GSMA

Mobile Net Zero: Greater China

Regional Focus on Climate Action 2025

June 2025

GSMA™

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at **gsma.com**

Contents

Summary

Climate action is a key strategic and business priority for mobile operators in the Greater China region. The region is already experiencing significant climate impacts but is well placed to capitalise on clean energy opportunities as the global leader in manufacturing clean energy technologies. This report provides an in-depth look at the industry's progress on climate action in the region.

A growing number of mobile operators in Greater China are setting voluntary climate targets. Four operators have validated near-term science-based targets while three have validated net zero targets. Three operators have also joined RE100 with 100% renewable energy targets by 2040. Other operators have set 2025 energy and climate targets.

Operators in Greater China are leading on disclosures, with nearly all mobile connections in the region covered by public disclosures of energy and emissions data. Of these, one-quarter of connections were covered by CDP disclosures.

Operational emissions rose 7% between 2019 and 2023, but preliminary data indicates a 4% drop in 2024. This means that between 2019 and 2024, operational emissions rose by only 3%, while the number of mobile and fixed broadband connections in the region rose 14% and 43% respectively, and mobile data traffic nearly quadrupled.

Growing demand for connectivity and digital services has driven a 30% increase in electricity use between 2019 and 2024. The number of 5G base stations has increased 30-fold between 2019 and 2024, while 5G coverage has increased from less than 10% of the population in 2019 to more than 90%. Operators consumed around 120 TWh of electricity in 2024, or around 1.2% of regional electricity use.

Operators are increasing energy efficiency and renewable energy use. The average connection (including mobile and fixed broadband) in Greater China consumed around 48 kWh in 2024, which has fallen steadily from a peak of nearly 50 kWh in 2021. Preliminary data for 2024 shows that the three largest operators in the region purchased a combined 6.3 TWh of green electricity in 2024, five times higher than their combined purchases in 2023. Further progress on renewables is critical to reducing operator emissions in the region.

Scope 3 measurement and reporting remains a challenge for operators in the region. Only five operator groups in the region, covering a quarter of mobile connections, disclosed on all four key Scope 3 categories (1, 2, 3, 11). This compares with nearly half of mobile connections globally disclosing on the four key categories. The GSMA has published guidance to help mobile operators assess Scope 3 emissions.

Suppliers in Greater China are making strong progress on climate action. Mobile operators globally rely on key suppliers headquartered in Greater China, including network equipment and phone manufacturers. Several key suppliers headquartered in the region have committed or set near-term science-based targets and 2050 net zero targets. Others have set a range of emission reduction and renewable energy targets.

Achieving the industry's net zero goal requires concerted action from operators and suppliers, supported by enabling policies and investment from governments. The Greater China region plays a leading role in driving the global emission trends of the mobile industry. Therefore, progress on clean energy, energy efficiency and circularity by operators and suppliers in the region will play a pivotal role in achieving the industry's global net zero ambitions.

1 Net zero ambition

Mobile operators in Greater China are increasingly setting climate and energy targets.

Tracking the industry's progress on climate action in Greater China

In 2019, the Board of the GSMA made a milestone commitment – to transform the global mobile industry to reach net zero carbon emissions by 2050.

The GSMA's latest annual assessment of the industry's progress towards net zero showed how operators in several regions, including Greater China, have made significant progress on climate action.

This report provides further in-depth analysis of progress in Greater China, including how operators in the region are setting climate targets and reducing their emissions through energy efficiency, renewable energy and supply chain engagement. The analysis also explores the progress of key industry suppliers headquartered in the region.

Mobile operators in Greater China are setting climate targets

Four mobile operators in the Greater China region – Chunghwa Telecom, CK Hutchison, Far EasTone and Taiwan Mobile – have set near-term science-based targets (SBTs), with all four SBTs approved by the Science-Based Targets Initiative (SBTi).

These operators have also set or committed to net zero targets, including three validated targets: Chunghwa Telecom (2045), Far EasTone (2048) and Taiwan Mobile (2050). All three operators have also joined RE100, with targets to reach 100% renewable energy by 2040. Other operators have set a range of 2025 energy and emission reduction targets.

For more information on Operators' climate targets

GSMA Climate Action Taskforce

The GSMA created a Climate Action Taskforce in 2019 to collaborate across the industry on climate action. The Taskforce has grown rapidly over the last three years and now has 77 members across the world, including the largest operators in Greater China.

The Climate Action Taskforce welcomes new mobile network operator members. Please contact **betterfuture@gsma.com** if you would like to join.

Climate Action in Greater China

Climate change is an urgent and fundamental issue for the Greater China region. The region is already experiencing significant climate impacts, including devastating floods and intense heatwaves in recent years.

China has recognised the importance of transitioning towards a lower-carbon economy, pledging to peak carbon emissions by 2030 and become carbon neutral by 2060. China faces both challenges and enormous opportunities in transitioning to clean energy. On the one hand, China is the world's largest emitter of greenhouse gases – accounting for around a third of global energy-related greenhouse gas (GHG) emissions, and around 60% of its electricity is generated from coal. On the other hand, China is also deploying record amounts of new wind and solar power, accounting for around two-thirds of all global deployment.

China is also well positioned to capitalise on the global clean energy transition. It is by far the world's largest manufacturer of key clean energy technologies, including solar panels, wind turbines, electric vehicles and batteries, and dominates the mining and processing of most critical minerals that are essential for a clean, digitalised economy.

2 Tracking progress on climate action

Operators in Greater China are leading on public disclosures of key energy and emissions data.

Nearly all mobile connections in Greater China are covered by public disclosures of energy and emissions data

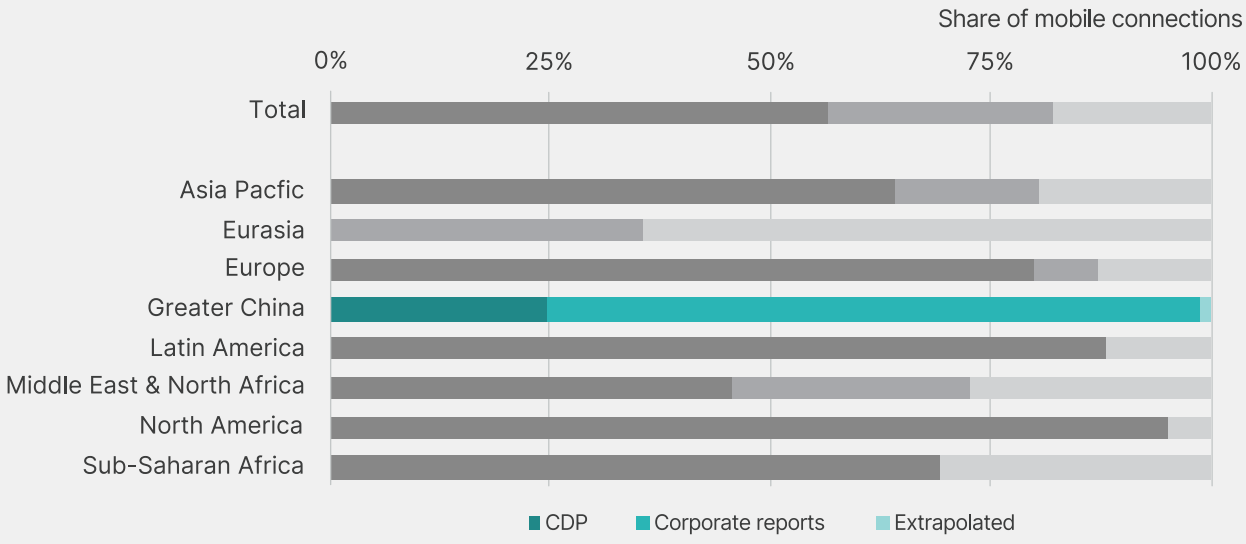
Public disclosure of climate impacts is vital for transparency and to understand progress towards net zero.

Nearly all mobile operators in the Greater China region – representing 98.5% of mobile connections in the region – disclosed key energy and emissions data through sustainability reports and CDP disclosures **(Figure 1)**.

In the CDP's 2024 disclosure cycle, six mobile network operators in Greater China – China Telecom, Chunghwa Telecom, CK Hutchison, Far EasTone, HKT and Taiwan Mobile – disclosed to the CDP, covering 25% of mobile connections in the region.

More broadly, ESG (Environmental, Social and Governance) data and analysis have become increasingly important for investors to identify risks and opportunities. To harmonise ESG reporting across mobile operators, the GSMA published the first voluntary ESG mobile industry reporting framework in 2022, which was updated in 2024.

Figure 1 Climate disclosures by region



Nearly all mobile connections in Greater China are covered by public disclosures of climate data, including 25% of connections disclosing to CDP

Note: Corporate reports include integrated annual reports, ESG and sustainability reports and other publicly disclosed data

Source: GSMA analysis

3 Emissions from mobile operators

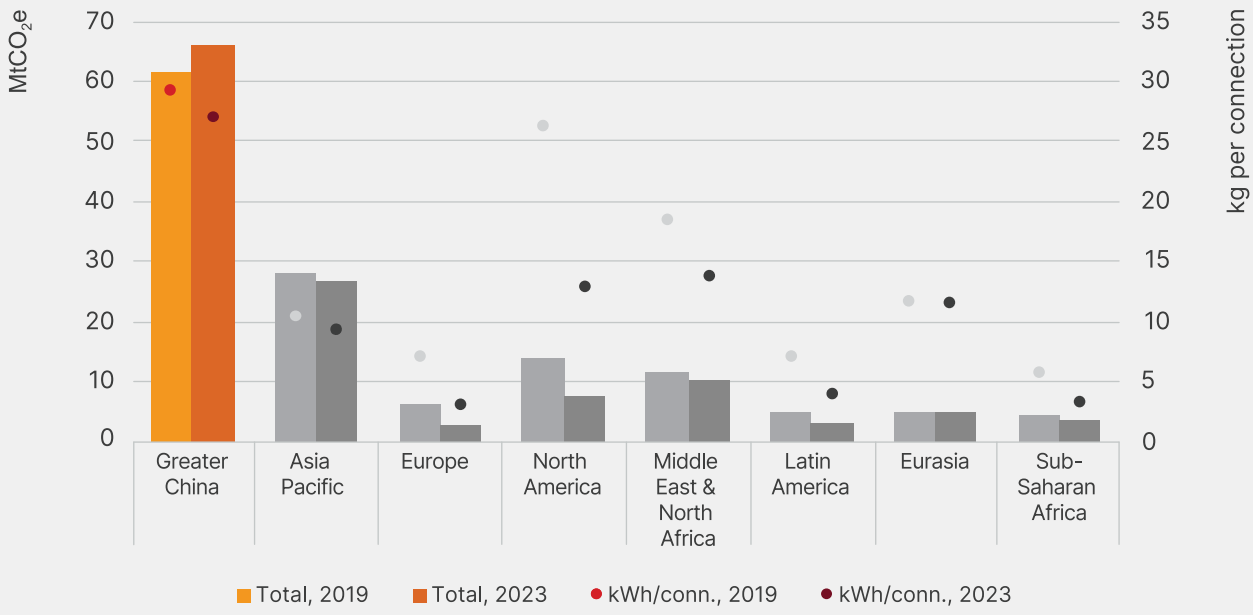
Operational emissions per connection in Greater China fell 7% between 2019 and 2023.

Operator emissions in Greater China were around 65 million tonnes in 2023, equivalent to around 0.5% of the region's overall GHG emissions

The operational emissions[1] of mobile operators in Greater China were around 65 million tonnes (Mt) CO_2e in 2023, equivalent to around 0.5% of the region's overall GHG emissions[2] **(Figure 2)**.

Greater Chinese operators accounted for around 40% of global operator emissions. This means that emissions in Greater China have an important influence on global trends.

Figure 2 Operational emissions by region, 2019 and 2023



Operational emissions in China were around 65 $MtCO_2e$ in 2023, or around 27 kg per connection

Note: Connections include mobile and fixed broadband connections

Source: GSMA analysis

Scope 1, 2, and 3 Emissions

GHG emissions are reported in three types or "scopes". For mobile operators, **Scope 1** emissions include emissions from the operator's vehicle fleet for network maintenance and diesel generators to operate base stations. **Scope 2** emissions for operators mostly come from the electricity used in network base station sites, data centres and other buildings. **Scope 3** emissions are all other indirect emissions that the organisation is indirectly responsible for, up and down its value chain.

[1] Scope 1 + Scope 2 market-based
[2] Based on regional emissions of 14.3 $GtCO_2e$ in 2023 from Our World in Data, based on Jones et al. (2024) Source: https://ourworldindata.org/greenhouse-gas-emissions

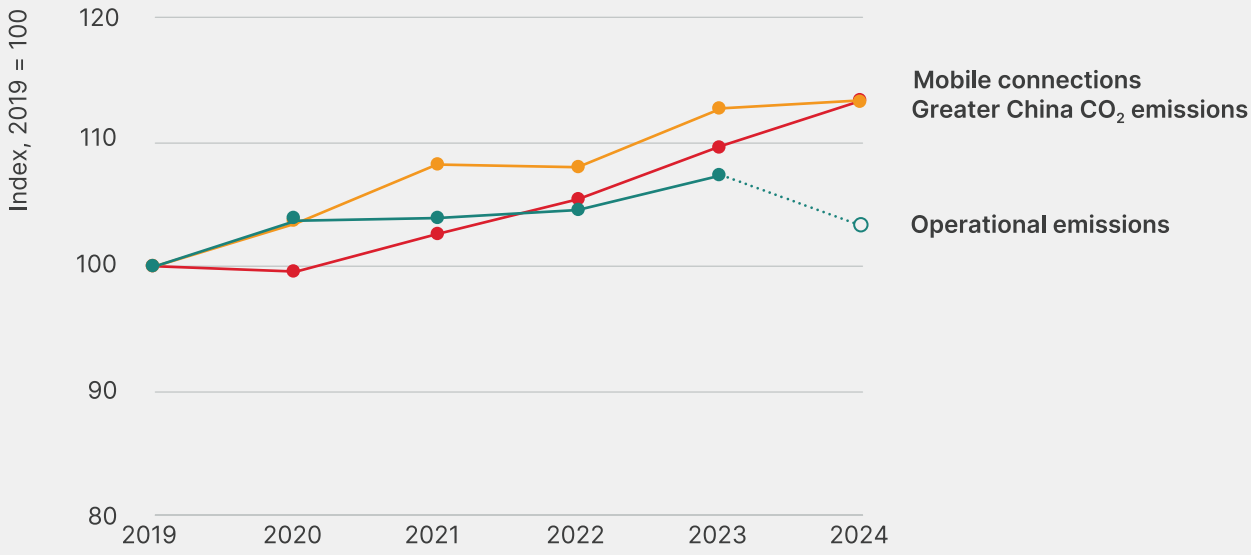
Operational emissions rose 7% between 2019 and 2023, with preliminary estimates for 2024 indicating a 4% drop

Operational emissions in Greater China – combined Scope 1 and 2 (market-based) emissions – rose by 7% between 2019 and 2023. Over the same period, the number of mobile and fixed broadband connections in the region rose 10% and 37% respectively, while mobile data traffic more than tripled **(Figure 3)**.

As a result of the strong growth in demand outpacing emissions growth, operational emissions per connection[3] fell 7% between 2019 and 2023, while emissions per unit revenue decreased 11%.

Based on preliminary data for 2024[4], operational emissions are estimated to have dropped by around 4% from 2023 levels, falling slightly below 2020 levels, thanks to strong progress in energy efficiency and renewable energy.

Figure 3 Operational emissions, mobile connections and overall regional emissions in Greater China, 2019-2024



Operational emissions increased by 7% between 2019 and 2023, but preliminary data shows a 4% year-over-year drop in 2024

Note: 2024 operational emissions are estimated as of April 2025, based on preliminary data.

Source: GSMA analysis. Mobile connections data from GSMA Intelligence; mobile data traffic from China Internet Network Information Centre; emissions data from IEA

[3] Mobile and fixed broadband connections
[4] The preliminary analysis covers disclosures covering more than 90% of mobile connections in the region

Electricity consumption by operators has increased strongly, driven by 5G and growing demand for data and connectivity

Most operational emissions came from generated and purchased electricity used to power networks, data centres, offices, stores and other operations.

Operators consumed an estimated 115 terawatt-hours (TWh) of electricity in 2023, or 1.2% of regional electricity use. Data centres accounted for around 20 TWh of this total.

Given that most operational emissions come from electricity use, reducing operational emissions requires action in two key areas: energy efficiency – particularly in networks – and increasing the share of renewable and low-carbon electricity.

Operators are increasing energy efficiency, with the average connection using less energy each year since 2021

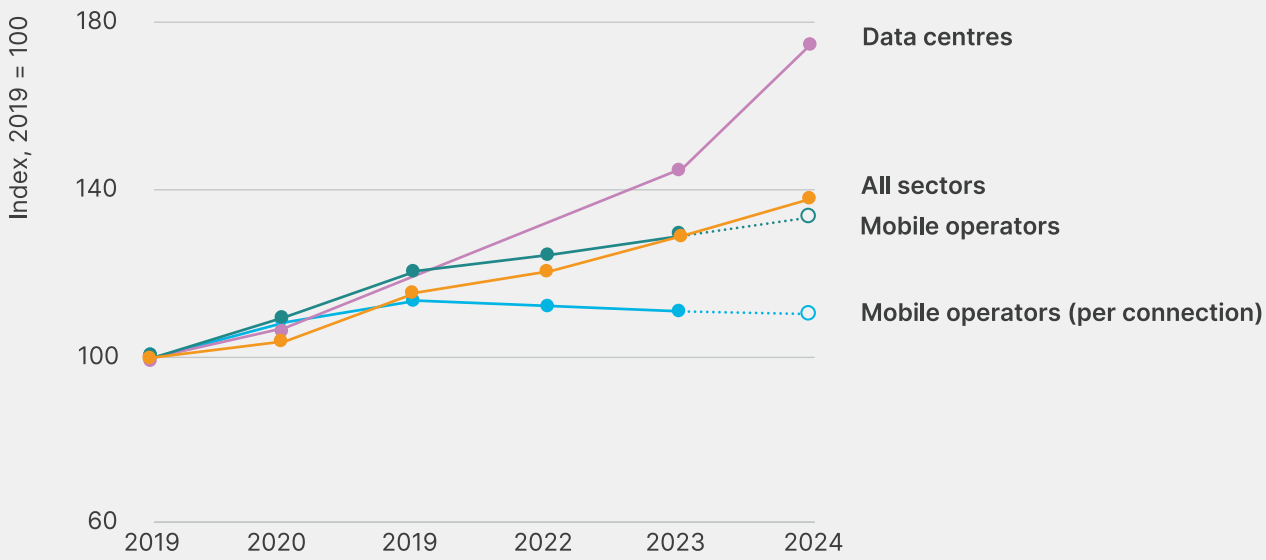
Energy efficiency is a strategic priority for mobile network operators, with energy accounting for an important share of operational costs.

Total electricity use by operators in the region rose nearly 30% between 2019 and 2023, while electricity consumption per connection increased by 12%, compared with a 1% increase globally.

However, this growth rate is slower than that of data centres or the region more broadly **(Figure 4)**.

Preliminary data for 2024 indicates that electricity consumption increased by 4% compared with 2023, tracking with the growth in the number of connections.

Figure 4 Electricity use trends in Greater China, 2019-2024



Electricity use by mobile operators has increased since 2019, but data centres and other sectors have seen faster growth

Note: 'Data centres' include those operated by mobile operators. 'Mobile operators' show total company-wide electricity use, including their data centres. 2024 estimated based on preliminary data disclosed as of April 2025.

Source: GSMA analysis based on latest CDP disclosures and corporate sustainability reports; regional total electricity and data centre electricity from IEA

One of the factors driving the increase in electricity demand has been the rapid growth in 5G, where coverage in the region has increased from less than 10% of the population in 2019 to more than 90%. In China, the number of 5G base stations has risen from around 130,000 in 2019[5] to 3.4 million as of the end of 2023[6] and 4.25 million as of the end of 2024[7].

Electricity demand growth has decelerated from around 10% per year between 2019 and 2021 to 3–4% since 2021, likely as the rollout of 5G has approached completion. The average connection (including mobile and fixed broadband) in Greater China consumed 48 kWh per connection per year in 2024, falling steadily from a peak of nearly 50 kWh in 2021.

Case study **Hong Kong Telecom - Supporting cross-sector innovation and promoting environmental responsibility**

[5] https://english.www.gov.cn/statecouncil/ministries/202005/03/content_WS5eaebb9ec6d0b3f0e9496ef2.html
[6] https://english.www.gov.cn/archive/statistics/202401/19/content_WS65aa171cc6d0868f4e8e34c5.html
[7] http://english.scio.gov.cn/pressroom/2025-01/22/content_117678998.html

Renewable energy use increased strongly in 2024

Operators in Greater China are also taking steps to increase their use of renewable energy, leading to lower Scope 2 emissions. In 2024, China Mobile purchased 3.5 TWh of green electricity (5.6% of total electricity use), up from 0.16 TWh in 2023. China Telecom purchased 2.7 TWh, more than doubling (+145%) its previous year's total[8].

At the national level, China has been a leader on clean energy deployment, accounting for half of global renewable energy additions over the past decade, including two-thirds of additions in 2023 and 2024[9]. In 2024, renewables accounted for 34% of generation in China compared with 22% in 2014[10].

The carbon intensity of electricity generation in China has fallen by around 17% over the same period and is projected to decrease by more than 5% per year to 2027[11]. These national trends will play a critical role in helping to decrease the Scope 2 emissions of mobile operators over the coming years, as well as key suppliers in the region.

Case study **China Mobile – Renewable energy and green base station upgrades**

[8] https://www.chinatelecom-h.com/en/ir/presentations/annpre250325.pdf
[9] https://www.irena.org/Publications/2025/Mar/Renewable-capacity-statistics-2025
[10] https://www.iea.org/reports/global-energy-review-2025/electricity; https://ourworldindata.org/grapher/share-electricity-renewables
[11] https://www.iea.org/reports/electricity-2025

4 Emissions from supply chains and customers

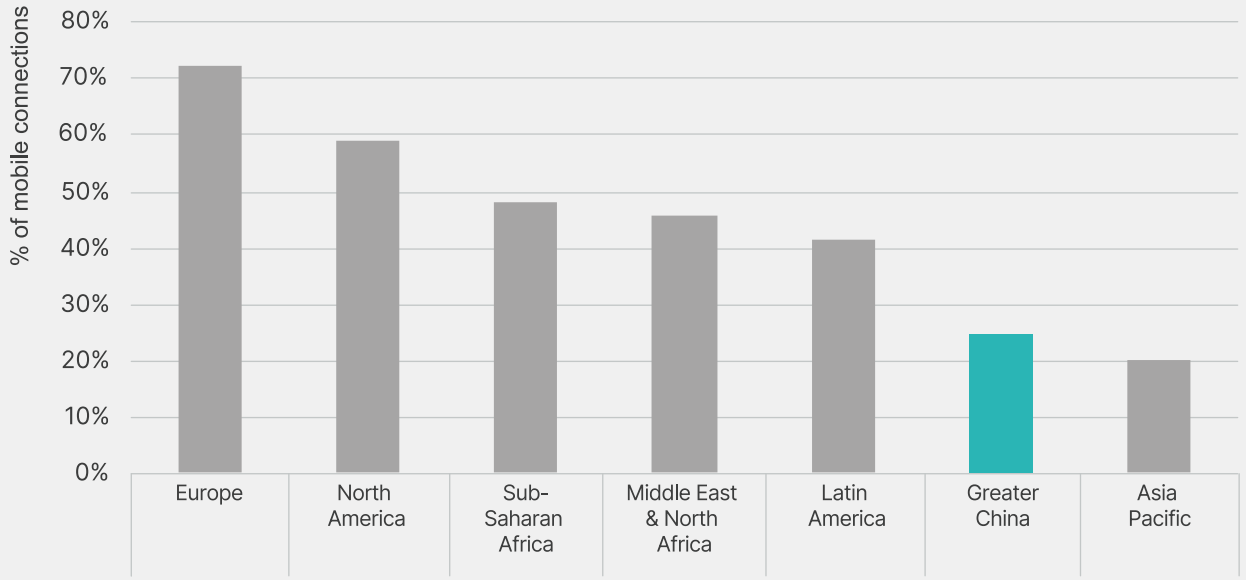
There is currently a limited number of operators disclosing Scope 3 emissions in Greater China. Further engagement with suppliers is critical to improve measurement and reduce emissions.

Scope 3 measurement and reporting is a challenge for operators in the region

In 2023, 8 out of 12 operator groups in the Greater China region disclosed Scope 3 emissions, representing around 80% of regional connections. Of the eight disclosing operators, five disclosed in 10 or more categories: China Telecom Group, Chunghwa Telecom, CK Hutchison Group, Far EasTone and Taiwan Mobile.

These five operators, representing a quarter of mobile connections in the region, disclosed emissions from four key categories **(Figure 5)**: 1) Purchased goods and services; 2) Capital goods; 3) Fuel- and energy-related activities; and 11) Use of sold products. These four categories make up more than 80% of the industry's overall Scope 3 emissions globally, and 97% of the disclosed Scope 3 emissions in Greater China.

Figure 5 Disclosures of four key Scope 3 categories by region



Operators representing a quarter of mobile connections in Greater China disclosed on all four key Scope 3 categories

Note: The four key Scope 3 categories are: 1) Purchased goods and services; 2) Capital goods; 3) Fuel- and energy-related activities; and 11) Use of sold products.

Source: GSMA analysis based on latest CDP disclosures and corporate sustainability reports

Scope 3 emissions in Greater China were around 70 $MtCO_2e$ in 2023, or just over half of the overall regional footprint

Based on an extrapolation of the disclosed data, Scope 3 emissions in Greater China were an estimated 70 $MtCO_2e$ in 2023, or just over half of the overall regional footprint.

Other regions had higher relative Scope 3 emissions, with 80% of the overall footprint coming from Scope 3. This difference in balance may be the result of relatively high electricity use and carbon intensity of electricity in the Greater China region – resulting in a relatively higher share of Scope 2 emissions.

There is a wide range of Scope 3 emissions per connection between operators and regions, as well as the relative shares of different Scope 3 categories. Some of these differences may stem from different business models and operations, while others may be due to methodological differences or a lack of data.

The Scope 3 Guidance for Telecommunications Operators developed by the GSMA includes key principles, methodologies and data sources to help operators develop and improve their Scope 3 disclosures.

Case study **China Telecom – Greening procurement and supply chain**

Suppliers in Greater China are making strong progress on climate action

Mobile operators globally rely on many key suppliers in Greater China, making the region an important source of Scope 3 emissions for the industry, and critical to helping the wider industry reach its net zero goals.

Several key suppliers headquartered in the Greater China region have committed or set near-term science-based targets (SBTs) and 2050 net zero targets. Arcadyan Technology, HTC, Lenovo and ZTE have validated near-term SBTs and net zero targets, while Sercomm has a validated near-term SBT. Fiberhome Telecommunications, MediaTek, OPPO and TP-Link have committed to near-term SBTs.

Other key suppliers have also set other climate and renewable energy targets, such as carbon neutrality and operational emissions intensity targets.

For more information on Suppliers' Climate Targets

Circularity is a key lever for achieving climate targets

China's 14th Five-Year Plan on Circular Economy aims to improve overall resource utilisation capacity, build a resource recycling industrial system and develop the circular economy by 2025. The Plan emphasises the importance of a circular economy as an approach to tackling climate change and achieving carbon neutrality by 2060. It includes targets, such as increasing resource productivity by 20% compared to 2020 levels, producing 20 million tonnes of recycled non-ferrous metals and achieving a resource recycling industry output value of RMB 5 trillion by 2025.

Increasing the circularity of network equipment and mobile phones can play an important role in reducing emissions and helping mobile operators achieve their climate targets.

The GSMA has recently developed new guidance on Quantifying the Carbon Savings of Circularity to help operators calculate how circularity initiatives can help reduce Scope 3 emissions.

Consumer trends are strengthening the business case for circularity

Circular business models are gaining traction in the mobile industry and beyond, and offer many commercial opportunities and benefits, including lower costs, new revenue opportunities and customer loyalty.

The GSMA Global Consumer Survey on Circularity and other market research show that consumers are keeping their devices longer, with average upgrade cycles slowing to around 3.5 years globally and around 3.7 years in China.

Consumers are interested in more circular products and services

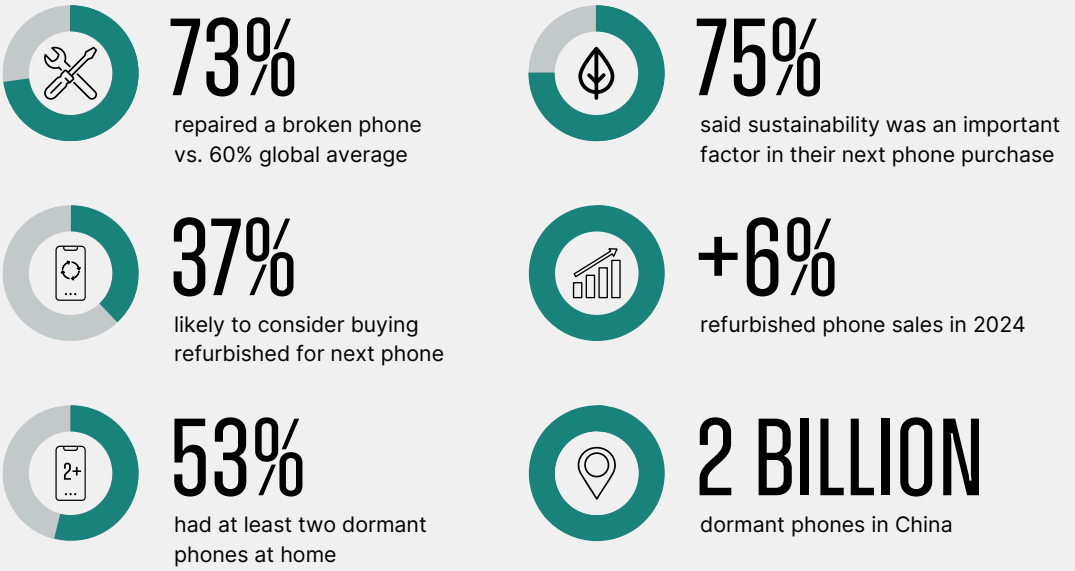
Consumers in the region are increasingly interested in more durable and circular products and services **(Figure 6)**. When asked how long they would like to keep their phone before replacing it, consumers in China reported the longest average device lifespan among the 32 countries surveyed, nearly eight months longer than the global average.

A total of 73% of survey respondents had repaired a previous phone, significantly higher than the global average of 60%, indicating better access to affordable repair services and spare parts.

Durability was an important factor in their next phone purchase decision for 90% of survey respondents, while three-quarters said sustainability was a key consideration. In addition, 37% of them would consider buying a refurbished phone for their next phone.

Case study **China Unicom – Low-Carbon Life: Enabling individuals and advocating for a green lifestyle**

Figure 6 Consumer interest in circular products and services in Greater China



There is strong consumer interest in circular products and services in Greater China

Notes: Survey results based on responses from more than 400 mobile phone users in China.

Source: GSMA (2025), Rethinking Mobile Phones: The Business Case for Circularity

Refurbished phone sales are growing in the region, with used and refurbished phones accounting for one in five phones sold

Refurbished phones sales in the region have increased in recent years, growing 6% in 2024[12]. Used and refurbished phones now make up 20% of the total smartphone industry in China[13]. Hong Kong is a major transit point for the global refurbished phone market.

There are huge opportunities to recover old phones that are sitting idle in homes across the region for reuse or recycling. More than half (53%) of survey respondents in China had two or more dormant mobile phones at home. Based on the survey data, there are an estimated 10 billion mobile phones lying dormant worldwide, including around two billion in China.

If properly recycled, more than 20,000 tonnes of copper, 200 tonnes of silver and 40 tonnes of gold could be recovered. There is also enough cobalt in these phones to supply cobalt for more than two million electric vehicle batteries.

In January 2025, the Chinese government launched a new trade-in subsidy programme for consumers purchasing new electronics, including smartphones[14]. While this programme aims to boost purchases of new smartphones, it is also likely to help drive the recovery and trade-in of older devices.

Phone manufacturers and mobile operators have key roles to play in increasing circularity

Device manufacturers have a key role to play in increasing the circularity of mobile phones through design choices, greater repairability and use of recycled materials and renewable energy in manufacturing.

Five device manufacturers – vivo, Huawei, Xiaomi, HONOR and OPPO – all headquartered in China, collectively account for around three-quarters of the market share for new devices in China. Action from these manufacturers is critical to increase the circularity of devices in the region.

Operator targets on circularity

In June 2023, the GSMA announced that leading operators had committed to two new circularity targets. The targets aim to increase take-back of mobile phones to at least 20% and prevent them from being sent to landfill or incineration. As of June 2025, 16 operators have signed up to the circularity targets, representing more than a billion connections.

The GSMA invites mobile network operators in Greater China to consider aligning to these targets to help expand the industry's efforts to move towards a more circular economy. For more information, please contact **betterfuture@gsma.com**.

[12] https://www.counterpointresearch.com/insight/chinas-secondary-smartphone-market-now-makes-up-20-of-its-total-smartphone-industry-as-organized-unorganized-sectors-grow
[13] https://www.counterpointresearch.com/insight/chinas-secondary-smartphone-market-now-makes-up-20-of-its-total-smartphone-industry-as-organized-unorganized-sectors-grow
[14] http://english.scio.gov.cn/pressroom/2025-02/10/content_117704179.html

5 Recommendations to accelerate progress

Achieving the industry's goal of net zero emissions while enhancing resilience to climate impacts requires strong and concerted action from operators and suppliers, supported by enabling policies and investment from governments.

Moving the entire mobile industry to net zero emissions by 2050 will require concerted effort and action by all key stakeholders.

Over the past year, the GSMA has worked with operators to support this journey with the immediate focus being on the rapid cuts needed by 2030.

The following outlines key recommended actions to enhance resilience and accelerate progress towards net zero.

Operators	Suppliers	Governments and Policymakers
Climate targets and strategy		
Set science-based and net zero targets aligned with a 1.5°C pathway Develop a climate transition plan that clearly outlines the principles, plans and processes to meet climate targets	Set science-based and net zero targets aligned with a 1.5°C pathway Develop a climate transition plan that clearly outlines the principles, plans and processes to meet climate targets	Prioritise a just transition to economy-wide net zero emissions, including strengthening nationally determined contributions Implement and enhance national climate, energy and industrial policies to enable the achievement of these targets Support companies in their decarbonisation efforts, including through policies and incentives to reward companies' low-emissions strategies
Climate disclosure		
Assess and publicly disclose energy and emissions data and climate risks and opportunities, for example through the CDP Harmonise measurement approaches and data reporting with other operators in the country/region	Assess and disclose carbon emissions and climate risks and opportunities through the CDP	Consult with operators to harmonise and simplify reporting of key energy and emission indicators
Energy efficiency and electrification		
Optimise energy use of networks by adopting energy- efficient hardware and best practices and retiring legacy networks Reduce fossil fuel use in fleets and diesel generators	Develop more energy efficient equipment, devices and systems	Support innovation for the development and deployment of more efficient technologies Support the retirement of 2G/3G and copper-based legacy networks in consultation with operators

> continued

Operators	Suppliers	Governments and Policymakers
Renewable energy		
Purchase and use renewable energy Assess and invest in on-site renewables and/or battery storage to reduce operating costs and emissions while increasing resilience	Purchase and use renewable energy	Ensure electricity markets and regulations encourage renewables and support operators where there is a lack of access Facilitate electricity market designs that incentivise load shifting to support grid operations and increased renewable energy integration
Circularity		
Engage suppliers on climate action and integrate climate requirements into procurement Develop circular economy initiatives for network equipment, mobile phones and customer premises equipment	Incorporate eco-design and circularity principles in devices and equipment, including longer software and security support Engage supply chains on climate action, including encouraging suppliers to use renewable energy and recycled materials Develop circular economy initiatives for network equipment, mobile phones and customer premises equipment	Implement laws and regulations that ensure used mobile phones can be recovered and recycled responsibly
Adaptation and resilience		
Integrate climate risk assessment into network planning, investment and technology deployment decisions	Design equipment for greater operational resilience in a wider range of future operating conditions	Support operators in assessing climate risks Facilitate cross-sector collaboration to address interdependencies during climate-related disasters
Enabling climate action		
Deploy and support digital solutions that enable climate action across all sectors	Deploy and support digital solutions that enable climate action across all sectors	Recognise the enablement effect of the digital transformation and foster innovation and investment in green digital technologies and solutions

Climate Course for Policymakers

To support governments around the world in better understanding the intersection of climate change and the mobile industry, the GSMA has developed a new Capacity Building course for policymakers and regulators.

GSMA Head Office
1 Angel Lane,
London,
EC4R 3AB,
United Kingdom