The *green* factor:
digitisation for the green transition

Digital Public Policy, Regulation and Competition

2023

Telefónica

Index

1. *Executive* Summary

The digital revolution has the potential to transform our world more intensively than any previous technical revolution.

In a context in which climate change, along with other environmental issues, is possibly the most complex challenge we face, the digital transition will play a decisive role. The green and digital transitions must necessarily go hand in hand. Digitalisation is not only an essential condition for the modernisation of our economies through greater business competitiveness, increased labour productivity and more efficient production processes, it can also contribute to reducing inequalities and achieving greater social equity. Indeed, it has the capacity to transform our societies towards a new paradigm based on decarbonisation, sustainability and the circular economy.

Without digitalisation there can be no energy transition.

In a geopolitical context marked by a severe energy crisis in Europe, it is essential to accelerate the dual digital and green transition to move towards greater energy efficiency and a higher penetration of renewable energies.

Digitisation is a key enabler for other productive sectors on their way to a green transition.

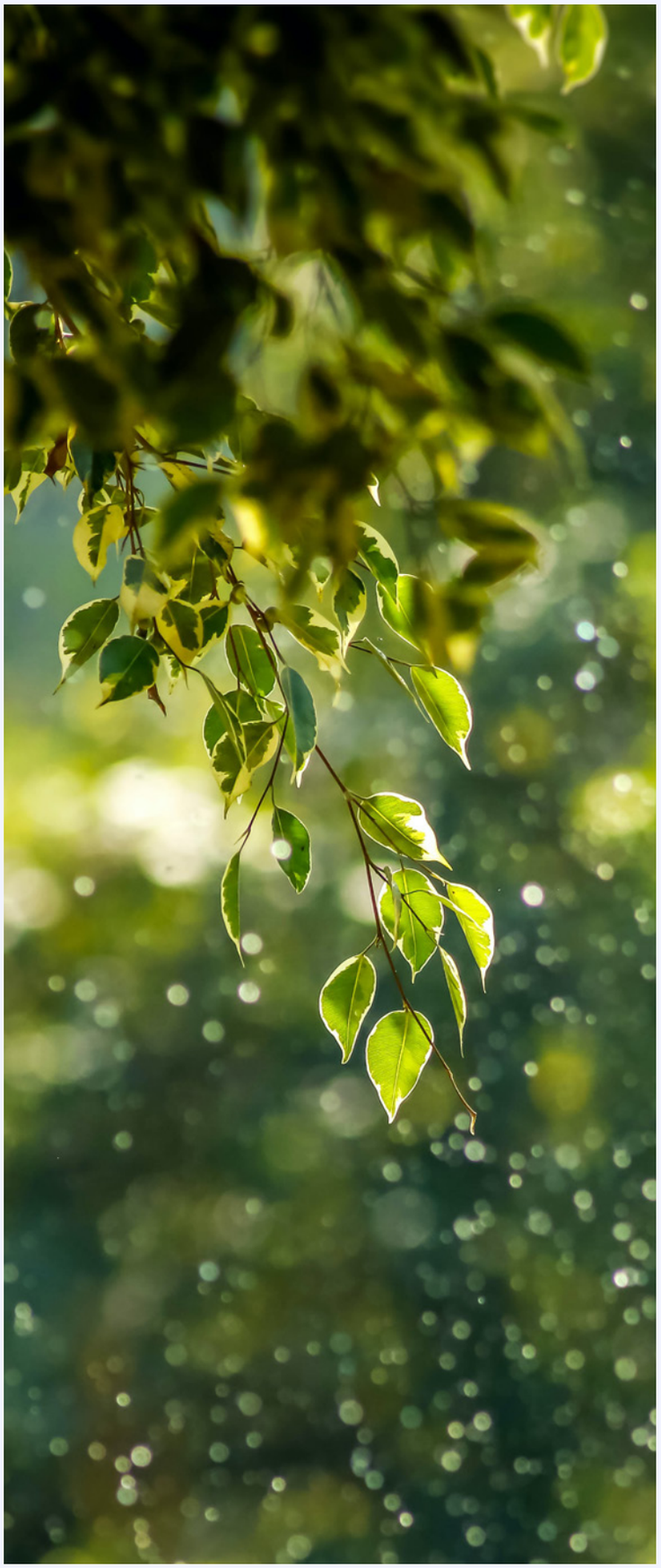
Telecommunications networks are the basis for digitisation and are an essential enabler for other sectors to make progress in their path to decarbonisation. Digitalisation improves efficiency in the consumption of resources and energy, which translates into significant reductions in greenhouse gas emissions in sectors such as transport, industry and cities.

To enable the digitisation process, efficient, last generation telecommunications networks are needed.

Over the last decade, energy consumption from the use of telecommunications networks has remained stable and emissions have even decreased, despite huge increases in network traffic. This can be explained, among other factors, by the deployment of more efficient networks and the use of renewable energies.

The green and the digital transitions are twins, it will not be possible to achieve the environmental goals without full digitisation, but this must be done under the highest environmental parameters and leaving nobody behind.

This is something that must change in the coming years. We believe that a greater push for digitisation, through transformative policies that serve to increase the uptake of digitisation, will put society in a better position to meet the challenges of climate change and achieve more sustainable economic development, supported by the development of basic infrastructures. To this end, the consideration of next generation telecommunications networks as green investments within the taxonomy of sustainable finance is essential. If businesses, policy makers and citizens support this transformation, the impact will be multiplied in the coming years.



2. Context

The Paris Agreement is the first legally binding agreement to establish a common framework for committing to keeping global warming well below 2°C, and continuing efforts to limit it to 1.5°C above pre-industrial levels.

The ICT sector has a major role to play in keeping emissions in line with climate targets, and in the case of Europe, reaching climate neutrality by 2050, as stipulated in the European Green Deal. The combination of new digital applications that facilitate the achievement of sustainability and decarbonisation goals, based on a high-capacity and energy-efficient networks architecture, can play a key role in accelerating the decarbonisation of other sectors. WEF reports and the Exponential Roadmap have shown that digitalisation can reduce CO2 emissions by up to 20%[1] when applied in industrial sectors and up to 35%[2] considering its ability to change people's habits.

The digitalisation can reduce CO2 emissions by up to 20% when applied in industrial sectors.

1. World Economic Forum. (2022) Digital Tech Can Reduce Emissions by up to 20% in High-Emitting Industries.

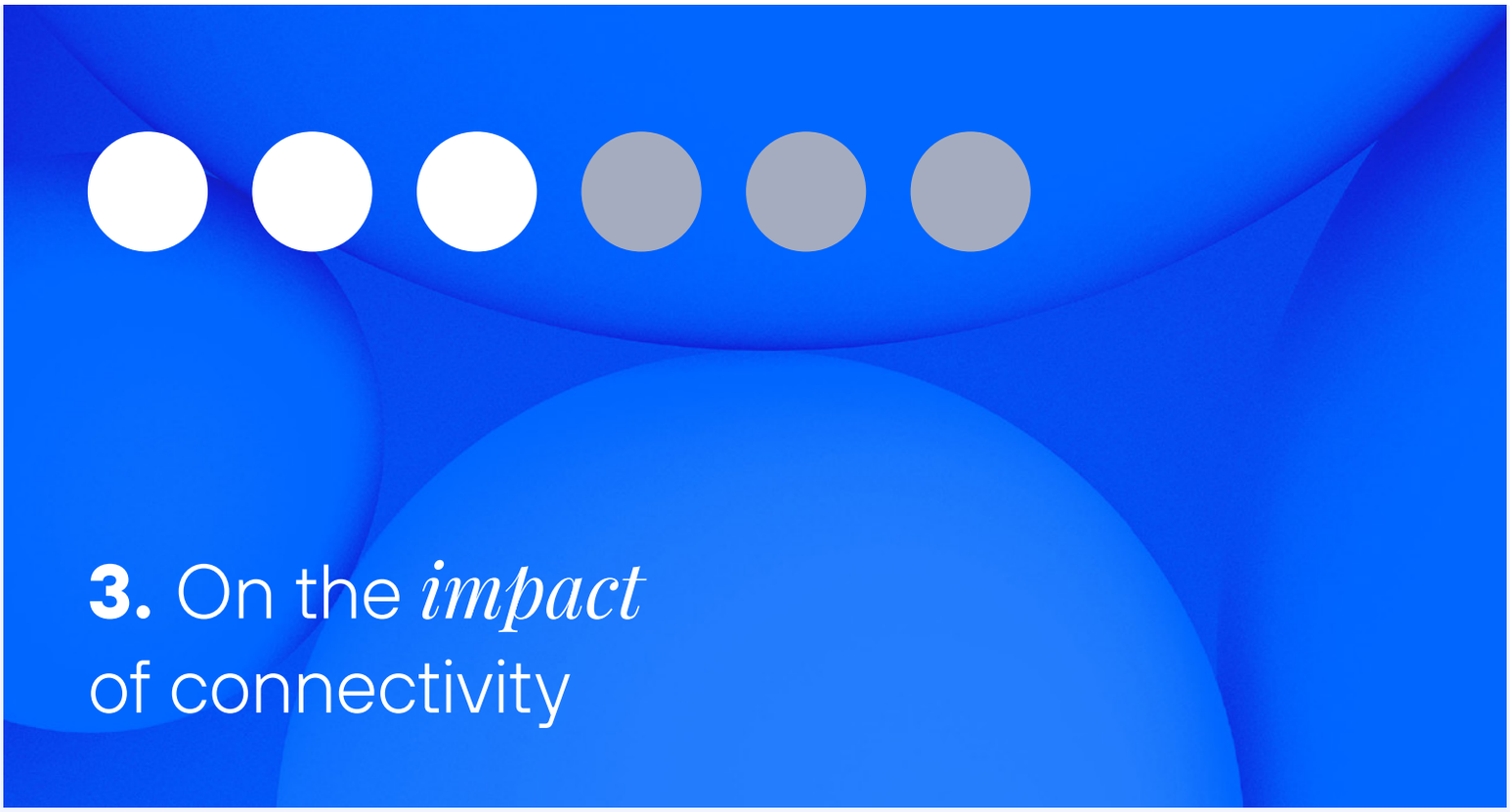
2. Exponential Roadmap. (2020) Scaling 36 solutions to halve emissions by 2030.

One of the cases that best exemplifies this new scope is teleworking. High-speed connectivity solutions in homes and businesses have enabled a change in behaviour for both businesses and employees, improving "work from home" approaches while reducing the need for the employee to commute. This change has resulted in lower carbon emissions as a result of reduced commuting.

Telefónica has quantified the total carbon reduction that can be attributed to the connectivity it provides, which in the case of telework was around 20% based on fixed line connections and 15.3% for B2B mobile connections[3].

LEARN MORE ABOUT TELEFÓNICA'S COMMITMENT TO THE ENVIRONMENT.

3. European Round Table. (2022) Towards an EU Action Plan for a Digitally Enabled Green Transition.



3. On the *impact* of connectivity

A. "Breaking the energy curve" by harnessing the increased efficiency of 5G networks and fibre optics

B. Telefónica's decarbonisation targets

Efficiency in the digital sector is essential to avoid that the net emissions of connectivity solutions, whether or not associated with other digital services, are higher, and that there is no disproportionate increase in energy consumption and emissions in the digital sector.

Concerns about the potential increase in energy consumption by the digital sector explain the emergence of multiple initiatives aimed at improving the understanding of its environmental impact by national policy makers and regulators.

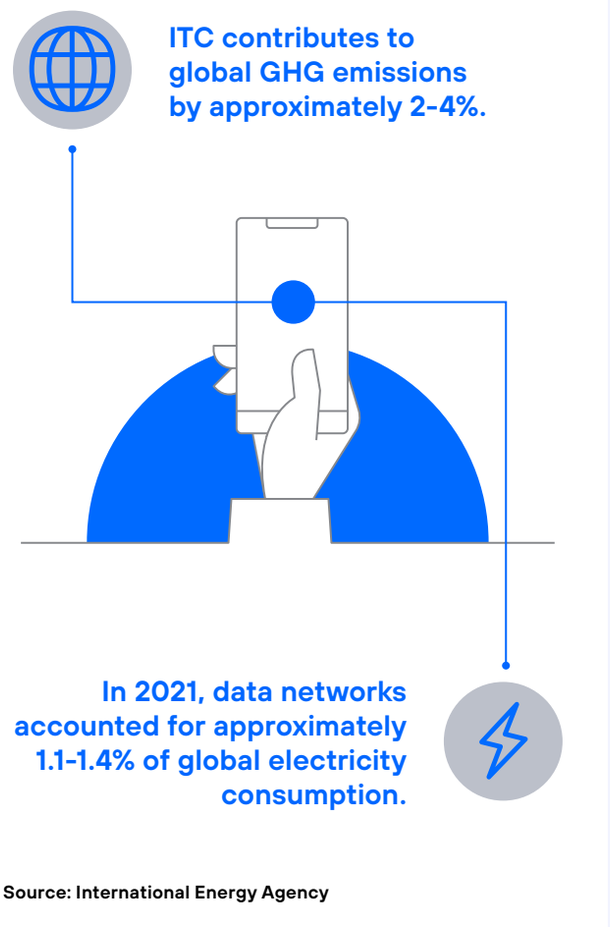
According to data from the International Energy Agency[4], the ICT sector currently contributes 2-4% of total global Greenhouse Gas (GHG) emissions. Within this share, telecommunications networks would be responsible for approximately 12-24%. Devices contribute 60-80% and data centres around 15% of ICT GHG emissions, according to studies.

Globally, data transmission networks consumed 260-340 TWh in 2021[5], accounting for 1.1-1.4% of global electricity use. The energy efficiency of data transmission has

4. International Energy Agency. (2020) Tracking Clean Energy Progress.

5. Análisis de IEA basado en Coroama (2021), ITU (2020), Malmodin and Lundén (2018), Malmodin (2020) and GSMA (2022).

improved rapidly in the last decade: the energy intensity of the fixed-line network has halved every two years[6] in developed countries, and the energy efficiency of the mobile access network has improved by 10-30% per year in recent years[7]. Fibre is 85% more energy efficient than copper and 5G is up to 90% more energy efficient than 4G[8].



Source: International Energy Agency

Global internet traffic increased by 23% in 2021[9]. During the pandemic in 2020, an increase of 40-50% was reported. GSMA members reported that their network data traffic increased by 31% in 2021, while total electricity use by operators increased by 5%[10]. Data from major European telecom network operators analysed by Lundén et al. (2022)[11] reflect these overall efficiency trends. Electricity consumption of the reporting companies, which accounts for about 36% of European subscriptions and 8% of global subscriptions, increased by only 1% between 2015 and 2018, while data traffic tripled.

There are two fundamental factors to consider when assessing energy efficiency in the telecommunications sector.

On the one hand, there is demand-driven energy consumption: mainly the traffic generated by network users. This is the main driver of energy consumption.

On the other hand, we have the energy consumption that depends on the type of technology, the operation and the efficiency of the networks themselves.

The two aspects are, of course, interdependent.

6. Joshua Aslan, Kieren Mayers, Jonathan G. Koomey, and Chris France. (2017) Electricity Intensity of Internet Data Transmission: Untangling the Estimates.

7. IEEE Journals. (2011) The global footprint of mobile communications: The ecological and economic perspective.

8. Nokia. (2020) Nokia confirms 5G as 90 percent more energy efficient.

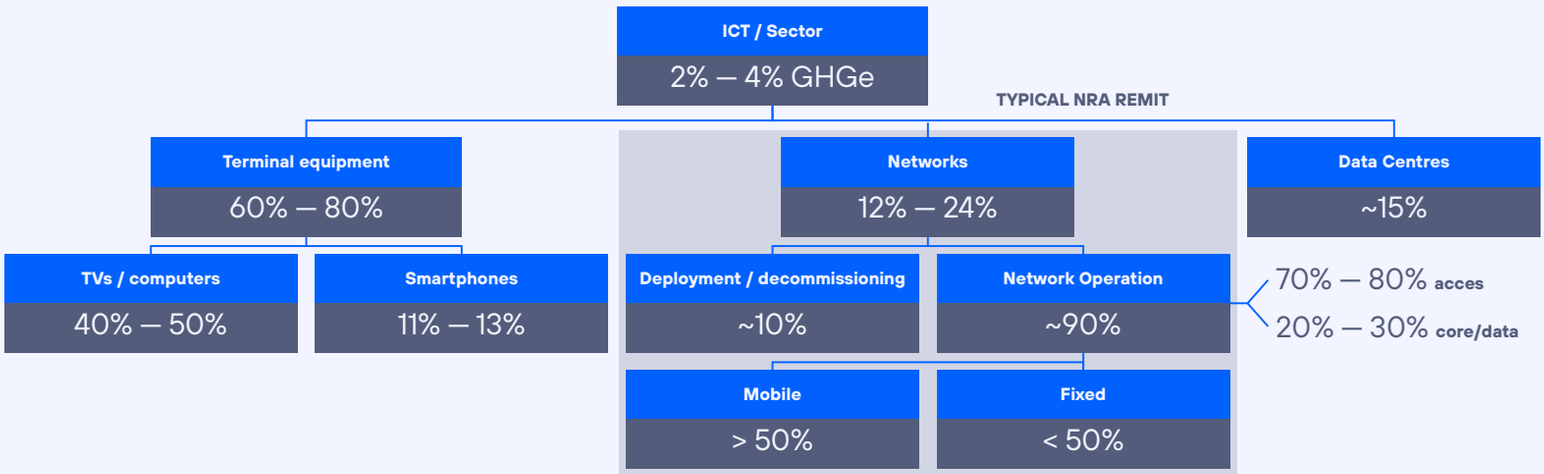
9. TeleGeography. (2022) The State of The Network.

10. GSMA Assotiation. (2022) Mobile Net Zero State of the Industry on Climate Action.

11. Lundén, D.; Malmodin, J.; Bergmark, P.; Lövehagen (2022) Electricity Consumption and Operational Carbon Emissions of European Telecom Network Operators.

Breakdown of contributions to GHG emissions in the ICT sector[12]

Source: International Energy Agency



In addition to GHG emissions, it is relevant to consider other environmental impacts associated with ICT infrastructures, in particular the raw materials and natural resources required by manufacturers of network devices and equipment. In addition, they could be a challenge for future sustainability policies in terms of supply chain security, as these materials are also likely to be needed in the green transition (e.g. in solar panels and wind turbines). According to Telefónica's report 'Connectivity Solutions' Life Cycle Assessment, the environmental impact, considering the whole life cycle, of Telefónica Spain's fibre to the home (FTTH) is 18 times lower than that of copper. In the case of mobile technologies, the environmental impact of Telefónica España's 4G/5G has been shown to be 7 times lower than 2G/3G due to more efficient and lower energy consumption during data transport and processing in the network system.

In any case, it is clear that the sector, like any other, must be aware of its own environmental footprint and try to limit it. This is the line and the work that is already being done, to achieve greater energy efficiency and an increase in the consumption of renewable electricity to achieve net zero emissions by 2050 at the latest (GSMA Commitment | COP27 - Turning Ambition into Action - #BetterFuture), 2040 in the case of Telefónica.

According to the report 'Connectivity Solutions' Life Cycle Assessment, the environmental impact of Telefónica España's 4G/5G has been shown to be 7 times lower than 2G/3G due to more efficient and lower energy consumption during data transport and processing in the network system.

12. Extracted from BEREC's external study "The Environmental Impact of Electronic Communications", WIK and Ramboll (2022), based on several studies. The different figures summarised in the diagram above are due in particular to differences in the extent of emissions captured and different interpretations of the boundaries between the different segments that make up the ICT ecosystem.

A. "Breaking the energy curve" by harnessing the increased efficiency of 5G networks and fibre optics

While it is true that Internet traffic has increased exponentially over the last decades, this has only led to a moderate increase in the energy consumption of networks and data centres, even decreasing the energy demand per unit of traffic. The associated carbon emissions have been reduced even further due to the increased use of renewable energy.

On the one hand, it should be noted that traffic growth is mainly explained by the increasing demand for digital services: Since 2010, the number of Internet users worldwide has more than doubled, while global Internet traffic has increased 20-fold[13].

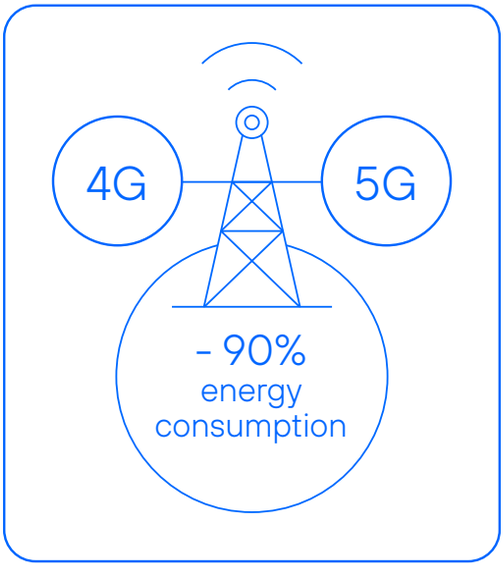
On the other hand, it should be underlined that rapid improvements in energy efficiency have helped to limit the growth in energy demand of data centres and data transmission networks. These efficiencies have largely been achieved through the deployment of 4G, 5G and fibre networks and the shutdown of legacy networks. Tests show that customer access with fibre is 85% more efficient than with copper, and that 5G networks are up to 90% more efficient than legacy technologies.

Certainly, the pace of growth in digital consumption (volume of data, number of devices, etc.) justifies the importance of closely monitoring the sector's emissions trajectory. However, the reality is that currently the share of GHG emissions within the sector remains comparatively low.

But to complete the digitisation of our societies, the efforts made by operators must be accompanied by public policy measures to bridge the digital divide while encouraging energy efficiency in the sector (see section 4).

Breaking the energy curve

In 2021, Ericsson and Telefónica conducted a joint study on energy efficiency of telecommunications networks. The tests, which took place in Spain and Brazil, were conducted with a strong focus on achieving maximum sustainability and energy efficiency when evolving to 5G networks. The results of the tests conducted showed that 5G technology is up to 90% more efficient than 4G, in terms of energy consumption per unit of traffic (W/Mbps).



13. IEA (2022), Data Centres and Data Transmission Networks, IEA, Paris. https://www.iea.org/reports/data-centres-and-data-transmission-networks.

B. Telefónica's decarbonisation targets

At Telefónica we are deeply aware of our responsibility, and we know that digitalisation has to be done without contributing to an increase in emissions from the sector itself. For this reason, we have ambitious targets that will lead our company to be a zero net emissions company by 2040, reducing our own emissions and those of our value chain in line with the ambition of limiting global warming to 1.5°C and neutralising the residual emissions that cannot be avoided. By the end of 2022 the company's emissions were already 80% lower than 7 years earlier, and those of our value chain 30% lower.

Climate Action Plan

	Energy effciency	Renewable energy	Scope 1 and 2 emissions	Value chain emissions (Scope 3)	Customers' emissions avoided through digitalisation	Neutralisation
SHORT-TERM 2025	Improve energy consumption per unit of traffic by **90%**, compared to 2015	Continue to consume electricity with **100%** renewable origin in the main markets	**-90%** in main markets compared to 2015	**-39%** globally compared to 2016	Help customers to reduce **12 million tonnes** of CO_2 per year through Eco Smart services	Neutralise unabated **Scope 1 and Scope 2** emissions in main markets annually **(10%)**
MEDIUM-TERM 2030		**100%** of electricity from renewable sources globally	**-80%** globally compared to 2015	**-56%** globally compared to 2016		
LONG-TERM 2040			Reduce total emissions by **90%**			Neutralise residual emissions annually **(10%)**

net zero emissions

Our challenge is to keep electricity consumption stable despite the sharp increase in the digitalisation of society and the increase in data going over our telecommunications networks. The main savings are achieved by modernising our network and switching off legacy networks.

Not only do we want to be 100% renewable, but as a major consumer of electricity, we also contribute to increasing clean energy generation in the countries where we are located. To achieve both goals, we promote long-term power purchase agreements (PPAs) with utilities, contribute to the construction of small renewable hydroelectric or solar power plants, or self-generate in our own facilities.

Our grids are green: we are 100% renewable in Europe, Brazil, Chile and Peru, and 82% globally (in the data centres we operate, both our own and those of third parties, 67.5% of the 384 GWh we consume comes from renewable sources).

In addition, we aim to become a Zero Waste company by 2030. Our priority is to increase repair, reuse and recycling, ensuring that our waste is not incinerated or landfilled, but transformed into raw materials that are reintroduced into the value chain. Thanks to this approach to the circular economy, we have managed to reuse close to 5 million pieces of electronic equipment by 2022 alone, as well as recycling 98% of the waste we produce.

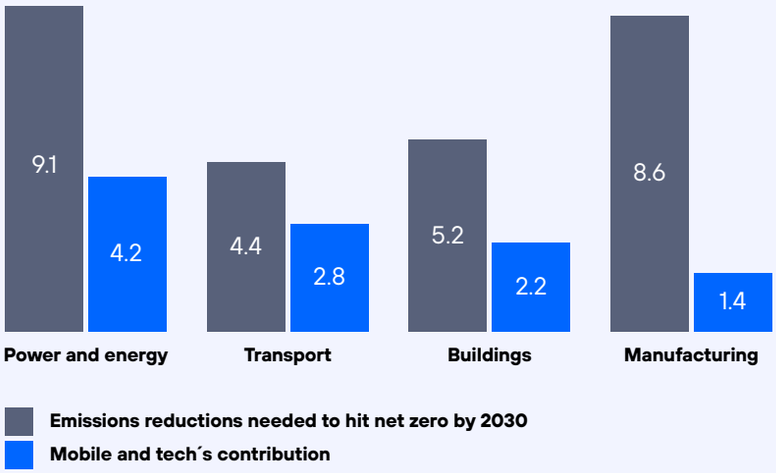
LEARN MORE ABOUT TELEFÓNICA'S ENVIRONMENTAL OBJECTIVES.

4. Digitalisation as a *condition* for sustainability

A. Digitalisation is an enabler for the decarbonisation of the economy

The digital transformation of society and the economy is the bridge between innovation, productivity and sustainability. To achieve the Sustainable Development Goals, digital technology provides new solutions and enables the development of new business models.

Alongside the effort telecommunications operators are making to reduce their carbon footprint, there is the even greater effect they are having in supporting the decarbonisation of other sectors, through the efficiencies created by the use of new digital technologies and applications.



In the same vein, behavioural changes are occurring at the socio-occupational level as a result of the use of new digital tools. The GSMA's *Enablement Effect* (2019) report estimated that the emissions savings were almost ten times greater than the overall carbon footprint of the mobile industry itself[14].

B. Digital solutions for the environmental challenges of sectors

Digitalisation can make a key contribution to the green transition of companies and to meeting countries' environmental targets. Sectors as diverse as manufacturing, transport, healthcare and public administration can only achieve carbon neutrality by accelerating their digital transformation. At Telefónica, we drive digitalisation through connectivity solutions specifically designed to help our customers operate more efficiently and sustainably. We have set ourselves the following objectives to further advance this goal:

- Develop new green digital solutions and reach 58% of our service portfolio verified as Eco Smart by 2024.
- Avoid GHG emissions by deploying digital and connectivity services to our customers between 2019 and 2025.

Eco Smart Services

Our Eco Smart digital solutions optimise the consumption of resources such as energy and water, improve traffic planning and air quality in cities, reduce CO2 emissions and promote the circular economy.

Our aim is to become a key partner in accompanying companies and public administrations throughout this process by implementing sector-specific digital solutions.

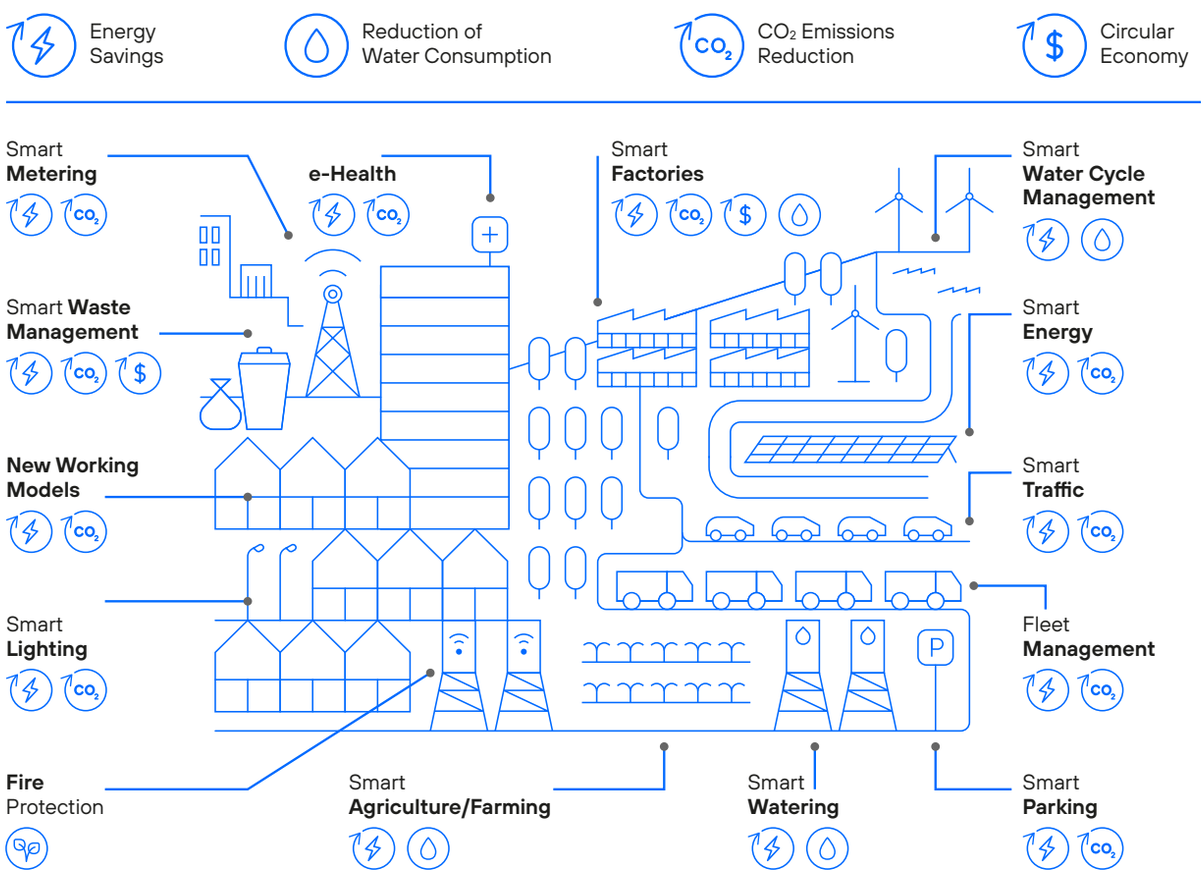
14. GSMA Assotiation. (2021) The Enablement Effect.

Connected life

Connectivity is the first requirement to access the digital world. Thanks to mobile connectivity and broadband services for the B2C segment, our customers can access digital applications that allow them to adopt more sustainable habits such as: teleworking, distance learning, audio/video calls, car sharing, use of satellite navigation applications, real-time access to public transport applications, shared accommodation, online shopping and online banking services.

The digital applications with the highest penetration are audio/video calling, online shopping and online banking services. They all reduce or eliminate many daily commutes or longer distance journeys by facilitating teleworking, remote training and access to online services. This leads to a reduction in fuel consumption of vehicles that are no longer in use and, therefore, in the resulting GHG emissions.

Our customers also use car sharing and accommodation apps, less polluting options than traditional ones. As well as public transport apps that provide real-time information encouraging their use or satellite navigation apps that provide users with the most efficient routes.



C. Digitalisation and the energy sector

In line with SDG 7: "Affordable and clean energy", the European Green Deal included the energy transition as a key component in achieving the sustainability goals. Also, in the EU, digital technologies have an important role to play in helping to overcome the energy crisis as they are central to the whole energy value chain. The deployment of such solutions can deliver net energy savings of 15% to 22% across the EU.

In recent times, geopolitical tensions have introduced a new meaning to the energy transition, making it one of the EU's top priorities.

The electricity sector has positioned itself as a key means to move towards the decarbonisation of our economy, thanks to the large-scale deployment of renewable energies, the use of electric vehicles and the integration of distributed energy resources, among other initiatives. This evolution of the current energy system requires the more intensive use of technological solutions such as IoT, Big Data, AI and Blockchain to maintain the security and guarantee of supply of electricity grids in the future. Central to all of this are the communications networks that enable these connectivity solutions.

The digitisation of the Energy & Utilities sector can achieve greater operational efficiency and resilience of a large part of its processes, allowing, in turn, the efficient management of the associated technical infrastructures, the reduction of environmental impact and the development of new business models.

The process of digitisation of electricity grids needs to be accompanied by regulation that enables and encourages its deployment. All participants in the system, from consumers and distributors to equipment manufacturers, need a sufficient incentive, encouraged by this regulation. In this regard, barriers to consumer participation should be removed, system interoperability should be ensured, and digital assets should be considered as an integral part of investment plans for all purposes.

Accelerating the energy transition through the digitisation of the electricity grid

Telefónica Tech has a set of solutions that allow the development of the digitalisation of electricity grids to be tackled with guarantees, taking into account technological, regulatory and economic aspects.

From a technological point of view, the digitalisation of the electricity sector is based on three pillars:

1. sensors and actuators,
2. connectivity and
3. data processing.

Collecting and recording information alone is not enough. That information needs to be transferred to where it can be processed, evaluated and analysed.

The digitisation of the energy sector starts at the generation plants. From wind farms and photovoltaic plants to hydroelectric power plants, they can be managed remotely, which, together with the application of advanced analytics, allows their operation to be optimised. In distribution networks, the potential of digitalisation is even greater. Smart meters enable Smart Grids to improve the flexibility and decentralisation of the electricity system, which is extremely important for intermittent renewable sources such as wind and solar energy, which can thus be fully integrated into the grid.

D. Digitisation of other critical sectors

1. Efficient Water Management

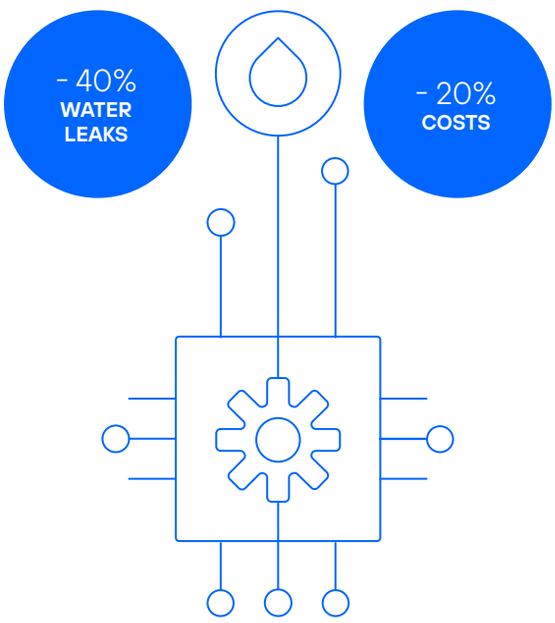
Smart water management arises from the need to offer a holistic view of all phases of the water cycle, from catchment to wastewater treatment, with the aim of boosting efficiency in the management of water infrastructures, preventing unnecessary waste and ensuring that it reaches where it is needed. The digital solutions applied throughout the water cycle facilitate its conservation and enable better use of resources, which contributes positively to guaranteeing its future.

2. Transport Networks

The digital transformation of the transport sector continues to accelerate to adapt to new mobility needs, traveller interests and new business models where digitalisation and datification are key. The transport sector must be prepared for business transformation, the growing commitment to sustainability, the implementation of measures to ensure safety and security, and move towards demand forecasting and planning to adapt the organisation's services to actual demand, among many other challenges.

Canal Isabel II: Digital transformation in water management

The future of water is digital. According to studies by Telefónica Tech, the use of smart metering systems reduces water leaks by 40%, reduces operation and maintenance costs by 20%, and improves customer satisfaction rates by up to 60%.



National Highways: Optimising the Transport Plan

To optimise the data collection and exploitation processes, Highways England chose Telefónica as its partner, relying on our Mobility Insights solution, with which it has access to an anonymised database containing more than 4 billion network events generated every day by O2 customers. This data, together with the data collected by the road operator, allows valuable *insights* to be extracted for infrastructure modelling and planning and process simplification.

The digital transformation of public spaces, whether in stations, transport terminals or offices, is one of the areas with the greatest impact on business and the citizen's experience. In addition, there are solutions that allow us to know the movements of travellers in stations/airports/offices, their behaviour patterns and other data of interest that allow to advance in the energy management of buildings towards more sustainable spaces.

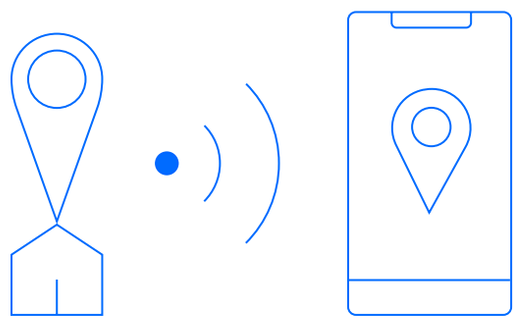
3. Smart buildings

In buildings, technologies such as building automation and control systems allow for the monitoring, control and optimisation of building energy and improved environmental performance.

The installation of connectivity solutions, the use of digital applications and smart meters enable optimisation of electricity use in residential spaces, commercial buildings, offices and other public buildings such as hospitals and universities. They can enable smarter and more efficient energy use based on usage patterns, time of day and capacity levels of national or local energy grids. In addition, they can facilitate interaction with the energy grid, improving consumption forecasting, energy storage management and generation from renewable sources.

Smart meters. *Smartmetering*

Smart meters are also useful for end-consumers, as they can provide near real-time information on consumption and production, enabling new services, improving response time to peak demand and contributing to home automation.

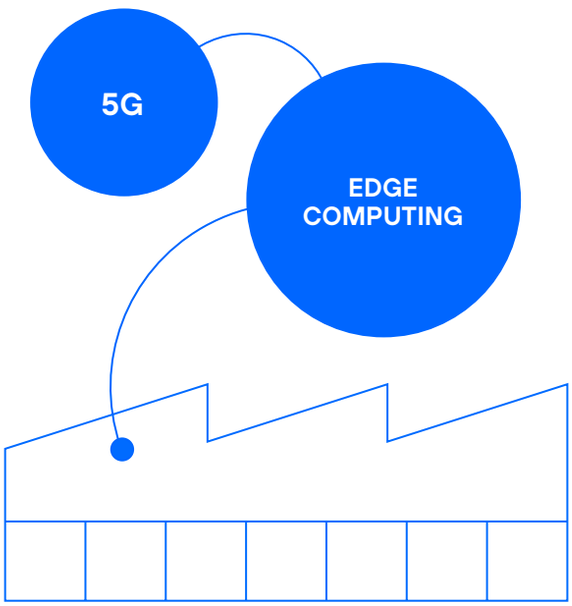


4. Digitisation of Industry

Smart factories refer to an industrial environment in which the production process is carried out through the use of machinery and robotics equipped with sensors that allow data streams to be analysed in the perimeter cloud, enabling real-time adjustments to be made, influencing production capacity and optimising equipment maintenance. This contributes to improving productivity and operational efficiency and, consequently, reducing energy consumption, resources and carbon emissions.

Gestamp: connecting industry

Thanks to the new connectivity and computing capabilities offered by Telefónica through 5G and Edge Computing, Gestamp has taken a further step towards digital transformation, creating the first digitised factory with 5G in Spain to improve the management of industrial processes.



5. Proposals to *boost* the twin transitions

The digital and green transitions need public policies and regulatory environments that ensure full legal certainty and promote investment.

Europe is in an excellent position to become the global benchmark in driving the twin green and digital transition. However, a regulatory framework is needed to take advantage of all the opportunities offered by digitalisation as an enabler of the green transition, and public policies that strongly promote a circular economy model together with an energy transition based on digitalisation.

In the current European context, both transitions cannot be conceived separately, and will shape a new economic and social paradigm. Policy makers need to establish clear guidelines, enhancing a unified approach and harmonising current and future regulations with the EU's environmental objectives.

From Telefónica's perspective, we believe that, at the current time of intense regulation for sustainability policies and initiatives, it is important to integrate digitalisation as a driver to achieve environmental goals, to look not only at the necessary green transition of the digital sector, but also to promote investments in digitalisation and a higher penetration of digitalisation to decarbonise relevant sectors of the EU economy.

In terms of environmental regulation and how it is integrating the digital sector, we see that the most relevant ones are: the Circular Economy package, the Ecodesign and Energy Labelling Directive, the Waste Electrical and Electronic Equipment Directive, the Energy Efficiency Directive, currently under review, the Renewable Energy Directive, the sustainable finance regulatory package...

The Commission's digital strategy already underlines the need for the ICT sector to "undergo its own green transformation" by stating that, by 2030, data centres and telecommunications "can and should become carbon neutral". For its part, the European Parliament has also been very proactive in this area and has repeatedly expressed the need to drive the digital transition and environmental policies together.

We see that this vision is necessary but not sufficient, and further digitalisation must be promoted to achieve the green transformation of such critical sectors as energy, cities or industry as mentioned above.

A. EU Action Plan for the Circular Economy in the Digital Sector

The benefits of the circular economy and the need for it are undeniable for a sector such as the digital sector, but it is also clear that greater digitalisation, for example through traceability of information (e.g. Digital Passport) will be essential to increase circularity. A greater presence of digital proposals around the circular economy will have a major impact on environmental objectives.

Recommendations
Circular economy at Telefónica

1. Keeping terminals in active use for a longer period of time

2. Sharing network infrastructure

3. Developing circular economy awareness across industry

4. Give refurbished terminals the same consideration as new terminals in business proposals.

5. Creating common metrics and KPI guidelines

6. Rethinking the business relationship to support re-use

7. Improving the regulatory ecosystem in favour of circular transactions

8. Creating and interconnecting markets

9. Ensure that energy efficiency is a priority for network equipment.

1. Telecommunications infrastructure[15]

European telecommunications operators have long included sustainability and circular economy measures as central elements in their business plans. This also applies to network infrastructure. To this end, the telecoms industry needs to collaborate at different levels of the supply chain, asking its partners and suppliers to be more committed to the concept of circularity in infrastructure design. This encompasses multiple aspects including, among others, durability, repairability and recyclability, also defined as targets by the EC in its EU action plan for the circular economy.

2. Right to repair[16]

Mobile devices such as *smartphones* and *tablets* are the tools by which digital services, through connectivity, become usable by customers. Technological evolution and the rapid transformation of users' consumption patterns mean that product life cycles are shortening, resulting in increased production and increased waste. Correcting this model implies the cooperation of all actors along the whole value chain, therefore, regulation has to consider well the relational and responsibility model that is established.

3. EcoDesign and energy labelling. Ecorating

Consumers are willing to consider sustainability as a purchasing criterion. Transparency is the first step in establishing sustainable design conditions. Such transparency should increase the leverage of sustainability requirements, establishing sustainability as a competitive factor.

In terms of hardware design, regulation in Europe may involve a higher level of compromise than in the rest of the world. This should lead the way forward. Generating a high standard of self-demanding circularity based on the concept of *sustainability by design*.

The industry's approach is to work together in the same direction to bring about a change of mindset with the intention of making global production more sustainable.

With regard to energy labelling, we believe that the Energy Label proposed by the EU could generate confusion among consumers with regard to mobile phones, smartphones and tablets, since in these devices the greatest environmental impact does not come from energy consumption but from manufacturing, we advocate for a more holistic view of the value chain of these devices, in order to take into account other elements in the lifetime of a mobile phone from the label and Eco Rating methodology.

Eco Rating Consortium

European telecommunications operators Deutsche Telekom, Orange, Telefónica, Telia Company and Vodafone founded the Eco Rating consortium with the intention of creating a holistic methodology that combines the various aspects of environmental performance by considering durability, repairability, recyclability, as well as climate impact and resource efficiency.

The rating is based on several years of development to find the optimal way to assess the environmental footprint based on international standards. With Eco Rating we make it easier for consumers to make a conscious choice.

Our aim is to make this methodology the common tool of the industry and therefore we propose that the European Union should be able to accept this qualification as the common ecological standard.

15. GSMA Assotiation. (2022) Strategy Paper for Circular Economy: Network equipment

16. ETNO. (2021) Position paper to the European Commission's public consultation on "potential measures for regulating the environmental impact of mobile phones and tablets"

B. European taxonomy

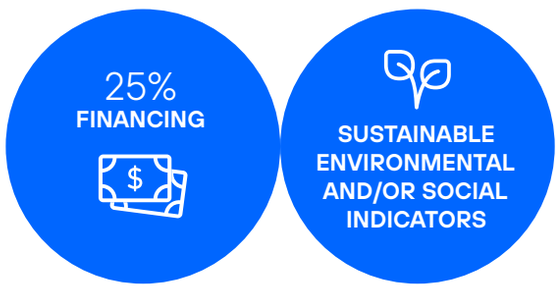
A central area of EU leadership at the global level has been the establishment of a taxonomy of sustainable finance. The taxonomy provides consistent definitions of which activities can be classified as sustainable and therefore align with the objectives of investors committed to sustainable investment strategies. It is one of the main levers to support investment in green activities and is complementary to several pieces of legislation, such as the forthcoming Corporate Sustainability Reporting Directive.

The reality, however, is that the taxonomy regulation agreed in 2020, and the 2021 Delegated Act, ambiguously captures the role of digital in the Green Switchover, weakening its potential impact on redirecting capital towards sustainable activities. Currently, the existing text on IT and digital services in the Annex to the Delegated Act is confusing, creating a significant degree of legal uncertainty within the digital sector as to which economic activities are taxonomically eligible.

Indeed, the recognition of the role of digital in supporting the achievement of green objectives is present but insufficient throughout the development of the EU sustainable finance taxonomy. This is the case at the level of the Taxonomy Regulation itself, but also from the perspective of future modifications and extensions of the taxonomy.

Green bonds

Telefónica is a pioneer in the telecommunications sector in the green bond market and one of the largest issuers in terms of volume, number and diversification of sustainable finance (senior green bonds, green and sustainable hybrid instruments, etc.). - Our commitment is that 25% of financing - balance sheet debt, hybrids and committed credit lines - will be associated with sustainable environmental and/or social indicators by 2024, with the aim of making sustainable financing one of the Telefónica Group's main financing tools.



Recommendations
European Taxonomy of Sustainable Activities

In terms of public policy, it is essential that telecommunications infrastructures are recognised as sustainable investments and properly included in the European taxonomy of sustainable activities. In this respect, a clear statement related to the activity taxonomy of data-driven solutions or any of the identified gaps would be useful and appreciated in order to obtain comparable results and as many ICT companies as possible reporting taxonomy KPIs.

C. Energy Efficiency Directive

Telefónica believes that efficient energy use is key to achieving the objectives of the Green Deal. The original objectives of the Directive are still very relevant and, in general, have contributed to increasing awareness and knowledge related to energy, which is often still seen as a mere *commodity*.

The ICT sector, including telecommunications networks, has taken important steps to improve energy efficiency. Telecommunications companies have invested and continue to invest heavily in building and upgrading network infrastructure and high-speed data centres, as well as in the development and deployment of digital services. This translates into greater energy efficiency in the provision of mobile and fixed services.

Telefónica: Energy Efficiency Plan

- At Telefónica we are committed to a green and digital energy transition, promoting both efficiency and renewable consumption.
- We have implemented up to 188 energy efficiency initiatives by 2021.
- We are helping industries and buildings to reduce their energy consumption, avoiding more than 9.5 million tCO_2e through digital services.
- We continuously innovate, for example we have implemented the disruptive Liquid Cooling for server cooling, a technology that is up to 50% more energy-efficient than air-conditioning.

Recommendations of the Energy Efficiency Directive

Establishing a clear distinction between data centres and network infrastructures

The logic behind the Directive is mainly based on the expected increase in power consumption of data centres, however, the assumptions used to develop this forecast follow a different definition of data centre and power limits. This problem highlights the need to look for a common and comprehensive definition of data centre. We believe that the given definition is too broad, as it does not capture the distinction between data centre and telecommunications network infrastructure and their differences with respect to energy efficiency. Since the European authorities have recognised the two concepts separately, it seems appropriate to underline this differentiation in the Directive of the European Parliament and of the Council on energy efficiency.

D. Regulation of renewable energy markets in Latin America

Despite growing support for renewables, mobile operators, who have large but widely distributed electricity consumption, face a number of challenges in accessing renewable sources of electricity, particularly in regions, such as Latin America, where markets are not as open. In these cases, the main challenges that arise are the following:

- Regulation does not always support power purchase agreements, which allow a commercial energy consumer, such as a mobile operator, to enter into an agreement with the independent power producer and commit to purchase a specified amount of renewable electricity at an agreed price for a specified period of time.

- Limited transmission and distribution infrastructure restricts the expansion of renewable energy. There is a lack of a level playing field for renewable electricity, with energy markets distorted by subsidies.

E. *Fair Share* as an enabler of energy efficiency

In the regulatory context, it is important to mention that network operators have limited room for manoeuvre on the environmental impact associated with the ICT sector. First, because users' devices, such as phones, tablets, computers and modems, account for most of the sector's total carbon footprint. But, in addition, telecommunications companies, referred to as "mere conduits" of traffic, have very little ability to directly reduce the volume of traffic resulting from the use of the service by third parties. This limitation is mainly due to practical and legal constraints (e.g. the European Open Internet Regulation).

Therefore, any attempt to encourage more efficient generation of data traffic that would effectively reduce network traffic volumes, and subsequent energy consumption, must be conceived by looking at the entire value chain, considering the services provided over the Internet, as well as the Internet consumption habits of users.

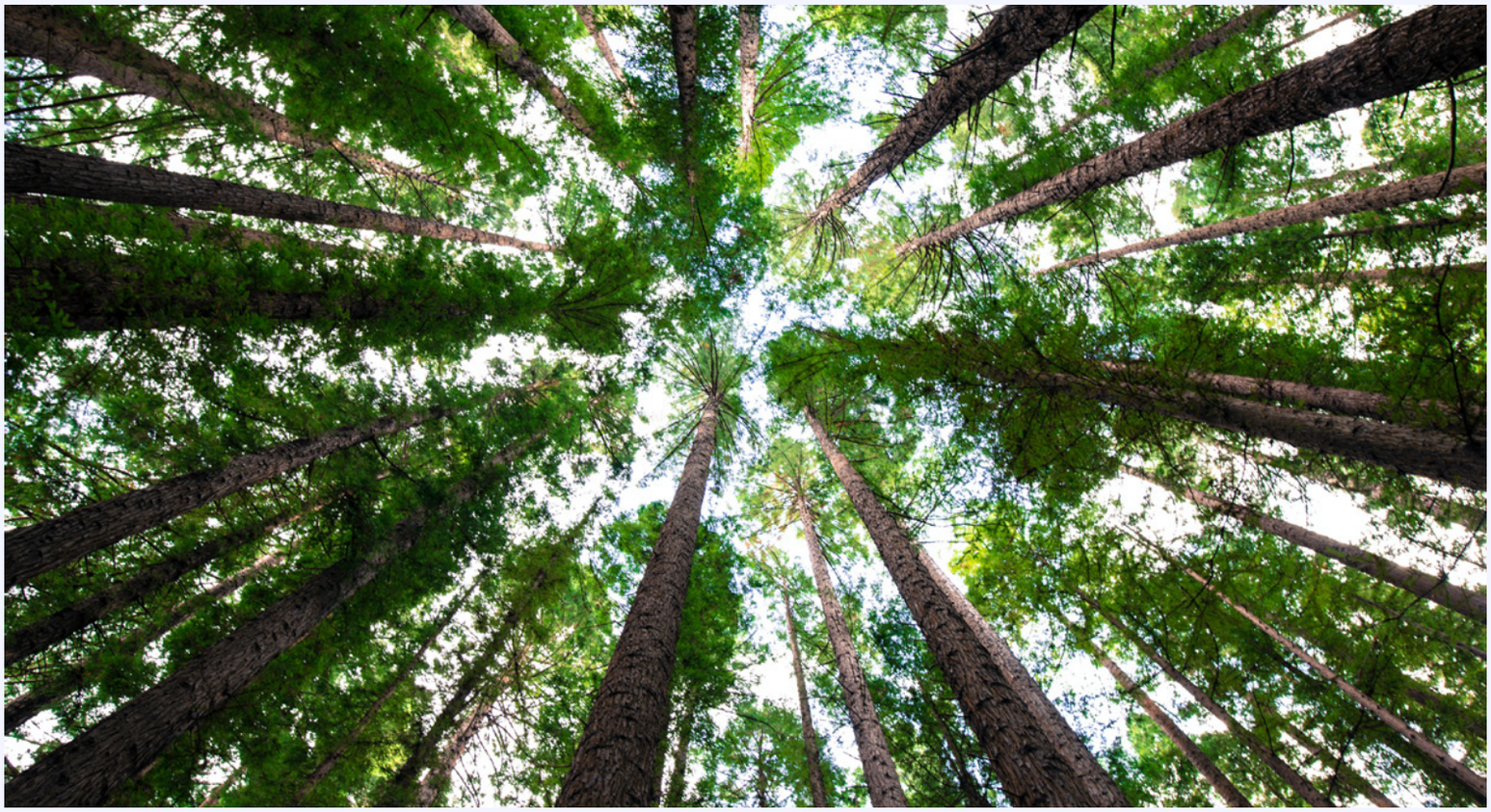
Currently, there is an imbalance in the value chain, with 50% of traffic being generated by only 5 or 6 companies, coupled with increasing investment requirements and decreasing profitability for operators. In this context, there must be regulation to encourage efficiency in the use of data traffic and therefore energy consumption in this sector by ensuring that those players that occupy more than, for example, 5% of the bandwidth in the hour charged pay for the traffic transport service provided by the network operators, and to allow free negotiation between operators and OTTs. This should lead to greater efficiency and thus to a lower environmental impact.

A 2022 study[17], assessed whether technical regulation could serve this objective, but concluded that it could be intrusive and incompatible with the demands of rapid technological development. However, it considered that setting a price for data traffic transport service would provide a positive incentive for market players to reduce data traffic. The study suggests that this price could be set in commercial negotiations or with the alternative option of an arbitration mechanism for those where agreement cannot be reached.

As we have seen, 5G networks can become 10 times more efficient. With the financial contribution of OTTs to the deployment and use of 5G and fibre networks, faster deployment of these more energy efficient systems could occur. Axon estimated[18] that this could lead to an overall reduction of 38.7% of the total energy consumed in EU mobile access networks by 2025. In the same vein Axon estimated that an annual contribution of EUR 20 billion could result in a reduction of 13.8 Mt_{CO2} , or a 93.8% reduction in total carbon emissions in 2025.

17. Reinhard Madlener, Siamak Sheykhha, Wolfgang Briglauer. (2022) The electricity -and CO2- saving potentials offered by regulation of European video-streaming, Energy Policy, Volume 161.

18. Axon Partners Group. (2020) Europe's internet ecosystem: socio-economic benefits of a fairer balance between tech giants and telecom operators.



F. The role of radio spectrum policy in tackling climate change[19]

It is highly recommended that the fight against climate change be included among the objectives of regulatory bodies in charge of designing radio spectrum management policies.

With sufficient spectrum resources available and avoiding artificial limitations and unnecessary deployment and operational requirements, national regulators can use spectrum policies as a way to contribute to reducing climate impact.

Any regulatory policy that unjustifiably implies an unfavourable investment environment for the sector (e.g. high spectrum allocation prices, unjustified restrictions on co-investment, complex administrative procedures for deployment, stricter limits on exposure to electromagnetic fields than internationally recommended) would be counterproductive to the ability of operators to invest in upgrading networks to more efficient and climate-neutral standards.

In this way, spectrum policies could be established with positive incentives for those companies that contribute most to the decarbonisation of the economy or that demonstrate a greater commitment to their environmental or sustainability goals.

19. ETNO. (2021) ETNO response public consultation on the draft RSPG opinion on the role of radio spectrum policy to help combat climate change.

6. Final *Conclusion*

In the current context, in order to achieve the decarbonisation objectives and limit the effects of climate change, it is essential to move forward together in a digital and green transition. However, in addition to promoting European leadership in this double transition, it is essential to create a framework for international collaboration and public-private cooperation.

So far, the policy and regulatory framework initiated with the announcement of the European Green Deal has made steady progress. Despite the energy crisis stemming from the war in Ukraine, the announcement of the Fit for 55 package of measures is moving in the same direction, with new projects and regulatory measures to accelerate compliance with environmental objectives together with the RepowerEU Plan to guarantee European strategic autonomy through an energy transition based on reducing Europe's dependence on fossil fuels. In this sense, a more decisive push for the digitisation of the energy sector is essential to accelerate the green transition of the energy sector.

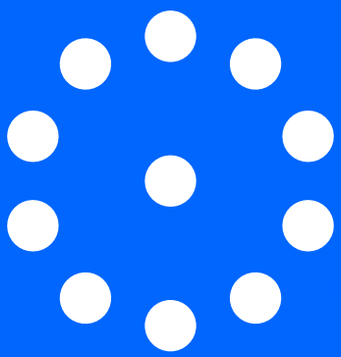
In terms of sustainable finance, investment should be redirected towards technologies that can best contribute to meeting environmental objectives. Digital technologies, underpinned by high-capacity, resilient and energy-efficient telecommunications networks, should be considered as green investments because of their contribution to climate change mitigation.

In addition, the commitment to move towards greater efficiency and an energy transition that promotes the use of clean and renewable energies, as well as the implementation of a sustainable and circular economy that allows a better use of resources must be seen as an opportunity for digitisation.

At Telefónica we are moving resolutely in this direction. Our commitment is firm and we assume our responsibility, we are committed to being a company with zero net emissions by 2040 and we are working hard to achieve this. We consider digitalisation to be an essential condition for curbing climate change. And that is how we see it, as an opportunity and a challenge that, together, we must achieve.

At Telefónica we are committed to being a company with zero net emissions by 2040.

The *green* factor:
digitisation for the green transition



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