LOOKING FORWARD
TO COP21

ETNO Climate Change Report

October 2015

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FOREWORD

Sir Nicholas Stern[1] in his well-known and widely discussed review "The Economics of Climate Change" released in 2006 for the British government stated that climate change "is the greatest and widest-ranging market failure ever seen" and that "ignoring climate change will eventually damage economic growth".

Climate change will not only impact the economy, of course: "continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems[2]".

This report looks at climate change from a business perspective, that of telecommunication operators, which are an integral part of a wider industry sector - the Information and Communication Technology (ICT) - a sector that is now playing a crucial role in the development of the economy and society worldwide. This industry offers solutions that aim at increasing the efficiency of business processes in general and at improving citizens' quality of life. This sector has a unique potential in delivering solutions that can effectively contribute to combating climate change by enabling significant reductions in greenhouse gas (GHG) emissions across all sectors of the economy[3].

ETNO has a long history of commitment to environmental protection, which dates back to 1996 when the Association launched its **Environmental Charter of the European Telecommunications Operators** that marked the beginning of a strong and fruitful cooperation among companies, beyond competition.

While it is true that ICT contributes to the problem, ETNO member companies are also an important part of the solution. They have worked hard over the years to reduce their own environmental footprint, and their GHG emissions in particular. Such efforts, and results, are testified in their individual environmental and sustainability reports as well as in the collective reports published by the Association since 1998.

Now, in view of the incoming Conference of the Parties (COP) that will take place in Paris later this year, ETNO member companies would like to draw the attention of their stakeholders and EU policy-makers above all, on the issues they consider relevant, on how they see the future agreements on GHG reduction and on the role they can play if a suitable regulatory and technical environment is set.

Steven Tas,
ETNO Executive Board Chairman

Danilo Riva,
Chairman of the ETNO Working Group on Corporate Responsibility

Steven Tas

Danilo Riva

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[1] Chair of the Grantham Research Institute on Climate Change and the Environment at the London School of Economics and also chair of the Centre for Climate Change Economics and Policy (CCCEP) at Leeds University and LSE
[2] IPCC – Climate Change 2014 – Synthesis Report, Summary for Policy Makers
[3] See for example the SMART series of report published by the Global e-Sustainability Initiative (GeSI)

EXECUTIVE SUMMARY

The contribution of the ICT sector to climate change has been the subject of an on-going debate since 2007, when Gartner estimated that the industry produced 2% of global CO_2 emissions[4], placing it on a par with the aviation industry. Data centres - that use energy to run servers and provide cooling - accounted for almost a quarter of such emissions[5], Gartner said. These figures were bound to increase over time, due to the digitalisation of the economy and the consequent increase in use of ICT services and equipment.

Today, the **SMARTer2030 study**, released by the Global e-Sustainability Initiative (GeSI) in 2015, estimates that the ICT sector's carbon footprint will account for 1.97% of global emissions by 2030, and that ICT has the potential to enable a 20% reduction of global CO_2 emissions by 2030, maintaining emissions at 2015 levels. These figures show that the contribution of ICT usage to reducing emissions is nearly ten times higher than the emissions generated by deploying it.

> " *These figures show that the contribution of ICT usage to reducing emissions is nearly ten times higher than the emissions generated by deploying it.* "

ETNO member companies are fully aware of the challenge represented by climate change, and are working hard to reduce their footprint as well as to demonstrate that they are an important part of the solution. The results of a survey which collected information from a sample of 11 ETNO member companies, has shown that their energy consumption and GHG emissions are increasing slowly, if at all. A number of measures, backed by significant investments, have contributed to keeping both energy consumption and emissions stable over time. In the meantime, the overall operational efficiency of these companies has continued to increase. The services that the surveyed telecom operators offer to their customers contribute significantly to increasing the efficiency of all sectors of the economy as well as that of governments and citizens. ETNO's Climate Change Report 2015 provides some facts and figures.

ETNO member companies believe they share the responsibility of leading the global transition to a low-carbon, climate-resilient economy. We call upon policy-makers to develop the right environment to allow this to happen by ensuring that the role of ICT, and in particular of high-speed fixed and mobile broadband networks, is fully reflected in the forthcoming sector specific energy efficiency roadmaps and in the national low carbon economy plans.

Looking forward to COP21, ETNO would strongly support an agreement based on sound scientific evidence, that would set reasonable targets aimed at limiting temperature rise to acceptable levels and avoiding climate-related disasters in the future. Such an agreement should take into account the potential of telecommunications and ICT in general to decarbonise the economy, and include a set of tools and actions needed to make sure that this potential is fully exploited.

Connected cars

Smart city

Smart home

Smart energy

Smart transport

Smart office

[4] See: www.gartner.com/newsroom/id/503867
[5] See: www.gartner.com/newsroom/id/530912

INTRODUCTION

There is arguably no greater threat posed to the globe in this century than that of Climate Change. It is widely known that GHG emissions lead to dramatic and widespread temperature changes around the globe, but there are other destabilising effects that can prove devastating to the earth's climate:

- Weather patterns are changing, leading to extreme conditions such as tornadoes and draughts, but also to extreme temperatures, both high and low, in several parts of the globe.
- Higher temperatures in polar regions are causing the melting of ice, and are causing the death of rainforests in the tropics. The CO_2 absorbed by the oceans is leading to their acidification, threatening marine life and destroying coral reefs.
- These changes are threatening animal species around the globe, jeopardising biodiversity because they are disrupting habitats. Many terrestrial and aquatic species are shifting their geographic ranges and habits as well as interactions with other species.

In its 5th Assessment Report published in 2014, the Intergovernmental Panel on Climate Change (IPCC) states that climate change represents a significant threat to sustainable development, but "there are many opportunities to link mitigation, adaptation and the pursuit of other societal objectives through integrated responses" and that "successful implementation relies on relevant tools, suitable governance structures and enhanced capacity to respond".

Indeed, addressing climate change while maintaining sustainable economic growth is possible, and substantial results can be obtained if the right actions are put in place quickly and in a well-coordinated and efficient manner.

Despite several studies proving the ICT sector's potential in enabling significant reductions of GHG emissions across the economy, this prospective remains untapped. The sector itself has been accused of significantly contributing to global GHG emissions, and it is said that this contribution is bound to increase with the growing take up of ICT services and the corresponding use of IT equipment.

However, the SMARTer2030 study, released by GeSI in June 2015, shows that the ICT sector's carbon footprint is expected to decrease to 1.97% of global emissions by 2030 compared to 2.3% in 2020, as predicted by the previous SMARTer2020 study released at the end of 2012.

ICT can in fact be an important part of the solution: GeSI's SMARTer2030 report shows that ICT has the potential to enable a 20% reduction in global CO_2e emissions by 2030, maintaining emissions at 2015 levels. **Thus, the contribution of ICT usage to reducing emissions is nearly ten times higher than the emissions generated by deploying it.** The analysis published in September 2014 by CDP[6] indicated that reducing carbon emissions continues to be a dominant corporate agenda. In general, climate change is recognised both as a business risk and an opportunity by ICT companies around the world. Companies have attempted to engage - both directly and indirectly - on public policy issues focused on energy management, energy efficiency initiatives, mandatory carbon reporting and clean energy generation.

> " *Climate action supporting smart growth : A business opportunity for the telecom sector* "

[6] ICT Sector's Role in Climate Change Mitigation - An analysis of climate change performance and preparedness of 320 global ICT companies

ETNO MEMBER COMPANIES'
CARBON FOOTPRINT AND INITIATIVES

ETNO member companies recognise both their responsibility in reducing their own footprint and their role in making sustainability happen: the Association's Corporate Responsibility Charter embodies its members' commitment to sustainable development via:

- a sustainable provision of ICT based solutions with significant environmental, social and economic benefits, with a particular focus on enabling the reduction of environmental impacts of other industry sectors and society at large, and improving citizens' quality of life;
- a determined effort to integrate their business activities with environmental, social, and economic responsibilities - minimising, where practicable, any negative impact these activities may generate.

Network rollout and an increased demand for advanced telecommunications services have led to a substantial increase in energy consumption. There is a growing need to improve the energy efficiency of communication networks, from both the economic and sustainability points of view. The results of a study published in 2012[7] showed that network electricity consumption is growing fast at a rate of 10% per year, and that its relative contribution to the total worldwide electricity consumption has increased from 1.3% in 2007 to 1.8% in 2012. Most of the electricity used to power telecommunications networks around the world is produced by burning fossil fuels and increased energy consumption

means increased production of GHG (Scope 2[8]) emissions. Network consumption represents the largest portion of the electricity used, but one must also consider the electricity consumed in office buildings- used mostly for lighting, air conditioning and office equipment- and in data centres, that also generate GHG (Scope 2) emissions.

Telecom operators use fossil fuels for heating, vehicles and to produce part of the electricity they need (as in the case of diesel generators and co-generation plants), and therefore generate significant amounts of direct (Scope 1) GHG emissions.
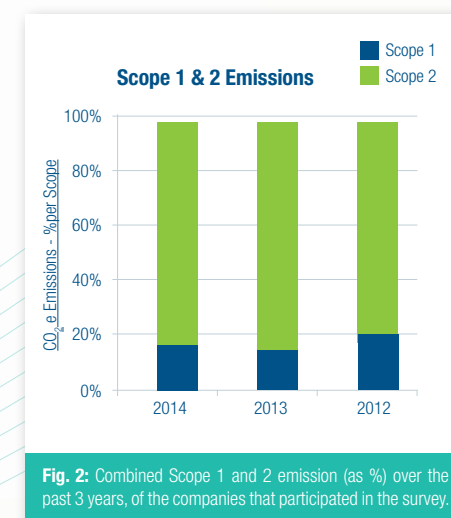
A survey which collected information from 11 ETNO member companies[9] - representing a significant part of the fixed and mobile telecommunications business in Europe - has shown that their energy consumption and GHG emissions[10] are increasing slowly, if at all. Rather, a number of measures, backed by significant investments, but with a short-medium payback period, are contributing to keeping both energy consumption and emissions stable over time and in the meantime, the overall operational efficiency of these companies continues to increase.

Looking at the following charts, one can see that over the past three years, direct (Scope 1) emissions have shown a downward trend. Indirect (Scope 2) emissions show a net reduction in 2014 as compared to 2013.

The reason the overall amount of Scope 2 emissions was lower in 2012 than in 2013 and 2014 is that one of the companies participating in the survey, (Deutsche Telekom), purchased Renewable Energy Certificates to compensate its Carbon emissions in Germany up until 2012, while from 2013 it decided to invest more in energy efficiency measures. If such certificates had not been used in 2012, the overall indirect emissions would have been higher than in 2013. On the other hand in 2014, Telecom

Italia - while still investing in energy efficiency measures- purchased Guarantees of Origin that certify electricity generated by renewable sources, for almost 100% of the electricity purchased by the group in Italy.

Even if such guarantees had not been bought, the overall indirect emissions produced in 2014 would have been lower than in 2013.

Fig. 1: Scope 1 and 2 emission trends over the past 3 years, of the companies that participated in the survey.

Fig. 2: Combined Scope 1 and 2 emission (as %) over the past 3 years, of the companies that participated in the survey.

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[7] S. Lambert et al.: Worldwide electricity consumption of communication networks - Optics Express 20. (2012) B513–B524
[8] The GHG Protocol defines as Scope 1 those GHG emissions that occur from sources that are owned or controlled by a company, while Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by a company.
For more information visit : www.ghgprotocol.org
[9] Deutsche Telekom, KPN, Magyar Telekom, Orange, OTE, Proximus, PT Portugal , Telecom Italia, Telefónica, Telekom Slovenije, TeliaSonera participated in the survey.
[10] Data collected refer only to European operations. Emissions are calculated in accordance with the GHG Protocol standards and conversion factors provided by local authorities and/or providers have been applied.

ETNO MEMBER COMPANIES'
CARBON FOOTPRINT AND INITIATIVES

How has this been possible? What follows is the description of some of the energy efficiency and GHG emission reduction measures put in place by the 11 ETNO member companies.

DEUTSCHE TELEKOM

Global data centre consolidation: in 2013 DT began the second phase of its data centre efficiency programme. This phase included the physical consolidation of data centres (i.e., reducing the amount of data centre space and the number of sites) with logical consolidation (i.e., virtualisation[11]). The DC11@2018 program is working to globally consolidate data centre sites with the latest IT technology to a few FMO (Future Mode of Operation) data centres. Current programme plans estimate a cumulated CO_2 reduction of up to 51% by 2020 based on 2012 figures.

Solar power in network sites: in 2014 DT decided to equip around 600 of its own technology sites with solar power systems. The idea originated with the employees of Telekom Deutschland. The internal energy service provider, Power and Air Solutions, has, up to now, installed photovoltaic systems on the roofs of around 300 offices. The expected carbon footprint reduction is in the order of 1,600 metric tons of CO_2 per year.

Self generation of heat and power: in addition to traditional power grids, DT is also increasingly using combined heat and power units (CHP) to power network nodes (Internet distribution points) in a way that is efficient and environmentally friendly. These units convert around 90% of fuel energy into usable energy (electricity and heat), while the efficiency of electricity generated via conventional means and sourced from the German power grid represents only about 40%.

KPN

Network upgrading: KPN has managed to reduce its energy consumption by 41 GWh (7% of total electricity consumption of the network in the Netherlands) and consequently to reduce its emissions by 15,580 tons of CO_2. This was mainly made possible by phasing out legacy networks for voice and data traffic and migrating customers to new IP-based platforms and services. These new platforms in turn are also more energy efficient.

Use of electricity from renewable sources and compensation: since 2011, 100% of KPN's electricity consumed in the Netherlands and in Belgium originates from renewable sources, and this was extended to the whole Group in 2013. All the electricity used in the Netherlands is generated locally from wind or bio-mass. In 2014 all natural gas and about 50% of diesel and petrol consumed was compensated for by forest compensation and Gold Standard[12] projects. All this, together with energy saving programmes, has enabled KPN to reduce its CO_2 emissions by 98% since 2005.

MAGYAR TELEKOM

Carbon offset: 50% of the amount collected as *malus* payment (i.e. around 20,500,000 HUF in 2014) by users of personal use cars with emissions above the reference values was spent on decreasing the Magyar Telekom's CO_2 footprint: in 2014 the company offset 2,850 tons of carbon-dioxide and planted nearly 100 trees across 3 sites in Budapest with the help of Fókert[13]. In 2014 T-Systems Hungary compensated for the total CO_2 emissions generated by its own energy consumption and its data park by purchasing Kyoto units, thus relieving the environment of 14,285 tons of CO_2.

Data Centre: in 2014 Magyar Telekom's data centre finished its investment cycle of 3 years. In the final year, the water cooling system was replaced with a free cooling system. As a result, the data centre was able to save around 5 GWh in 2014, which is approximately the consumption of 2,400 households, and is equivalent to reducing emissions by 1,800 tCO_2e/year.

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[11] Server virtualisation is the partitioning of a physical server into smaller virtual servers to help maximize server resources. The resources of the server itself are hidden, or masked, from users, and software is used to divide the physical server into multiple virtual environments, called virtual or private servers. This is in more efficient than dedicating one server to a single application or task.
[12] See: www.goldstandard.org
[13] See: www.fokert.hu

ETNO MEMBER COMPANIES' CARBON FOOTPRINT AND INITIATIVES

ORANGE

Radio Access Network upgrading: the upgrade of Orange's Radio Access Network began in 2010, enabling around 20% of energy consumption reduction, which continued throughout the Group until 2014. In 2014 the Group saved 188 GWh of energy by buying new equipment, corresponding to around 55,977 tons of CO_2.

Optimisation of data processing centres: data centre operations, which account for 13% of IT and networks energy consumption, were optimised through the decommissioning, upgrading and virtualisation of servers, room optimisation, application of sleep mode on servers and data centre consolidation. Thanks to these initiatives, in 2014, the Group saved 98 GWh, thus avoiding the emission of 14,252 tons of CO_2.

Air conditioning: thanks to the optimisation of air conditioning systems through re-engineering and increased use of optimised ventilation in 2014, the Group saved 87 GWh, thus avoiding the emission of 25,589 tons of CO_2.

OTE & COSMOTE

Fixed and mobile telecom networks: a number of energy efficiency measures were put into place addressing the full range of OTE and COSMOTE activities, including telecom networks, buildings, data centres and transportation. The cumulative effect of these measures implemented in 2014 resulted in an electricity consumption reduction of around 16 GWh, thus avoiding the emission of around 10,900 tons of CO_2.

Maintenance of power generators: mobile network diesel generators were subject to an extensive maintenance activity over the past three years. In 2014 such activity resulted in an energy consumption reduction of about 15,650 GJ, thus avoiding 1,164 tons of CO_2 emissions.

PROXIMUS

Vehicle fleet: old vehicles in the company's car fleet have been progressively replaced with new ones, featuring lower emissions, which is essential to decreasing air pollution and has allowed Proximus to reduce their vehicle fleet's CO_2 emissions by around 8 ktons per year: Company cars are now 20% "greener" than the average car riding on Belgian roads.

Renewable energy: Proximus buys Guarantees of Origin that certify electricity generated by renewable sources on a regular basis, thus avoiding around 80 ktons of (Scope 2) CO_2 emissions per year.

Data centres: optimisation and virtualisation of servers resulted in an energy saving of 31 TJ on a yearly basis.

PT PORTUGAL

Vehicle fleet and mobility: in 2014, with the fleet optimisation and the implementation of a maximum speed limit for vehicles, direct CO_2 emissions were reduced by 4% compared to 2013 (-687 tons of CO_2). These measures are part of a "Sustainable fleet program", a process meant to make PTP's car fleet - more than 3,000 vehicles - greener. Programme actions and initiatives include: car sharing, removal of personal vehicles with high pollution index, selection of operational vehicles based on a technical analysis of fuel consumption and CO_2 emissions, training and divulgation of eco-driving, defensive driving and, of course, the promotion of the use of alternative transport such as bicycles, trains and 'walk to work'.

Free cooling of mobile networks: free cooling systems were installed in about 2,500 (out of 3,070) mobile network sites between 2011 and 2013, with a significant positive impact in terms of reduction of energy consumptions and emissions in 2014. The mobile network has a total of about 4,550 sites, of which around 1,480 are indoors, cabinets or technical rooms, where free cooling is not applicable. This activity has enabled the reduction of CO_2 emissions by 1,281 tons.

Network modernisation and optimisation/Phasing-out of old equipment: the initiative consists in shutting down around 900 old generation ATM DSLAMs and in the migration of around 150,000 clients to IP DSLAMs. In 2014, 245 DSLAMs were decommissioned, and the emissions-reduction achieved was about 926 tCO_2.

Consolidation/Concentration of PSTN fixed network switches: reduction of the number of PSTN voice circuit switches in order to optimise the network, through a higher concentration of customers per equipment. 7 switches were consolidated in 2014 and the resulting emissions-reduction reached around 474 tCO_2.

ETNO MEMBER COMPANIES'
CARBON FOOTPRINT AND INITIATIVES

TELECOM ITALIA

Lighting project: the project started a few years ago, and began with the replacement of old neon tubes with high efficiency LED lamps in the common spaces of Telecom Italia's buildings. The activity continued in 2014 with the installation of new ceiling lights in office premises, equipped with presence detectors and variable light controls to adjust the lighting required depending on external lighting. Around 15,000 ceiling lights were installed in 2014, corresponding to an electricity consumption reduction of 4.3 GWh, and the installation continues at a rate of around 1,000 replacements a week. The estimated annual CO_2 emissions saving is in the order of 1,662 tons.

Replacement of power supply systems: the replacement of 315 old power supply systems with new and more efficient ones in selected buildings has enabled an electricity consumption reduction in the order of 25 GWh. The estimated annual CO_2 emissions saving is in the order of 9,660 tons.

Renewable energy: in 2014, Telecom Italia entered into an agreement, that also covers 2015, to buy guarantees of origin that certify electricity generated by renewable sources, for almost 100% of the electricity purchased by the Group in Italy in 2014 (1,910 out of 1,945 GWh). Thus a reduction of 90% in Scope 2 emissions was achieved in 2014 as compared to 2013.

TELEFÓNICA

Upgrading of power units: a power unit-upgrading project carried out in Germany, consisted in replacing old rectifiers, allowing Telefónica to save around 586,000 kWh, thus avoiding the emission of around 279.5 tons CO_2 per year.

Energy efficiency in technical buildings: upgrading works have been carried out in some technical buildings in Aravaca, an area of the city of Madrid. This has resulted in a saving of around 1.2 GWh and a CO_2 emission-reduction of around 349 tons per year.

These are just a few examples of the many energy efficiency and GHG emission reduction activities put in place by some ETNO member companies. Most of these examples apply to other ETNO members that did not participate in the survey.

A lot of effort is also dedicated to reducing the energy requirements of sold products and services. Here are some examples.

The customers using **Deutsche Telekom's** IPTV service (Entertain) are required to install a Set-Top-Box (STB) in order to decode the IP-signal. The total energy consumption for the service therefore consists of Data Centre operation, transmission and the STB at the customer's premises. The STB itself consumes around 140 Wh, which is roughly 87.5% of the total energy consumption. DT is planning to introduce a so called "Virtual Set-top-Box" (vSTB) which has the size of a HDMI stick and consumes only 20 Wh. The main difference is that functions like recording and storage will not be performed by a hard disk drive but will be moved to DT's cloud. The total daily energy consumption of the IPTV service per customer is now around 38 kWh (20 Wh for the STB Hardware, 15 kWh for the Transmission and 3 kWh for the Data Centre), which lowers the energy requirement by 75% compared to the standard STB.

KPN is also looking at the same service as DT, and adopted a similar solution: customers' recordings of TV programmes are stored in the green KPN cloud. This solution not only reduces KPN's customers' energy consumption but also requires less energy and materials during the production phase and facilitates the disposal phase. KPN's equipment sourcing policy requires all new ICT equipment to be more energy efficient than its predecessor. In 2014 KPN saved 13 GWh of electricity by replacing set-top boxes for IPTV customers with a newer and more energy-efficient model.

By developing and offering technical solutions that enable and support teleworking, Proximus offers its customers the possibility to organise the work of their employees more efficiently. By working at home, employees save commuting time and the company pays less transport costs, thus reducing its carbon emissions. For example, a company using **Proximus** teleworking solutions can reduce CO_2 emissions caused by commuting by around 29 tons per year per employee[14].

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[14] Assuming a commuting distance of 90 km/day and 1 day/week teleworking, and using average standard consumption and emission figures for company cars.

ETNO MEMBER COMPANIES'
CARBON FOOTPRINT AND INITIATIVES

Smart cloud services are seen by **PT Portugal** as a very efficient and sustainable solution for businesses. Every year, PTP's Cloud Service allows a medium-size enterprise to: save, on average, 93% of IT equipment purchasing and maintenance as well as energy consumption costs; reduce its electricity consumption by 6,670 KWh; and avoid the emission of 3.3 tons of CO_2.

Taking into account the increase in data traffic, virtualisation and the need for data storage and processing, PT Portugal inaugurated in 2013 a new Data Centre in the city of Covilhã - an infrastructure with the capacity to install more than 50.000 servers with 30 Pbytes storage capacity, connected to PTP's high-speed fibre optic network with symmetrical speeds of 100 Gbps. PT Portugal's new Data Centre has a PUE[15] of 1.2, about 40% less than the global average. Its environmental sustainability and energy efficiency are based on the use of renewable energy, environmentally friendly air conditioning systems and the intelligent distribution of temperature, in the use of highly energy-efficient lighting and monitoring systems. In the first year of the data centre's operation, forecasts pointed to a 40% reduction in energy consumption and a 50% reduction in carbon emissions, ie. 144,000 tCO_2e.

At the end of the 1990s, **Telecom Italia** launched a series of internal research and development activities to build terminals with a reduced environmental impact. Attention is being paid to their energy aspects, optimising consumption while meeting the needs of the services delivered and applying "Design For Environment" rules that reduce their environmental impact.

The products that carry the "TIM eco-friendly" logo come with environmental declaration which is contained in the packaging, and is drawn up in accordance with the UNI EN ISO 14021 standard. The most recent environmental declarations issued, relate to 3 new products launched in 2014, i.e.:

- the TIMvision IPTV decoder, which provides an electricity saving of more than 65% compared to the similar previous generation model and has a high energy efficiency (over 84%) power supply;
- the Cordless Facile Start telephone, which provides an electricity saving of more than 60% compared to a previous generation product with the same functions and includes an additional ECO mode which allows an additional energy saving of 10% to be achieved;
- the "Sirio." (Sirio dot) fixed telephone which, despite including advanced functions, provides an electricity saving of over 90%: in fact it has no power supply and works with the voltage and current supplied remotely, with no impact on the customer's electricity use.

Telefónica offers a service called Fleet Management which can be used by companies in logistics, transport and packaging and enables the locating of cars or of any terminal without requiring the installation of GPS-specific modules. The service provides specific modules for driving and route optimisation and helps optimise car assignments, find the routes with the least traffic, and reduce fuel consumption. Telefónica's customers have reduced their fuel consumption by 20% thanks to this solution. Two other services offered by Telefónica help its customers reduce their electricity consumption as well as the associated GHG emissions. They are:

- Inmotics: a smart building solution which supports energy efficiency in different buildings of a same company or retail enterprise and can support the reduction of 20 to 30% of the electricity bill per year. This service is available since 2010, and users have reduced their emissions by an average of 15-20 tons CO_2 per year. In Spain, for example, a reduction of around 15,000 tons CO_2 from customers using this service is expected by 2020.
- Smart metering: Telefónica is going to provide connectivity for the smart metering service in the UK, which will generate substantial income for Telefónica over the next 15 years. This initiative is the most ambitious smart meter scheme in the world, and envisages the installation of over 53 million smart meters by 2020; expected GHG emission savings are in the order of 24.94 million tons of CO_2 by 2022.

Once again, these are just a few examples of initiatives and solutions aimed at increasing the energy efficiency and reducing the energy consumption of ETNO member companies' customers. ETNO member companies are committed to *"supporting research and development so that new telecommunication products and services are as economically and ecologically sustainable as possible"*, as stated in the Association's Corporate Responsibility Charter.

It is worth mentioning that in order to fulfil its commitments, ETNO has established a specific Task Force on Energy (ETF) that has been active for several years: the ETF, which is composed of energy experts of ETNO member companies - please add a comma after companies - identifies best practices, investigates energy efficient and cost effective solutions applicable to both network and customer equipment, promotes benchmarking among operators and engages suppliers in an open and cooperative dialogue. THe - the H should be turned to h, lower case - ETF has also developed the Association's Guidelines on Energy Policy, which remains a reference for all companies willing to improve their performance, and reduce their GHG emissions.

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[15] PUE stands for Power Usage Effectiveness. It's a metric used to determine the energy efficiency of a data centre. It is calculated by dividing the amount of power entering a data centre by the power used to run the computer infrastructure within it, meaning that overall efficiency improves as the quotient decreases toward 1.

RISKS AND OPPORTUNITIES ASSOCIATED WITH CLIMATE CHANGE

The risks associated with climate change for the telecommunications sector have implications of a physical, economical and regulatory nature, with major impacts on the image and reputation of a company. Climate change causes changes in meteorological models that can result in extreme situations. But it also brings along opportunities, since the ICT sector is required to play an important part in the fight against climate change by promoting the replacement of physical products and traditional services with digital products and processes: efficiency improvements, savings achievable in economic terms and reduced environmental impacts associated with the use of these services are an interesting business opportunity for the sector. Therefore climate change management should be integrated into a company's business strategy.

RISKS

In Italy, in particular, considerable flooding has occurred in recent years, which has had a devastating impact on vast areas of land, cities and infrastructure. **Telecom Italia**'s installations, network infrastructure and Data Centres are spread across the country and the company believes that flooding is one of the most serious physical risks and the one most likely to occur. The evaluated effects consist of damage ranging from reduced use to loss of properties and, in extreme cases, total loss of the ability to provide the service to customers. In order to prevent or limit the potential damage, Telecom Italia's new exchanges and buildings are built at a safe distance from rivers and bodies of water in general and, in order to ensure continuity of service, the network is designed considering appropriate levels of resilience and redundancy.

Telefónica foresees a risk linked to future EU regulation, which originates from the obligation to accomplish the emissions targets proposed by the EU. In fact, currently the ICT sector is not regulated by any cap & trade scheme, but the new 2030 policy framework for climate & energy proposed by the European Commission states that emissions from sectors outside the EU Emission Trading Scheme would need to be cut by 30% below the 2005 level. Investments in energy efficiency and emissions reduction would have to be anticipated, and there would probably also be an impact on the global supply chain (ICT network equipment). This would increase the capital costs required for the purchase of new equipment.

Since the telecommunication sector is considered as a solution to climate change, and to low pollution, it is not yet subjected to any environmental labelling requirements. However, this requirement does already exist in other sectors such as for electrical appliances. Therefore **Orange** considers the risk of being subjected to such requirements as significant, in particular within the European Union. Mandatory regulations for standardisation of products and services could increase development costs of new products and services. This would impact the competitive conditions when taking products to the market. Orange has also noticed an increasing number of heat waves over the past few years. Such temperature changes induces risks of damaging the array of antennas and there is a greater need for network maintenance and investments in solutions that would enable a higher resilience of the network infrastructure in case of extreme weather conditions.

The climate change strategy of a company and the footprint of products and services provided are gradually shaping the overall image of an enterprise. Therefore for **OTE and COSMOTE** financial implications may relate to a possible loss of market share as a result of consumers' behaviour against the policy of companies with regards to climate change. Actions taken that are related to reputational risk include: (a) the program for energy conservation, (b) estimation and documentation of the GHG footprint of the company (c) development and implementation of ISO 14001 Environmental Management Systems and (d) investing in sustainable products and services.

TeliaSonera looks also at climate change as a competitive issue: both private and business customers are increasingly conscious of the risks and consequences related to climate change, and act accordingly when they select their telecommunications service provider. Companies are unable to understand and meet stakeholder demands related to providing eco-efficient products and services, and managing GHG emissions in their own operations, there is a risk that business (and subsequent revenue) will be lost to other operators that can better show how they are managing these issues.

The introduction of a carbon tax is also seen by **Proximus**, as well as by most of the companies, as very likely, and the associated financial implications may have a significant impact on companies' business, such as an increase in the costs of fuels used for heating and by the company's vehicle fleet and of the electricity used to power the network and data centres.

RISKS AND OPPORTUNITIES ASSOCIATED WITH CLIMATE CHANGE

OPPORTUNITIES

Deutsche Telekom sees climate protection above all as an opportunity in particular when enabling customers to reduce their own CO_2 emissions amongst other benefits. An example for this reduction potential is the Dynamic Workplace. Dynamic, that is a user-friendly IT workplace allowing access to virtually any application through a simple web browser, compatible with any type of device (e.g. laptop, notebook, tablet, smartphone) and delivered in a secure fashion from the T-Systems private cloud. In a pilot project carried out in 2015, DT estimated that, if implemented in a company with 35,000 employees, the service enables an annual reduction of 16,000 tons of CO_2 emission and 15 Million € cost savings from reduced idle time and sickness days of employees.

The demand for energy efficient services, enabling emission reduction and responding to increased demands from different groups of stakeholders is a powerful driver to the development of **Telecom Italia**'s Smart Services portfolio. Smart Town, a service developed for the integrated management of local infrastructure networks, enables energy savings which are estimated within a range of values between 15% (light produced by high-efficiency lamps, e.g. LEDs) and over 30% in the case of light produced by old style lamps (e.g. sodium vapour or incandescence). Added to these values is the option of varying lighting by switching on and/or reducing the intensity of individual lamp posts. Assuming that the average per capita energy consumption in Italy is 107 kWh[16] and applying a 20% reduction (the replacement of conventional lamps with high efficiency ones is in progress in many towns), a town of 100,000 inhabitants would be able to achieve a total annual saving of 2,140 MWh, corresponding to 827 t of CO_2 emissions avoided.

Increased awareness of climate change and its effects mainly on companies and public decision makers has led to an increase in interest in research and development of, and subsequent price reduction in, solar power equipment that can be used to power mobile base stations and other facilities. **TeliaSonera** is already utilising solar power and will continue to do so as capital costs required for investments continues to drop. This also means the ROI on these investments will become more significant over time, making it financially viable to further invest in solar power equipment.

As most of ETNO member companies **Telefónica** provide services such as Telepresence or audio- and video-conferencing to our customers, thus helping them to reduce their travel needs. The employees of Telefónica themselves make extensive use of the Telepresence service. Since 2008 an average of 7,500 tons of CO_2 have been avoided thanks to the exploitation of this service, and business travel costs have been significantly reduced.

ETNO member companies are more and more aware that climate change represents a challenge and that only a proactive approach can respond in an adequate, timely and business effective manner enabling them to manage risks and grasp opportunities.

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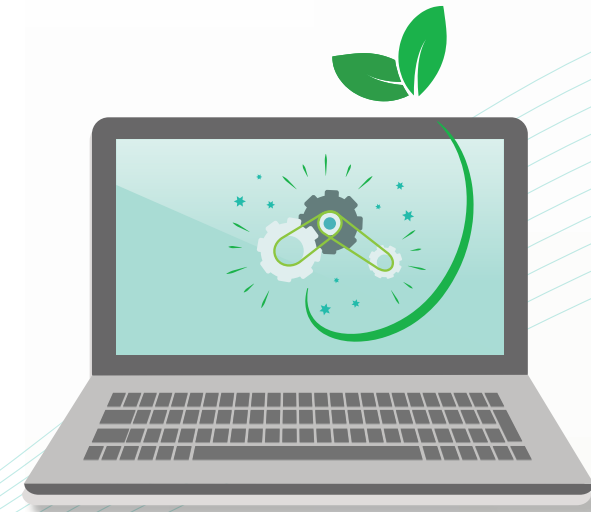
[16] Source: blog of the Commissioner for Spending Review of the Italian Government.

MESSAGE FOR POLICY-MAKERS AND COP21

Effective adaptation and mitigation responses will depend on policies and measures at multiple levels: international, regional, national and sub-national. Policies across all levels, supporting technology development, diffusion and transfer, as well as finance for responses to climate change, can complement and enhance the effectiveness of policies that directly promote adaptation and mitigation.

ETNO therefore calls upon EU policy-makers to ensure that the role of ICT and, in particular, of high-speed fixed and mobile broadband networks is fully reflected in the forthcoming sector specific energy efficiency roadmaps and in the national low-carbon economy plans.

Concrete measures to encourage businesses and citizens to opt for low-carbon broadband enabled applications will in turn contribute to stimulate take up of new networks and improve conditions for investment in new high-speed networks, in line with the Digital Agenda for Europe.

ETNO is also aware of the importance of the outcome of COP21, on which great expectations are placed by both businesses, governments and civil society.

ETNO member companies believe that the private sector has a responsibility to actively engage in global efforts to reduce GHG emissions, and to help lead the global transition to a low-carbon, climate-resilient economy. Therefore ETNO would welcome a binding agreement based on sound scientific evidence, that would set reasonable targets aimed at limiting temperature rise to acceptable levels and avoiding climate related disasters in the future. Such an agreement should include crucial issues like mitigation, adaptation, finance, capacity building, tools and transparency of action and support.
It should also take into account the potential of telecommunications and ICT in general to decarbonise the economy, which has been demonstrated by several studies, including the latest GeSI SMARTer2030 report.

ETNO member companies are actively engaged in reducing their own carbon footprint, applying technical and organisational solutions to their own operations, investing in the research and development of new services and solutions aimed at the public and private sectors to help increase their efficiency and reduce their GHG emissions.
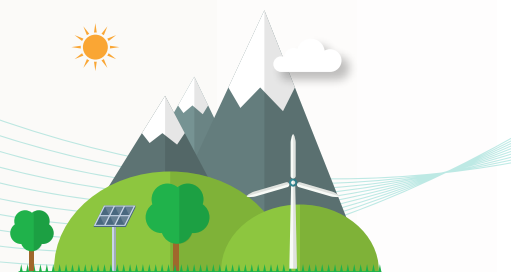
ABOUT ETNO

ETNO has been the voice of Europe's telecommunications network operators since 1992 and has become the principal policy group for European electronic communications network operators. Its 50 members and observers in 35 countries collectively account for a turnover of more than € 600 billion and employ over 1.6 million people. ETNO companies are the main drivers of broadband and are committed to its continual growth in Europe.

ETNO members are pan-European operators, also holding new entrant positions outside their national markets. ETNO brings together the main investors in innovative and high-quality e-communications platforms and services, representing 70% of total sector investment.

ETNO closely contributes to shaping the best regulatory and commercial environment for its members to continue rolling out innovative and high quality services and platforms for the benefit of European consumers and businesses.

For more information on ETNO, visit the Association's website: **www.etno.eu** It is also possible to contact ETNO via email (info@etno.eu) or on twitter (@ETNOAssociation).

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European Telecommunications Network Operators' Association
info@etno.eu | Tel: +32 (0)2 219 3242

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