

# Mobile Net Zero

## State of the Industry on Climate Action 2023

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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.

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# Foreword

From the devastating floods in Pakistan to the scorching heatwave across Europe this past year, the need for climate action has never been clearer. This is why we are heartened by the mobile industry's continuing progress towards net zero. In our third annual evaluation, a record 36 mobile network operators received an A score for their climate reporting in 2022.

Ambition can be clearly observed across the industry as mobile operators continue to set bold targets, with a further 12 operators committing to rapidly cutting their emissions by 2030 since our last report. There has also been a notable increase in net zero commitments by operators, now representing 39% of mobile connections and 43% of global revenue. Furthermore, the industry continues to lead on transparency and accountability, with five operators – Proximus, TDC, Tele2, Telefónica and T-Mobile US – among the first companies in the world to have their targets verified against the new Net Zero Corporate Standard.

This year's report also provides our first breakdown of regional progress on climate action and it is clear that Europe and North America are making the biggest strides, with operators expanding their energy efficiency programmes and sharply increasing renewable electricity use. In other regions, the picture is mixed. While there are strong levels of ambition, there are also challenges to reaching targets.

Now, surprisingly, one of the key challenges to overcome in decarbonising the sector is access to renewable electricity. The good news is that the industry is moving forward, with operators now directly purchasing 24% of their electricity from renewable sources, up from 18% in 2021 and 14% in 2020. This is in addition to renewables supplied through the electricity grid mix. However, operator demand is outstripping supply. We continue to call on governments to help expand renewable electricity access to facilitate private sector purchases.

As we head into the future, collaboration is crucial to tackling the challenges that lie ahead. I am pleased that we now have more than 60 mobile operators driving systemic transformation through the GSMA Climate Action Taskforce. Together, we can succeed. The GSMA invites more operators to join, no matter where they might be on their journey.

In countries around the world, we will continue to call for progressive policy from governments to build a regulatory environment that helps operators decarbonise, as well as recognising the power of connected digital solutions to help decarbonise other industries.

**The time to act is now. We hope this report provides insights into creating a greener, more sustainable and better-connected world.**



**John Giusti**  
Chief Regulatory Officer, GSMA

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# Executive Summary

**This is the third year that the GSMA has assessed progress against the mobile industry's ambition to be net zero by 2050 and we are proud to say that the industry continues to align around the 1.5°C pathway.**

## **Aligning to net zero**

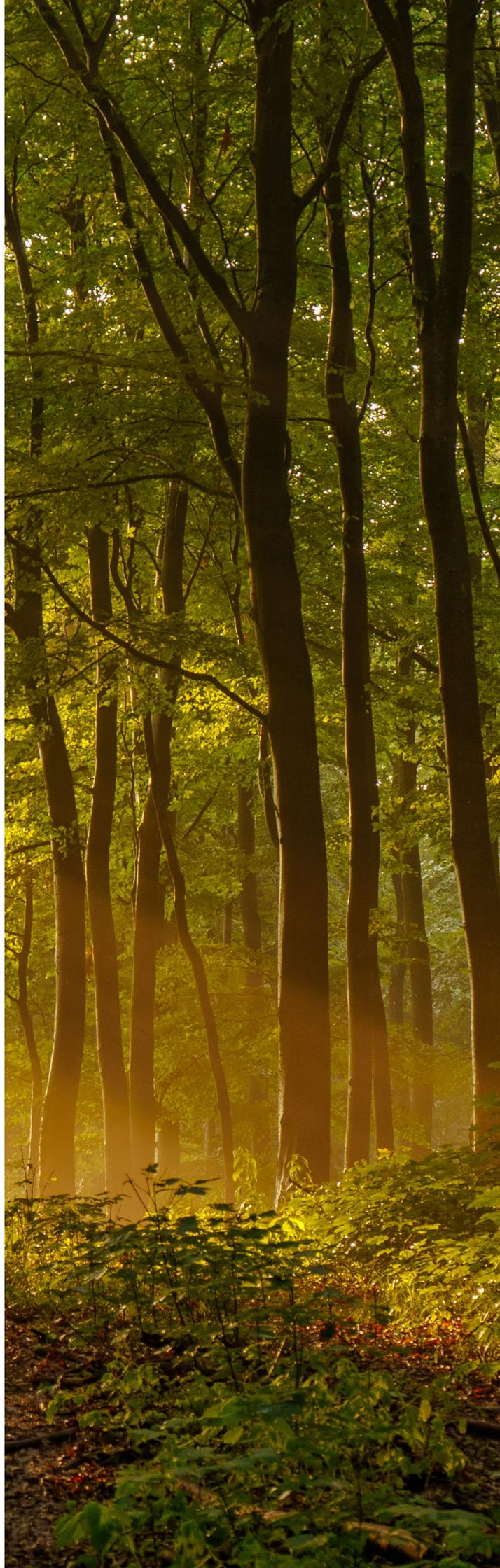
To date, 62 operators representing 61% of the industry by revenue and 46% by connections have committed to a science-based target of rapidly decreasing their direct and indirect emissions by 2030. This is an increase of 12 operators since last year's report. A considerable portion of operators have also committed to net zero targets by 2050 or earlier, accounting for 39% of mobile connections and 43% of global revenue.

## **Climate reporting**

To better understand current emissions and reduce them, the mobile industry has seen an increased level of climate disclosure. This is reflected both in the number of operators disclosing and the quality of disclosures. Of the industry, 67 operators disclosed to the Carbon Disclosure Project (CDP) – the global disclosure system. This is an increase of seven operators since last year, and accounts for 79% of mobile revenue and 66% of global connections. Furthermore, the number of mobile operators scoring A or A- reached 36, which is an increase of 14 since last year.

## **Regional progress**

For the first time, we provide an assessment of regional progress towards the net zero ambition. Europe and North America are leading, with direct (Scope 1 and 2) emissions per connection falling since last year and absolute emissions plateauing. This reflects operators' established energy efficiency programmes and access to renewable electricity (RE).



### **Electricity efficiency**

On average, the network accounts for 90% of energy use for an operator, with the Radio Access Network (RAN) representing more than 80% of this, based on our latest energy benchmarking study. Energy has stubbornly remained at 20-40% of overall opex, which has been exacerbated by recent wholesale market volatility. To address this, AI-based sleep states, lithium-ion batteries, natural cooling systems and smarter site location – among other measures – are being deployed.

### **Switching to renewables**

Globally, 24% of electricity used by operators in 2022 is from purchased renewables, up from 18% in 2021 and 14% in 2020. There is, however, significant regional variation, with gaps present in the global south and east where access and, at times, political constraints make the shift harder. European operators are purchasing the most RE at more than 80% on average, with North American operators currently around half that but expected to close the gap with new RE purchasing contracts.

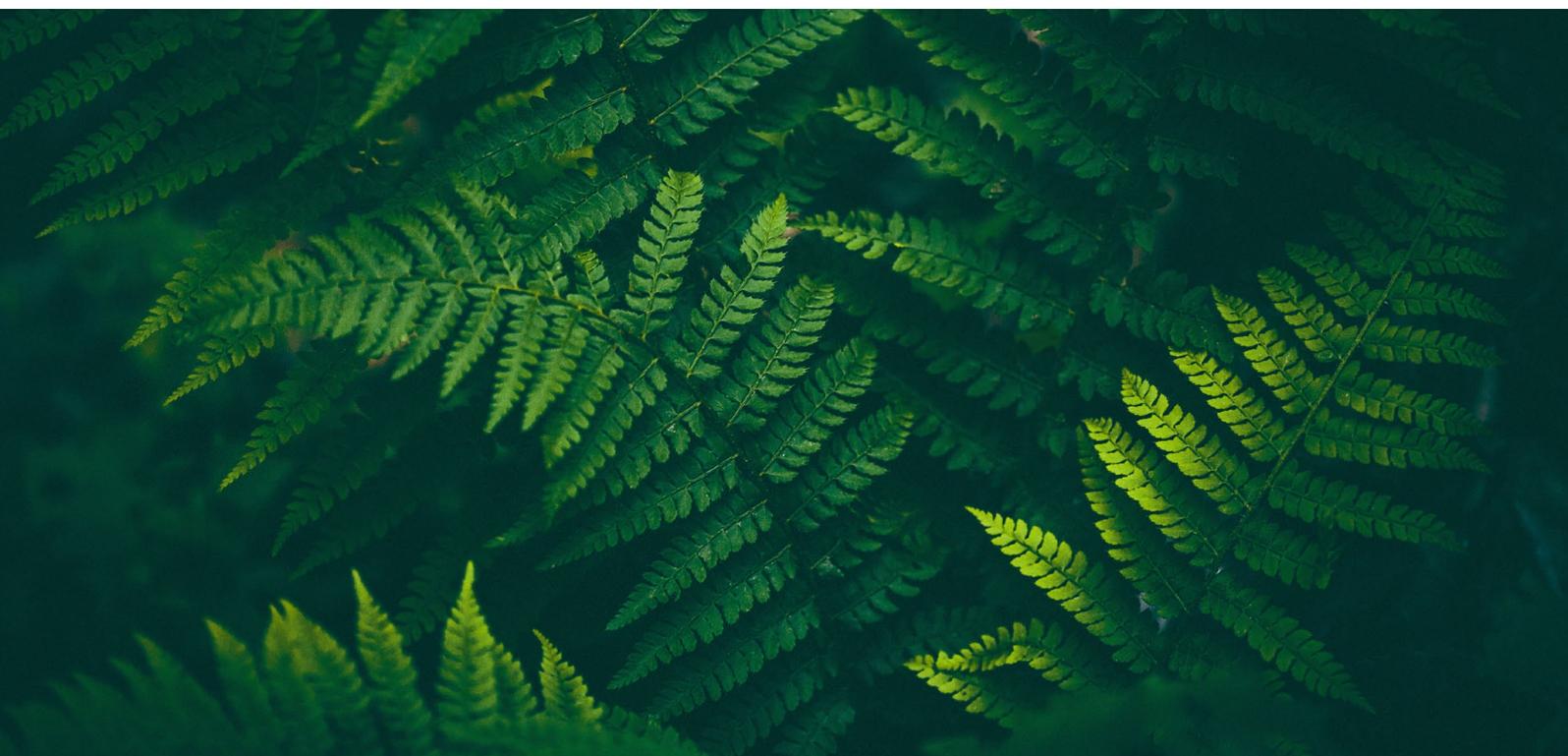
Energy market innovation and collaboration between governments and the private sector is needed to

accelerate the transition to clean energy. Following COP27, the GSMA continues to call on governments to align their carbon-reduction targets to net zero by 2050 at the latest, and to create suitable energy market frameworks for businesses to access renewable electricity at a competitive price. The environmental and financial benefits of climate action are compelling.

### **Supply chain**

Scope 3 emissions, which are largely from the supply chain, continue to be difficult to measure and compare year-on-year due to variances in operator reporting boundaries, methodologies and databases. To improve transparency, the GSMA has been working with members on Scope 3 measurement guidance which will be published in 2023.

Finally, circularity is a fast-emerging trend to boost rates of reuse, remanufacture, refurbishment, recyclability and recycling. The GSMA published a strategy paper in November 2022 on moving towards a more circular economy for mobile devices with a focus on improving recycling and reuse rates and increasing the longevity of mobile phones.





# Net zero ambition



# Net zero ambition and SBT targets

Mobile network operators worldwide are increasing their commitments to reach net zero carbon emissions. By committing to net zero targets, operators are taking responsibility for their emissions, as well as their indirect emissions up and down their value chains.

62



mobile operators have committed to science-based targets (SBTs) as of January 2023, accounting for...



46%

of global connections

and...

61%

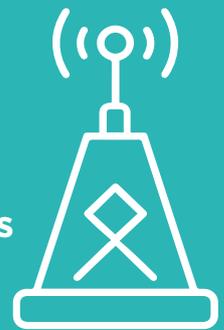
of global revenue.



This represents an increase of...

12

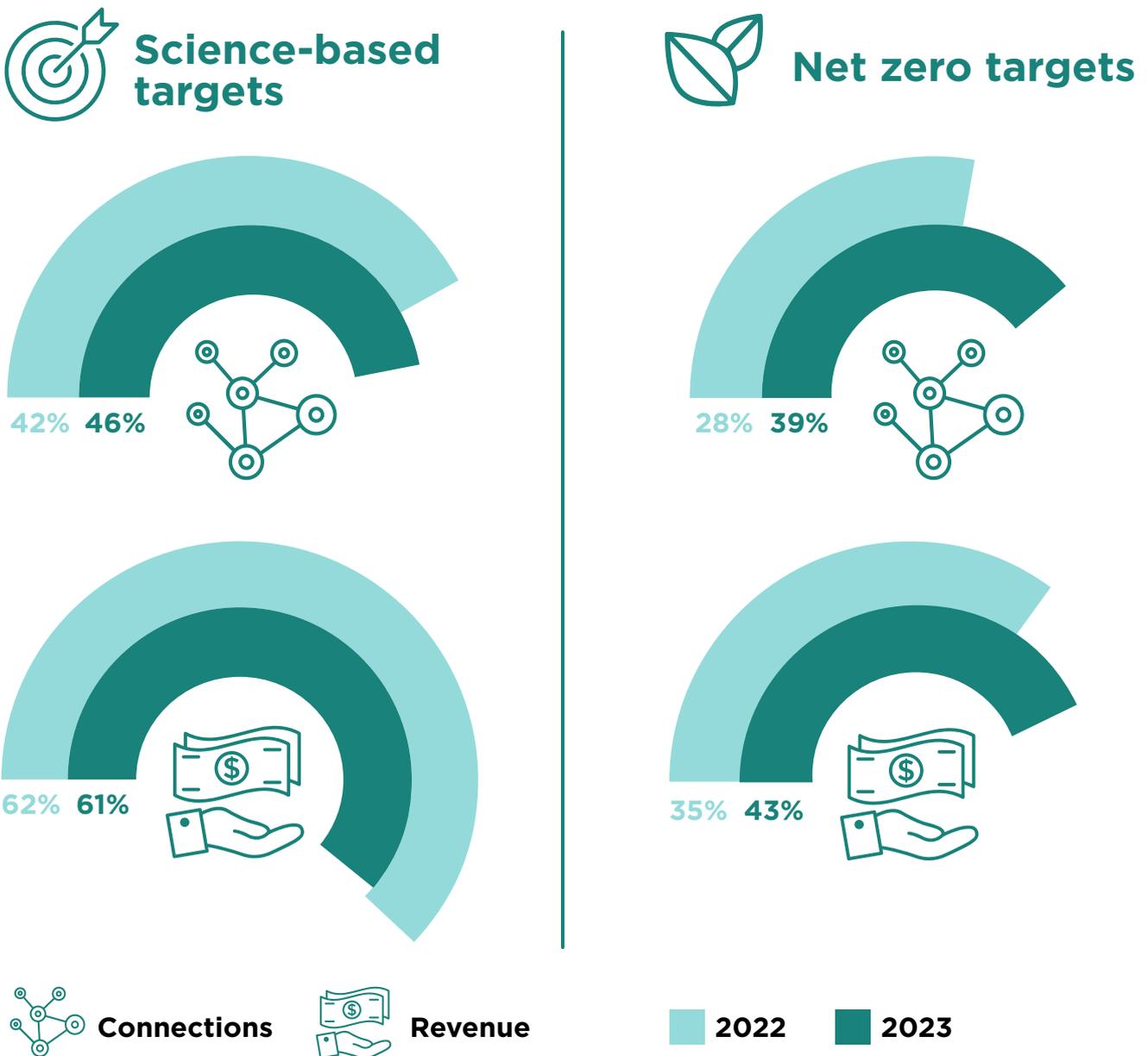
operators compared to April 2022, when our previous edition of this report was published



The gain is a positive indicator for the industry as more operators make SBT commitments. However, it also underscores that more than half of the telecoms industry (measured by mobile connections market share) has yet to commit to SBT - a key influencing factor to the overall sector achieving net zero by 2050.

The gap is for a variety of reasons that range from a lack of political leadership and commitments on a national level, it not yet being a priority for some companies, and the pragmatic fact that some companies will already be in the process of aligning to SBT even if the formal commitment has not yet occurred and therefore would not show up in these numbers.

**Figure 1** | Telco industry commitment rates on key climate indicators



Source: GSMA and CDP



## Case Study: TDC Net

TDC Net, Denmark's leading digital infrastructure provider, is the first telecom operator to have set an ambitious target to have net zero operations by 2028 and net zero in its value chain by 2030 (compared to 2020) – two decades earlier than the ambitions set out in the Paris Agreement. TDC Net believe that the companies with the best conditions to reach science-based net zero have an obligation and an opportunity to lead climate action.

TDC Net's climate roadmap has a focus on energy efficiency, renewable energy (RE) and supplier engagement. TDC Net's approach focusses on the principle that the best energy is energy saved. Therefore, investment is placed in the most energy-efficient technologies and they work to reduce network energy consumption by decommissioning legacy technology.

The infrastructure is powered by electricity, so additionality is a mandatory requirement when procuring renewable energy. This means that power is purchased from new RE sources that are added to the grid and not certificates from existing green energy sources.

To take responsibility for adding renewable energy to the Danish grid, TDC Net signed a power purchase agreement (PPA) in 2021 for four new solar parks in Denmark that reflect the geographical coverage of their network and infrastructure. The four solar parks will cover approximately 60% (~140 GWh) of their total energy consumption in 2023, and TDC Net aims to be 100% covered by renewable energy in 2028.

In addition, regular onsite sustainability audits are conducted through the Joint Audit Cooperation (JAC). To engage smaller vendors, climate reporting workshops are hosted and TDC Net recommend that they sign up to the third-party platform EcoVadis to ensure verified climate data.

For new suppliers, a sustainability screening tool was developed to ensure that suppliers with the lowest carbon emissions are selected. Furthermore, TDC Net plans to introduce life cycle assessment for Scope 3 calculations which will improve the accuracy and help to reduce CO<sub>2</sub> emissions by selecting less carbon-intensive materials (e.g. with more recycled content).

TDC Net have a range of initiatives to tackle the remaining 20% of the Scope 3 emissions, such as a hybrid workplace to reduce business travel and employee commuting. Moreover, energy- and fuel-related emissions will be reduced by moving to 100% renewable energy on Scope 1 and 2 and converting downstream assets to renewables.



**Figure 2** | Climate target by operator

See definitions of targets on P12.

 <b>COMPANY</b>	 <b>NEAR TERM SCIENCE-BASED TARGET (SCOPES 1, 2 AND 3)</b>	 <b>CARBON NEUTRAL TARGET (SCOPES 1 AND 2)</b>	 <b>NET ZERO TARGET (SCOPES 1, 2 AND 3)</b>
2degrees	Committed		
A1	<b>1.5°C aligned</b>	2021	
Altice	Committed		2050
América Móvil	<b>1.5°C aligned</b>	2030	2050
AT&T	<b>1.5°C aligned</b>	2035	
Axiata	Committed		2050
BCE	<b>1.5°C aligned</b>	2025	2050
Bharti Airtel	<b>1.5°C aligned</b>		2050
Bouygues Telecom	<b>1.5°C aligned</b>	2027	2050
BT Group	<b>1.5°C aligned</b>	2031	2041
Chunghwa Telecom	Committed		
CK Hutchison	<b>1.5°C aligned</b>	2040	2050
Deutsche Telekom	<b>1.5°C aligned</b>	2025	2040
Elisa	<b>1.5°C aligned</b>	2020	2050
Far EasTone	2°C aligned	2030	
Iliad <sup>†</sup>	Committed	2035	2050
JT Group	Well-below 2°C	2030	
KDDI	<b>1.5°C aligned</b>	2030	
KPN	<b>1.5°C aligned</b>	2015	2040
LG Uplus		2030	
Liberty Global	<b>1.5°C aligned</b>		
M1	<b>1.5°C aligned</b>		
Magyar Telekom	<b>1.5°C aligned</b>	2030	2050
Millicom	<b>1.5°C aligned</b>		2050
MTN	Committed		2040
NTT DOCOMO	<b>1.5°C aligned</b>	2030	
Orange	<b>1.5°C aligned</b>		2040
PPF	Committed		
Proximus	<b>1.5°C aligned</b>	2016	<b>2040</b>
Rakuten Mobile	Committed	2023	
Reliance Jio	<b>1.5°C aligned</b>	2035	2050
Rogers	Committed		2050
Safaricom	Well-below 2°C aligned		2050
Singtel	Well-below 2°C aligned		2050
SK Telecom	<b>1.5°C aligned</b>	2050	2050

**CONTINUED** >>>

**CONTINUED**

 <b>COMPANY</b>	 <b>NEAR TERM SCIENCE-BASED TARGET (SCOPES 1, 2 AND 3)</b>	 <b>CARBON NEUTRAL TARGET (SCOPES 1 AND 2)</b>	 <b>NET ZERO TARGET (SCOPES 1, 2 AND 3)</b>
SoftBank Corp	<b>1.5°C aligned</b>	2030	2050
Spark New Zealand	<b>1.5°C aligned</b>		
Sunrise	Committed		
Swisscom	<b>1.5°C aligned</b>	2020	2050
Taiwan Mobile	Well-below 2°C aligned	2030	2050
TDC Net	<b>1.5°C aligned</b>	2028	<b>2030</b>
Tele2	<b>1.5°C aligned</b>	2020	<b>2035</b>
Telefónica	<b>1.5°C aligned</b>	2025*	<b>2040</b>
Telenor Group	<b>1.5°C aligned</b>	2030**	2040**
Telia Company	<b>1.5°C aligned</b>	2022	2040
Telkom SA	<b>1.5°C aligned</b>		2050
Telstra	<b>1.5°C aligned</b>	2020	2050
Telus	<b>1.5°C aligned</b>	2030	
TIM	<b>1.5°C aligned</b>	2025	2040***
T Mobile Nederland	Committed		2050
T Mobile USA	<b>1.5°C aligned</b>	2021	<b>2040</b>
TPG	Committed		2050
True Corporation	Committed	2030	2050
Turkcell	Committed		
Verizon	<b>1.5°C aligned</b>	2035	2050
Virgin Media O2	Committed		2050
Vodacom	<b>1.5°C aligned</b>	2030	2040
Vodafone	<b>1.5°C aligned</b>	2030	2040
Vodafone Ziggo	<b>1.5°C aligned</b>	2030	2050
Zain	Committed		2050

**Bold** - validated and in line with mobile sector's net zero by 2050 ambition

\* Main markets - Spain, Germany and Brazil

\*\* Nordic operations

\*\*\* Europe markets

† Excludes Polish operations

Source: CDP, SBT, UN and operators

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# Definitions



## Near-term science-based targets (SBTs)

Defined by the Science-Based Targets Initiative (SBTi) to set carbon-reduction targets in line with limiting global warming. First, an organisation commits to a target, then it is validated against a target level. Targets in bold are validated and in line with the ambition of the mobile sector to be net zero by 2050.

For more information, please see [gsma.com/betterfuture/resources/setting-climate-targets](https://www.gsma.com/betterfuture/resources/setting-climate-targets)



## Carbon neutral target

Refers to reducing and offsetting carbon emissions from a company's own operations (only Scope 1 and 2 emissions).



## Net zero targets

Committing to achieving net zero carbon emissions by 2050 at the latest, as part of the UN-led Race to Zero campaign. According to the criteria used by the campaign, a net zero target includes reductions in Scope 3 emissions across the whole value chain.

For more information, please see [unfccc.int/climate-action/race-to-zero-campaign](https://unfccc.int/climate-action/race-to-zero-campaign)



## Validated net zero targets

Independent validation by a team of technical experts of emissions reduction targets against the qualitative and quantitative corporate criteria.

For more information, please see [sciencebasedtargets.org/resources/files/Net-Zero-Getting-Started-Guide.pdf](https://sciencebasedtargets.org/resources/files/Net-Zero-Getting-Started-Guide.pdf)



# Climate Action Taskforce



Progress towards net zero has been strengthened and accelerated through collaboration between operators across the sector. To provide a forum for this collaboration, the GSMA created a Climate Action Taskforce in 2019. The taskforce has grown rapidly over the last three years and now has 62 members, with networks in most countries around the world.

The Climate Action Taskforce has four main purposes:

- To promote and encourage leadership on climate action to move the industry towards net zero carbon emissions by 2050.
- To agree climate policy frameworks and advocacy engagement to gain support from governments and other stakeholders for a fair and equitable net zero transition.
- To share best practices on climate action so operators support each other and raise their ambitions.
- To create thought leadership and research on how mobile technologies support climate mitigation and adaptation.

Through knowledge-sharing and industry collaboration, the Climate Action Taskforce also supports operators on:

- Improving energy efficiency in networks and buildings.
- Advocating for increased access to, and use of, renewable electricity.
- Engaging with mobile industry suppliers on Scope 3 emissions and setting SBTs.
- Improving the environmental sustainability of mobile devices, network equipment and waste management practices.
- Using mobile connectivity to reduce carbon emissions through green digital solutions.



The **Climate Action Taskforce** welcomes new mobile network operator members. Please contact the GSMA at **[betterfuture@gsma.com](mailto:betterfuture@gsma.com)** if you would like to join.





# Understanding climate risks and opportunities



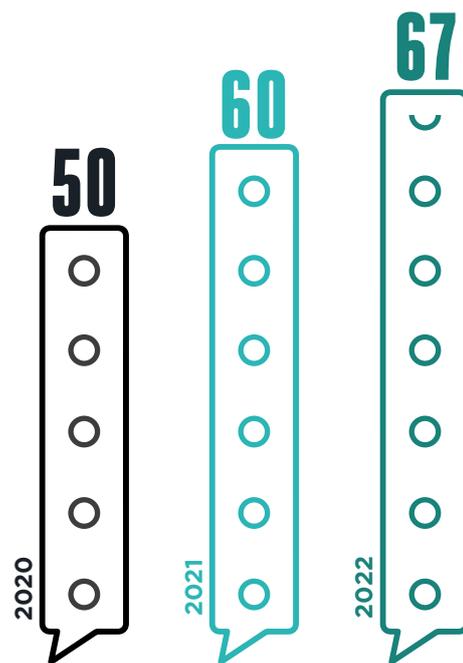
# The journey to leadership in environmental transparency

Since it was founded in 2000 as the Carbon Disclosure Project (CDP), the CDP has created a global reporting system for greenhouse gas emissions and the detailing of climate risks and opportunities. Companies are asked to disclose this information through the CDP by their customers and investors.

As of October 2022, nearly 20,000 organisations disclose through the CDP – a 38% increase since 2021. More than 18,700 companies representing half of the global market capitalisation and more than 1,100 cities, states and regions disclose data through the CDP on climate change, deforestation and water security. However, with mandatory disclosure regulation set to take effect within the next three years in many major economies, more than 29,500 companies worth at least US\$24.5 trillion still fail to respond to the disclosure request<sup>1</sup>.

In 2022, 67 mobile network operators (accounting for 66% of global mobile connections) disclosed their climate impact data to the CDP, compared to 60 mobile network operators disclosing in the previous year and 50 in 2020.

**Figure 3** | Number of mobile network operators disclosing to the CDP



Source: CDP



<sup>1</sup> [cdp.net/en/articles/media/nearly-20-000-organizations-disclose-environmental-data-in-record-year-as-world-prepares-for-mandatory-disclosure](https://cdp.net/en/articles/media/nearly-20-000-organizations-disclose-environmental-data-in-record-year-as-world-prepares-for-mandatory-disclosure)

# 2022 versus 2021

- **Nine additional companies disclosing CDP data in 2022.**
- **Two companies were no longer represented in 2022 CDP disclosure due to merger and acquisition:**
  - » Oi (mobile assets were acquired by TIM, VIVO, and Claro in Q2 2022)
  - » Shaw Communication disclosed to CDP in 2021 but not in 2022 (also amidst a merger)

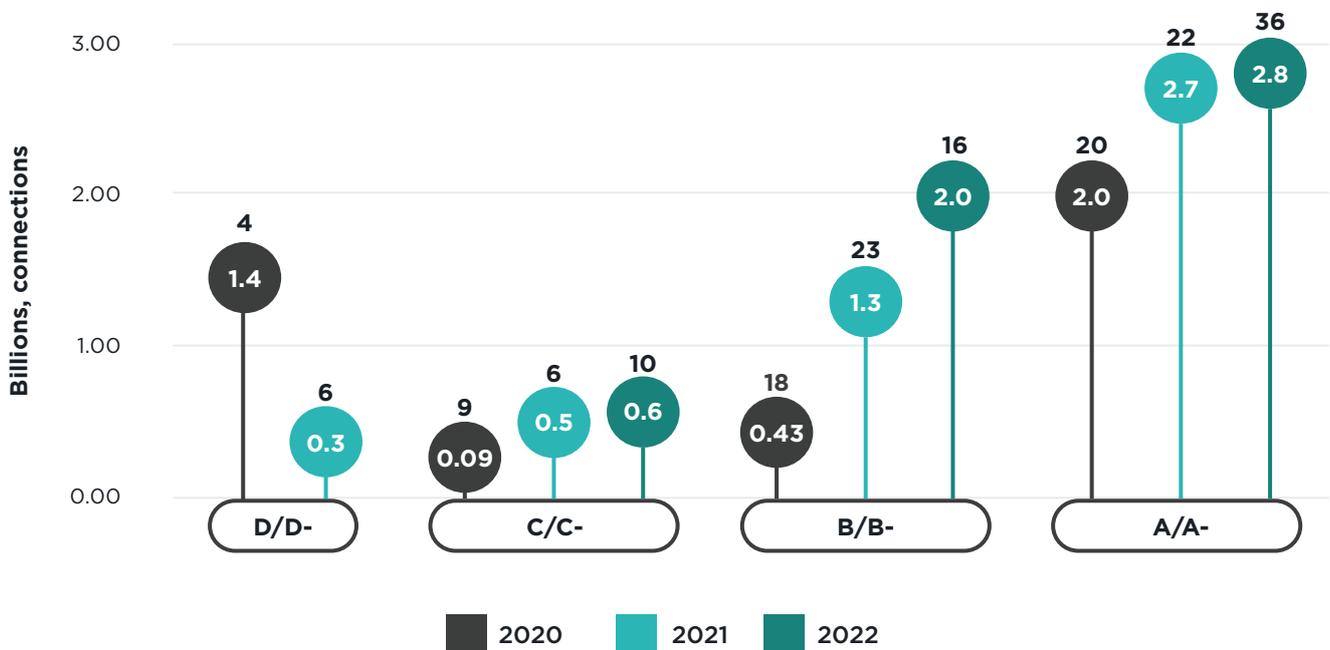
More mobile operators are disclosing and those that already disclosed have provided more information about their climate impact and emissions, leading

to significantly higher scores. By scoring mobile operators, the CDP aims to incentivise and guide them on a journey through disclosure and towards becoming leaders in environmental transparency and action.

There are four main scoring categories:

- 1 Leadership (A/A-):** implementing current best practices
- 2 Management (B/B-):** taking coordinated action on climate issues
- 3 Awareness (C/C-):** knowledge of the impact on, and of, climate issues
- 4 Disclosure (D/D-):** transparent about climate issues

**Figure 5** | Number of connections and operators by carbon disclosure score category in 2020, 2021 and 2022



Source: CDP

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## Carbon disclosure scores: 2022 versus prior years

Compared to 2021, scores per operator improved significantly in 2022 (see Figure 5). Between 2021 and 2022, the number of mobile network operators scoring A or A- has increased from 22 to 36, accounting for 2.7 billion and 2.8 billion connections respectively (around 65% of global connections market share).

Twelve operators have moved from B or B- to A or A-; one operator has moved from A to B, one operator has moved from C to A- and one operator disclosing for the first time has scored A-. Two operators have moved from C or C- to B or B- and from B or B- to C or C-. Two operators not scored in 2021 have scored B or B- in 2022.

ESG (Environmental, Social and Governance) analysis and data have become increasingly important for investment decision-making. Investors are applying these non-financial factors as part of their analysis to identify material risks and growth opportunities.

ESG metrics are not mandatory parts of financial reporting, though companies are increasingly making disclosure in their annual report or third parties' databases such as the CDP<sup>2</sup>, TCFD and other reporting standards for environmental data.

In an effort to harmonise broad ESG reporting across mobile operators, in 2022 the GSMA published the first voluntary ESG mobile industry reporting framework, which is now piloted by some operators<sup>3</sup>.

The CDP convenes a growing number of financial institutions and large purchasing companies, supporting them in their

requests for corporate environmental disclosure. In 2022, more than 680 financial institutions with more than US\$130 trillion in assets requested nearly 10,400 companies to disclose environmental data through the CDP<sup>4</sup>.

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## Long-term returns

The top reason professional investors consider ESG-related information such as CDP information is to determine whether a company is adequately managing risk and aligning its strategy for long-term returns<sup>5</sup>. The pursuit of greater transparency and enhanced risk management, combined with the expectations to generate long-term sustainable returns, have been consistently highlighted as key motivating reasons for committing to ESG integration<sup>6</sup>.



<sup>2</sup> CFA Financial Institute, [www.cfainstitute.org/en/research/esg-investing](http://www.cfainstitute.org/en/research/esg-investing)

<sup>3</sup> [gsma.com/betterfuture/esg-metrics-for-mobile](http://gsma.com/betterfuture/esg-metrics-for-mobile)

<sup>4</sup> [cdp.net/en/articles/media/nearly-20-000-organizations-disclose-environmental-data-in-record-year-as-world-prepares-for-mandatory-disclosure](http://cdp.net/en/articles/media/nearly-20-000-organizations-disclose-environmental-data-in-record-year-as-world-prepares-for-mandatory-disclosure)

<sup>5</sup> 'ESG Investing: practices, progress and challenges', OECD, 2020

<sup>6</sup> In a 2017 ESG survey published by the CFA Institute, 73% of investor respondents said they take ESG issues into account in their investment analysis and decisions.



# Carbon emissions of the industry



# Measurement and methodologies

An increasing number of operators have set ambitious targets to achieve net zero carbon emissions, but what are the current emissions of operators? The most widespread approach to measure emissions from companies and their supply chains is to use Scopes to define greenhouse gas (GHG) emissions.

Scope 1, 2, and 3 categorise the type of carbon emissions operators create in their own operations and in the wider value chain:



**Scope 1** - Direct emissions from an operator, such as from running its fleet for network maintenance and using diesel to operate base stations in hard-to-reach areas.



**Scope 2** - Indirect emissions from electricity use or energy bought for heating and cooling building, produces on a company's behalf.

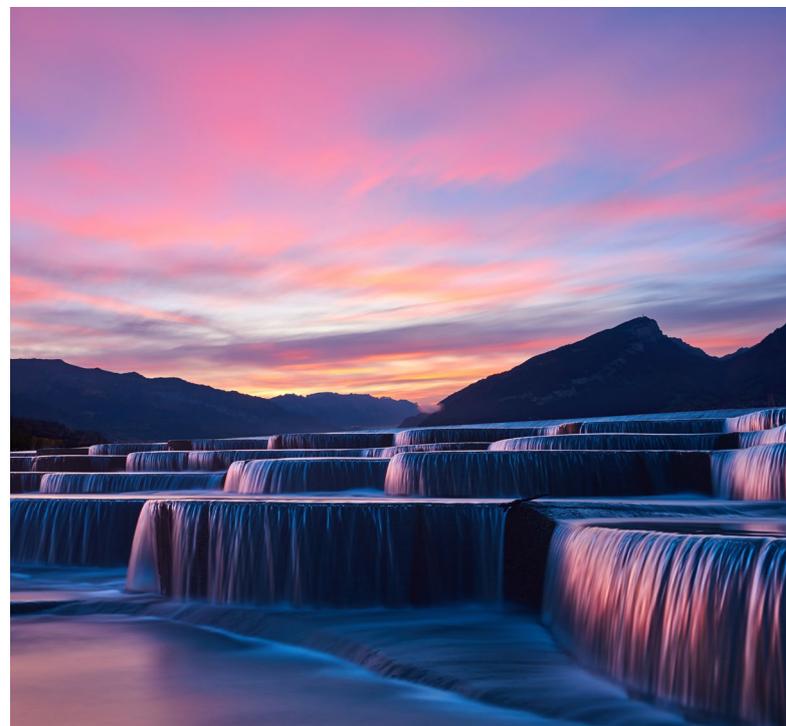


**Scope 3** - Emissions that are not associated with the operator itself but which the organisation is indirectly responsible for, up and down its value chain. For example, emissions related to the buying of network equipment and those produced by its suppliers, as well as emissions from operator services when subscribers and enterprises make use of them. Scope 3 is often the largest in terms of emissions and the hardest to measure accurately.

To measure all of the emissions associated with the operation of a company, Scope 3 emissions should be considered. Data gathering and processing are more complex and diverse than with Scope 1 or 2 emissions.

For Scope 3 emissions, a higher margin of error should be factored into estimates. This is not just because of the smaller sample of data, but also because of the methodological constraints and the lack of Scope 3 accounting harmonization, increasing the potential error margin.

61 mobile network operators reported Scope 3 emissions in 2022. For accurate, comparable Scope 3 measurement, work is required on standards, reporting, and coordination across supply chains. The GSMA is working with the Taskforce and external partners to develop Scope 3 measurement guidance, which will be published this year.



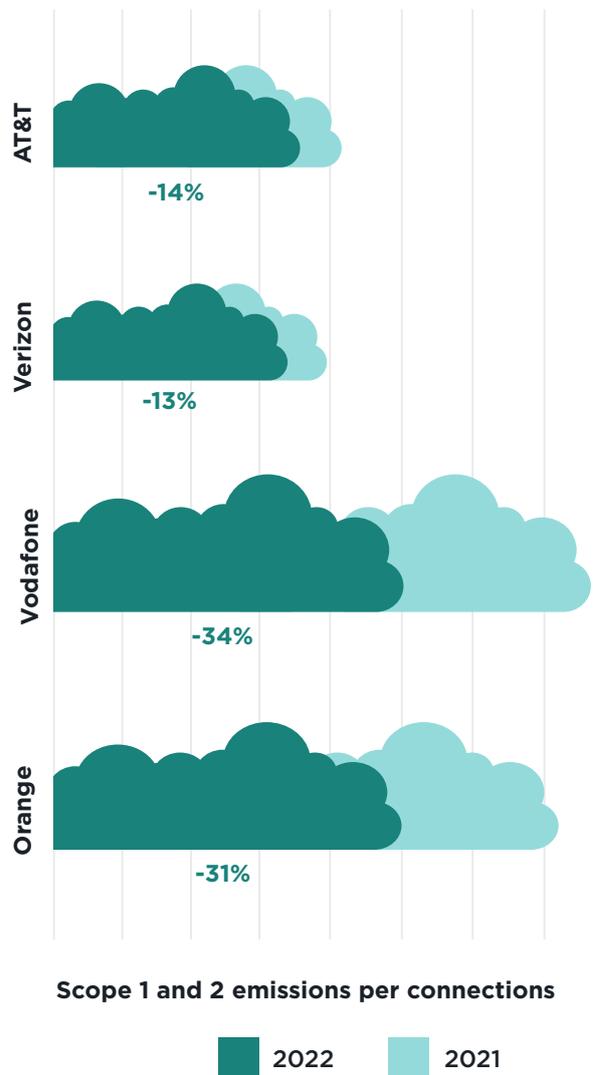
# Emissions in the context of data traffic

Despite growing data traffic requirements and ongoing 5G transformation, a number of large operators including AT&T, Verizon, Vodafone and Orange reduced their Scope 1 and 2 carbon emissions per connection in 2022. This is due to two main factors:

- 5G is more energy-efficient at moving data compared to LTE (90% gain), with this gain increasing considerably relative to 2G/3G networks (10-15x).
- Investment in lower carbon energy to power networks, such as onsite and market-based renewable electricity.

Data traffic continues to grow exponentially, with an average 5G customer using around 30GB per month – a rise of 4-5x on LTE. However, while the rising traffic can increase pressure on energy consumption, the reality is more nuanced because 5G workloads are increasingly being shifted to the cloud, where operators lease datacentre capacity from hyperscalers like Amazon and Microsoft (in effect, turning Scope 1 emissions to Scope 3).

**Figure 5** | Operators' Scope 1 and 2 emissions reductions per connection from 2021 to 2022



Source: CDP and GSMAi



# Energy efficiency of networks



Energy efficiency has become a core strategic priority across the telecom ecosystem. Major mobile network operators have recognised the importance of network solutions improvements, realising that more efficient equipment is a major purchasing criterion for cost savings and reputational reasons.

There are financial reasons as well for operators when addressing energy efficiency. Energy still accounts for, on average, 20-40% of telco opex and 80-90% of network spending excluding site rental costs. The shift to renewables and efficiency gains should help bring this down. The International Energy Agency (IEA) adopts the view that energy efficiency is 'the first fuel'. Energy-efficiency improvements can alleviate the contradiction between energy consumption growth and green development.

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## Benchmarking energy efficiency

In 2021, GSMA Intelligence released an energy efficiency benchmarking service for mobile networks. The unique analytical approach allows operators to measure the relative efficiency of their networks.

The direct energy consumption of the operators can be categorised into four groups:

- **RAN energy consumption** – energy consumed by the radio access network (RAN). This includes BTS, Node B, eNodeB and gNodeB energy usage and all associated infrastructure energy usage such as from air-conditioning, inverters and rectifiers. It includes energy usage from repeaters and all energy consumption associated with backhaul transport.
- **Core energy consumption** – energy consumed by the core network related to the mobile network. This includes the RNC, BSCs, MSC, SGSN, GGSN, HLR, SMS-C, MMS-C, MME, Serving Gateway, and all associated infrastructure energy usage as from air-conditioning, inverters, and rectifiers.
- **Data centre energy consumption** – energy consumed by data centres, which are the physical sites that host operators' IT, including OSS and BSS and intranet infrastructure.
- **Other operations** – energy consumed by the mobile operator for its own operations. This includes offices, shops, retail activity and logistics<sup>7</sup>.

The majority of energy (87%) is consumed in the RAN. The remaining distribution of consumption comprises data centres and the core (12%) and other operations (1%). The 2022 edition of the energy benchmark report provides some reason for optimism. **The core efficiency metric improved from 0.24 kWh per GB of data to 0.17** across a sample of more than 40 networks worldwide. This has, of course, happened despite a steeply rising traffic profile. Equipment upgrades featuring AI-driven RAN shutdowns, liquid cooling (sites and data centres), swapping out lead acid for lithium-ion batteries and smarter site selection to better position cells to users have all likely played a part.



<sup>7</sup> 'Global CO<sub>2</sub> emissions rebounded to their highest level in history in 2021', IEA, March 2022

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## Enabling further energy efficiency with 5G

Although 5G offers a significant energy efficiency improvement per gigabyte when compared to previous technologies, new 5G use cases and the adoption of mmWave will require more sites and antennae. This leads to the prospect of a more efficient network that could paradoxically result in higher emissions in the absence of active intervention from operators.

Significantly, 5G is the first wireless technology where energy efficiency has been considered during standardisation. Each cellular technology has become more energy-efficient since 2G as the transmission technology has improved. On top of this, a number of energy-saving measures are built into the 5G standards, such as sleep or shutdown functions in the transceiver and low-energy scheduler solutions.

These energy-saving measures built into the 5G new radio (NR) standard may be offset by rising data traffic, paradoxically resulting in higher levels of energy consumption and emissions. However, to address and counter this, energy strategies of operators take a holistic approach which includes retiring legacy networks, increasing renewable consumption and buying power-efficient equipment.





# Case Study:

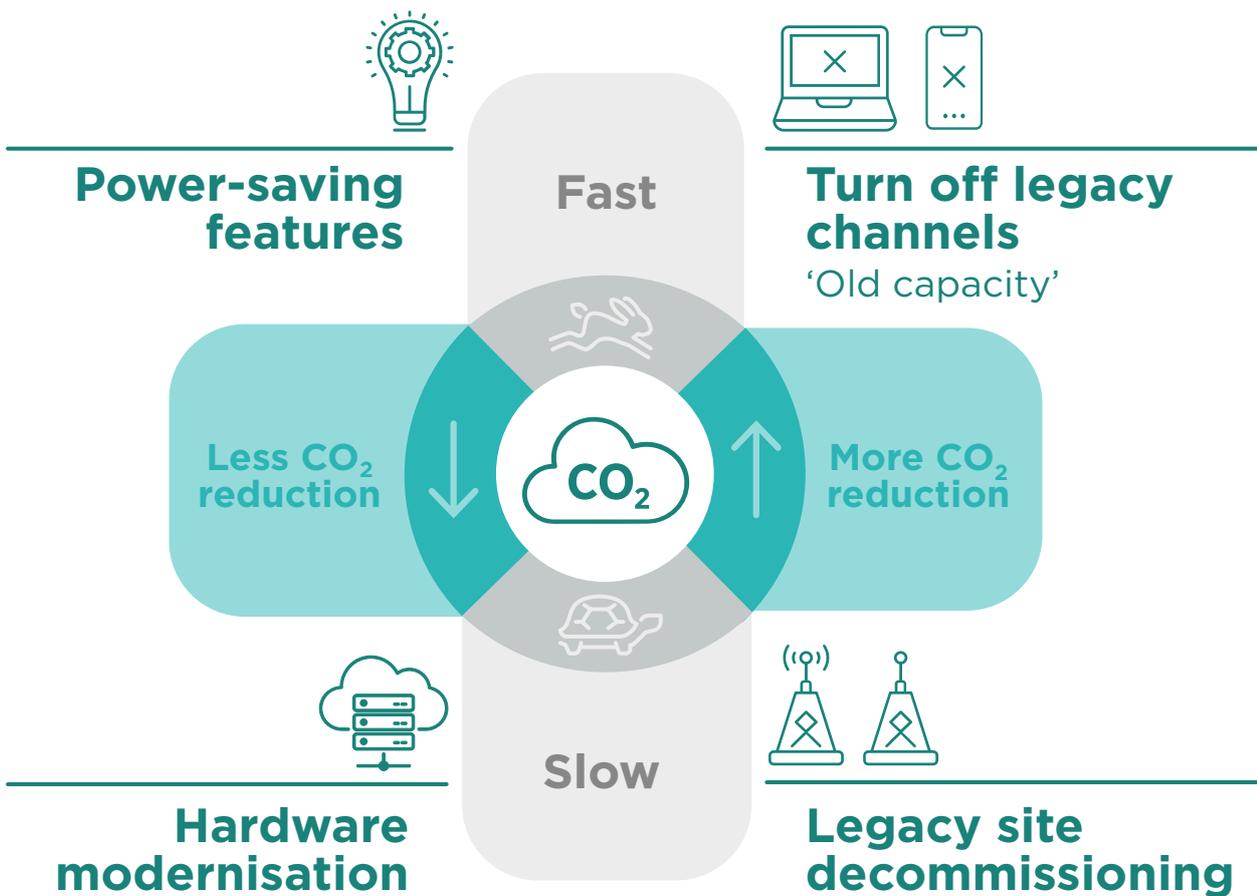
Millicom | Tigo

Tigo is fully committed to reaching its science-based target for carbon emission reductions in all of its operations. To accomplish this objective, Tigo must consolidate all carbon reduction initiatives, prioritise and execute them in all operations.

To do this, Tigo has built a team of experts called the 'Green Team' who came from different parts of the organisation and countries of operation.

The team categorised all of the initiatives in five different streams: RAN efficiency; renewables; cooling system optimisation; off grid fuel optimisation; and sites power off and outdoor migration.

First, the company focused on the RAN efficiency stream and then prioritised the other initiatives by two main characteristics: the CO<sub>2</sub> reduction opportunity and how fast the initiative can be deployed.





# Case Study:

## Millicom | Tigo



### Power-saving features

Activating power-saving features is the fastest way to obtain CO<sub>2</sub> reductions while also being cost-efficient because physical changes to the network are not required. This works through software updates by following traffic behaviour and turning off capacity layers (for example, at night when users are sleeping). This results in 1% to 10% less site energy consumption.



### Turn off legacy channels

Thanks to the high penetration of LTE devices today and an aggressive LTE overlay on the network, Tigo can turn off 2G/3G channels following legacy traffic reduction. This is the first step to a sunset legacy networks. This results in 10% to 30% less in site energy consumption.



### Legacy site decommissioning (sunset legacy network)

The legacy site decommissioning initiative represents the highest impact on carbon emission reductions and has significant opex benefits due to rent, energy and maintenance savings. The first site category to be decommissioned was the legacy capacity sites and, after the LTE overlay, it was the legacy coverage sites (for example, in Colombia in November 2022).



### Hardware modernisation

Tigo believes that “evolution comes with efficiency”. The new hardware thinking in the adoption of 4G and 5G is the best decision to support business continuity and be prepared for new revenue streams. This can result in up to 40% less energy consumption.



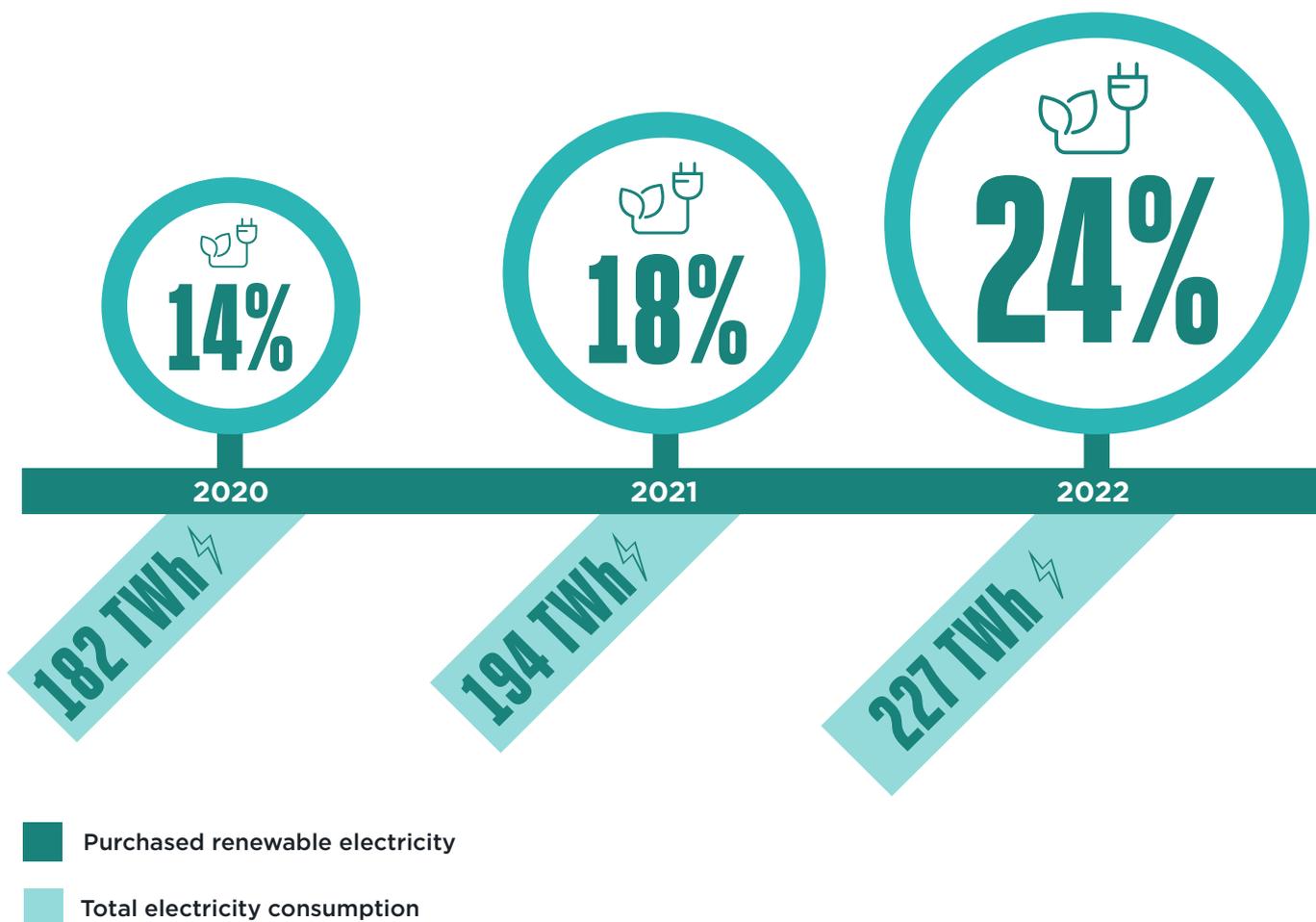
# Transitioning to renewable electricity



For operators that report to the CDP, purchased renewable electricity used as a share of their total energy consumption increased from 18% in 2021 to around 24% in 2022. This is a positive move, although it underpins the reality that the vast majority of electricity (around 75%) in the telecoms sector is still derived from grid access or diesel.

Renewables are the other side of the coin to energy efficiency in helping telcos lower overall energy emissions, with the shift to renewables fundamental in any transition to net zero. The weak run rate in the renewable share of overall consumption is concerning, at only 4-6ppts a year. Extrapolating forwards, this would imply it will take another five years for renewables to reach 50% consumption and 15 years (nearly 2040) to 100%.

**Figure 6** | Purchased renewable electricity usage in telecoms



Source: CDP

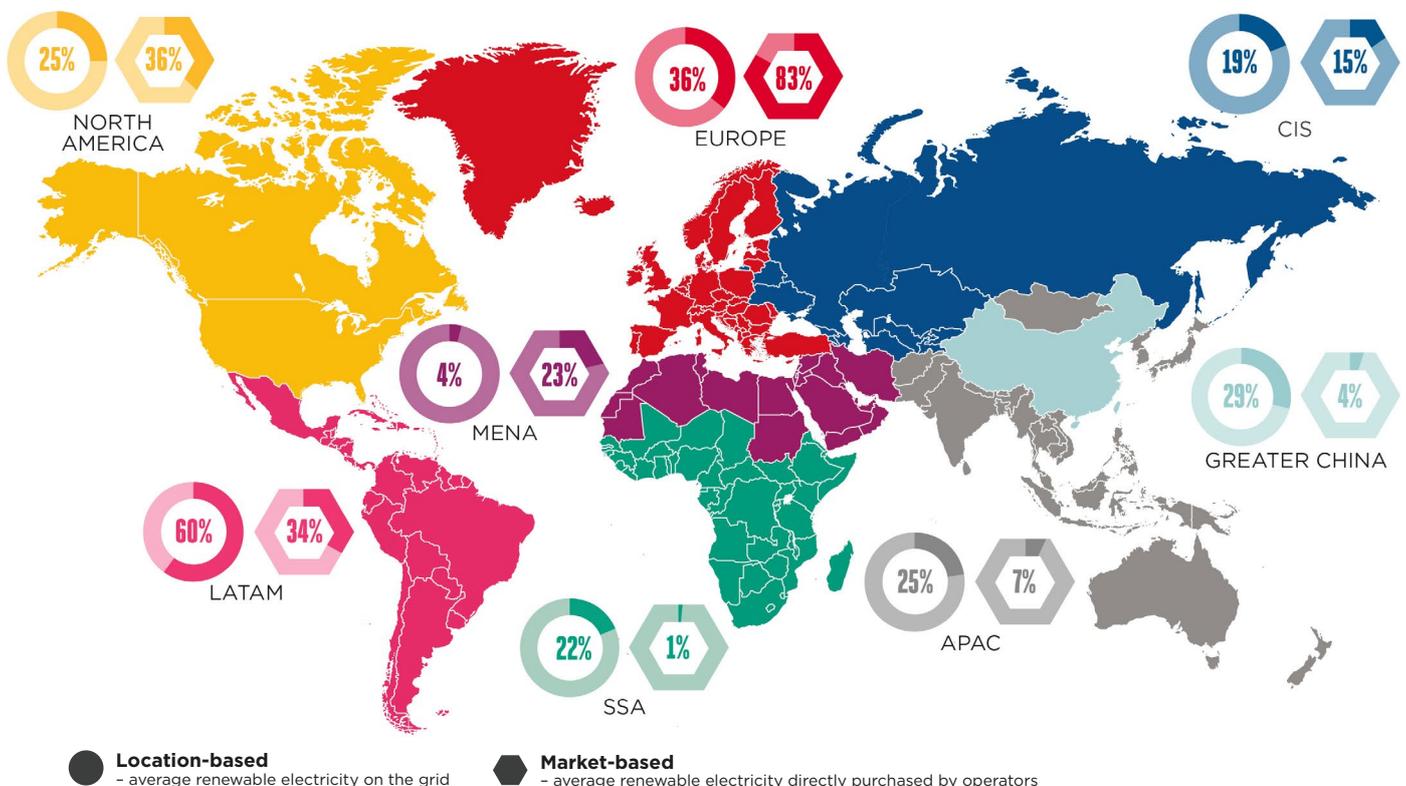
To a certain extent, this is academic because the rate of change will depend as much on political, rather than industrial, commitments to reforming national energy markets in favour of renewables. Even here, a small number of highly populous countries distort the overall average, meaning a significant policy change could have an outsized effect on how fast the overall telecoms industry moves.

Telecoms operators vary in their progress, which correlates with renewable energy supply on the grid. European and American groups are most advanced. For example, Vodafone, Telefónica and BT have targets of 100% renewable energy consumption by 2030 or earlier (sometimes much earlier). There is, however, considerable regional variation on the downside, particularly in Africa, India and Asia, where even mains grid

access is patchy and diesel remains in use in rural off-grid areas. Political resistance to renewables is also present in some countries, with economies still dependent on hydrocarbon/oil exports.

Power Purchase Agreements (PPAs) are one way of mitigating grid constraints. However, data on the total investment value of PPAs for operators is not plentiful. Data from the IEA indicates PPAs reached nearly US\$20 billion by 2019. Carrying forward the 40% growth rate, the figure as of 2021 would be US\$36 billion per year, or around 10% of global investment in renewable energy projects. Telia and Telenor's recent joint PPA deal in the Nordics, T-Mobile US and Enel Green (Oklahoma), BT and Total (UK) and DoCoMo (Japan) are all examples of telco-led investment in renewable power providers on a local or national level to secure long-term access.

**Figure 7** | Distribution of renewable electricity accessed by mobile network operators globally



Source: CDP and Our World in Data



## Case Study: Verizon

More than 90% of Verizon's operational carbon footprint comes from the electricity used to power its networks. To tackle Scope 2 emissions, Verizon is focussing on two key drivers: maximising the energy efficiency of networks and facilities and transitioning to renewable energy.

Since 2019, Verizon has signed 24 REPs for more than 3.0 GW of projected renewable energy capacity, which is roughly equivalent to 8.4 million megawatt hours (MWh) of annual electricity production.

Mobile network operations are located across the country and require a constant supply of electricity to operate. As it is not feasible to power the network operations solely on solar or wind generation, Verizon is dependent on sourcing power from the national electrical grids. To achieve Verizon's interim renewable energy and long-term operational net zero goal, resources are being focussed on accelerating the transition to greener electrical grids across the USA.

Additional renewable energy capacity is being added to the grids by entering into long-term power purchase agreements for solar and wind power sources which are currently under development. The agreements, called virtual power purchase agreements (VPPAs), are financially settled and can help reduce Verizon's long-term exposure to energy price volatility.

In January 2023, Verizon announced that it had further increased its renewable capacity by signing four new long-term renewable energy purchase agreements (REPs) for an aggregate of up to 410 MW of renewable energy capacity.

With these new agreements, Verizon has surpassed 3.0 GW of total projected renewable energy capacity as it continues to be a leading buyer of US renewable energy. These agreements also position the company to meet its goal to source or generate renewable energy equivalent to 50 per cent of its total annual electricity consumption by 2025.





# Mobile industry and the supply chain



# Circular economy and mobile devices

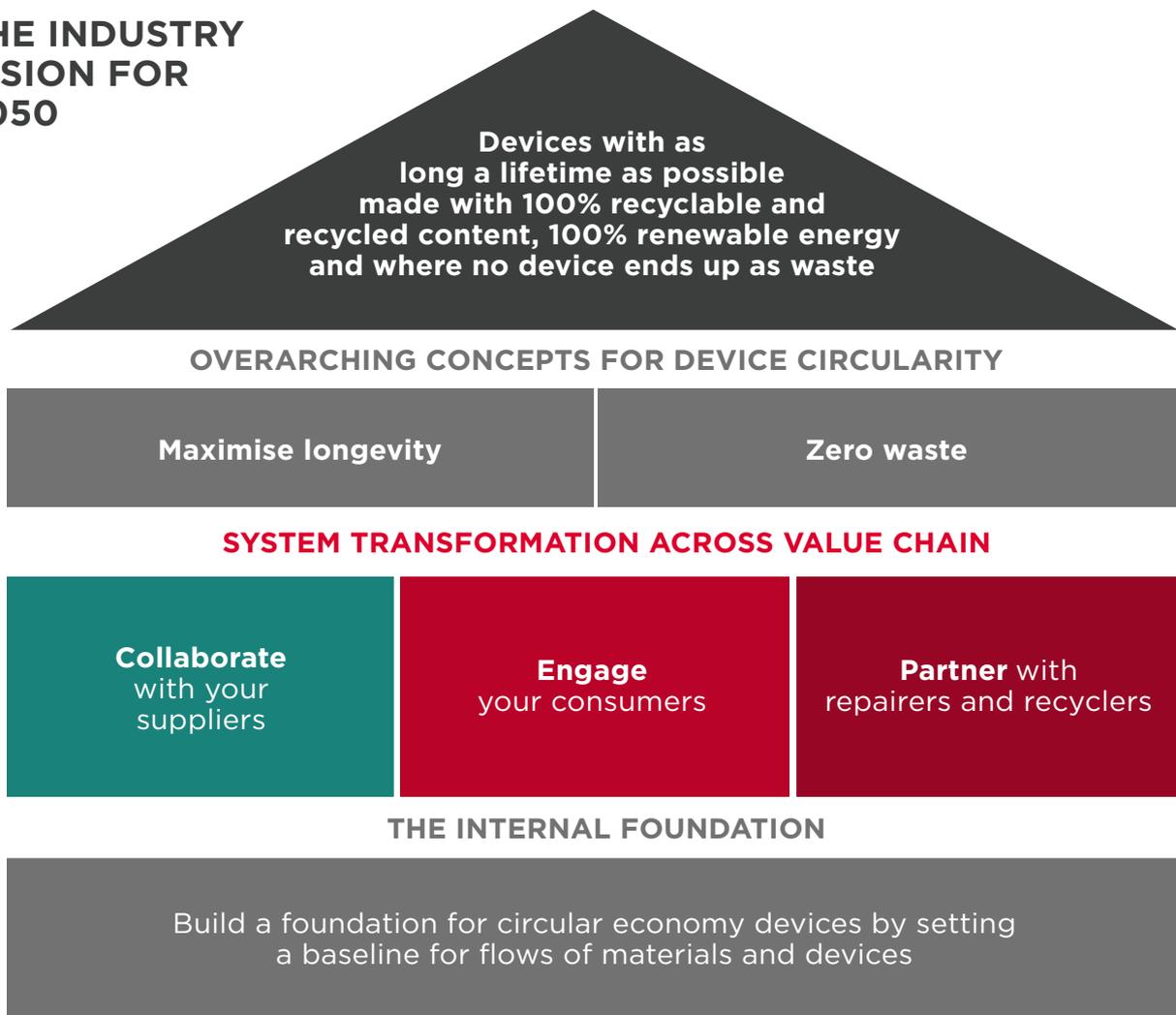
For the mobile industry, one of its biggest environmental impacts is from mobile devices which rely on the supply of finite resources. However, existential challenges such as climate change, waste, pollution, resource scarcity and biodiversity loss

can be mitigated by moving to a more circular economy.

In November 2022, the GSMA published a new strategy to move the telecoms industry towards greater circularity<sup>8</sup>. This vision embraces a future where devices have as long a lifetime as possible, where they are made with 100% recyclable and recycled content using 100% renewable energy and where no device ends up as waste.

**Figure 8** | The circular model displaying the circular transition for devices.

## THE INDUSTRY VISION FOR 2050



Source: GSMA

8 [gsma.com/betterfuture/resources/strategy-paper-for-circular-economy-mobile-devices](https://gsma.com/betterfuture/resources/strategy-paper-for-circular-economy-mobile-devices)

The two primary principles supporting this vision are increasing the longevity of devices and zero waste. Key benefits include:

- 1** Extending the lifetime of all smartphones in the world by just one year has the potential to save up to 21.4 million tonnes of CO<sub>2</sub> emissions annually by 2030, equal to taking more than 4.7 million cars off the road.
- 2** A reduction in the 30 million adults and children currently experiencing adverse health impacts from informal e-waste recycling.
- 3** A refurbished mobile devices market predicted to be worth more than US\$140 billion by 2030, compared to US\$50 billion in 2020.

The opportunity space is wide given that efforts to increase circularity are still broadly nascent. This includes four priority areas:



**Understand product flows.** Increase the number of mobile devices collected from consumers (e.g. smartphones, tablets, smart home devices etc) and create the foundation to measure the share of recycled, repaired, reused and reclaimed devices.



**Increase consumer awareness.** Improve understanding of consumption habits in terms of end-of-life treatment and incentives to increase the longevity of devices.



### **Engage with suppliers.**

This involves working with device suppliers to build reusability and reparability of components into the design of different device categories.



### **Partner with repairers.**

Extending partnerships with the device repair and refurbishment industry to increase the share of devices that can be repurposed rather than confined to e-waste.

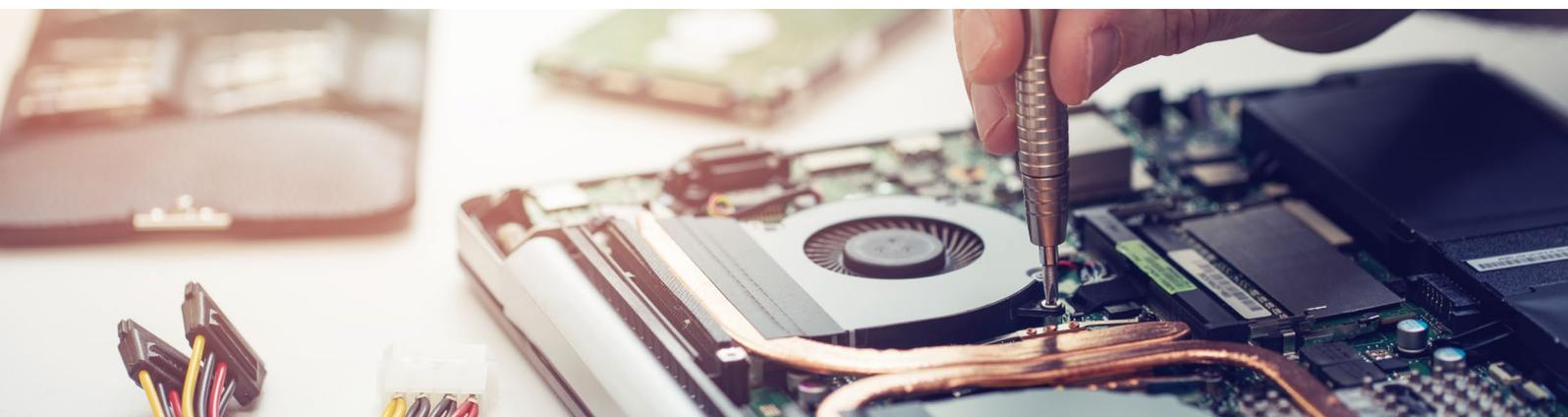
By moving to a more circular business model, negative environmental and social impacts of the industry can be reduced. It can also create new market and employment opportunities and will support a just transition with supportive government policies and incentives.

### **Manufacturer progress**

Apple have committed to create products with zero carbon impact by 2030, which includes using 100% renewable electricity for their entire product supply chain.

Samsung has committed to a carbon-neutral target for its core devices division by 2030 (which includes smartphones, tablets and PCs) and the broader device solutions business by 2050. Samsung is also a recent entrant to the network equipment value chain.

Lenovo, the Chinese PC and electronics maker, announced in January 2023 that its net zero targets had been validated by SBTi. Combined with existing commitments from Nokia, Ericsson and other global-scale suppliers to the telecoms industry, this should help quantify and accelerate the reduction of Scope 3 emissions for mobile operators.



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# Impact of virtualisation

The impact of the move to a virtual network paradigm on energy consumption is complex because it depends on the energy efficiency and power source of data centres (often leased from cloud majors rather than owned by telcos) and the changing use of enterprise verticals. The reduction in truck rolls associated with network repair and upgrades – which is reduced in a software-defined environment – has a carbon benefit.

On open RAN, it is not possible to say whether it will be more energy-efficient than traditional RAN solutions, but initial lab tests highlight gains. Virtualisation offers better energy efficiency through capacity aggregation, cloudification and the use of refurbished equipment, and can also be upgraded, set up and authenticated remotely, saving on truck roll and associated staff.

Edge computing is a third facet to the virtualisation topic. This is a key part of the industrial digitisation wave and for operators selling 5G into industries such as manufacturing and transport. As productivity gains rise, so does energy use decline – consequently lowering emissions.





## Case Study: MTN

MTN's Circular Economy programme, named 'Project Infinity', is one of the key drivers of their Ambition 2025 strategy for achieving net zero by the 2040 target. MTN has, since 2018, run a proof of concept and is currently operationalising the programme. It aims to move away from the traditional linear economy model of take-make-use-waste. Project Infinity promotes collaboration with partners to close the loop, extend the lifecycle and maximise the use of network equipment through responsible production,

consumption and disposal, thus saving valuable and precious resources. The programme consists of a digital platform to provide the necessary visibility and intelligence to match supply and demand, and a service partner to facilitate responsible reuse, recycling and movement of equipment across borders. Through cooperation with the relevant industry organisations, key suppliers and partner operators, MTN is advocating for broader support and inclusion of circularity within our industry.



## Case Study: Tele2

As a result of Tele2's ambitious efforts to reduce emissions by 90% in their own operations in two years, the majority of Tele2's emissions lie within its value chain today.

Transitioning to a more circular economy has the potential to decrease the environmental impact of Tele2's value chain and is one of four key focus areas of Tele2's sustainability strategy.

In the autumn of 2021, Tele2 mapped out the most important material flows of its operations and identified key questions for moving forward in the circular transition. The material flow analysis included both network infrastructure, offices and stores

as well as customer products in B2B and B2C offers. Material inputs of around 3,000 tonnes were identified.

Excluding the network equipment, the largest material flows in terms of weight concerned plastics and metals such as aluminium and copper. The analysis showed that around 8-15% of all procured mobile devices are either reused or recycled. To close the loop for mobile devices, the number of reclaimed devices must increase.

The insights from the material mapping will be used to further develop Tele2's understanding and implementation of circular economy for devices.



# Digitisation and enablement





## Digitisation and the core of green and digital transformation

Digitisation is a key enabler of the decarbonisation transition. Network operators, equipment vendors and supporting ecosystem partners play a vital role in the move to greener economies. At the EU level, discussions on the links between digitalisation and the environment have gained momentum in recent years, with the launch last year of the **European Green Digital Coalition**.

Many of the major European network operators were founding members of this initiative by promoting and signing the Declaration, which involves a commitment to reach net zero by 2040 – a decade earlier than the global ICT sector pathway. Mobile operators that have signed the

declaration include A1, Telekom Austria Group, BT Group, Deutsche Telekom, KPN, Liberty Global, Nos, Orange, Proximus, TDC, Telefonica, Telenor Group, Telia Company, TIM and Vodafone.

By signing the declaration, companies commit to act in the following areas:

- Invest in the development and deployment of greener digital technologies and services that are more energy- and material-efficient.
- Develop methods and tools to measure the net impact of green digital technologies on the environment and climate.
- Co-create a set of recommendations and guidelines for green digital transformation.

Members promoting this initiative recognise the need for science-based methods to estimate the reduction and avoidance of GHG emissions by specific ICT solutions across sectors.

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## Enablement effect

For any country or company to get to net zero by 2050, reductions of 50% will be required in each successive decade leading up to that point. The next 10 years to 2030 are crucial.

With global CO<sub>2</sub> emissions now at approximately 53 gigatonnes (GT), the required cut this decade is around 26GT. Put in context, that is 26 billion tonnes of carbon or three tonnes of CO<sub>2</sub> taken out of circulation for every person on Earth over the next 10 years.

To this end, beyond the investments telco operators make to improve the energy efficiency of their own mobile and fixed networks, a larger proportionate impact is available through the digitisation of other industries.

The mechanism for this is what is referred to as the 'enablement effect', in which mobile connectivity, IoT, AI and other digital technologies are used by enterprise verticals to help lower their own energy use and emissions to a level multiples that of the telecoms sector's own footprint.

GSMAi modelling suggests that mobile and digital technology, deployed at scale, could amount to just under 40% of the required CO<sub>2</sub> reductions over the next 10 years within the top four emitting industries that account for 80% of global emissions - manufacturing, power and energy, transport, and buildings. Investment costs, integration complexities and a lack of RoI proof points are the main headwinds. As digitisation continues to grow across the economy, the energy reduction aspect of advanced technology will increasingly become a unique selling point for telcos, equipment vendors and tech companies.

There must  
be a cut of  
**26 BILLION**  
GT CO<sub>2</sub> or three  
tonnes per  
person

taken out of  
circulation for every  
person on Earth over  
the next \_\_\_\_\_

**10 YEARS**



Over the  
next 10 years,  
mobile and digital  
technology could  
help cut nearly

**40%**

of required CO<sub>2</sub> emissions  
within manufacturing, power  
and energy, transport and  
construction - the industries  
which account for

**80%** of global  
emissions





## Case Study:

### Telia and Ekobot

Telia and Ekobot have teamed up to combat climate change by providing a solution for sustainable agriculture. Feeding a growing global population while contributing to healthy diets and balancing our ecosystems are some of the biggest challenges to solving the climate crisis.

A robot system based on AI (Artificial Intelligence) and IoT (Internet of Things) technologies that uses data to provide a business intelligent system to farmers, Ekobot enables efficient and environmentally conscious precision farming. It is an autonomous, electric field robot for mechanical weed control which is connected to Telia's 5G network. Ekobot can identify and mechanically remove weeds using advanced camera sensors and AI. It allows for reduced use of chemicals on the field for healthier crops, soil and produce, and also improves harvest efficiency.

Powerful sensors mounted on the robot, such as multispectral cameras and soil probes, generate data which is analysed in the cloud, sent back to the robot and made available to farmers via an app. The robot can run around the clock and can be steered remotely, which requires real-time data feeds. This is possible with a robust and secure connectivity solution, and 5G's low latency and high bandwidth meet these needs at scale.

Ekobot's camera technology allows for both precision weeding and crop monitoring. In the app, farmers can detect varying conditions in their crops and take measures only in areas that require additional care instead of treating the whole field. This way, they can use resources more efficiently and reduce the impact on the environment. Ekobot also automates manual work in agriculture, which is often expensive and – in some regions of Europe – can even be scarce.





# Adaptation and resilience



# Task Force on Climate-Related Financial Disclosures

The Task Force on Climate-Related Financial Disclosures (TCFD) was created in 2015 by the Financial Stability Board to develop consistent climate-related financial risk disclosures for use by companies, banks and investors in providing information to stakeholders. The goal is to achieve a greater understanding of climate risks and facilitate financing of the transition to a more stable and sustainable economy.

Network operators are especially exposed to climate-related financial risks because their valuable assets (base stations) are scattered everywhere, including areas at greater risk. Many operators have already undertaken short- or long-term TCFD-aligned climate change risk and opportunity analysis.

Based on the data provided by the operators to the CDP, 60% of network operators by revenue and 58% by connections have started or are planning their TCFD-aligned climate change risk and opportunity analysis.

Short-term climate risk-related analysis covers the impacts already experienced and the expected impacts over the next few years. Long-term risk assessment scenarios are modelled according to a 20- or 30-year timespan or to 2050 to align with the Paris Agreement.

Examples of operators who have carried out comprehensive climate-related financial analysis and scenario planning include A1, Globe Telecom, Orange, Safaricom, Taiwan Mobile, Telenor, Verizon and Vodafone.

As climate change results in rising sea levels and more extreme weather events, mobile operators' networks could be damaged with greater frequency, resulting in more service interruption for customers and greater financial risks for operators. Operators are therefore under increasing pressure to make their networks as robust as possible so they can withstand extreme weather and be restored quickly.

At the same time, mobile technology and innovation enabled through, for example, AI and big data<sup>9</sup> is uniquely positioned to provide and enable tools for climate change mitigation, adaptation, weather disaster response, pollution and environmental monitoring<sup>10</sup>.

**60%** of the network operators by revenue and

**58%** by connections have started or are planning their



**TCFD-aligned climate change risk and opportunity analysis**



<sup>9</sup> [gsma.com/betterfuture/aiforimpact](https://www.gsma.com/betterfuture/aiforimpact)  
<sup>10</sup> [gsma.com/mobilefordevelopment/resources/the-role-of-digital-and-mobile-enabled-solutions-in-addressing-climate-change](https://www.gsma.com/mobilefordevelopment/resources/the-role-of-digital-and-mobile-enabled-solutions-in-addressing-climate-change)

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# GSMA Mobile for Development Innovation Fund

Digital technology can help create a more resilient and sustainable future for communities that are vulnerable to climate shocks and stressors. Mobile services, digital payment services, data assets and frontier technologies such as Internet of Things (IoT), artificial intelligence (AI) and blockchain present a range of possibilities for digital and mobile-enabled solutions in the climate context.

In November 2022 at COP27, the GSMA Innovation Fund<sup>11</sup> for Climate Resilience and Adaptation announced the second cohort of successful applicants that have secured innovation funding from the UK Foreign, Commonwealth and Development Office (FCDO) and the Swedish International Development Cooperation Agency (SIDA).

The objective of the Innovation Fund is to support the launch and accelerate the scaling of mobile and digital innovations that could enable some of the world's most vulnerable communities to build their resilience to climate change. The funding supports start-ups, small and medium enterprises (SMEs) and social enterprises working on climate action.





## Case Study: Jazz Pakistan

While the vast majority of farmers in Pakistan already possess functional identities (e.g. National ID cards), they rarely translate into economic identities given the low financial inclusion and high incidence of cash payments, especially in the agriculture sector. This leads to challenges for buyers as well as financial service providers. Jazz aims to address this issue by establishing, enriching and then actioning profiles to enable access to financial products.

Jazz gives farmers the option to receive digital payments via their proprietary JazzCash mobile money wallet and outsources their advisory service to agritech BaKhabar Kissan (BKK). Jazz has also partnered with agritech Ricult and agribusiness Reap Agro to digitise farmer profiling, procurement records and digital payments. Loans are provided in

partnership with fintechs CreditPer and Finja (for Reap Agro farmers), while Ricult began a pilot with Habib Bank in Q4 2022.

Ricult follows a B2B model, providing procurement software as a service to crop buyers that want to digitise their procurement transactions with farmers. Reap Agro, on the other hand, buys directly from farmers under a contract farming model using a proprietary digital procurement solution.

Jazz initially partnered with Ricult and Reap Agro/BKK on digital procurement, but the company has defined functional specifications to develop their own software with support from the GSMA Innovation Fund. This digital profile and procurement service integrates JazzCash payments and was launched in November 2022.





# Recommendations



Moving the whole mobile industry to net zero emissions by 2050 will require concerted effort and action by all key industry 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 gives an overview of the actions needed by stakeholders if the industry is to be successful in its net zero ambition:



### **Operators**

- Disclosure through the CDP and aligning with TCFD
- Setting science-based and net zero targets
- Switch to renewable energy
- Develop circular economy initiatives for network equipment and connected devices
- Engage with suppliers on climate action and integrate climate requirements into procurement



### **Suppliers**

- Disclosure through the CDP and aligning with TCFD
- Setting science-based and net zero targets
- Switch to renewable energy
- Develop circular economy initiatives for network equipment and connected devices
- Engage with operators on climate action



### **Governments and policymakers**

- Support the private sector in their decarbonisation efforts, ensuring policy and regulatory frameworks are conducive of private sector investment
- Align policies and targets with decarbonisation pathways that support limiting global heating to 1.5°C
- Support retirement of 2G/3G legacy networks where possible
- Accelerate access to renewable and actively engage in dialogue with private sector where there is a lack of access
- Recognise the enablement effect of the digital transformation and foster investment in smart digital technologies



# Regional Data





# Asia Pacific Climate Action Progress



**21** disclose to CDP



**10** scored A on CDP



**18** set science-based targets



**11** committed to net zero



**+6%**  Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:

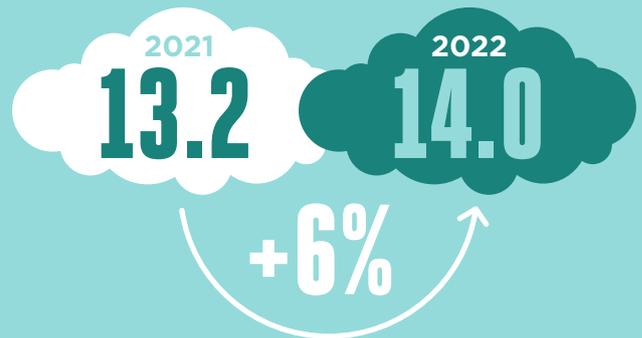


Change in emissions 2021 to 2022

**-1%**  
Scope 1

**+5%**  
Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



Operators in Asia Pacific (APAC) continue to make good progress on climate disclosure, scoring and target setting. Scope 1 emissions remain flat compared with the previous year, while electricity use and Scope 1 and 2 emissions per

mobile connection have increased from last year by 6%. There has been an increase in renewable electricity use, up to 7% from 4%, but the rate of growth is still too low for operators to meet their 2030 science-based targets.



# APAC Case Study

## Axiata

Axiata has set an ambitious target to hit net zero by 2050. To reach the decarbonisation of Scope 1 and 2 reductions of 45% required by 2030, access to renewable electricity (RE) through national grids is essential to achieve these commitments. However, the current capacity of renewables in Axiata's markets does not currently meet this demand.

To solve this challenge, supporting regulatory and policy environments that enable access to stable renewable electricity marketplaces are needed to help the company's transition to net zero. Mobile operators, together with other businesses with similar science-based targets towards 2030, can act as frontrunners to lower risk and attract investment into renewables by committing to long-term, large-scale offtake agreements.

Axiata, along with the other Malaysian operators and with the support of GSMA, held a roundtable to engage the relevant government agencies on the challenge of accessing renewables in Malaysia.

The session discussed the opportunity for the mobile sector to play a leading role in supporting Malaysia to reach net zero by 2050.

This closed-door roundtable brought together mobile operators (MNOs), tower infrastructure (ToweCo), relevant government departments and the electricity utility provider in Malaysia to discuss the country's changing policy and renewable energy landscape. The key focus was to enable knowledge sharing to identify opportunities for joint industry collaboration to address challenges to accessing renewables and how to support Malaysia's climate goals.

As policymakers consider the mobile industry as a strategic partner in the decarbonisation of the global economy, increased public-private dialogue will help to expedite the availability and access to renewable sources of energy in regions where it is not possible today or still limited. Such partnerships can support governments to meet their carbon reduction targets while also enabling the mobile industry's net zero ambition.





# Sub-Saharan Africa Climate Action Progress



**8** disclose to CDP



**2** scored A on CDP



**7** set science-based targets



**6** committed to net zero



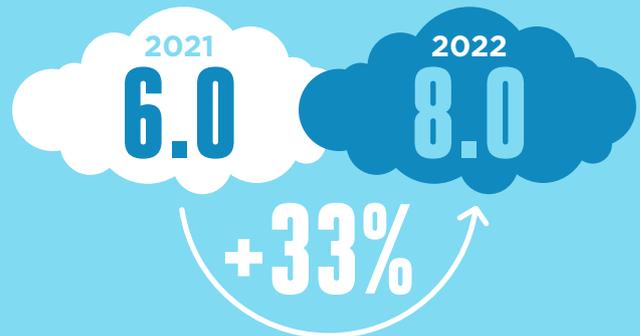
**+21%**  Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:



Change in emissions 2021 to 2022 **+44%** Scope 1 **+38%** Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



Operators in Sub-Saharan Africa (SSA) are disclosing to the CDP and have set science-based and net zero targets. The significant increase in electricity use is due to operators reporting higher electricity in 2022 despite power outages and supply problems from the grid. There has been

a corresponding rise in Scope 1 emissions from the subsequent reliance on diesel generators to provide power. Directly purchased renewable electricity remains at low levels compared with last year, with access posing a continuing challenge due to electricity market structures.



# SSA Case Study

## Safaricom

Electronic waste or e-waste is a growing problem around the world and Kenya is no exception. It is estimated that Kenya generates an average of 3,000 tons of e-waste each year from computers, monitors, printers, mobile phones, fridges, batteries and other devices. E-waste is hazardous because the components used to make devices such as laptops, cell phones and televisions contain metals and chemicals known to harm human health.

To handle the issue of e-waste, Safaricom has an active partnership with WEEE Centre, a NEMA (National Environment Management Authority in Kenya) licenced e-waste handler. E-waste is collected across Kenya and brought to the recycling centre, where it is weighed, registered and sorted for reuse, refurbishment or for dismantling for recycling. Some fractions are recycled locally and others are shipped abroad. Each month, the centre in Nairobi processes up to 10 tonnes of e-waste and, to date, Safaricom have been able to

collect more than 1,700 tons of e-waste to return to the circular economy through the support of WEEE Centre.

In addition, Safaricom has, since 2018, partnered with the Ministry of Environment and Forestry, the East Africa Communications Organisation (EACO) and other stakeholders to commemorate International E-Waste Day with the aim of creating awareness on the importance of safe disposal, handling and recycling of e-waste.

In 2022, Safaricom entered into partnership with Badili, an electronic company, to pilot device trade-ins where they take in damaged or broken phones from customers and refurbish them for resale. Safaricom have also partnered with Carlcare to address e-waste menace from phones. To date, they have managed to acquire 300 phones from customers which Carlcare has dismantled to obtain spare parts.





# Middle East and North Africa Climate Action Progress



**7** disclose to CDP



**3** scored A on CDP



**6** set science-based targets



**4** committed to net zero



**-2%**

Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:

**3%**  
2021

**23%**  
2022

Change in emissions 2021 to 2022

**+9%**  
Scope 1

**-25%**  
Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



Operators in the Middle East and North Africa (MENA) have seen a slight decrease in electricity from 2021 to 2022, down 2%, but there has also been a significant increase in the share of renewable

electricity up from 3% to 23%, driven largely by purchases in Turkey. This has led to a drop of 25% in both Scope 2 emissions overall and in Scope 1 and 2 emissions per connection.



# MENA Case Study

## Orange

Orange has set the ambitious target of being net zero in carbon emissions by 2040, which is 10 years ahead of the mobile sector commitment. This goal of reducing direct and indirect CO<sub>2</sub> emissions will require considerable effort and it will be addressed by increasing energy efficiency and the proportion of renewable energy, applying circular economy techniques and carbon capture.

To date, Orange has deployed 4,750 solar sites in Africa and Middle East which supply their mobile telephone systems. Orange is also developing the use of solar energy through partnerships with electricity companies (ESCO projects), with eight countries benefitting: Democratic Republic of Congo, Guinea, Côte d'Ivoire, Burkina Faso, Sierra Leone, Central African Republic, Liberia and Cameroon.

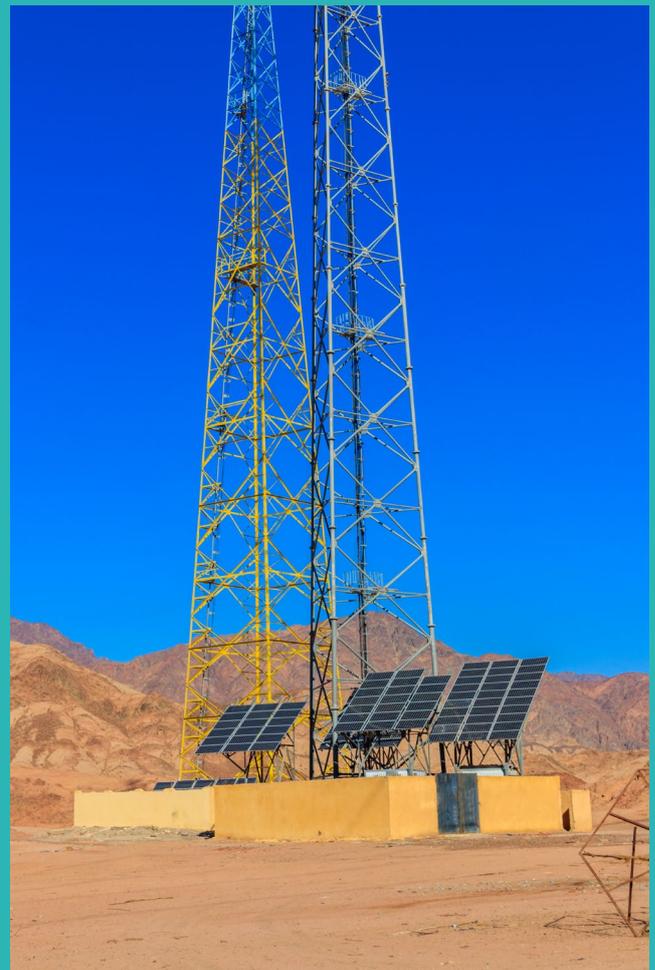
At COP27 in Egypt, Orange Egypt and the New and Renewable Energy Authority of the Ministry of Electricity and Renewable Energy signed a new cooperation protocol. Under the agreement, Orange Egypt will receive clean electricity generated by the Authority from wind and solar energy, allowing it to avoid the use of fossil fuels and electricity generated from unsustainable sources.

Orange Egypt has succeeded in operating a large number of towers and stations using 100% solar energy over the last two years. It has also converted hundreds of sites to work with hybrid energy by installing modern generators that reduce the use of diesel while also working on charging high-efficiency lithium batteries. This means that the number of conventional generators has decreased by more than 55%.

Orange is also committed to optimising the lifespan of electrical and electronic equipment. The company aims to collect

the equivalent in the volume of WEEE of 20% of all mobile phones sold in Africa and the Middle East as part of our Engage 2025 strategic plan.

Since 2010, Orange has partnered with Emmaüs International and Ateliers du Bocage, a community project boosting local employment opportunities, to open workshops for collecting mobile waste. In the absence of an official recycling system, the waste collected is sent back to France in bulk in accordance with European environmental standards. This programme is operational in five countries (Burkina Faso, Benin, Niger, Cameroon and Côte d'Ivoire), and an equivalent of two million mobile phones have been collected and many local jobs have been created.





# Greater China Climate Action Progress



**6** disclose to CDP



**3** scored A on CDP



**4** set science-based targets



**2** committed to net zero



**+58%**  Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:

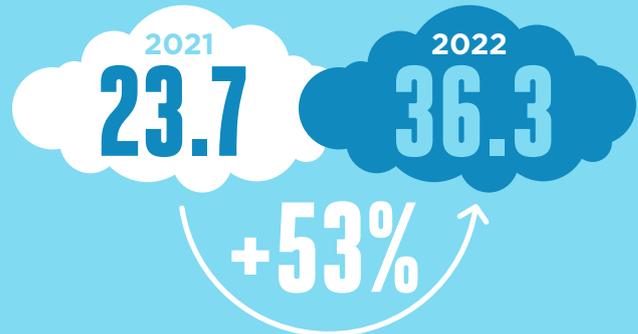


Change in emissions 2021 to 2022

**+8%**  
Scope 1

**+53%**  
Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



In Greater China, electricity use, Scope 2 emissions and Scope 1 and 2 emissions per connection have all increased significantly since the previous year because China Mobile included the energy consumption

of the rented equipment from China Tower for the first time. Despite the big jump in electricity use, the share of renewable electricity purchases has remained constant at 4%.



# Europe Climate Action Progress



**23** disclose to CDP



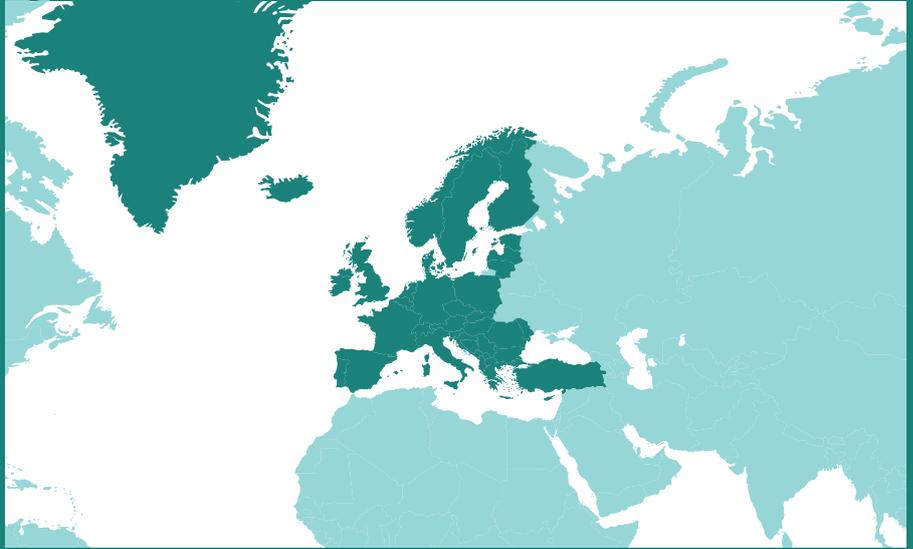
**12** scored A on CDP



**24** set science-based targets

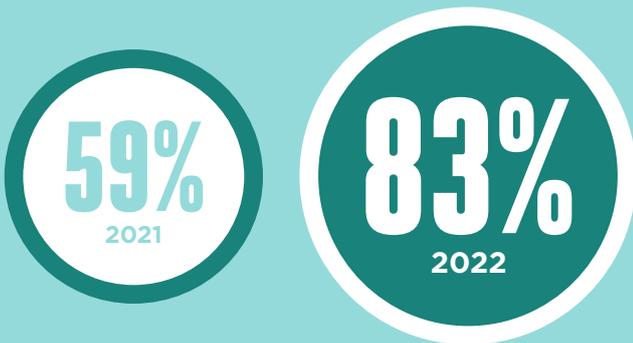


**19** committed to net zero



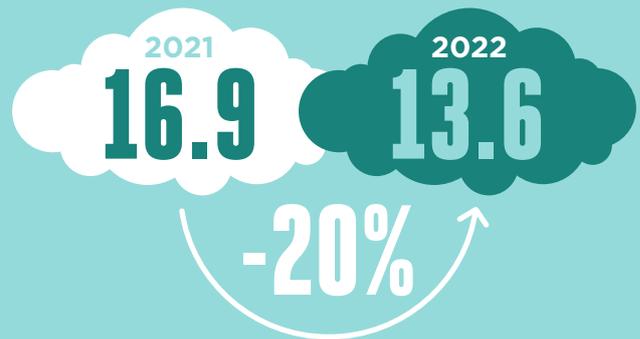
**+6%**  Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:



Change in emissions 2021 to 2022 **+14%** Scope 1 **+1%** Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



In Europe, Scope 1 and 2 emissions have increased, mainly due to an increase in the number of operators reporting. Like-for-like comparison with last year shows less than a 1% decrease in electricity use and a 6% decrease in

Scope 2 emissions. Renewable electricity use has increased significantly since the previous year and Scope 1 and 2 emissions per connection have dropped by 20%, showing operators progressing towards their science-based targets.



# Europe Case Study

## BT Group

BT Group has been a leader in climate and sustainability action for 30 years, setting its first carbon reduction target in 1992 and one of the world's first science-based targets in 2008. In 2022, BT Group pledged to be net zero in carbon emissions for its own operations by the end of March 2031 and for its supply chain and customer emissions by the end of March 2041.

In November 2020, BT Group hit a huge milestone by completing the switch to 100% renewable electricity worldwide<sup>1</sup>. The company is also reducing electricity consumption by decarbonising buildings and networks and, in 2022, cut its global energy consumption by a further 9GWh.

Nearly two-thirds of BT Group's operational emissions come from its commercial fleet. BT Group has added more than 2,000 electric vehicles to the commercial fleet, has increased the number of charging points at its sites and worked with electricity providers to install off-street chargers at engineers' homes. To date, the electric fleet has travelled around 3.5m miles and avoided 1,500 tonnes of CO<sub>2</sub>e.

In 2020, BT Group and Openreach joined forces with the Climate Group to set up the UK Electric Fleets Coalition. This organisation now has 28 members to advocate for policy measures to support the transition to electric vehicles.

As with many companies in the telecoms industry, only a small percentage of BT Group's end-to-end carbon emissions come from its own operations and this is why working with suppliers to reduce their own carbon emissions is key to reaching net zero. A climate clause has been introduced with some key suppliers which commits them to making measurable carbon savings during the life of their contract.

In addition, BT Group tracks compliance through supplier assessments and encourages suppliers disclose to the CDP to enhance transparency and accountability. In February 2023, the company launched a new supplier engagement campaign to encourage setting of net zero science-based targets.



<sup>1</sup> 99.9% of the global electricity BT sources is renewable. The remaining 0.1% represents where markets don't allow due to non-availability of renewable electricity.



# North America

## Climate Action Progress



**8** disclose to CDP



**5** scored A on CDP



**8** set science-based targets



**5** committed to net zero



**+1%**  Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:

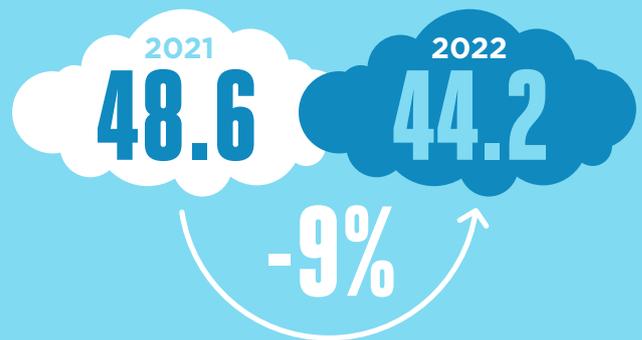


Change in emissions 2021 to 2022

**-5%**  
Scope 1

**-5%**  
Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



Operator electricity use was largely flat in North America, with a significant increase in renewable electricity purchase (from 11% to 36%). This has been accompanied by a 5% reduction

in both Scope 1 and 2 emissions. Scope 1 and 2 emissions per connection has declined even further by 9%. This data indicates that progress is being made towards operator carbon targets.



# North America Case Study

## T-Mobile

T-Mobile has made great progress in reducing its environmental footprint and is now taking even bigger steps to reduce carbon emissions, with a commitment to meeting the Science Based Targets Initiative's (SBTi) Net-Zero Standard.

T-Mobile has become the first company in US wireless to set a net zero goal for all three emissions scopes that has been validated by the SBTi using their net zero standard, which is the world's first framework for company targets that aligns with the latest climate science. This goal covers emission Scopes 1 and 2, inclusive of direct emissions from T-Mobile's operations and facilities, as well as indirect emissions from purchased electricity.

The net zero standard also covers all remaining indirect Scope 3 emissions (the company's entire footprint), including those produced by suppliers, customer device usage, materials and fuel required

to ship products and employee travel, which represents roughly two-thirds of the company's carbon footprint.

To bolster this new goal, T-Mobile also signed onto The Climate Pledge, a cross-sector community of companies and organisations working together to solve the challenges of cutting global carbon emissions for a sustainable future.

T-Mobile has a long track record of dedication to building a more sustainable future. It was previously the first in US wireless to achieve an ambitious 100% renewable electricity goal, as well as previous science-based carbon reduction goals. It earned an A- for the 2022 CDP Climate Change disclosure and was recognised in the top 20 of JUST Capital's 2023 Rankings of America's Most Just Companies, including a number one ranking in the telecom industry for environmental impact.





# Latin America Climate Action Progress



**7** disclose to CDP



**1** scored A on CDP



**4** set science-based targets



**3** committed to net zero



**-2%**



Change in electricity use from 2021 to 2022

Share of purchased renewable electricity as percentage of total:

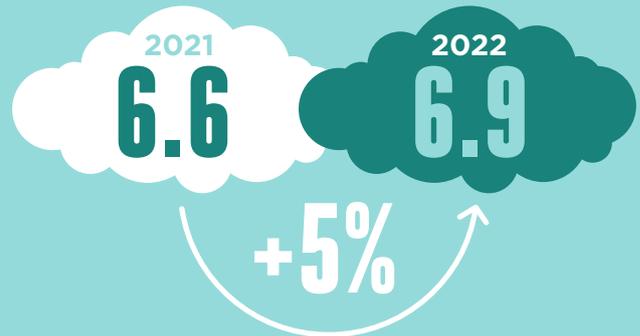


Change in emissions 2021 to 2022

**-6%**  
Scope 1

**+17%**  
Scope 2

Scope 1 and 2 metric tonnes of CO<sub>2</sub> emissions per million connections:



In Latin America, there has been an increase in electricity use from 2021 to 2022, and this has had a subsequent effect on Scope 2 emissions. Purchased renewable electricity use has dropped

because one operator merged with another. Scope 1 emissions have remained broadly flat, and Scope 1 and 2 emissions per connection have seen a slight increase.



# LATAM Case Study

## Telefónica

Companies need to increase efforts to reduce their carbon footprint and digitisation is an enabler of the green transition.

### The solution

In August 2022, Telefónica was the first telco in the world to obtain validation from the Science Based Targets Initiative (SBTi). To ensure compliance with emission reduction targets, Telefónica has integrated the net zero standard into its governance model through its Climate Action Plan with its operational, value chain, commercial, financial and governance roadmap. All employees, including the Executive Committee, are involved and part of their variable remuneration is linked to this target.

To support the net zero transition, Telefónica have introduced the following programmes: network transformation; energy efficiency projects; the Renewable Energy Plan; internal carbon pricing and the emission neutralisation plan.

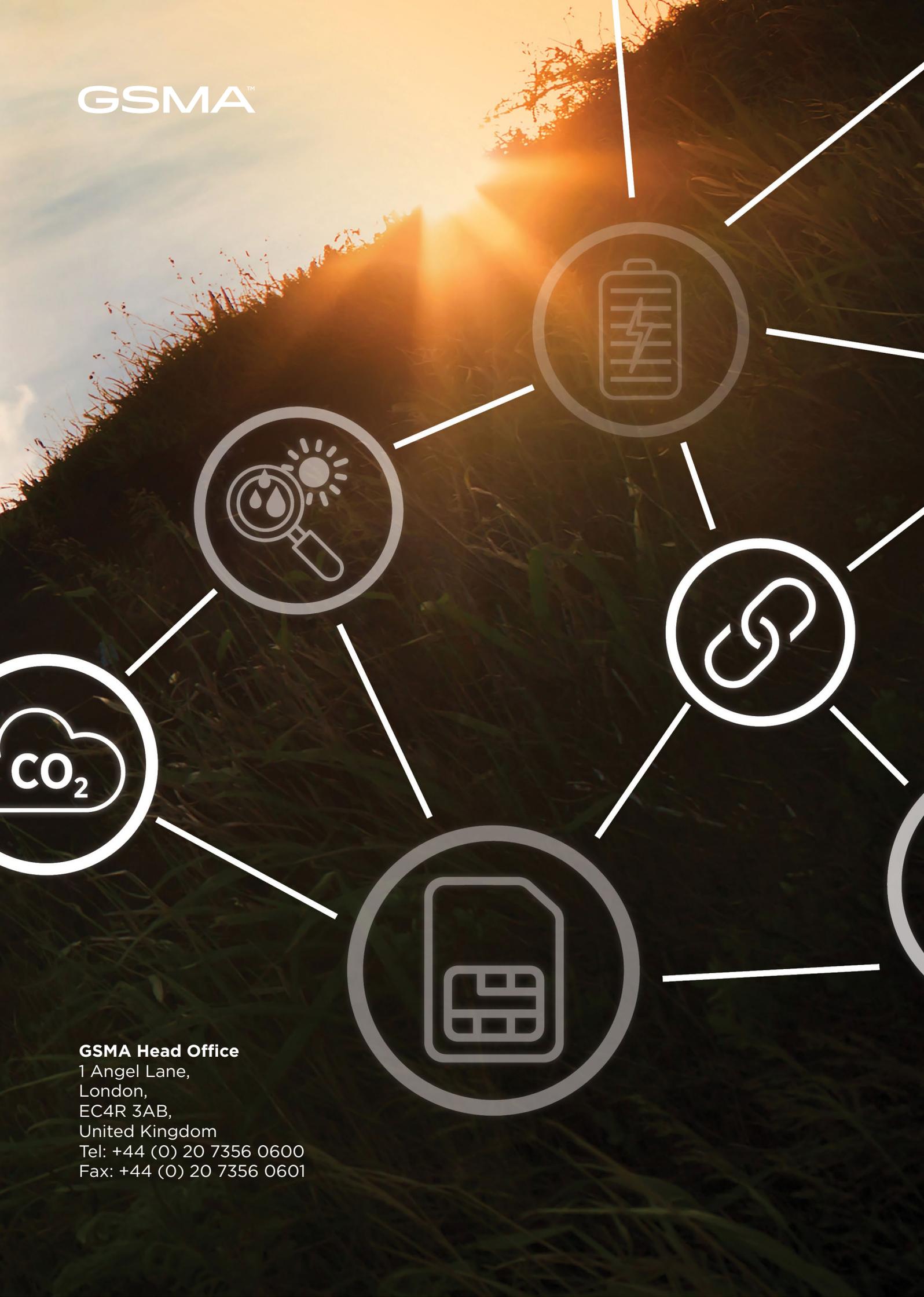
Telefónica is committed to achieving net zero greenhouse gas (GHG) emissions across the value chain by 2040, which means an effective reduction of at least 90% of all its emissions (direct and indirect) and neutralising the remaining emissions (less than 10%) through high-quality carbon credits.

As an intermediate target, Telefónica will reduce absolute GHG emissions in Scope 1 and 2 by 80% and 56% in Scope 3 (value chain) by 2030.

### The impact

The company has decreased all its emissions by more than 50% (80% for Scope 1 and 2 since 2015 and 30% for Scope 3). In Europe, Brazil, Chile and Peru, 100% of the electricity Telefónica consumes for its own operations comes from renewable sources (82% at global level). The company is contributing to increasing the renewable energy mix in the countries through self-generation or by facilitating the construction of new parks.





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