tech sector production is expected to reach KRW 495 trillion by 2025, with an annual growth rate of 1.5% from 2021.¹⁹ Samsung Electronics, LG Electronics, and SK Hynix are some of the world's biggest technology companies. According to figures released by the Ministry of Environment (NGMS) and Greenpeace calculations, South Korea's tech sector²⁰ was responsible for nearly 37 million tonnes of carbon emissions in 2019, exceeding Norway's total emissions in 2018.²¹

13. Greenpeace East Asia. (2019). Electricity consumption from China's internet industry to increase by two thirds by 2023. Retrieved October 25, from <https://www.greenpeace.org/eastasia/press/1255/electricity-consumption-from-chinas-internet-industry-to-increase-by-two-thirds-by-2023-greenpeace-2/>

14. Greenpeace East Asia. (2021). China 5g and data center carbon emission outlook. Retrieved October 25, from <https://www.greenpeace.org.cn/wp-content/uploads/2021/05/China-5G-and-Data-Center-Carbon-Emissions-Outlook-2035.pdf>

15. JETRO. (2021). Attractive Sectors: ICT. Retrieved October 25, from https://www.jetro.go.jp/ext_images/en/invest/img/attractive_sectors/ict/ict_EN_202103.pdf

16. JETRO. (2021). Attractive Sectors: ICT. Retrieved October 25, from https://www.jetro.go.jp/ext_images/en/invest/img/attractive_sectors/ict/ict_EN_202103.pdf

17. Retrieved October 25, from <https://www.iea.org/fuels-and-technologies/electricity>

18. ISEP. (2021). Share of Electricity Generated from Renewable Energy in 2020 (Preliminary Report). Retrieved November 5, from <https://www.isep.or.jp/en/1075/>

19. KISDI. (2021). ICT Industry Outlook of Korea. Retrieved October 25, from https://mediasvr.egentouch.com/egentouch.media/apiFile.do?action=view&SCHOOL_ID=1007002&URL_KEY=f1832361-004d-4bbd-a3dc-1c577ec4fe39

20. Including semiconductor, display, electrical electronics, and communication

21. Includes LULUCF

PERFORMANCE

ASSESSMENT

Climate Commitments

The climate commitments category evaluates whether a company has committed to carbon neutrality/net zero and 100% renewable energy with a reasonable scope and timeframe.

Tech firms that have targeted to achieve 100% renewable energy by or before 2030 are granted higher scores. Companies are also evaluated based on whether they have developed sophisticated and inclusive pathways to achieve their stated commitments, such as by integrating supply chain carbon emissions into their GHG emissions reduction plans.

Necessity

Following climate pledges issued by China, Japan and South Korea in autumn 2020, a number of tech firms across the three countries have set carbon neutrality/net zero targets to reduce their GHG emissions. However, the credibility of these commitments varies.

Credible GHG emissions reduction pledges include:

- A timeline: companies must publicly disclose all steps in the timeline, including by establishing clear mid-term targets.
- A clear pathway: companies must clearly demonstrate how they will achieve their GHG emissions reduction targets. Companies should prioritize reducing direct emissions and avoid relying on carbon offsets.²²
- Scope 3 emissions: companies must take responsibility to reduce their scope 3 (primarily from the supply chain) emissions.

²² Offsets are a viable option in the short-term for industries where it is technically or financially challenging to reduce emissions, such as aviation or shipping. For such offsets to be credible, they must be supported by robust governance and monitoring mechanisms. However, companies should not rely on offsets to achieve carbon neutrality/net zero. Instead, they should undertake structural, technical, and financial approaches to reduce emissions at the source.

What is Carbon Offsetting?

“Carbon offsetting” is an accounting method that enables a nation or company with a high carbon footprint to purchase carbon credits, such as from tree planting and forest restoration, which are intended to offset the purchaser’s own emissions.

Carbon offsets distract from direct emissions reduction and are often used as an excuse for high-emitting companies to continue their reliance on fossil fuels.

Why Offsets Don’t Work

Speed: Fossil fuel emissions have an immediate impact, while the removal of CO₂ from the atmosphere takes much longer. Tree growth takes decades.²³

Permanence: Biosphere carbon is vulnerable to release into the atmosphere at any time, while fossil carbon stays in the ground permanently unless it is burned. Oregon’s largest wildfire, the Bootleg Fire, which occurred in July 2021, burned nearly 400,000 acres across the southern parts of the state. The flames spread through one-fifth of forests set aside for carbon offsets in the area.²⁴ Forest fires not only wipe out stored carbon, but also release more carbon dioxide into the atmosphere.

Additionality: Offsets are based on assumptions of what would have happened in the absence of the offset, for example, that deforestation would have occurred. However, it is not possible to prove what might have happened in the absence of an offset scheme. This means that offsets may not bring about additional carbon sequestration or emissions avoidance.

Leakage: Avoided emissions from the protection of forests may simply displace logging into another area, resulting in no emissions reduction at all.

Limited carbon sinks: Nature-based carbon uptake has a limited capacity. Current CO₂ levels are too high, meaning sinks are needed to take up the carbon that is already in the atmosphere. Sink capacity must not be tied up for decades to ‘pay off’ ongoing emissions.

For more information regarding our analysis of offsets and its risks, please refer to the report “Hero to Zero: uncovering the truth of corporate Australia’s Climate Action Claims,” written by Greenpeace Australia Pacific.

We encourage companies to protect and restore ecosystems, but carbon offsets are not a substitute for the reduction of GHG emissions.

Tech firms should first seek to cut emissions in as comprehensive a way - including by adjusting their business model to achieve maximum emissions reductions and transitioning towards 100% renewable energy across the supply chain.

²³ Reuters. (2021). Greenpeace calls for end to carbon offsets. Retrieved October 25, from <https://www.reuters.com/business/sustainable-business/reuters-impact-greenpeace-calls-end-carbon-offsets-2021-10-06/>

²⁴ Wolfe, D., & Yellin, T. (2021). Bootleg Fire is burning up carbon offsets. Retrieved October 25, from <https://edition.cnn.com/2021/07/22/weather/bootleg-oregon-fire-carbon-offsets/index.html>

The optimum pathway for a company to achieve net zero or carbon neutrality is through switching to 100% renewable energy as early as possible. Since China, Japan and South Korea have pledged to achieve major GHG emission reduction targets within just a few decades, 2030 is a critical year to assess progress.²⁵ In achieving 100% renewable energy by 2030, tech firms can contribute significantly to their national climate targets.

Current Status

In total, 14 ranked companies, including Sony, Fujitsu, LG Electronics, and Baidu, have publicly committed to achieve carbon neutrality or net zero by 2050. Others, including Tencent, China Mobile, China Telecom, and China Unicom, have announced that they will work towards carbon neutrality, but have not yet officially set a target.

Of the 14 companies that have issued carbon neutrality or net zero pledges, only Sony, Toshiba and Hitachi include all supply chain GHG emissions in their commitments. Fujitsu and Panasonic have included a partial plan for scope 3 emission reduction targets. Most ranked companies that have developed GHG emissions reduction plans have not included scope 3 emissions in their plans.

Company	Scope 3 included
SONY	Yes
Panasonic	Partial
FUJITSU	Partial
HITACHI	Yes
RENESAS	No
TOSHIBA	Yes
SoftBank	No
Canon	No
NAVER	No
kt	No
LG Electronics	No
SK telecom	No
SK hynix	No
Baidu	No

Figure 2. The inclusion of scope 3 in ranked companies' GHG emission reduction plans

25. Greenpeace East Asia. (2020). China, Japan, and Korea promised carbon neutrality. Now we need them to make it happen. Retrieved October 25, from <https://www.greenpeace.org/eastasia/blog/6219/china-japan-and-korea-promised-carbon-neutrality-now-we-need-them-to-make-it-happen/>

Most companies included in the ranking have been far too slow to set 100% renewable energy targets. As shown in figure 3, only nine out of 30 ranked companies, including Sony, LG Electronics, and SK Hynix, have announced official pledges. Others, including Samsung Electronics, Toshiba, and Canon, still lack global 100% renewable energy targets. Ten ranked companies in China, including Alibaba, Tencent, and GDS, have yet to issue 100% renewable energy targets.²⁶

Companies have targeted to achieve 100% renewable energy by dates that are far too distant in the future. For example, Sony, Panasonic, and SK Hynix have pledged to achieve 100% renewable energy between 2040 to 2050, decades too late to be impactful and long after the RE100 average of 2028.²⁷ Only two companies, Yahoo Japan (2023) and Rakuten (2025), have pledged to achieve 100% renewable energy before 2030. Furthermore, none of the ranked companies have included the entire supply chain in their 100% renewable energy targets.

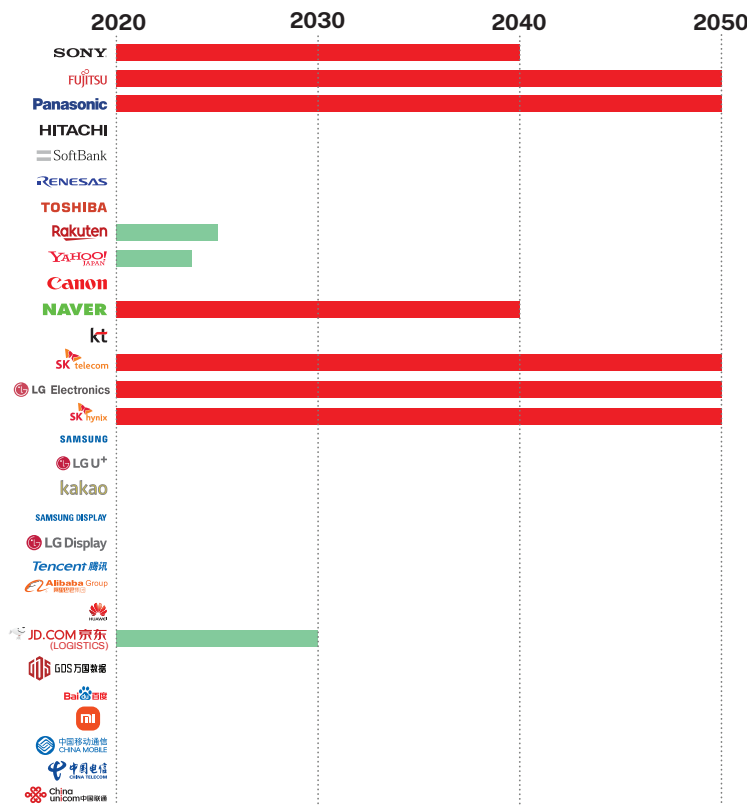


Figure 3. Timeline of 100% renewable energy commitments by ranked companies

26. JD Logistics, the former logistics arm of JD.com, has committed to transitioning to 100% renewable energy by 2030. JD.com is yet to issue the same commitment.

27. Daul, J. (2021). No more excuse for climate inaction. Retrieved October 25, from https://www.koreatimes.co.kr/www/opinion/2021/07/794_307195.html

Comparison to Major Global Tech Brands

An analysis of existing commitments and sustainability measures by Google, Apple, Facebook, Microsoft, Amazon, Equinix, and Salesforce offers lessons for companies included in the 'Race to Green' ranking.

Company Name	100% RE target	Progress of RE target (2021)	Year that RE target was proposed
Google	Achieved in 2017	100%	2012
Apple	Achieved in 2018	100%	2012
Facebook	Achieved in 2018	100%	2011
Microsoft	Achieved in 2014	100%	2014
Amazon	2025	65% (2020)	2014
Equinix	2030	90% (2020)	2015
Salesforce	2022	100%	2013

Figure 4. 100% Renewable Energy Targets and Progress by Major Global Tech Companies²⁸

28. Greenpeace. (2021). Clean Cloud. Retrieved October 25, from https://www.greenpeace.org/cn/wp-content/uploads/2021/04/ccracking_2021_cn.pdf

Recommendations

- **Set credible GHG emission reduction targets and avoid the use of carbon offsets. Scope 3 should be included in emission reduction targets.**

- » Companies should work to reduce GHG emissions through a transition to 100% renewable energy and **must not rely on carbon offsets to achieve GHG emissions reduction targets.**

- » **Companies need to include scope 3 emissions in their GHG emission reduction plan.** As supply chain emissions are usually 5.5 times higher than a company's direct carbon emissions,²⁹ meaningful emission reduction targets include supply chain emissions.

- **Achieve 100% renewable energy across the supply chain by 2030 to reduce GHG emissions.** The majority of tech industry GHG emissions come from electricity usage, so the shift to renewable energy is critical. As the window of opportunity to address the climate crisis is closing, tech companies in the region need to transition to 100% renewable energy as soon as possible.

Climate Action

The climate action category evaluates whether companies have taken effective steps to reduce GHG emissions. Companies are ranked based on their adoption of renewable energy, progress on reducing emissions across the supply chain, and utilization of energy efficiency approaches. When the RE usage ratio passes 50%, a company receives full points within the renewable energy ratio category.

²⁹ CDP. (2019). Supply chains hold the key to one gigaton of emissions savings, finds new report.). Retrieved October 25, from <https://www.cdp.net/en/articles/media/supply-chains-hold-the-key-to-one-gigaton-of-emissions-savings-finds-new-report>

Necessity

Following net zero/carbon neutrality announcements in autumn 2020 by the governments of China, Japan, and South Korea, a growing number of companies in the region have issued their own climate commitments. However, it is necessary to evaluate whether companies have followed through on these pledges, or whether such promises are simply empty words and greenwashing.

The technology sector accounts for between 6-10% of the world's total electricity consumption and nearly 4% of greenhouse gas emissions.³⁰ As most GHG emissions are generated from electricity consumption, switching to renewable energy is the most effective and fastest way for tech companies to reduce their GHG emissions.

Besides renewable energy procurement, energy saving is also an important approach for companies to manage their GHG emissions. Energy saving can also help companies to lower their energy and electricity costs.

Due to the critical role of supply chain operations, it is essential that tech giants help to lead the sector by supporting emissions reduction across the supply chain.

Current Status

Ranked companies have taken various approaches to reduce their GHG emissions, including the adoption of renewable energy and energy conservation strategies, and management of supply chain GHG emissions. However, in most cases, the rate of renewable energy adoption is still too slow for companies to meet their own GHG reduction and 100% renewable energy commitments.

27 out of 30 ranked companies have stated in their ESG or CSR reports that they utilize renewable energy in their operations. The three exceptions are Kakao, Xiaomi, and China Telecom, which have not disclosed any renewable energy usage.

30. Cailloué, L. (2018). New Technologies' Wasted Energies. Retrieved October 25, from <https://news.cnrs.fr/articles/new-technologies-wasted-energies>

However, the rate of renewable energy usage among ranked companies remains low. As shown in Figure 4, 12 out of 30 companies have disclosed their RE usage ratio. Renewable energy use remains below 20% for all but two of the 12 companies: Rakuten (64.8%) and GDS (20%). Toshiba, Tencent and Alibaba have yet to disclose any RE usage data.

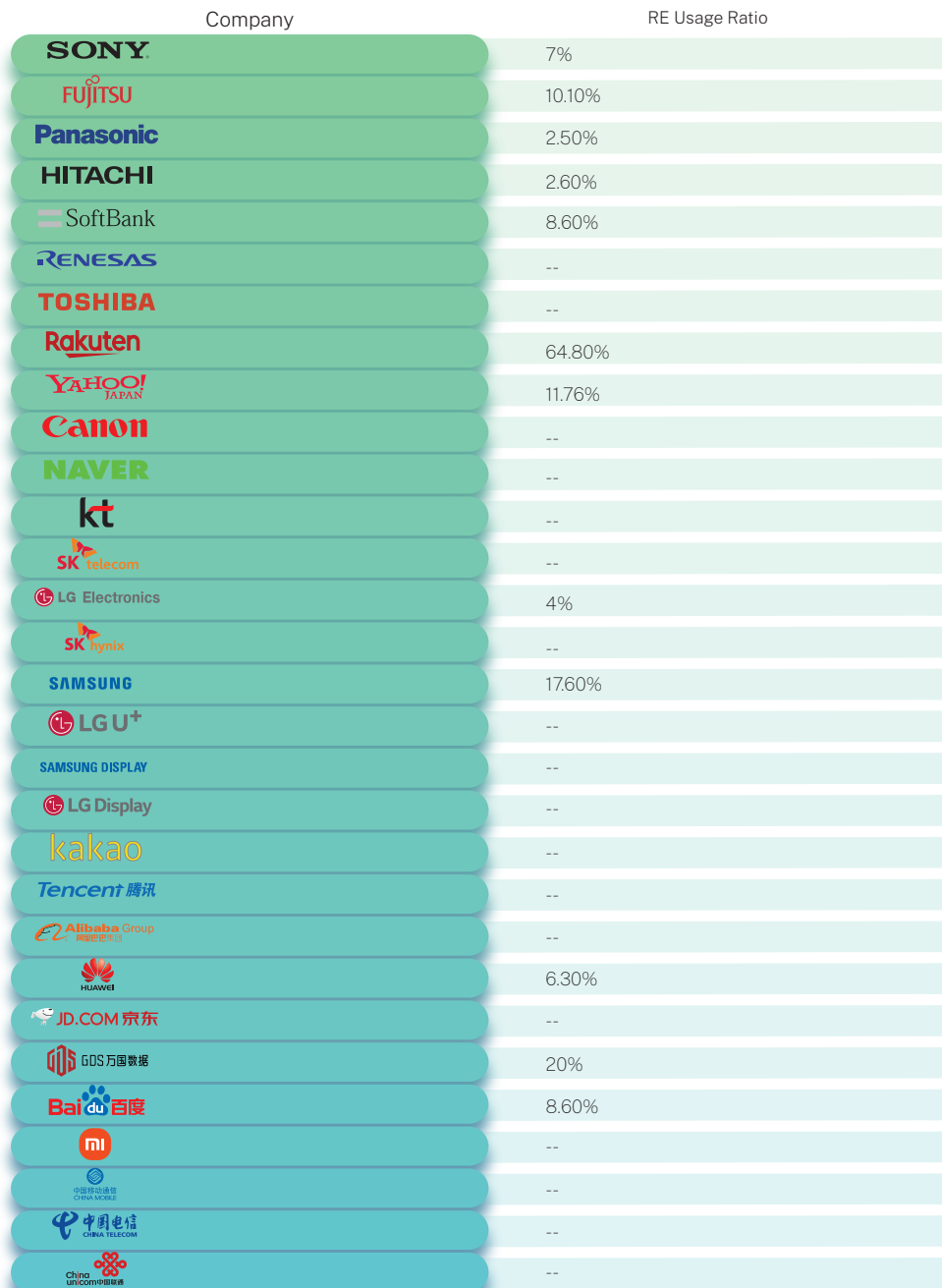


Figure 5. RE usage ratio by company³¹

31. The reference of this data is shown in the company data card.

Besides the low RE usage ratio, most ranked companies are not sourcing RE through impactful procurement methods, such as PPAs.

As shown in Figure 6, rooftop solar was the primary RE sourcing method utilized by ranked companies. Rooftop solar is an easy and affordable way for companies to adopt renewable energy. It can directly promote local procurement and add new renewable energy capacity.

However, the volume of solar PV panels that can be installed on a company's roof is limited due to space constraints and is far from sufficient to meet the electricity demand of major tech companies. For example, LG Electronics has built 6.7 MW of solar energy capacity at worksites in South Korea, which produced 8,832 MWh of solar energy in 2019.³² But in 2019 LG Electronics consumed more than 90 times the amount of solar energy that the rooftop capacity was able to generate. Although rooftop solar panels have clear additionality, reliance on rooftop PV alone is insufficient to meet the needs of major tech companies.

Renewable energy certificates (RECs) are the second preferred RE sourcing method among ranked companies. 11 ranked companies used REC to purchase renewable energy as shown in figure 6. An REC is a market-based instrument that indicates that the REC holder owns one megawatt-hour (MWh) of electricity generated from renewable energy sources.³³ The majority of RECs in the three countries are unbundled RECs. Though unbundled RECs offer flexibility, simplicity and lower operational risks, they typically do not lead to an increase in local renewable energy capacity.

Only six ranked companies have reported use of market trading (or PPAs) to source RE: Baidu, Alibaba, China Mobile, China Unicom, Tencent and GDS. Under a corporate PPA, the buyer enters into a contract with an independent power producer, utility, or financier, and commits to purchase a set amount of renewable electricity or the output from a specific asset at an agreed price and for an agreed period of time. There is no limit to the amount of electricity purchased under a corporate PPA. For a corporate PPA to be credible, RE power stations should provide RECs along with the contract. RECs represent

32. LG Electronics. (2020) LG Electronics Sustainability Report 2019-2020. Retrieved October 25, from [https://www.lg.com/global/sustainability/resource/2019-2020%20Sustainability%20Report\[20210825_172240524\].pdf](https://www.lg.com/global/sustainability/resource/2019-2020%20Sustainability%20Report[20210825_172240524].pdf)

33. Chen, J. (2021). Renewable Energy Certificates. Retrieved November 2, from <https://www.investopedia.com/terms/r/rec.asp>

the environmental attributes of the purchased electricity, while the PPA represents the electrical attributes.³⁴ Corporate PPAs are trackable and promote RE consumption. They are the most promising procurement method for tech companies to realise 100% RE.

When it comes to impactful RE procurement methods, there are three factors for consideration.³⁵

1. Trackability: clarify ownership and power consumption of the environmental attributes of renewable energy, and avoid double counting.
2. Local procurement: promote local consumption of renewable energy and decarbonization of the local power grid.
3. Additionality: increase new renewable energy installation capacity.

Renewable energy sourcing mechanisms are discussed in detail in the following section.

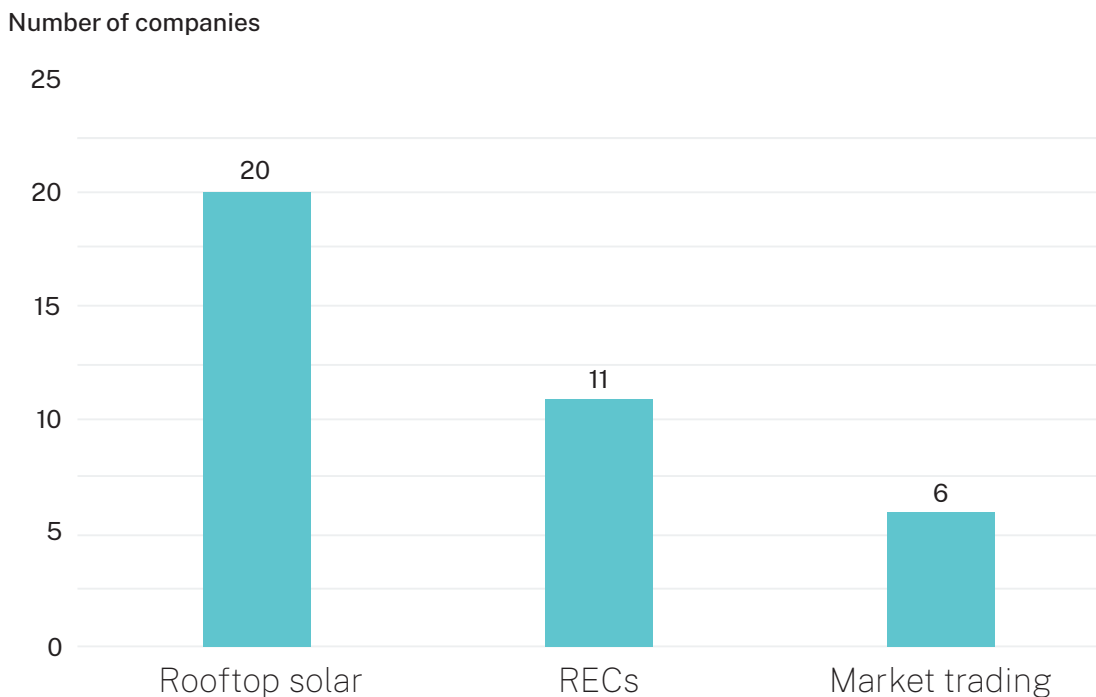


Figure 6. Use of various RE procurement methods by the 30 ranked companies.

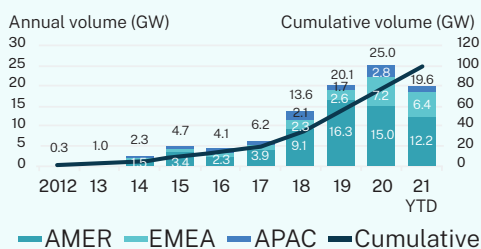
³⁴ Johnson, J. (2020). 4 Ways to Get Renewable Energy Certificates: Pros & Cons of Each. Retrieved November 2, from <https://www.leveltenenergy.com/post/ways-to-get-renewable-energy-certificates>

³⁵ IRENA, (2018). Corporate Sourcing of Renewables: Market and Industry Trends. Retrieved October 25, from https://irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_Corporate_sourcing_2018.pdf

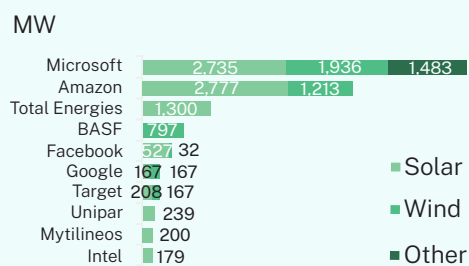
Tracking the Purchase of Renewable Energy by Global Tech Firms

Globally, PPAs are the primary method for companies to source renewable energy. By H1 2021, corporations worldwide had purchased 19.6 GW of renewable energy through signed PPAs, an increase of more than 120% year on year.³⁶ Five of the world's biggest PPA buyers are tech companies: Microsoft, Amazon, Google, Facebook, and Intel.

Global corporate PPA volumes, by region



Top corporate offtakers, 2021



Source: BloombergNEF Note: Charts are for offsite deals only. Capacity is displayed in MW DC

In addition to the adoption of renewable energy, companies have a responsibility to reduce GHG emissions across the supply chain. Although most of the ranked companies have yet to include scope 3 emissions in their carbon neutrality commitments, 23 out of the 30 companies said they had considered GHG emissions, energy conservation, and emission reduction when selecting suppliers.

However, most emission reduction requirements for suppliers have not been adopted in practice. Only nine ranked companies, including Sony, LG Electronics, and Samsung Electronics, provided GHG emissions reduction training sessions for their suppliers. No ranked tech firms have provided financial assistance to suppliers to promote the use of renewable energy. By contrast, an initiative by Apple called the China Clean Energy Fund demonstrates how financial assistance to suppliers can function in practice.³⁷

36. 2H 2021 Corporate Energy Market Outlook (BNEF, 2021).

37. Apple. (2018). Apple launches new clean energy fund in China. Retrieved October 25, from <https://www.apple.com/hk/en/newsroom/2018/07/apple-launches-new-clean-energy-fund-in-china/>

Best Practice

As part of Apple's commitment to address climate change and increase the use of renewable energy within its supply chain, Apple and 10 of its suppliers vowed in 2018 to jointly invest nearly USD \$300 million over the next four years in the China Clean Energy Fund. The fund was established to invest in and develop clean energy projects totaling more than 1 gigawatt of renewable energy in China, the equivalent of powering nearly 1 million homes.³⁸

Recommendations

- **Increase the RE usage ratio.** Renewable energy is the most effective and credible way to reduce tech industry GHG emissions. Companies must increase the RE usage ratio in their operations.
- **Adopt impactful renewable energy procurement methods.** Develop a powerful renewable energy procurement plan to promote the development of local renewable energy while meeting electricity demand, such as PPAs.
- **Provide assistance to suppliers to achieve carbon reduction.** Learn from the experience of international companies in promoting emissions reductions across the supply chain. Companies can use their own influence to establish a renewable energy fund to help suppliers purchase renewable energy.

Transparency

The transparency category includes whether companies disclose energy use, electricity use, climate mitigation, and GHG emissions information to the public and stakeholders. In addition, companies are assessed on the publication of detailed environmental data, including energy type, regional environmental data, and scope 3 emissions data. All data have been collected from public platforms, such as official company websites and ESG reports. Websites that require registration to view data are not taken into account.

³⁸ Apple. (2018). Apple launches new clean energy fund in China. Retrieved October 25, from <https://www.apple.com/hk/en/newsroom/2018/07/apple-launches-new-clean-energy-fund-in-china/>

Necessity

In recent years, Environmental, Social, and Governance (ESG) has become an important factor in the investment management process. According to the Global Sustainable Investment Review, sustainable investing assets increased by 34% between 2016 and 2018, to \$30.7 trillion.³⁹

Data transparency is closely linked to ESG ratings. ESG ratings enable investors to evaluate portfolios according to their sustainable objectives and long-term financial and social returns.⁴⁰ Global investors such as Blackrock have emphasised the role of data disclosure in helping companies to attract investment.⁴¹

Tech companies have a responsibility to disclose environmental data to investors, customers and other relevant stakeholders.

Current Status

Nearly all tech companies included in the ranking have disclosed environmental data to some degree. One noteworthy exception is GDS, which to date has yet to release an ESG report. The level of data transparency varies across tech companies in the ranking, especially when it comes to data transparency across all operations and disclosure of scope 3 emissions.

³⁹. Global Sustainable Investment Alliance. (2019). 2018 Global Sustainable Investment Review. Retrieved October 25, from http://www.gsi-alliance.org/wp-content/uploads/2019/06/GSIR_Review2018F.pdf

⁴⁰. OECD Paris. (2020). ESG Investing: Practices, Progress and Challenges. Retrieved October 25, from www.oecd.org/finance/ESG-Investing-Practices-Progress-and-Challenges.pdf

⁴¹. Larry Fink's 2020 Letter to CEOs. (2020) A Fundamental Reshaping of Finance. Retrieved October 25, from <https://www.blackrock.com/us/individual/larry-fink-ceo-letter>

COMPANY	ENERGY USAGE	ELECTRICITY USAGE	CLIMATE MITIGATION	GHG EMISSION
SONY	Green	Green	Green	Green
FUJITSU	Green	Green	Green	Green
Panasonic	Green	Green	Green	Green
LG Electronics	Green	Green	Green	Green
Rakuten	Green	Green	Grey	Green
Baidu 百度	Green	Green	Green	Green
HUAWEI	Green	Green	Green	Green
RENESAS	Green	Green	Green	Green
SoftBank	Grey	Green	Grey	Green
HITACHI	Green	Green	Green	Green
YAHOO! JAPAN	Green	Green	Grey	Green
SK hynix	Green	Green	Green	Green
TOSHIBA	Green	Green	Green	Green
中国移动通信 CHINA MOBILE	Green	Green	Green	Green
Canon	Green	Green	Green	Green
NAVER	Green	Green	Green	Green
Tencent 腾讯	Green	Green	Green	Green
LG Display	Green	Green	Green	Green
China unicom 中国联通	Green	Green	Green	Green
kt	Green	Green	Green	Green
中国电信 CHINA TELECOM	Green	Green	Green	Green
JD.COM 京东	Green	Green	Green	Green
SK telecom	Green	Green	Grey	Green
SAMSUNG	Green	Green	Green	Green
SAMSUNG DISPLAY	Green	Grey	Green	Green
GDS 万国数据	Grey	Grey	Grey	Grey
Alibaba Group 阿里巴巴集团	Grey	Grey	Green	Grey
LG U+	Green	Green	Grey	Green
mi	Green	Grey	Green	Green
kakao	Green	Green	Grey	Green

Figure 7. Environmental data disclosure by ranked companies. Green indicates that a company has disclosed data, while grey indicates that it has not.

There is also a need for ranked companies to be transparent about global and regional environmental data. Of the 30 ranked companies, only Sony, Canon, Renesas Electronics, and LG Electronics have disclosed energy and electricity usage outside the country where they are headquartered. Huawei has disclosed its electricity usage outside of China but has not disclosed the corresponding energy data. The remaining ranked companies have failed to disclose environmental data outside of the countries where they are headquartered.

All companies included in the ranking disclosed scope 1 and 2 GHG emissions with exception of Alibaba and GDS. However, nearly a third of ranked companies failed to disclose their scope 3 emissions data, including Naver, Tencent, and Xiaomi. Most companies included in the ranking are multinational corporations with business operations in different regions. It is necessary that they publish environmental data for each region where they operate.

Recommendations:

- A structured and consistent data disclosure framework is necessary. Companies can adhere to relevant international disclosure guidelines such as TCFD (Task Force on Climate-Related Financial Disclosures) and CDP (Carbon Disclosure Project).
- Companies are encouraged to disclose scope 3 emissions in full, including supply chain emissions.
- To more effectively reduce emissions, companies should disclose their approach to emissions reduction. In particular, they must fully disclose information about the offset of so-called “uncuttable emissions” and must detail where these emissions come from, why they cannot be directly reduced, the volume of total emissions that they account for, and the plan to reduce the emissions.

Best Practice

GHG emissions by Sony:⁴²

Sony has disclosed GHG emissions from scope 1, 2, and 3 at the global and regional level and has described the category and calculation methods of different emission scopes.⁴³

Category	Scope	Unit	2018	2019	2020
Annual energy consumption reduction rate per product (compared to FY 2013)	Electronics products	%	51	52	54
GHG emissions: Scope 1 (direct emissions)	Sony Group	Thousand t-CO ₂	187	188	189
GHG emissions: Scope 2 (indirect emissions)	Sony Group	Thousand t-CO ₂	1152	1188	1204
GHG emissions: Scope 3 (other emissions)	Sony Group	Thousand t-CO ₂	16,403	14,870	17,077
Purchased goods and services	Sony Group	Thousand t-CO ₂	4,233	3,316	3,791
Capital goods	Sony Group	Thousand t-CO ₂	781	1,296	1,202
Fuel and energy related activities (not included in scope 1 or scope 2)	Sony Group	Thousand t-CO ₂	94	95	173
Upstream transportation and distribution	Sony Group	Thousand t-CO ₂	220	172	267
Waste generated in operations	Sony Group	Thousand t-CO ₂	39	41	43
Business travel	Sony Group	Thousand t-CO ₂	93	87	6
Employee commuting	Sony Group	Thousand t-CO ₂	102	125	51
Upstream leased assets	Sony Group	Thousand t-CO ₂	N/A	N/A	N/A
Downstream transportation and distribution	Sony Group	Thousand t-CO ₂	3	3	3
Processing of sold products	Sony Group	Thousand t-CO ₂	4	4	5
Use of sold products	Sony Group	Thousand t-CO ₂	10,635	9,570	11,403
End-of-life treatment of sold products	Sony Group	Thousand t-CO ₂	182	137	117
Downstream leased assets	Sony Group	Thousand t-CO ₂	N/A	N/A	N/A
Franchises	Sony Group	Thousand t-CO ₂	N/A	N/A	N/A
Investments	Sony Group	Thousand t-CO ₂	17	24	16

42. Sony. (2021). Sony Sustainability Report 2021. Retrieved October 25, from https://www.sony.com/en/SonyInfo/csr/library/reports/SustainabilityReport2021_E.pdf

43. Sony. (2021). Greenhouse Gas Related Data Collection Methods and Rationale. Retrieved November 3, https://www.sony.com/en/SonyInfo/csr_report/environment/data/method/ghg.html

Regional GHG emissions data from Sony⁴⁴

Environmental Data for Sites: North America (Fiscal 2015 Onwards)

Year	Scope 1 Non Energy-Related (t-CO ₂)	Scope 1 Energy-Related (t-CO ₂)	Scope 2 (t-CO ₂)	Total (t-CO ₂)
Fiscal 2015	1,192	29,070	69,271	99,533
Fiscal 2016	733	31,139	58,292	90,164
Fiscal 2017	69	28,179	50,432	78,680
Fiscal 2018	0	19,628	36,086	55,714
Fiscal 2019	0	18,226	23,209	41,435

Advocacy

The advocacy category evaluates whether a company has publicly advocated for and engaged with carbon neutrality and renewable energy-related issues on various levels, including corporate governance, policy, and peer advocacy.

Necessity

Advocacy efforts by major tech companies can have widespread impacts, especially for markets where renewable energy is difficult to source. On one hand, tech companies can use their influence to persuade governments to establish renewable energy-friendly policy mechanisms. They can also share with other companies their experiences with renewable energy procurement and emissions reduction pathways.

In March 2021, a group of leading global tech firms, including some headquartered in Japan, lobbied Japan’s government to increase its 2030 renewable energy target to 50%.⁴⁵ In July 2021, the government responded by establishing plans to set the new national RE target at 36%-38%, a partial victory for the companies.⁴⁶

⁴⁴ Sony. Environmental data file. Retrieved November 4, from https://www.sony.com/en/SonyInfo/csr_report/environment/data/

⁴⁵ Global businesses urge Japanese Government to accelerate renewable energy goals (2021). Retrieved October 26, from <https://www.there100.org/japan-letter>

⁴⁶ RE100. (2021). Japan aims for nearly 40% renewable energy by fiscal 2030. Retrieved October 26, from <https://asia.nikkei.com/Business/Energy/Japan-aims-for-nearly-40-renewable-energy-by-fiscal-2030>

Though companies may conduct policy advocacy in a private setting, we also encourage industry leaders to publicly advocate for renewable energy mechanisms to maximise impact.

Current Status

Eight Chinese and seven Japanese companies included in the ranking have been active in publicly engaging with their respective governments to develop renewable energy and carbon reduction opportunities. Ranked companies in China and Japan have taken varying approaches to influence public policy. Japanese companies included in the ranking have primarily requested wider renewable energy accessibility through joint petitions to the government, while Chinese companies have proposed solutions through participation in government conferences and policy seminars. To date Greenpeace has not observed any effective action by South Korean companies in terms of public governmental lobbying for more ambitious renewable energy expansion. On the contrary, the three major lobbying entities, the Federation of Korean Industries (FKI), Korea Chamber of Commerce and Industry (KCCI), and Korea Enterprises Federation (KEF), have opposed both ambitious climate action and strengthening of the current renewable energy expansion policy.

COMPANY	POLICY	PEER	GOVERNANCE
SONY	Green	Green	Green
FUJITSU	Green	Green	Green
Panasonic	Green	Green	Green
LG Electronics	Grey	Grey	Green
Rakuten	Grey	Green	Grey
Baidu 百度	Green	Green	Green
HUAWEI	Green	Green	Green
RENESAS	Green	Green	Green
SoftBank	Green	Green	Green
HITACHI	Grey	Grey	Green
YAHOO! JAPAN	Green	Grey	Green
SK hynix	Grey	Green	Green
TOSHIBA	Green	Green	Green
中国移动通信 CHINA MOBILE	Green	Green	Green
Canon	Grey	Grey	Green
NAVER	Grey	Green	Green
Tencent 腾讯	Green	Green	Green
LG Display	Grey	Grey	Green
China unicom 中国联通	Green	Green	Green
kt	Grey	Grey	Green
中国电信 CHINA TELECOM	Green	Green	Green
JD.COM 京东	Grey	Green	Green
SK telecom	Grey	Grey	Green
SAMSUNG	Grey	Grey	Green
SAMSUNG DISPLAY	Grey	Grey	Green
GDS 万国数据	Green	Green	Grey
Alibaba Group 阿里巴巴集团	Green	Green	Grey
LG U+	Grey	Grey	Grey
mi	Grey	Grey	Green
kakao	Grey	Grey	Green

Figure 8. Public advocacy actions by ranked companies

Recommendations

- Tech companies in East Asia must cooperate and utilize public platforms to advocate for RE-friendly mechanisms. Public advocacy efforts, such as public lobbying and petitions, can lead to greater accountability and recognition of the issue by policymakers.

CORPORATE RENEWABLE ENERGY

PROCUREMENT METHODS

Continuous improvements to energy efficiency and a transition to 100% renewable energy are two key strategies to achieve GHG emission reduction targets. There is widespread speculation that energy efficiency and energy-saving technologies will inevitably encounter bottlenecks and that the timeline for such technologies remains uncertain. Therefore, accelerating the implementation of renewable energy development is the most direct and effective way to reduce emissions. Companies should select impactful RE procurement methods to increase their RE usage ratio.

In this chapter, procurement methods available in China, Japan, and South Korea are introduced to assist companies in developing impactful RE procurement strategies.

China

A growing number of Chinese companies have launched emissions reduction plans and developed green electricity requirements. China is still in the early stages of power market reform and there are currently four primary options available for corporate green power procurement: on-site generation, RECs, PPA, and direct investment.

On-site Generation

Companies can procure renewable energy by building on-site electricity generation facilities, such as distributed solar projects. Surplus power generated from the facility is sold to the grid.

On-site generation offers clear additionality, low cost, and ease of construction, but there are also limitations. The technical difficulty of distributed project construction is low, the investment scale is small, and for infrastructure such as data centers, the power generated by renewable projects is used on site. However, to date, corporate distributed renewables projects in China have primarily consisted of rooftop photovoltaics. The project volume is relatively small, which means it is difficult to meet the power demand of large electricity users. For this reason, companies should

consider implementing distributed renewables projects in conjunction with other procurement methods.

Example: In 2017, JD Logistics implemented a rooftop distributed photovoltaic power generation system at Shanghai Asia No. 1 Intelligent Logistics Park. The solar capacity was officially connected to the grid in 2018 and generated 2,538,000 kWh of electricity in 2020.⁴⁷

Renewable Energy Certificates (RECs)

China launched its first voluntary trading platform for RECs in July 2017. Certificates are awarded to renewable energy generators such as onshore wind farms and solar power plants (excluding distributed solar generators).

Two types of RECs are currently available in China: subsidized and unsubsidized. Subsidized RECs are issued for projects that were connected to the grid prior to 2021. Subsidized RECs are relatively expensive because they are intended to replace the government subsidies for renewable energy projects before 2021. RECs without subsidies are issued for subsidy-free renewable energy projects after 2021, so the price is much lower.⁴⁸ As the scale of unsubsidized RECs gradually expands, the price will continue to fall.

The process for purchasing RECs is relatively simple. Consumers can register and place an order directly on the national renewable energy certificate issuance and voluntary trading system. Buyers can choose to purchase electricity from specific wind power or photovoltaic power stations.

PPAs

As electricity markets open up, companies can also procure renewable energy from RE producers through an agreement known as a PPA.

On September 7, 2021, China's green power trading pilot was officially launched. In this pilot trading scheme, state-owned power generators

⁴⁷. Environmental, Social and Governance Report (2021), 21. Retrieved October 26, from <https://ir.jd.com/static-files/b83d0a39-6e0a-4984-825a-db55b86f104b>

⁴⁸. Circular of the National Development and Reform Commission and the National Energy Administration on actively promoting wind power and photovoltaic power generation to be sold to grid without subsidy and at par (NDRC, 2019). Retrieved October 26, from https://www.ndrc.gov.cn/xxgk/zcfb/tz/201901/t20190109_962365.html?code=0&state=123

participate in the market as producers and large-scale consumers are able to buy electricity from them.⁴⁹

With the further development of the pilot market, private power generators can also participate in trading. With greater scalability, prices are likely to fall further. PPAs can meet long-term and large-scale demand for green power, making them a powerful green electricity procurement method.

Example: GDS plans to purchase wind and solar power from China General Nuclear Power New Energy within the next 10 years, with a total purchase of no less than 2 billion kWh.⁵⁰

Direct Investment

Companies can build or invest in off-site, utility-scale renewable projects. This model adds renewable energy power generation installed capacity on a national level, rather than directly contributing to a company's renewable energy use. Enterprises can also obtain a certain rate of return on investment through power station operation. Given that other power purchase options are limited, direct investment in renewable energy is an effective strategy for large companies to participate in green power procurement.

Example: In 2016, Apple and Goldwind co-invested in 285MW of wind projects in China, with Apple assuming 30% ownership of the projects.⁵¹

The advantages, challenges, and feasibility of various green power procurement methods are summarized in figure 8.

⁴⁹. CNIFA. (2021). Seven core issues of green power pilot transaction. Retrieved October 26, from <https://mp.weixin.qq.com/s/emnMwsPmqNcSP2z1sS86uA>

⁵⁰. Wang, L. (2021). GDS signed a large-scale green power procurement agreement with CGN New Energy. Retrieved October 26, from http://www.ce.cn/cysclny/gdxw/202109/08/t20210908_36894930.shtml

⁵¹. Zhou, L. (2016). Apple expands its new energy layout in China: taking shares in four new energy companies under Goldwind Technology (Zhou, L., 2016). Retrieved October 26, from <http://finance.sina.com.cn/stock/s/2016-12-07/doc-ifyxipt0504095.shtml>

	COST⁵²	ADDITIONALITY⁵³	FEASIBILITY⁵⁴
On-site generation	★★★	★★★★★	★★★★★
RECs	★★	★★★	★★★★★
PPAs	★★	★★★★★	★★
Direct investment	★★★★	★★★★★	★★★

Figure 9. Comparison of Corporate Renewable Energy Sourcing Methods in China

Japan

Japan’s government has pledged to achieve net zero by 2050, and many Japanese tech companies, including Sony, Panasonic, and Hitachi, have committed to switch to 100% renewable energy within this timeframe. In Japan, four options are available to source renewable energy: on-site generation, renewable energy certificates, green electricity tariffs, and PPAs. However, the effectiveness of these four procurement methods varies.

On-Site Generation

Consumers in Japan can invest in captive renewable energy assets and source electricity directly. The most common approach for this sourcing method is rooftop solar. This scheme offers good economic value and additionality that can contribute to national renewable generation capacity. However, the scale of on-site generation is limited, creating potential challenges for technology companies with high electricity demand.

⁵². How expensive it is for a company to choose this method.

⁵³. Increase new renewable energy installation capacity.

⁵⁴. How easy it is for the company to adopt this method.

Green Electricity Tariffs

Companies in Japan can source renewable energy through green electricity tariffs offered by electricity retailers. Existing hydropower plants are the primary renewable source for this option. The price of this option is higher than regular electricity rates.

Renewable Energy Certificates

In Japan, four types of renewable certificates are available. Companies can directly purchase J-credits and Green Energy Certificates, which meet RE100 standards. The other two certificates, non-FiT renewable energy certificates and FiT certificates, are only available for purchase through licensed electricity retailers.

	J credits	Green Energy Certificates	Non-FiT renewable energy certificate	FiT certificate energy certificate
Technologies	Non-FiT solar	RE projects (biomass, hydro, solar, and wind) developed outside of FiT	Large hydro, post-FiT biomass, and solar	Solar, wind, biomass geothermal, and hydro covered by FiT
Eligible buyers	Corporations	Corporations	Electricity retailer	Electricity retailer
Supply volume	899GWh (2020)	390GWh (2019)	11,200GWh	441GWh
Price	Up to 10 yen (2-3 yen for large purchases)	0.84 yen (average bid in June 2020 tender)	Up to 4 yen	1.3-4 yen
How to purchase	Auction, direct purchase	Direct purchase	Auction, bilateral contracts	Auction

Figure 10. Japanese renewable energy certificates, data sourced from BNEF.⁵⁵

⁵⁵. Procurement mechanisms in Japan (BNEF, 2020).

PPAs

Corporations in Japan can purchase renewables on a large scale by signing PPAs. Although sourcing renewable energy through PPAs has become popular among corporations in the US and Europe, PPAs have not seen widespread use in Japan due in part to strict regulatory requirements. For example, Japan’s PPA policy requires that a corporate consumer is the owner of an offsite project in order to purchase electricity from that project.⁵⁶ However, some global technology companies that operate in Japan, including Amazon, have signed contracts to meet large-scale electricity needs with PPAs. PPAs are likely to gain more traction as demand from corporations increases.

Example: In 2021, Amazon signed PPAs with 22 MW of solar projects from Mitsubishi subsidiary MC Retail Energy. The PPAs will help Amazon to reach its goal of 100% renewable energy use worldwide by 2030.⁵⁷

	COST	ADDITIONALITY	FEASIBILITY
On-site generation	★★★	★★★★★	★★★★★
Green electricity tariffs	★★	★	★★★★★
RECs	★★	★★	★★★★★
PPAs	★★★★★	★★★★★	★

Figure 11. Comparison of Corporate Renewable Energy Sourcing Methods in Japan

South Korea

Before 2021, self-installation was the only available option for companies in South Korea to purchase electricity generated from renewable energy sources. Almost all generated electricity (conventional and renewable) is aggregated on the Korea Power Exchange (“KPX”) and then sold to electricity consumers through the Korea Electric Power Company (KEPCO, the state-run electric

56. Procurement mechanisms in Japan (BNEF, 2020).

57. Swinho, D. (2021). AWS signs solar PPA with Mitsubishi in Japan. Retrieved October 26, from <https://www.datacenterdynamics.com/en/news/aws-signs-solar-ppa-with-mitsubishi-in-japan/>

utility) without any certificates of origin.

To meet growing demand for renewable electricity and follow the global RE100 trend, in January 2021, South Korea's Ministry of Trade, Industry, and Energy (MoTIE) introduced five additional methods for electricity consumers to procure renewable electricity: Green Premiums (a type of green tariff offered by KEPCO), purchase of RECs, equity investments, PPAs and third-party PPAs.

Self-Installation

Companies can generate and consume electricity from their own installations at their facilities. They can then apply for a certificate titled, Confirmation of Renewable Energy Use to the Korea Energy Agency (KEA). They can also receive greenhouse gas emission reduction credits for self-installed renewable energy capacity under the Korea Emission Trading Scheme.

Equity Investment

Electricity consumers can invest directly in a renewable power project and sign a third-party PPA to purchase the electricity with RECs from the power station. The corporate investor can also purchase RECs only.

Green Premium

The green premium enables industry and commercial electricity consumers to pay KEPCO a premium, which is considered as a purchase of renewable electricity. Consumers bid on the premium until the designated amount is sold out. The premium is a tender for annual electricity consumption, and the payment is made every month.

RECs

Industrial and commercial consumers can receive recognition for the use of renewable electricity through the purchase of RECs. Since August 2021, the KEA has operated a dedicated REC trading platform twice per month for RE100 implementation. Because the platform is independent from the Renewable Portfolio System (RPS),⁵⁸ RECs are not double counted and additionality can be

⁵⁸. Retrieved October 26, from <https://www.kpx.or.kr/eng/contents.do?key=300>

secured even though the RECs are not bundled. Once an electricity consumer purchases a REC, the consumer can then submit it to the RE100 Management System. The KEA then issues a Confirmation of Renewable Energy Use.

PPAs

A PPA is a contract between a renewable electricity producer and an electricity consumer. PPAs provide long-term price security, opportunities to finance investments in new power generation capacity, and the reduction of risks associated with electricity sales and purchases. Therefore, PPAs are regarded as one of the most effective tools to expand renewable energy use. PPAs accounted for 26% of RE100 members’ sourced renewable power in 2019.

Third-Party PPA

Under a third-party PPA, KEPCO collects electricity generated by its subsidiaries and independent power companies and sells it as a single source. Renewable power producers whose generation capacity exceeds 1 megawatt can sign a trilateral supply agreement between KEPCO and a consumer so that KEPCO can relay the power transaction.⁵⁹

Based on the above content, GPEA has assessed renewable energy procurement methods available in Korea in terms of cost, additionality, and feasibility.

	COST	ADDITIONALITY	FEASIBILITY
Self-installation	★★★★	★★★★★★	★★★★
Equity Investment	★★★	★★★★★★	★★★
Green Premium	★	★	★★★★★★
RECs	★★★	★★★★	★★★★
PPAs	★★★	★★★★★★	★★
Third-party PPA	★★★	★★★★★★	★★★

Figure 12. Comparison of Corporate Renewable Sourcing Methods in South Korea⁶⁰

⁵⁹ World Today News. (2021). From this year, companies can also procure renewable energy in Korea – Science Times. <https://www.world-today-news.com/from-this-year-companies-can-also-procure-renewable-energy-in-korea-sciencetimes/>

⁶⁰ The chart is based on analysis of corporate renewable energy sourcing methods in South Korea in October 2021. There is potential for dramatic changes in the near future, especially to the cost and feasibility of these options, depending on domestic electricity market conditions and changes to government protocol and guidelines.

Common Barriers

External Barriers

- **Regulatory barriers to PPAs in all three countries remain a significant obstacle for corporations to meet their electricity demand with renewable energy.**

China

As China has opened its electricity market and launched its green power trading pilot scheme, PPAs are becoming available in a total of 25 provinces.⁶¹ Despite the progress, some uncertainty still remains regarding the transaction price, volume, and market access for companies wishing to sign PPA contracts.

Japan

In many cases, barriers to the purchase of PPAs in Japan constrain companies from making use of this option.

The price of PPAs remains high due to the price of solar and wind in Japan. In addition to high costs, the deal structure also prevents companies from choosing PPAs as their primary method for purchase of renewable energy. According to Japan's PPA policy, a company must own a renewable energy project to be able to sign an off-site PPA, which has resulted in policy barriers for companies.

South Korea

South Korea only opened access for corporations to purchase renewable energy in early 2021. PPAs are perceived as the most effective method for the purchase of renewable energy in the country. However, renewable energy consumers are prohibited from signing contracts directly with power plants and must instead purchase from KEPCO, creating some challenges for buyers. In addition, global companies who have leased offices in South Korea are prohibited from joining PPA schemes, leading them to source renewable

⁶¹ BNEF (2021). China Corporate Clean Energy handbook 2021. Retrieved October 26, <https://www.bloomberg.com/news/articles/2021-09-17/china-s-corporate-clean-energy-market-sets-record-bnef-chart>

energy through less favourable approaches.⁶² Finally, high sleeving fees, environmental charges, and policies mandating that consumers purchase the total electricity from a given generator render it difficult for companies to source renewables through this option.⁶³

- **Bundled RECs Are Not Widely Available in China, Japan, and South Korea**

RECs are the most widely utilized strategy for renewable energy procurement due to their accessibility. However, the majority of RECs available in these three countries are unbundled, which means that the environmental and physical attributes are separated. Companies that source renewables through this option only receive the environmental attributes of the certificate, thereby making it rare that unbundled RECs lead to an increase in national renewable energy consumption.

Internal Barriers

- **Low Motivation for Companies to Purchase Renewable Energy**

Companies in the region remain unmotivated to purchase renewable energy for various reasons. First, companies are not aware of potential options for renewable energy procurement. Second, companies lack expertise in the area. Finally, tech firms in China, Japan, and South Korea face insufficient pressure from governments to transition to 100% renewable energy use.

Suggestions

- The Chinese, Japanese and South Korean governments must remove regulatory barriers that limit the use of PPAs. PPAs are the most effective way for companies to purchase renewable energy at a large scale.
- The governments in the region should introduce relevant policies to urge tech companies to purchase renewable energy.

Tech companies in China, Japan, and South Korea must take significant action to achieve their emissions reduction targets on time.

⁶². RE100. (2021). The rise of South Korea: is the market open for business? Retrieved October 26, <https://www.there100.org/our-work/news/rise-south-korea-market-open-business>

⁶³. RE100. (2021). The rise of South Korea: is the market open for business? Retrieved October 26, <https://www.there100.org/our-work/news/rise-south-korea-market-open-business>

RECOMMENDATIONS

Tech companies in China, Japan, and South Korea must take significant action to achieve their emissions reductions targets on time.

Set targets to achieve 100% renewable energy across the supply chain by 2030.

The most effective strategy to achieve carbon neutrality is to increase renewable energy use. Almost 90% of tech company GHG emissions come from electricity usage, and increased use of renewables is the most accessible and direct way for companies to reduce emissions.

Set ambitious GHG emissions reduction targets that are not reliant on the use of carbon offsets and include the entire supply chain (scope 3).

Tech firms should work towards zero GHG emissions, or as near zero emissions as possible. They must set short-term targets along the way and seek to first cut emissions as comprehensively as possible. We encourage companies to protect and restore ecosystems, but carbon offsets are not a substitute for the reduction of fossil fuel usage.

Tech companies must include scope 3 emissions, or the carbon footprint of their supply chain, while issuing their own climate commitments. Supply chain emissions are on average 5.5 times higher than companies' direct emissions.⁶⁴

Choose impactful renewable energy procurement methods, such as PPAs, that are trackable and contribute to national renewable energy installed capacity.

Companies must choose impactful renewable energy procurement methods, such as PPAs, which lead to an increase in national renewable energy capacity. The selection of impactful renewable energy procurement methods can both meet tech industry energy demand and contribute to the region's energy transition.

Disclose environmental data across the supply chain by abiding by a data

⁶⁴ CDP. (2019). Supply chains hold the key to one gigaton of emissions savings, finds new report. Retrieved October 26, from <https://www.cdp.net/en/articles/media/supply-chains-hold-the-key-to-one-gigaton-of-emissions-savings-finds-new-report>

Disclosure framework that includes scope 3 emissions.

Companies can abide by a data disclosure framework like TCFD (Task Force on Climate-Related Financial Disclosures) and CDP (Carbon Disclosure Program) to increase their data transparency. Tech companies in the region must increase their efforts to disclose scope 3 environmental data.

Utilize status and platforms as industry leaders to advocate for renewable, energy-friendly policies.

When large corporations voice their demands, policymakers listen. Tech companies must challenge and engage policymakers to remove the current barriers to renewable energy procurement and streamline solutions.

APPENDIX

Methodology

About selected companies

Companies were selected based on three criteria:

- Top 100 digital companies' list from Forbes⁶⁵
- Domestic market value
- Social impact

About data collection

All data in this report comes from public sources, including information from corporate publications (official websites, annual reports, sustainability reports, ESG reports), news media, and government information platforms. Greenpeace East Asia only selected information sources that the public can obtain information on without paying any fees or signing up for membership.

The data collection period ended 30 September, 2021. Any data published after this period was not taken into account.

About the Evaluation Criteria

The research team developed a scoring index to reflect the climate action of tech companies in China, Japan, and South Korea.

Scores reflect the following factors:

1. Ambitiousness of corporate climate commitments and actions
2. The level of environmental information disclosure
3. Variations in the external environment of China, Japan, and South Korea, including differences in renewable energy procurement policies.

⁶⁵. Top 100 Digital Companies. Retrieved October 26, from <https://www.forbes.com/top-digital-companies/list/#tab:rank>

Limitations: due to data availability, offsets are not included in the ranking criteria. However, companies should avoid using carbon offsets as much as possible when they design their GHG emissions reduction plan. Companies should disclose their use of carbon offsets.

Please view the table below for detailed scoring information.

	SCORING DIMENSION	SCORING PRINCIPLE
<p>Weight 35%</p>	<p>Climate Commitment</p> <p>Companies will be assessed on whether they have issued a public commitment on carbon neutrality and 100% RE.</p>	<p>Carbon neutrality commitment:</p> <ul style="list-style-type: none"> •Has a clear timeline •Has detailed plans to achieve it •All office locations included •All three scopes included <p>Commitment on 100% RE procurement by 2030:</p> <ul style="list-style-type: none"> •Has a clear timeline •Has detailed plans to achieve it •All office locations included •Supply chain included
<p>Weight 35%</p>	<p>Climate Action</p> <p>Companies will be assessed on whether they have taken measures to use renewable energy and reduce energy consumption.</p>	<p>Renewable energy usage level and procurement method:</p> <ul style="list-style-type: none"> •Renewable energy usage ratio disclosed •Procurement methods disclosed, such as distributed photovoltaic and wind power, investment in renewable energy projects, market-based procurement of green power, and purchase of green certificates <p>The adoption of energy efficiency and carbon reduction measures. Measures include (but are not limited to) energy saving in facilities, information systems, air conditioning, power supply and distribution systems, lighting, etc.</p> <p>Actions taken to establish a green supply chain:</p> <ul style="list-style-type: none"> •Ensure that suppliers are powered by renewable energy and implementing GHG emissions reduction measures •Financial assistance for carbon reduction across the supply chain •Provide training for carbon reduction across the supply chain
<p>Weight 20%</p>	<p>Environmental data transparency</p> <p>Companies will be assessed on whether they have disclosed energy use information to the public or stakeholders on a public-facing platform. Disclosure channels include annual reports, CSR or ESG reports, official websites etc.</p>	<p>Electricity usage data:</p> <ul style="list-style-type: none"> •Total energy use disclosed •Energy usage type disclosed across all operations •Energy use disclosed on the branch/regional company level <p>Electricity usage data:</p> <ul style="list-style-type: none"> •Electricity use •Renewable energy data •Electricity use on the branch/regional company level <p>Climate mitigation data:</p> <ul style="list-style-type: none"> •Climate mitigation •Climate mitigation at the branch/regional company level <p>CO2 emission data:</p> <ul style="list-style-type: none"> •Scope 1 and 2 emissions •Scope 3 emissions •Calculation method
<p>Weight 10%</p>	<p>Advocacy</p> <p>Companies will be assessed based on whether they have engaged in carbon neutrality and RE procurement on different levels.</p>	<p>Policy level: top-level advocacy with national/regional policymakers for renewable energy friendly policies</p> <p>Peer level: sharing experience with other businesses in carbon reduction and RE procurement</p> <p>Corporate governance: establishment of a working group at the senior management level to support carbon neutrality work</p>

Company Scorecard

Link: <https://docs.google.com/spreadsheets/d/1aoi3Q79CLwbBFa6OeOcnwEXBftu7UYUIPZpih-Nm-Ac/edit?usp=sharing>