MALTA COMMUNICATIONS AUTHORITY

The contribution of the Communications Sector and the MCA's potential role towards achieving Malta's environmental sustainability goals

Discussion Paper

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TABLE OF CONTENTS

Executive Summary

The Malta Communications Authority (MCA) is the statutory body responsible for the regulation of the communications sector in Malta. The MCA has a range of functions and objectives as the communications regulator - across electronic communications, postal services, radio spectrum and digital services - in accordance with European Union (EU) and national legislation.

The communications sector plays a pivotal role in tackling the challenges presented by climate change and in enabling the reduction in greenhouse gas (GHG) emissions across various sectors of the economy; as Europe and many other parts of the world aim for a more environmentally sustainable society. At the same time the communications sector needs to consider its own impact on the environment, without having to forego any technology-driven business and innovation opportunities.

Through reviews of relevant reports, interactions with companies in the communications sector, and engagement with fellow national regulatory authorities (NRAs), the MCA has gained a better understanding of the role the sector plays in terms of its relationship to climate change. More specifically, the MCA is better informed on how the communications sector can assist in facilitating decarbonisation across the economy, how it can reduce its own carbon footprint and how it can adapt to a changing climate. The MCA is also better informed on its potential contribution, as the regulator of the communications sector, in promoting environmental sustainability.

Whilst the MCA does not, so far, carry a specific legal remit pertaining to environmental sustainability issues in the communications sector, it recognises its potential to contribute to Malta's sustainability goals. The MCA considers that, even within its current span of responsibilities, it may not only play a role in supporting the communications sector's decarbonisation goals, but also to promote the sector's cascading effect on other economic sectors, that is, on a wider national level.

In this discussion paper the MCA is sharing its views, together with a series of possible actions aimed at encouraging the communications sector to increasingly consider its contribution towards environmental sustainability. The MCA is confident that the exercise will continue to build on the environmental sustainability efforts and initiatives that are already being undertaken by the communications sector in Malta and contribute to the momentum towards Malta's environmental sustainability goals.

The MCA welcomes the views of interested parties and will carefully consider the responses received. These responses will be used to formulate a practical plan of action which may necessitate active engagement with various stakeholders, including the operators in the communications sector and other public bodies (some of whom have a direct remit in this area).

Please refer to **Section 6** for further information on submitting comments.

1 Introduction

The protection of the environment, in order to help prevent climate change, is higher than ever on the agenda of national, European and global public decision makers. The communications sector plays a key role in tackling the challenges presented by climate change, and in enabling the reduction in GHG emissions across various sectors of the economy.[1] At the same time the GHG emissions caused by the communications sector cannot be ignored and warrants a collective effort to limit and possibly reduce sectoral emissions.

Achieving carbon neutrality by 2050 is at the heart of Malta's economic vision.[2] In 2019 Government published "Malta's 2030 National Energy and Climate Plan (NECP)".[3] The NECP covers five inter-related and mutually reinforcing pillars: decarbonisation, energy efficiency, energy security, internal energy market, research and innovation, and competitiveness. Malta aims to facilitate the transition to a low carbon economy, mainly through a combination of national GHG emissions reduction initiatives and the deployment of feasible indigenous renewable energy sources.

In October 2021 Government published "Malta's Low Carbon Development Strategy[4] (LCDS)" which charts a course towards achieving Malta's decarbonisation targets. The LCDS observes that Malta's transport systems, infrastructure, energy use, construction, manufacturing and agriculture sectors are starting to bear the consequences of climate change. The LCDS addresses Malta's decarbonisation journey by prioritising the most cost-effective measures to improve energy efficiency and promoting renewable energy sources, whilst taking into account their socio-economic impacts. The LCDS aims at promoting green investment over a period of 30 years, whilst improving the quality of Malta's building stock, the way we work, our mobility patterns, our health and lifestyles. It is designed to address the pathways for Malta to achieve carbon neutrality by 2050 across all sectors of the economy. The LCDS recognises that although Malta has seen a reduction in carbon emissions, further efforts are required to tackle climate disruption. It also highlights the importance of Government, public bodies, and the private sector in taking action to reach Malta's decarbonisation goals.

In September 2022 the Environment Resource Authority (ERA) published Malta's National Strategy for the Environment 2050 (NSE) for public consultation.[5] The NSE charts a long-term and holistic vision of Malta's pathway towards environmental sustainability. The NSE is intended to provide strategic direction to all national plans, policies, decisions and projects

[1] The European Green Deal (Section 2.1.3): https://commission.europa.eu/publications/communication-european-green-deal_en

[2] Malta National Reform Programme Ministry for Finance and Employment April 2022

[3] Malta's 2030 National Energy and Climate Plan (December 2019)

[4] Malta Low Carbon Development Strategy – October 2021

[5] National Strategy for the Environment 2050 – A draft for public consultation (September 2022)

which have a bearing on the state of Malta's environment. The NSE also makes reference to the beneficial multiplier effect of the communications sector on the environmental sustainability of other sectors.

In December 2022 Government published Malta's Sustainable Development Strategy for 2050 (SDS) for public consultation.[6] The SDS highlights that digital technologies are not only critical in accelerating economic growth and job creation but also in safeguarding the environment, as well as in ensuring high-quality services and creating opportunities for personal development. The SDS recognises that digitalisation is a key enabler for sustainable development in that it can generate unique opportunities to strategically address sectoral development challenges and in ensuring equitable economic growth, environmental sustainability and a healthy society. In line with the SDS, Government will promote and support businesses to adopt digital technology products and services that will not only enhance their productivity and competitiveness, but also facilitate Malta's progress towards a green transition.

In July 2022 a group of thirteen founding member organisation from various economic sectors (which includes two of the main operators of electronic communications networks and services in Malta: GO Plc and Melita Ltd) set up the Malta Environmental, Social and Governance Alliance (MESGA).[7] The MESGA has the aim of acting as a platform for Maltese businesses to collaborate and work together in order to lead and drive national environmental, social and governance (ESG) goals and ultimately act as catalysts while leading by example.

Responding to climate change is a top priority at the European level. In December 2019, the European Commission (EC) published "The European Green Deal (EGD)" communication which resets the EC's commitment to tackling climate change.[8] The EGD communication reaffirms the target of net-zero GHG emissions in Europe by 2050 and avoid a rise in global temperature of more than 1.5°C.[9] The EC also adopted a set of proposals to make the EU climate, energy, transport and taxation policies fit for reducing net GHG emissions by at least 55% (compared to 1990 levels) by 2030.[10] In the EGD communication the EC identifies digital infrastructures and technologies as a critical enabler for attaining sustainability goals in many different sectors.

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[6] Malta's Sustainable Development Strategy for 2050 for public consultation (December 2022)

[7] Malta ESG Alliance (MESGA)

[8] https://commission.europa.eu/publications/communication-european-green-deal_en

[9] Put simply, net zero means cutting GHG emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests for instance. To keep global warming to no more than 1.5°C - as called for in the Paris Agreement - emissions need to be reduced by 45% by 2030 and reach net zero by 2050:

https://www.un.org/en/climatechange/paris-agreement

[10] Delivering the European Green Deal (Euractiv – Breakthrough as EU negotiators clinch deal on European climate law – 21 April 2021)

The EGD recognises that digital connectivity infrastructure is essential for achieving the twin digital and green transition, which are the EC's main priorities. The EC also emphasises that the digital sector itself should be sustainable at its heart and provides an objective that digital infrastructures should achieve climate neutrality.[11]

Appendix 1 provides additional information on Europe's regulatory and policy instruments which address different aspects of environmental sustainability having relevance to the information and communications technology (ICT) sector.

Having reviewed a range of recent reports which assess the communications sector's potential to facilitate reductions in GHG emissions, as well as through engaging with the active players in the sector, the MCA has acquired an informed perspective of the role that the communications sector plays in terms of its relationship to climate change. In addition, through its participation in various EU fora, notably through the Body of European Regulators for Electronic Communications[12] (BEREC), the European Regulators Group for Postal Services[13] (ERGP) and the Radio Spectrum Policy Group[14] (RSPG), the MCA has gained a better understanding on how the sector can assist in facilitating decarbonisation across the economy, how the sector can reduce its own carbon footprint, and how it can adapt to a changing climate. The MCA is also better informed on its potential role, as the regulator of the communications sector in Malta, in promoting environmental sustainability.

Environmental sustainability is an increasingly important driver of commercial decisions for many communications companies. It is encouraging to see these organisations in Malta reducing their GHG emissions, reducing energy consumption (or making energy consumption more efficient) while delivering communications networks and services that can help enable Malta to tackle the broader environmental challenges, including those brought about by climate change itself.

Electronic communications networks, services and applications are the key enablers of digitalisation initiatives, and these have the potential to accelerate reductions in GHG emissions across various sectors of the economy. These are likely to have a broader impact on the environment than an individual operator's own actions, and they are likely to offset

[11] The EC digital strategy 'Shaping Europe's Digital Future' also provides the objective of climate neutrality for digital infrastructures. Data centres and telecommunications will need to become more energy efficient, reuse waste energy, and use more renewable energy sources. They can and should become climate neutral by 2030.

[12] BEREC assists the EC and the NRAs in implementing the EU regulatory framework for electronic communications. It provides advice on request and on its own initiative to the European institutions and complements, at the European level, the regulatory tasks performed by the NRAs at the national level.

[13] ERGP is an advisory group to the EC. Its main objective is to help consolidate the internal postal services market and ensure consistent application of relevant legislation. To achieve these objectives, ERGP facilitates cooperation between the independent NRAs and between them and the EC.

[14] RSPG is a high-level advisory group assisting the EC in the development of radio spectrum policy.

several times over the impact of the electronic communications networks themselves. There is also a growing public awareness over the impact that the use of digital technology has on the planet. Economic agents - both vendors and users - are also starting to modify their behaviour to become more aligned to the environmental sustainability values.

Whilst the MCA does not, so far, carry a specific legal remit relating to environmental sustainability issues in the communications sector,[15] it sees itself, even within its current span of responsibilities, as playing a role to support primarily the communications sector's decarbonisation goals, but also in promoting the sector's cascading effect on other economic sectors, that is, on a wider national level.

Document Structure

In addition to this section the document comprises of the following five sections:

- **Section 2** discusses, based on the findings of various recent reports, how the electronic communications sector can help reduce GHG emissions across various other sectors of the economy.
- **Section 3** considers the steps which could be taken by the electronic communications sector in order to reduce its carbon footprint and to improve resilience in the face of climate change.
- **Section 4** discusses the increasing levels of eCommerce and its impact on the GHG emissions of the postal sector.
- **Section 5** outlines the MCA's potential contribution in encouraging the communications sector to increasingly consider its environmental sustainability and in promoting the role that the sector can play in reducing GHG emissions across various other sectors of the economy.
- **Section 6** sets out the next steps and process for interested parties to submit responses.

In addition, the document also includes the following four appendices:

- **Appendix 1** provides an overview of the European perspective on environmental sustainability in the digital sector.

[15] Article 4(3)(k) of the Malta Communications Authority Act, Cap. 418 states that the Authority shall in accordance with the laws it is entitled to enforce "establish measures, as necessary, for the protection of the environment in the provision of the services, products, operations or activities relating to any matter regulated by or under this Act".

- **Appendix 2** provides good practices on reducing GHG emissions in the electronic communications sector.

- **Appendix 3** provides an overview of some of the environmental sustainability initiatives being taken by the main providers of electronic communications networks and services in Malta.

- **Appendix 4** provides good practices on reducing GHG emissions in the postal sector.

2 The enabling potential of electronic communications in reducing GHG emissions

Digitalisation in general, and electronic communications networks and services in particular, are key enablers of the green transition thanks to their contribution to decarbonisation of other sectors of the economy. Access to secure electronic communications networks and services can enable a range of digital applications which can provide the opportunity to change the way we live and to enable a low carbon economy, thus tackling climate change.

It is estimated that ICT, in which connectivity plays a very important role, has the potential to enable a 15% GHG reduction in other economic sectors, such as energy, agriculture, industry and transport.[16] The potential of electronic communications networks, services and digital applications is also borne out in Malta's NSE (National Strategy for the Environment 2050) and Malta's SDS (Sustainable Development Strategy for 2050), which both refer to the beneficial environmental multiplier effect of electronic communications and digital solutions on other sectors of the economy.

The roll-out of very high-capacity networks (VHCNs) supporting digital applications [such as Internet of Things[17] (IoT) applications] can assist in facilitating decarbonisation across various sectors of the economy. For example, the use of smart building automation can facilitate improved energy efficiency and greater use of renewable energy, telecommuting can reduce the need to travel, while smart grids could improve the efficiency of utility networks. In many cases, electronic communications network and services can assist in facilitating the virtual replacement of a physical process which, uses considerably less energy (thus reducing GHG emissions), but still enable people to achieve the same or similar results.

A range of reports and studies have explored the potential environmental benefits that the ICT sector could facilitate. Reports have been produced by the Global e-Sustainability Initiative[18] ('GeSI'), the International Telecommunications Union[19] ('ITU'), the International Energy

[16] https://www.ericsson.com/en/news/2020/3/breaking-the-energy-curve

[17] From a conceptual standpoint, the Internet of Things (IoT) means connected physical objects that have their own digital identity and are capable of 'talking' to each other. From a technical standpoint, this consists of direct and standardised digital identification of a physical object thanks to a wireless communications system.

[18] GeSI is an international consortium for the promotion of ICTs and practices that promote sustainable development and growth. GeSI is comprised of diverse and international members and partnerships, representing around 40 of the world's leading ICT companies, 12 global business and multiple international organisations, such ITU, the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment Program (UNEP): https://gesi.org/members

[19] ITU-D, (2017). "Question 6/2: ICT and Climate Change"

Agency[20] ('IEA'), the Organisation for Economic Co-operation and Development[21] ('OECD') and the Radio Spectrum Policy Group[22] (RSPG), among others. These reports identify key sectors of the economy where the development of digital services and applications, enabled by the connectivity provided by fixed and wireless electronic communications networks and services, can facilitate abatement of GHG emissions. For example, "GeSI's SMARTer2030'' report[23] identifies eight key sectors (Energy, Health, Buildings, Work and Business, Manufacturing, Food, Learning and Mobility, and Logistics) which could see significant abatement of GHG emissions due to the development and application of ICT. The report estimates that the ICT sector could save up to 12 Gigatonnes (GT) of carbon (CO_2) emissions by 2030 by contributing solutions in different economic sectors, from mobility to energy generation and supply. Improved efficiencies acquired in these sectors will be expected to contribute to the decoupling of economic growth from the emission growth trajectory and thus make the ICT sector net carbon negative. Similarly, the ITU's 2013 Korean Case Study identifies fourteen key ICT services which may facilitate decarbonisation [real-time navigation (RTN), bus information system (BIS), e-logistics, telepresence, home energy management system (HEMS), smart grid, e-commerce, e-government, e-civil service, e-health care, digital contents, smart motor, e-learning and smart work].[24]

Based on the above-mentioned reports, it is recognised that there are a number of key processes by which technology can facilitate reductions in GHG emissions. These processes include the ability to 'Connect & Communicate', 'Monitor & Track', 'Analyse & Predict', and 'Automate & Control'.[25] Key technologies which make decarbonisation possible include both fixed and wireless VHCNs and IoT. For example, Smart Building products (using IoT technology) offered by electronic communications networks and services can allow consumers and businesses to monitor and track their energy usage. Through analysis of the gathered data, usage can be controlled or automated to reduce energy consumption and associated carbon emissions.

Key sectors in which connectivity provided by resilient and high-quality fixed and wireless electronic communications networks and services may be able to facilitate a reduction in GHG emissions include:

[20] IEA, (2019). "Energy Efficiency 2019":

[21] OECD (2009). "Towards Green ICT Strategies: Assessing Policies and Programmes on ICT and the Environment"

[22] In 2021 the RSPG published a 'Report on the roles of radio spectrum policy to help combat climate change'. The report outlines how communications technologies can have an abating effect when applied in other sectors, such as energy, industry and transport.

[23] GeSI (2015). "SMARTer2030: ICT Solutions for 21st Century Challenges"

[24] ITU, (2013). "The case of Korea: the quantification of GHG reduction effects achieved by ICTs"

[25] See ComReg's 19/126 "Call for Inputs – Connectivity and Decarbonisation" dated 20th December 2019.

Electricity – The emergence and widespread adoption of ICT technologies in electricity systems can facilitate a range of opportunities to reduce energy related GHG emissions. By using a network of connected devices, energy systems can be managed more efficiently by collecting, analysing, monitoring and exploiting real-time data. In particular Smart Meters, Smart Grid, Smart Buildings and Smart Cities, Electrical Vehicles (EVs) providing storage capacity, can all facilitate a range of benefits to reduce energy related GHG emissions. There are a range of ways in which connectivity provided by electronic communications networks and services can assist in facilitating the decarbonisation of the electricity sector. The widespread accessibility of VHCN and smart devices (via IoT) can allow consumers to better monitor, analyse and control their energy usage, thus reducing GHG emissions.

Transport – The widespread availability and access to VHCNs can assist in facilitating the reduction in GHG emissions associated with the transport sector in a range of ways such as: Virtual Replacement (teleworking/videoconferencing, eCommerce, eHealth, eLearning, eBanking), Traffic Control and Optimisation, Smart Charging and Connected Private Transportation. In the presence of VHCNs workers have the opportunity to work remotely minimising the need to travel to work. Similarly, the availability of online conference and collaboration tools reduce the need for business travel and the associated carbon emissions. This not only applies in the case of work but can similarly apply in the cases of e-Learning, e-Commerce, e-Banking and e-Health, as patients, customers and students can avoid the need to travel. There are also a number of specific opportunities with regard to logistics. Connectivity allows for smart logistics through the collection of vehicle data. This can then be used for optimisation of route planning, load optimisation, and improvement in driver behaviour. Smart vehicle of fleet management solutions reduces fuel consumption and associated GHG emissions. For the transport sector in general, other opportunities include smart parking apps, which can help drivers find available parking spaces, reducing congestion and GHG emissions.

Agriculture – Connectivity provided by electronic communications networks and services can also assist in facilitating reductions in GHG emissions associated with agriculture (e.g., precision agriculture practices using IoT sensors has the ability to lower GHG emissions).[26] IoT sensors can also be used to access real-time data to monitor and optimise land use and wastewater management, amongst others.

Industry – Advances in connectivity are contributing to a revolution in global manufacturing, where the use of ICT can enable connected industrial production. (e.g., the use of IoT sensors and machine-to-machine (M2M) communications which optimise manufacturing processes). This is commonly referred to as Industry 4.0 or the Industrial Internet of Things (IIoT). Manufacturing process can be made more efficient, flexible and responsive, transforming how

[26] Precision Agriculture Technologies Positively Contributing to GHG Emissions Mitigation, Farm Productivity and Economics. Sustainability 2017, 9(8), 1339

factories operate, improving productivity, reducing energy demand and associated GHG emissions. 5G deployment and Industry 4.0 applications could result in a steep change in manufacturing efficiency which has the potential to facilitate reduction in GHG emissions.

The range of enablement examples of the electronic communications sector, in the twin transition of a sustainable and digital economy, is vast and may not always be determined solely by the operators of electronic communications networks and services; sometimes positive changes occur as a by-product of consumer choices. But operators of electronic communications networks and services do play a proactive role by offering applications and solutions that foster more sustainable and green ecosystems. For example, the potential to make transport and logistics more efficient, or to eliminate the need for transport, by implementing remote communications (thus reducing commuting emissions) is one of the areas with the clearest and most obvious impact, but there are many other areas as mentioned above.

Practical considerations

Although various reports highlight the potential benefits that robust electronic communications networks and services have in reducing GHG emissions, other reports express caution that such a trajectory may not materialise as projected in the wider economy, without governance and intervention. A potential caveat cited in this regard is that the efficiency brought about by digital applications into sectors of the economy that are already carbon-intensive could lead to even more growth in these sectors, that will ultimately result in more GHG emissions.

Importantly, the abatement benefits of GHG emissions depend upon robust, resilient and high-quality connectivity provided by electronic communications networks and services.[27] However, when considering the benefits brought about by high-quality connectivity, it is important to also consider the so called "rebound effects" (Jevons paradox[28]). If improvements in technology increase efficiency and reduce costs for consumers, consumers may choose to increase consumption.[29] This may ultimately impact the overall reduction in GHG emissions facilitated by the use of digital services and applications. In addition, these developments can also have knock-on effects. The 'GeSI's SMARTer2030' report estimates that rebound effects could reduce carbon abatement potential by about 11%.[30] For example, the ease of making online

[27] Also noted in the Malta's draft Sustainable Development Strategy for 2050 (SDS) – Strategic Objective 1 – Towards a Digital Empowered Economy and Society.

[28] In economics, the *'Jevons paradox'* occurs when technological progress or government policy increases the efficiency with which a resource is used (reducing the amount necessary for any one use), but the falling cost of use increases its demand, thereby increasing, rather than reducing, resource use.

[29] ITU, (2015): "Question 24/2: ICT and Climate Change" Available at:

https://www.itu.int/dms_pub/itu-d/opb/stg/DSTG-SG02.24-2014-PDF-E.pdf

[30] GeSI (2015). "SMARTer2030: ICT Solutions for 21st Century Challenges" [GHG abatement potential (12.08 Gt.), Rebound effect (1.37 Gt), Final GHG abatement potential (10.71 Gt)].

booking of flights has led to a large surge in the demand for more flights that led to the growth of the aviation industry and a surge in GHG emissions. The rise in e-commerce may increase the carbon footprint of the postal sector while decreasing the overall carbon emissions of transport (see **Section 4**).[31] If traffic congestion can be reduced due to traffic control and optimisation, it may encourage more individuals to drive, which may impact the overall reductions in GHG emissions arising from the measure. Meanwhile, the increasing demand for data and connectivity may also drive increases in the energy demand of electronic communications networks and increase the carbon footprint of the electronic communications sector itself.

The benefits which digital solutions can provide need to be effectively communicated in order to promote usage and GHG emissions reduction. For digital solutions to drive reductions in GHG emissions, users need to understand their benefits and be motivated to use them. For example, the introduction of smart meters creates an opportunity for reductions in GHG emissions, but a quality user interface is also required to engage and empower consumers. Similarly, farmers may not engage with precision agriculture unless they understand and trust the benefits which the technology can provide. In addition, as the take-up of these services increases and society becomes more reliant on connectivity, the importance of the resilience of electronic communications networks and services also increases.

Malta's LCDS (Low Carbon Development Strategy) considers the teleworking/remote working possibility as a GHG reduction measure, addressing the dependency of productivity and transport. In order to support this further, Government will be looking into: (i) promoting and incentivising further remote working amongst the workforce, including through remote workspaces for public officials across Malta and Gozo; and (ii) improving the provision of online services. Malta's SDS (Sustainable Development Strategy for 2050) highlights that reducing traffic requires increasing awareness on alternate mobility, and associated benefits, and providing accessible and well-designed spaces for walking and cycling. It also recognises the need to strengthen the implementation of remote working policies[32] and facilities and moving towards online services to reduce and avoid the need to travel while enhancing work-life balance for all.[33] In addition, Malta's NSC also recognises the benefits in the importance of digital technology to make smart localities (e.g., making communal spaces available for remote working, intelligent systems, efficient mobility and encouraging walkability).

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[31] For a more detailed discussion about the positive and negative impacts of e-commerce on GHG emissions, see the following: ITU (2017). "Green ICT Technologies: How they can help mitigate the effects of climate change".

[32] With effect from 3 April 2023, public officers have started to benefit from improved measures and the introduction of modern work practices for enhanced work-life balance (the work practices of Reduced Hours, Flexi-time, Flexi-week and Remote Working will be structured and strengthened).

https://publicservice.gov.mt/en/people/Pages/GuidelinesFor.aspx

[33] See draft Malta's draft Sustainable Development Strategy for 2050 (SDS) – Strategic Objective 2 – Building Sustainable Communities Through Smart Mobility and Connectivity

A necessary prerequisite for a functional digital society is access to affordable and high-quality connectivity that allows everyone to get online and that all levels of society have sufficient levels of digital skills to access, interpret and make good use of information and data communicated by various digital devices. When some cohorts lack essential digital skills, they cannot fully participate in society and reap the benefits which digitisation brings. The use of remote working to video conferencing and shopping safely online are all activities associated with some form of transport and thus have the potential to reduce GHG emissions. Conversely, any benefits of technologies aimed at aiding sustainability efforts, which require the participation and input of society, may not reach their full potential if there are significant digital skills-gaps in segments of society.

Malta's SDS (Sustainable Development Strategy for 2050) recognises the need to "strengthen collaboration among educational institutions, community organisations and industry to mainstream *eSkills* in school curricula and lifelong education so that all cohorts of society, regardless of age or background, can engage with and benefit from digitalisation". The NSC (Malta's National Strategy for the Environment 2050) also recognises the benefits in increasing digital literacy to facilitate the uptake of remote working, online shopping and other government services.

BEREC[34] recognises that digital solutions are critical enablers of achieving climate neutrality through the positive enabling effects of digitisation on other sectors' decarbonisation - a view, which is also shared by the DG Connect.[35] It is clear that electronic communication networks and services play an essential role in the enablement of the twin challenge of green and digital transformation. Digitisation promises to bring major efficiency gains that translate into significant reductions of GHG emissions. At the same time, the digital sector's environmental footprint is increasing with energy usage going up. BEREC, therefore, recognises that it is important to get a good understanding of the environmental impact that the communications sector as a whole can have. In addition, the fast and smooth deployment of the relevant infrastructure is of utmost importance, whilst keeping the environmental impact of such deployment as low as possible.

[34] BEREC Report on Sustainability: Assessing BEREC's contribution to limiting the impact of the digital sector on the environment

[35] The Directorate-General for Communications Networks, Content and Technology (CNECT) develops and carries out the EC's policies on digital economy and society, research and innovation.

3 Reducing GHG emissions stemming from electronic communications

Despite the electronic communications sector's ability to facilitate reductions in GHG emissions in other sectors of the economy, the sector also needs to consider its own carbon emissions. The electronic communications sector is an important contributor towards Malta's net-zero targets. The objective is to successfully combine the ongoing investment, innovation and increase in the use of digital technologies while reducing its environmental footprint.

As discussed in the previous section, digitalisation, data use and smart technologies using advanced fixed and wireless digital infrastructures could lead both to resource efficiency gains and reductions in GHG emissions in a wide array of areas. The use of fixed and wireless electronic communications networks and services is, however, itself associated with energy consumption during use, as well as GHG emissions associated with energy and materials used throughout the life cycle of a product. Digital technology such as artificial intelligence (AI), cloud computing, IoT can enable speed and scale in delivering Europe's decarbonisation goals. However, while ICT technologies can help most sectors of the economy to become greener, the ICT sector itself must accept its responsibility to meet high ecological standards.[36]

A number of reports have attempted to estimate the carbon footprint of the ICT sector, which includes, but is broader than, the GHG emissions of the electronic communications sector per se (such as data centres and end-user devices). A life-cycle assessment of the contribution of the ICT sector's global GHG emission arguably accounts for between 2 - 4%,[37] which is equivalent to what some other sectors, such as aviation and shipping produce.[38] A life-cycle assessment covers the entire process from sourcing material, manufacturing, packaging and shipping, usage, up to the disposal of the end-user device and, or the decommissioning of legacy infrastructure.[39] In a further breakdown of this contribution, it is estimated that the electronic communications networks account for between 12 - 24% of these emissions (i.e., between 0.25-1% of total global GHG emissions). GHG emissions associated with the production and use of terminal equipment (devices) are estimated to account for the major

[36] https://events.euractiv.com/event/info/the-twin-transition-how-can-green-growth-and-digital-transformation-go-hand-in-hand-to-drive-europes-recovery

[37] BEREC Report on Sustainability: Assessing BEREC's contribution to limiting the impact of the digital sector on the environment – June 2022.

Extract from BEREC external study 'Environmental Impact of Electronic communications', WIK and Ramboll (2022) based on several studies.

[38] Greening digital companies: Monitoring emissions and climate commitments

[39] A life cycle begins with extracting raw materials from the ground and generating energy. Materials and energy are then part of manufacturing, transportation, use (e.g., operation of networks), and eventually recycling, reuse, or disposal. A life cycle approach (LCA) identifies both opportunities and risks of a product or technology, all the way from raw materials to disposal.

share of the ICT sector's GHG emissions (between 60 – 80%) with high impacts from large screens (TVs and computers) in particular. ICT infrastructure and devices themselves use a considerable amount of energy (mostly electricity). Data centres alone are estimated to contribute approximately 15% of all the ICT sector's GHG emissions, although this share may well increase as demands for more massive data processing are expected to increase from activities such as AI, blockchain technologies and a wider proliferation of IoTs. Data centres, communication networks and user devices accounted for an estimated 4-6% of global electricity use in 2020 (5-8% including televisions).

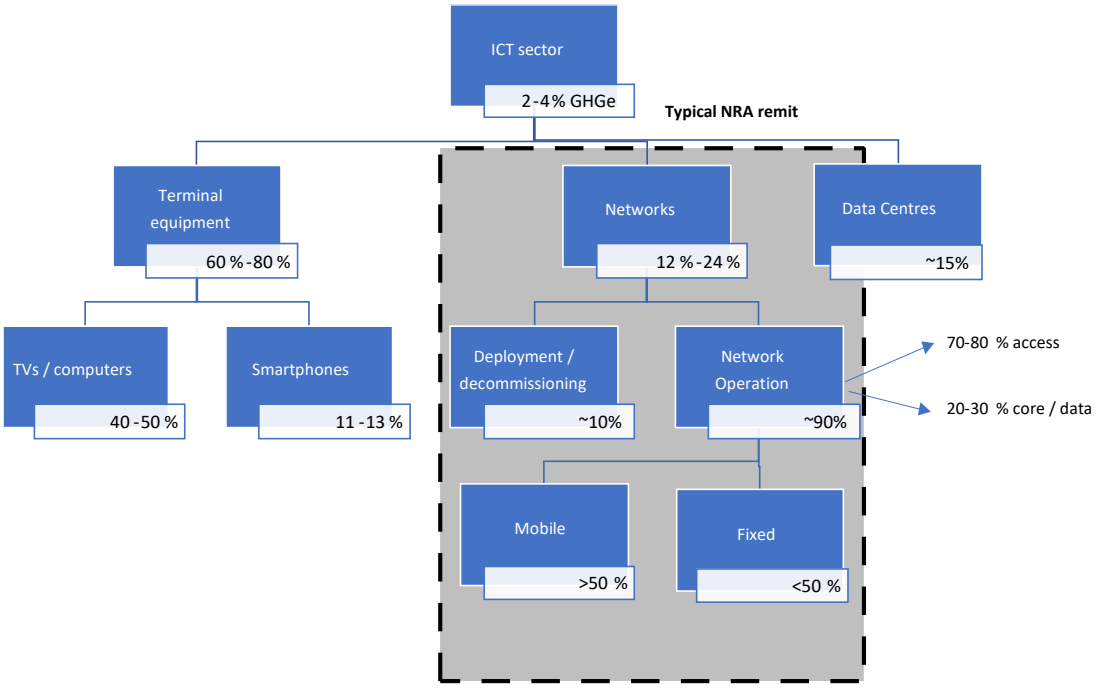

Diagram 1: A breakdown of contributions to GHG emissions by the ICT sector[40]

There is lack of consensus on which direction projections of future GHG emissions from the ICT sector may take. Some studies predict stable levels of GHG emissions over time, as the effect of the increase in data-consumption and the proliferation of devices will be largely mitigated by the improved technologies and sustainability measures introduced. Other studies,

[40] BEREC's report on Environmental impact of electronic communications:

https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/10206-external-sustainability-study-on-environmental-impact-of-electronic-communications

(Note: BEREC cautions that the values exhibited in Diagram 1 above should be interpreted carefully as different and sometimes non-consensual methodologies or scopes of assessments have been applied across different studies.)

such as the Shift project,[41] point towards an increase of about 14-24%[42] of the overall global emissions by 2030/40, mainly due to the "rebound effect" brought about by the increases, which will reverse and eventually add, to the net GHG emissions of the ICT sector.

BEREC supports the wide adoption of a multi-criteria life-cycle analysis to allow mitigation of all relevant adverse impacts related to the digital sector. Promoting sustainability in the ICT sector requires increased environmental accountability of all relevant parties of the Internet ecosystem [e.g., devices and equipment manufacturers/providers, data centres, operators of electronic communications networks and services, and content and application providers (CAPs)] in a manner that sets the right incentives for industry players and users. The complexity of the Internet ecosystem and its environmental impact requires robust assessment methodologies, with common sustainability indicators based on standardised data. The collection of environmental data would contribute to the environmentally sustainable development of the ICT sector.

Projections about future emissions from the ICT sector depend on which of the two effects will dominate: (i) increasing emissions resulting from increased data consumption; and (ii) the proliferation of devices, or energy efficiency and increased reliance on renewable energy. Some studies suggest that the energy efficiency that will be achieved through digitisation of other sectors will outweigh impacts from the ICT sector itself, while others consider that emissions from the ICT sector could multiply and undermine achievement of environmental targets.

It is encouraging to see in the electronic communications sector that environmental considerations are progressively being factored in, both at the equipment as well as at the policy and standards design phase before the advent of new network technologies. However, it is not yet possible to conclude the overall environmental impacts of these technologies, as they are not yet fully deployed. Regarding the footprint of digital services, proper eco-design criteria are also required to minimize the footprint of infrastructures and devices and vice versa.[43]

[41] The Shift project: aims to reflect on practices and actions that limit the direct and indirect environmental impacts of Digital, while maximising the net effect of the Digital levers in terms of ecological transition. The project takes roots in a context in which Digital energy consumption is growing faster than forecasted, and where, by extension, induced GHG emissions are also increasing.

[42] BEREC Report conducted by WIK-Consult and Ramboll: Environmental impact of electronic communications (December 2021).

[43] For now, digital services and CAPs are not covered by EU settings or regulatory framework on eco-design that focuses solely on goods, not services. It is currently being revised.

https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products_en

It is recognised that the energy sector is the source of around three-quarters of GHG emissions today and holds the key to averting the worst effects of climate change.[44] Electrification (the process whereby fossil-fuel sources of power are substituted with electricity generated from renewable energy sources, such as wind or solar) is one of the earliest strategic steps to be taken towards decarbonisation of society.[45] From this perspective, the ICT sector life-cycle carbon footprint is at least 80% based on the use of electricity.[46] A recent report claims that ICT's emissions could be reduced by 80% if all its electricity came from renewable sources.[47] The European Telecommunications Network Operators' Association (ETNO) "State of Digital Communications 2023" notes that Europe's electronic communications sector is speeding up its transition to renewable energy sources. According to ETNO, 83% of the total energy used by the sector came from renewables in 2021, up from 71% in 2018.[48]

Energy efficiency gains from new and less energy-intensive technologies and deployed equipment can limit the increase of the energy consumption of digital infrastructures and associated GHG emissions, with strong differences between wireless and fixed networks (i.e. fibre networks being associated with less operational emissions than mobile networks).[49] At the same time, increased data traffic is driving deployment of new digital infrastructures that could generate increased environmental impacts, for instance in the manufacturing phase of networks. Furthermore, energy efficiency gains can be associated with rebound effects inducing increased data consumption.[50] Hence, deployment of greener infrastructures and of sustainable digital services by design could help in achieving environmental targets, but data traffic alone is not the appropriate indicator to monitor such efforts.

It is clear that the adoption of renewable sources of energy plays a key role in the decarbonisation of the electronic communications sector, but the uneven availability of renewables and geographic distribution of the sector pose their fair share of challenges. However, this should not restrict the capability of ICT to bring about innovations that can help to mitigate GHG emissions in other sectors of the economy. As noted in Malta's NECP (Malta's 2030 National Energy and Climate Plan), Malta aims to facilitate the transition to a low carbon

[44] https://www.iea.org/reports/net-zero-by-2050

[45] United Nations – Climate Actions

[46] Recommendation ITU-T L.1470 - Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement

[47] https://www.sciencedirect.com/science/article/pii/S2666389921001884

[48] https://etno.eu//downloads/reports/etno-state%20of%20digital%20communications%202023.pdf

[49] International Energy Agency, Data Centres and Data Transmission Networks, 2022 Tracking report https://www.iea.org/reports/data-centres-and-data-transmission-networks

[50] D. Font Vivanco, J. Freire-González, R. Galvin, T. Santarius, H. J. Walnum, Tamar Makov, Serenella SalaRebound effect and sustainability science: A review (2022) https://doi.org/10.1111/jiec.13295 Bol, D., Pirson, T., Dekimpe, R. (2021). 'Moore's Law and ICT Innovation in the Anthropocene.' IEEE Design, Automation. https://dial.uclouvain.be/pr/boreal/object/boreal:24357

economy, mainly through a combination of national GHG emissions reduction initiatives and the deployment of feasible indigenous renewable energy sources. The NECP notes that Malta will continue to develop and support initiatives to increase its renewable energy share. However, it recognises that such efforts are becoming increasingly more challenging owing to the demand-driven growth in energy consumption and the limitations imposed by the geographical size and topographic characteristics of the Maltese islands.

Government has taken the decision to lay a second electrical interconnector between Malta and Sicily in order to cater for the increased demand expected to result from the forecast economic progress and well as the electrification of road transport. This is also one of the strategies to enable Malta to reach its environmental targets towards achieving carbon neutrality by 2050. The main objective of this project is for Malta to import electrical energy through the European grid including energy sources from renewables. A second electrical interconnector would contribute to ensuring that Malta complies with environmental and climate change obligations by importing electricity from sources emitting less or zero greenhouse gases than those installed locally. In view of the increasing renewable energy sources in Malta, the interconnectors would serve to enhance the stability of the grid by providing an alternating current link that will give more inertia and extra spinning reserve capacity to balance the intermittent fluctuations of renewables. A second electrical interconnector would also facilitate the integration of any possible local offshore renewable electricity generating solar or wind farms by improving the connection to a large stable grid to offset their intermittency.[51] More recently, Government published a bill aimed at setting up an exclusive economic zone which will serve to transform Malta into a hub of renewable energy production through the installation of renewable energy sources, primarily wind turbines and solar panels.[52]

The largest environmental impacts associated with the operation of electronic communications are linked to electricity use and could be limited by deploying more energy efficient technologies, such as fibre-to-the-home (FTTH) and potentially 5G Standalone (SA)[53], alongside the switch-off of legacy technologies. Temporary shutdowns, the use of sleep functions and network sharing could all support reductions in energy consumption and associated GHG emissions. On the end-users' side, studies also suggest that video streaming is associated with greater energy use than broadcast transmission (when transmitting to

[51] See "Project Description Statement for the Second Electrical Interconnector between Malta and Sicily - InterConnect Malta September 2021".

[52] Exclusive economic zone will turn Malta into a renewable energy hub:

https://timesofmalta.com/articles/view/exclusive-economic-zone-turn-malta-renewable-energy-hub-abela.1043153

[53] 5G standalone (SA) is an implementation of 5G that solely uses a 5G core network, meaning it has no dependency on 4G LTE network control functions, for signalling and data transfer.

multiple users), and that large screens and high resolution are both associated with higher data consumption and energy use.[54]

Although in relative terms, the effects on GHG emissions of different content distribution methods, technologies and network deployment methods are reasonably clear from the research literature, it is not possible to quantify these effects precisely due to the range of different metrics and methodologies that have been used to estimate environmental impacts. There is the need for standardised methodologies and metrics to be used horizontally as well as for digital technologies specifically. There is also the need to ensure data reliability and substantiation of claims in this area in order to avoid risks of greenwashing. The EC intends to assess the need for more transparency on the environmental impact of electronic communications networks and services, apply more stringent measures when deploying new networks and enhance the benefits of supporting 'take-back' schemes to incentivise people to return their unwanted devices such as mobile phones, tablets and chargers.[55]

In addition to rolling out more energy efficient networks, some proposals to reduce the carbon footprint of the communications sector have been made. For example, The Shift Project encouraged greater awareness of the environmental impacts of digital services.[56] Similarly, a report by ARCEP (France's Electronic Communications and Postal Regulatory Authority) suggests that consumers should be better informed about the environmental impact of the devices or services they use. For example, consumers could be informed of the energy savings associated with downloading content over Wi-Fi rather than over a mobile network. ARCEP's report also considers whether consumers could also receive standardised information on their devices' energy consumption and information about whether a device can easily be repaired.

In a separate report commissioned by DG Energy, titled "Assessment of the energy footprint of the digital actions and services"[57] the primary objective is to investigate the frequently overlooked energy implications of ICT. This report aims to accomplish this by presenting a summary of previously published estimates related to the energy consumption associated with ten common digital activities and services, which encompass activities such as video

[54] Schien et al. (2020), See IEA Commentary (11.12.2020) by Kamiya, G., https://www.iea.org/commentaries/the-carbon-footprint-of-streaming-video-fact-checking-the-headlines, and the Shift Project (2020), https://theshiftproject.org/wp-content/uploads/2020/06/2020-06_Did-TSP-overestimate-the-carbon-footprint-of-online-video_EN.pdf.

[55] EC, (2019). "The European Green Deal"

https://commission.europa.eu/publications/communication-european-green-deal_en

[56] The Shift project (2019). "Lean ICT: Towards Digital Sobriety"

https://theshiftproject.org/wpcontent/uploads/2019/03/Lean-ICT-Report_The-Shift-Project_2019.pdf

[57] European Commission, Directorate-General for Energy, Louguet, A., Caspani, M., Pytel, D. et al., *Assessment of the energy footprint of digital actions and services*, Publications Office of the European Union, 2023, https://data.europa.eu/doi/10.2833/478689

streaming, gaming, social networking, and even the simple act of turning off a Wi-Fi router, among other digital behaviours. The study had the objective of quantifying energy consumption across three levels: end-user, network, and data centre, for each of the digital activities. Additionally, it allocated a daily climate budget for each activity based on planetary boundaries.[58] The overarching scope of this research is to enhance transparency regarding the energy usage within the ICT sector. Furthermore, it seeks to provide empirical evidence concerning the behavioural factors that are most effective in influencing and mitigating the sector's detrimental environmental impacts. This study serves as a resource that collects and presents data to assist the EC in identifying strategies and mechanisms for addressing and alleviating the escalating energy consumption within the ICT sector. The goal is to align these efforts with the objectives set forth in the RePowerEU[59] Plan and the EGD.

In addition to considerations regarding the reduction of the environmental impact of electronic communications networks and services, the sector also needs to prepare itself for, and respond to, the changes in conditions which climate change will bring. Risks and vulnerabilities to the sector are associated with more frequent extreme weather events (such as flooding) but also to gradual changes (such as increases in temperature) associated with climate change. In particular, overhead fibre lines, underground cables, street cabinets and base stations are considered being particularly vulnerable to these changes in climate. In response to these changes, the sector will need to adapt to ensure that networks remain resilient in the face of more challenging weather conditions. In 2021 the Government engaged Ricardo, a global engineering, environmental and strategic consultancy, to carry out a number of adaptive capacity workshops on the vulnerability and risk exposure of the Maltese economy to climate change (with specific focus on the most impacted sectors).[60] The workshops involved both public and private sector perspectives with regards to identified vulnerabilities and considered both physical and economic impacts of climate change. Climate adaptation is sometimes overlooked when parties are focused on the decarbonisation targets for 2050, but it is important for our digital infrastructure to be fail-safe as our environment changes.

Environmental sustainability is an increasingly important driver of commercial decisions for many electronic communications companies. To varying degrees, electronic communications providers adopt the following policies to reduce their emissions: (i) increasing energy efficiency; (ii) increasing the share of renewable energy in their energy consumption and

[58] The planetary boundary (PB) concept, introduced in 2009, aimed to define the environmental limits within which humanity can safely operate. Of the original nine proposed boundaries, Steffen et al identified three (including climate change) that might push the Earth system into a new state if crossed and that also have a pervasive influence on the remaining boundaries. Source: SCIENCE 15 Jan 2015 Vol 347, Issue 6223 DOI: 10.1126/science.1259855

[59] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

[60] The first vulnerability and risk assessment conducted in Malta was in the year 2000.

offsetting those emissions that cannot be supplied by renewable energy by funding an equivalent CO_2 saving elsewhere;[61] and (iii) influencing their suppliers to reduce emissions.

It is encouraging to see the efforts of the providers of electronic communications networks and services in Malta reducing their own GHG emissions (referred to as 'Scope 1' emissions[62]); reducing energy consumption or making energy consumption more efficient (referred to as 'Scope 2' emissions[63]);[64] and reducing emissions across the value-chain (referred to 'Scope 3' emissions[65]),[66] while delivering communications networks and services that can help enable Malta to become more efficient, productive, and empowered to tackle the broader environmental challenge, including those brought about by climate change itself.

Appendix 2 consists of a non-exhaustive number of observations, elicited from a review of academic and industry-oriented literature on good practices related to reducing GHG emissions by the electronic communications sector.

In combating climate change, the electronic communications sector in Malta is already making efforts to reduce its carbon footprint, while delivering networks and services that can enable Malta to decarbonise and become more efficient (refer to **Appendix 3:** Sustainability initiatives by electronic communications providers).

[61] According to GSMA, energy consumption typically accounts for 20–40% of telcos' network opex and 3.5–4% of total opex (based on consulting firm Kearney's data). An Omdia study of major operators found that electricity costs equate to between 1% and 2% of revenue [Refer also to the World Broadband Association (WBBA) white paper entitled 'The importance of Environment Sustainability in Telecom Service Providers' Strategy'.

[62] Direct GHG emissions (Scope 1): direct emissions from fixed and mobile installations located within the organisation's perimeter, i.e., emissions from company-owned and controlled resources, such as combustion of fixed and mobile sources, industrial processes other than combustion, ruminant emissions, biogas from landfills, refrigerant leaks, nitrogenous fertilising and biomass.

[63] Indirect energy emissions (scope 2): indirect emissions from the production of electricity, heat or steam purchased or imported for the organisation's activities (electricity use in network and corporate sites).

[64] For telecoms operators, Scope 2 emissions (emissions related to the power supply) are usually about four times higher than Scope 1 (Analysys Mason, 2022, State of Digital Communications).

[65] Other indirect emissions (scope 3): The other emissions produced indirectly by the organisation's activities, that are linked to the full value chain, such as: the purchase or raw materials, services or other products, staff travel, upstream and downstream transport of merchandise, management of the waste generated by the organisation's activities, use and end of life of the products and services sole, capital goods and production equipment (i.e. includes effects from digital devices and services) .

[66] Operators have less control over their Scope 3 emissions than their Scope 1 and 2 emissions, and, as such, Scope 3 targets tend to be longer-term. However, the size of some operators gives them a degree of leverage with suppliers (Analysys Mason, 2022, State of Digital Communications).

4 Increasing levels of e-commerce and its impact on GHG emissions of the postal sector

The postal sector supports Malta's digital economy, particularly as a critical enabler of the e-commerce market. The widespread availability and access to electronic communications networks, services and applications has facilitated the growth in e-commerce.

E-commerce offers considerable opportunities for businesses to expand their customer base, enter new product markets and rationalise their business. The rise in e-commerce may, however, increase the carbon footprint of the postal sector while decreasing the overall carbon emissions of transport. Beside the technological development and continuing digitisation, the aspects of the environmental sustainability also emerge in the context of the postal sector, as it hinges on the transport element, which is a source of air pollution and GHG emissions.

Changes in the product mix (from letters to small packets/parcels) have implications for postal operators' environmental footprint because parcel delivery requires significantly more logistical and transportation capacity than letters, creating a challenge for postal operators to reduce their environmental footprint. Various studies show that 'last mile' delivery significantly increases CO_2 emissions and urban traffic congestion.[67] Postal operators are already responding to the challenge of increasing levels of e-commerce and its impact on the GHG emissions.

The Universal Postal Union[68] (UPU) estimates that the postal sector employs a global workforce of 5.5 million employees and uses thousands of motorised assets comprising of fleets of trucks, aircrafts, trains, boats and motorcycles as well as thousands of postal facilities including offices and administration buildings. These capital assets and infrastructure consume large quantities of diverse energy-mix, including renewables but they also use other consumable resources such as water, paper and cardboard for packaging, amongst other materials. With more than 1 million vehicles and some 800,000 buildings combined, the postal operators of UPU member countries have a significant environmental impact.

However, the postal sector is also part of the solution. It has the most advanced transport network in the world, is a major employer and reaches a large audience daily. In most cases, Posts are also the owners of the biggest vehicle fleets on a national level. As such, the Post is a powerful agent for change. Many postal operators have come far in implementing sustainable practices. Postal organizations around the world are transitioning their fleets to alternative vehicles and generating their own renewable energy, and have mainstreamed

[67] Sustainability and the Postal Service: Creating a Greener Future through Product Innovation - https://www.uspsoig.gov/sites/default/files/reports/2023-01/RISC-WP-20-005.pdf

[68] The Universal Postal Union (UPU) is a United Nations specialized agency and the postal sector's primary forum for international cooperation.

sustainability into their business management and procurement processes. Others are active in the communities they serve and make their infrastructure available for recycling schemes and information sharing on environmental issues. With the rise of e-commerce, an increasing demand from consumers for sustainable products and services, including climate-efficient shipping, is shaping new business models in the postal sector.

In 2015 the UPU launched the Online Solution for Carbon Analysis and Reporting (OSCAR).[69] OSCAR is a tool which enables postal operators to measure and analyse the carbon footprint of their operations. The UPU's vision for the tool is to help postal operators increase their efficiency, decrease their natural resource consumption and encourage them to invest in green solutions. This platform enables users to gain a better insight into the size and source of their GHG emissions, and to benchmark and report on their sustainability efforts. OSCAR is currently available free of charge to all UPU designated operators. The UPU will be conducting a study to gauge the needs of non-designated postal operators for the use of OSCAR.

The UPU Congress resolution C 17/2021 strengthened the commitment of the UPU to reducing GHG emissions from the postal sectors. The UPU also collects information on key indicators for progress towards climate-neutral postal operators of the designated operators of the UPU member countries. These include: (a) the size and composition of the vehicle fleet; and (b) the amount and composition of electricity use. The UPU's fourth Extraordinary Congress held in October 2023 agreed on a "Green Package" including voluntary climate action targets for the sector. The approved "Green Package" set forth a voluntary tiered approach to the reduction of GHG emissions in the postal sector, recommended based on posts' capacity to measure emissions and take action. First tier countries would strive to reduce emissions 30% by 2030, with all three tiers working towards a collective 85% reduction by 2050. In addition to the reduction targets, the package sets forth a framework for enabling greater climate action within the sector, focusing on mitigation, adaptation, and climate finance, and supported by a dedicated Climate Facility. The adoption of the package also provides a mechanism for posts to make their green commitments and ambitions more visible, by signing the Postal Climate Transparency Action statement. Collectively, these statements have sent a unified message to stakeholders that the postal sector aims to support a transformative climate action.

On a European level various postal operators acknowledge the decarbonisation potential of the sector and are increasingly taking measures to reduce the carbon footprint of their operations, particularly in the last mile transportation phase of the postal value chain. PostEurop,[70] the European public postal operators' association representing two million postal employees across Europe, estimates that 170,000 and 89,000 postal employees make the last-mile delivery on foot and by bike respectively. Added to these, European postal operators

[69] OSCAR (upu.int)

[70] https://www.posteurop.org/

are employing increasingly larger fleets of electric bikes as well as electric and alternative-fuel vehicles. The growing fleet of delivery means of transportation operating by more sustainable energy resources positions European postal operators in a unique place to become a zero-emissions delivery model in Europe.

Recently a common standardized methodology for calculating and declaring direct and indirect GHG and air pollutant emissions associated with parcel delivery services has been drafted by the CEN Technical Committee 331. The DIN EN 17837 PDEF indicator is currently being submitted to CEN members for enquiry.[71]

Global retail e-commerce sales have been rapidly growing. Revenues have jumped from USD 1.3 trillion in 2014 to USD 5.2 trillion in 2021, a 300% increase over seven years.[72] Currently, it is estimated that 82% of all consumers have shopped online within a three-month period. In research performed by the World Economic Forum[73] it was estimated that as a result of the ever-rising desire to buy products online the global CO_2 emissions from delivery of postal traffic in the top 100 cities will increase by 32% and traffic congestion will increase by over 21% by 2030, if no mitigating interventions are taken.

Given the rapid increase in e-commerce activities coupled with the lack of analysis on the environmental impact of e-commerce, in 2021 the EC commissioned a study to understand this impact and to recommend appropriate mitigating measures. In June 2022, the EC published the results of this study, which specifically sought to determine the impact of e-commerce transport and parcel delivery on air pollution and CO_2 emissions.[74] The study focused on identifying the critical factors that cause GHG emissions in both the Business to Consumer (B2C) e-commerce and brick & mortar (B&M) retail transport chains at present (2020) and in a decade's time (2030). The main conclusions of this study can be summarised as follows:

- The most important legs influencing GHG emissions of retail transport chains are long-distance pre carriage legs [the stage before the first parcel hub and post carriage legs after the parcel distribution centre (last mile)].

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[71] https://www.en-standard.eu/22-30443637-dc-bs-en-17837-postal-services-parcel-delivery-environmental-footprint-methodology-for-calculation-and-declaration-of-ghg-emissions-and-air-pollutants-of-parcel-logistics-delivery-services/

[72] A 300% increase in global e-commerce sales over seven years (2014-2021) - https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/

[73] World Economic Forum study "The Future of the Last-Mile Ecosystem" - https://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf

[74] Study to assess and analyse the impact of e-commerce driven transport and parcel delivery on air pollution and CO2 emissions.

- While GHG emissions for the last mile are heavily influenced by load factors and mode choice, GHG emissions for long-distance legs are influenced by the distance between origin and destination of the retail item.
- Trends and drivers affecting transport related GHG emissions:
  - electrification of road transport reduces GHG emissions but not to zero;
  - in combination with environmentally friendly pick-up mobility, the use of pick-up points in highly frequented locations increases transport efficiency and reduces GHG emissions;
  - micro-hubs and other last mile city logistics do not necessarily lead to GHG emissions savings;
  - consumer's modal transport choices for pick-up, shopping and returns have significant emission-savings potential, particularly if private car trips are saved;
  - stopping or limiting practices such as same-day deliveries and airfreight require increased awareness of the impact on the overall purchasing experience;
  - consumers taking responsibility can make changes that lead to GHG emissions reduction; and
  - rail freight is an emission reduction solution for long distance legs.

The same study identifies five mitigation measures that would have a positive impact on the reduction of GHG emissions of the postal sector:

- increased use of zero-emission vehicles, for example by restricting the use of diesel and other internal-combustion engine vehicles;
- increased density of pick-up points through, for example, the installation of open-access lockers and pick-up points;
- conscious consumer decisions, which can be influenced by educational and awareness campaigns provide simple but strong messages for consumers and how their decisions influence GHG emissions;
- optimising the use of delivery vehicles in the urban city centres (for example, by using the volume carrying capacity to the full); and
- where possible and available, shift deliveries from road, air and maritime transport modes to rail transport.

The study focused on the Business to Consumer (B2C) retail sector within the EU as well as some Far Eastern countries which have considerable volumes of retail trade with the EU-27 consumers, thus the scale of the logistical requirements of this study is synonymous with large countries and postal operations that involve multi-modal transport systems. It is recognised that such postal ecosystem may vary from the city-scale postal operation, such as in the case of Malta, which therefore means that a number of conclusions and mitigating measures identified in this study may have limited application in a domestic context. One such example is the limited number of transportation options including the absence of rail freight services in Malta and dependence on air/sea transport for foreign mail.

Two reports published by the ERGP on the environmental sustainability of the postal sector[75] outline various measures and initiatives being taken or planned to be taken by various postal operators in Europe. The scope formed part of an information dissemination effort to encourage other postal operators to adapt (according to their specific situations) and adopt such measures in their own operational setting. The ERGP also encourages NRAs to assist postal operators in the implementation of information initiatives. A similar approach is adopted by PostEurop, which through its Green Mobility Forum,[76] collects and shares best practices amongst its members.

GHG emissions generated by the postal sector can be classified as follows: Scope 1: Direct GHG emissions from sources that are owned or controlled by the postal operator (for example fuel used by the fleet of their vehicles); Scope 2: Indirect GHG emissions resulting from generation of electricity purchased by the postal operator (for example for electric fleet vehicles the emissions from the generation of the electricity they're powered by); and Scope 3: Indirect GHG emissions from sources not owned or directly controlled by the postal operator but related to its activities. Main sources of GHG emissions result from postal airfreight, vehicle fleets and buildings. The most frequently mentioned measures to reduce GHG emissions in the postal sector are: (i) sharing the last mile infrastructure (ii) increase the deployment of electric fleet and e-bikes (iii) environmentally friendly transport of packages (iv) better waste management of packaging material and (v) use energy from renewable sources[77].

MaltaPost, the designated universal postal service provider, is taking a number of environmentally sustainable initiatives including the deployment of e-vehicles for the last mile deliveries. At present, just over half of MaltaPost fleet is made up of electrical vehicles with a projected target to reach, at least, 75% by 2030. MaltaPost has also installed a number of photovoltaic panels at its head office premises, generating just over 29,000 kWh of electricity.

[75] ERGP Report on Green Deal impact on postal sector ERGP (21) and the follow up ERGP Report on Environmental Sustainability postal sector ERGP (22).

[76] PostEurop Green Mobility Forum: https://www.posteurop.org/GMF

[77] ERGP report on the Green Deal and the postal sector: https://ec.europa.eu/docsroom/documents/48201

Another measure taken was the installation of solar filtering film on some of the apertures of its head office with the aim to reduce the electricity demand of the air-conditioning units.

In September 2023 MaltaPost joined the International Post Corporation's (IPC) Sustainability Measurement and Management System (SMMS) programme,[78] which aims at managing sustainability and reducing the collective carbon footprint of the postal industry. By joining the SMMS programme MaltaPost will be assessed in terms of both qualitative (Sustainability Management Proficiency) and quantitative elements (Sustainability Performance Indicators). The first dataset to be collected will be for 2022 and will be reported in 2023. Through the IPC SMMS programme, posts across the world have committed to halving their yearly collective CO_2 emissions by 2030 compared to 2019 levels. To meet this goal, posts will focus mainly on own emissions generated by buildings and transportation, which respectively account for 44% and 56% of their total emissions. By 2030, posts collectively aim to have 50% of their fleet as alternative fuel vehicles, of which 25% of electric vehicles and 75% of their energy consumed, generated from renewable sources.

The local express and courier operators are also taking a variety of environmentally sustainable initiatives, such as: shifting from fossil fuel powered vehicles to electric vehicles together with an awareness campaign about it; conducting GPS-monitoring of the mileage made to evaluate the emissions and optimise routes; and conducting energy consumption monitoring and disseminating the collected data to all staff in a bid to raise energy conservation awareness amongst employees.

A number of initiatives and good practices being taken by postal operators to reduce their GHG emissions are reflected in **Appendix 4** of this document.

78 https://www.ipc.be/news-portal/general-news/2023/09/07/13/33/three-new-posts-join-the-ipc-sustainability-programme

5 The MCA's potential role towards environmental sustainability

This section outlines the potential role of the MCA towards achieving Malta's environmental sustainability goals. It identifies a series of possible actions aimed at encouraging the local communications sector to increasingly consider its environmental sustainability and to build awareness amongst consumers on their environmental footprint. Furthermore, the MCA aims to promote the role that the communications sector can play in facilitating connectivity as an enabler for reducing the carbon footprint of other sectors of the economy.

5.1 Facilitating deployment of new technologies and decommissioning of legacy networks

In addition to shifting to renewable energy sources, an essential action that operators can take when it comes to the greening of electronic communications networks and services is to transition to next generation networks and switching off legacy networks. There is a general understanding across the electronic communications sector that newer generations of technology are more energy efficient and less environmentally detrimental than their predecessors for given levels of bandwidth consumption.

Despite a number of known benefits attributed to the latest generation of network technologies, a number of studies also caution against interpreting projected savings from energy usage and GHG emissions at face value. This is because overall long-term reduction of these two indicators might turn out to be less in practice, than projected in theory. Likewise, some reports[79] maintain that the history of ICTs provides sufficient precedents where improvements in technology tend to fuel demand, which will induce a rise in GHG emissions that would risk a rebound effect. Whilst it is true that the 'rebound effect' would cancel part of the effects of the abatement measures the overall effect would still remain positive. For example, GeSi estimated, in a study which it commissioned in 2015, that the rebound effect will neutralise just over 11% of the GHG abatement potential, thus ensuring an 89% of the abatement measures still remain effective.

The MCA is already playing a role in supporting sustainable network deployment and operation via elements of its current regulatory framework which have positive effects on the environment. The MCA facilitates the deployment of more energy-efficient new technologies (such as FTTH and 5G) and encourages the planned transitioning from legacy to the latest

[79] The real climate and transformative impact of ICT: A critique of estimates, trends, and regulations (Sep.2021)

and most efficient technologies, whilst remaining fully cognisant of the challenges that such changes will bring to the sector and end-users alike.

The MCA also promotes the re-use of existing physical infrastructure as well as co-location or sharing of network elements and facilities which have a role to play in the reduction of the environmental, including carbon, footprint of new network builds. The re-use of physical infrastructure and other modes of collaboration has a positive impact on the environment as it prevents energy-wasteful infrastructure works and urban disruption (such as pollution, noise and traffic congestion).

Fixed networks – transitioning to new fixed network technologies.

A report by Analysys Mason dated January 2023 entitled "Copper decommissioning: the final step on the road to fibre and the end of the (copper) line" highlights that copper decommissioning is a key step from an environmental perspective.[80] A modern fibre access system generally consumes less power than its copper/DSL equivalent and can carry several orders of magnitude more data. Many of the potential energy savings on the access network can only be achieved when the legacy copper/DSL networks are switched off. However, many prerequisites need to be in place before copper is decommissioned, including full coverage (or an acceptable proxy) and a decommissioning plan that limits competitive distortions.

Research conducted by Analysys Mason on behalf of European Telecommunications Network Operators' Association (ETNO) on the 'State of Digital Communications – 2022' notes that full-fibre networks use less power than copper or hybrid fibre-coaxial networks, irrespective of data usage. The research notes that full-fibre networks are also substantially more power-efficient than Fixed Wireless Access (FWA). FTTH networks generally require less cooling, and most have no powered outside plant. The research notes that FTTH has the potential to reduce operators' fixed access energy consumption by about 85%, as long as older and less-efficient technologies are retired. The construction of FTTH networks does however come at a considerable carbon cost but given the assumed asset-life of physical fibre networks of at least 30 years, the benefits should easily outweigh the drawbacks.

Research by the Technical University of Central Hesse in Germany concluded that FTTH networks require up to three times less electricity than copper-based vectoring/super vectoring networks (VDSL/FTTC, or fibre to the curb) and up to six times less power than coaxial cable networks (HFC) in the DOCSIS 3.1 standard. Furthermore, comparison of the power consumption of gigabit FTTH and cable networks reveals that FTTH consumes up to eight times less electricity than HFC networks. A New Zealand-based study found that Optical Fibre Technology, on average generates, 35% less emissions than Copper, 21% less than Hybrid

[80] https://www.analysysmason.com/about-us/news/newsletter/copper-decommissioning-fibre-quarterly/

Coax Fibre and over 90% less than fixed wireless broadband.[81] Telefonica in Spain reported a 60% saving in energy costs and an 85% reduction in space from a switch-off of the copper network.[82]

The BEREC external study on 'Environmental impact of electronic communications'[83] highlights that the re-use of physical infrastructure (including duct access) and the co-ordination of civil works can contribute to achieve the environmental goals. In line with Article 4A of the Utilities and Services (Regulation of Certain Works) Act (Chapter 81 of the Laws of Malta)[84], the competent infrastructure regulator[85] acting of its own initiative or following the written request of an undertaking providing an utility service or network, or of a competent utility regulator (including the MCA) who considers the issue of such an order necessary for the provision of a utility service can impose co-location and sharing of network elements in order to protect the environment, public health, public security or to meet town planning and country objectives.

A collaborative climate by way of sharing strategies between the major players and the re-use of existing infrastructure will pave the way for more efficient deployment. Joint actions between two or more operators in this area will offer economic advantages for the stakeholders involved and would avoid the duplication of the environmental footprint related to civil works, including the use of materials and disposal of waste. The coordination of civil works, the use of synergies between different network operators and the joint use of existing physical infrastructure might not only help to save investments but could also reduce the environmental load by reducing the need for additional civil engineering works.

Wireless networks - transitioning to new network technologies.

New mobile technology generations are continuously evolving and brought into use. Newer mobile technology generations, such as 4G and 5G, provide significant advantages. The phasing out of older technology generations (2G/3G) in order to introduce newer technologies (4G/5G) is intended to increase spectrum and energy efficiency, improve communication security (through better data encryption and authentication techniques), provide higher data speeds and may enable new use cases.

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[81] Greening digital companies: Monitoring emissions and climate commitments (ITU & World Benchmarking Alliance, 2022)

[82] WIK Consult (2020), Copper Switch-Off - A European experience and practical considerations.

https://www.telefonica.com/en/communication-room/telefonica-will-shut-down-one-copper-switchboard-a-day-until-2020/

[83] (BoR (22) 34), https://www.berec.europa.eu/en/document-categories/berec/reports/external-sustainability-study-on-environmental-impact-of-electronic-communications

[84] https://legislation.mt/eli/cap/81/eng

[85] The Authority for Transport in Malta ("TM").

As reflected in the RSPG 2021 report on the role of radio spectrum policy to help combat climate change,[86] a shutdown of legacy 2G/3G mobile networks would reduce the energy consumption per transport bit, thus lowering the carbon footprint. However, it is recognised that there might be further implications of a shutdown of legacy technologies besides energy efficiency that need to be considered, as these networks may still be providing essential services. The process of transition from legacy to new and more efficient technologies is a journey that will take adaptive measures along the way rather than a big-bang one-time event.

Research conducted by Analysys Mason on behalf of ETNO on the 'State of Digital Communications – 2023'[87] notes that 2G networks will be decommissioned after 3G networks in most cases (or not at all), despite being an older and slower technology. This is because 2G is still important for IoT functions and basic voice services, while 3G has been mostly replaced by 4G and 5G. As a result, the 2G shutdown will proceed slowly in many countries, while there are expected to be forty-five decommissioned 3G networks in Europe by 2025 because these networks will become increasingly obsolete and expensive to run.[88] The research also suggests that mobile network operators (MNOs), who are currently maintaining a full suite of 2G, 3G, 4G and 5G services via separate base stations, could lower their mobile network energy consumption by up to 40% if they switch off both 2G and 3G.

In September 2023, the French NRA, ARCEP, published a study conducted by a Technical Experts Committee on mobile networks, assessing the impact in terms of carbon footprint of shutting down 2G/3G networks and migrating their voice/texting and M2M services to 4G/5G, using a network modelled on characteristics that are representative of the infrastructures currently deployed in France.[89] The study notes that despite a steady decrease in the use of the applications they support, 2G/3G networks still account for a significant share of mobile networks' energy consumption, all technologies combined: between 21% and 33% of networks' base stations today and possibly around 17% by 2025. Migrating 2G/3G technologies to 4G/5G technologies will therefore enable continuous and steady energy savings.

Current trends in new mobile technology include the investigation/standardisation of dormancy modes, reduction of energy consumption at radio site level and new modes of cooperation between various types of networks. Using fibre for mobile backhaul and decreasing cell size can make mobile networks more power efficient. These raise new challenges for mobile operators in providing continuity of service but represent attractive solutions for energy cost

[86] RSPG Report on the role of radio spectrum policy to help combat climate change (RSPG21-026 Final).

[87] https://etno.eu//downloads/reports/etno-state%20of%20digital%20communications%202023.pdf

[88] For more information, see Analysys Masons' Decommissioning legacy networks will be key to reducing operators' energy usage.

[89] Assessing the carbon footprint of shutting down 2G and 3G networks and migrating their services to 4G/5G - Detailed Report - Mobile Network Technical Experts Committee (September 2023) (arcep.fr)

reduction. As newer wireless electronic communications networks are rolled out, other older electronic communications networks and technologies diminish in their use and importance in the sector, leading to migration and eventual retirement.

The advent of 5G means that the concurrent running of multiple mobile networks by each of the local mobile operators (2G, 3G, 4G and now 5G networks), raises questions about efficiency, manageability and environmental implications. In July 2022, the MCA expressed its intention to engage with the relevant stakeholders to lay the groundwork for the eventual formulation of a roadmap that will culminate in the switch-off of some legacy technologies (including energy-hungry legacy equipment), amongst other actions. This process is aimed to set the scene for the sun-setting of 2G and 3G mobile networks and paves the way for migrating to later technologies, predominately 5G standalone (also referred as '5G SA'). Once the eco-system has sufficiently matured, the path ahead will primarily consist of first rolling out the Voice-over LTE (VoLTE) and subsequently, the VoNR (also referred to as Voice over 5G or Vo5G). While the migration from legacy networks is ultimately the responsibility of the operators, this will require extensive consultation and planning in order to ensure an efficiently managed transition and that competition and end-users (including vulnerable end-users) are protected at all stages of the process.

The shutting down of the 2G and 3G mobile networks is not without challenges. In most countries, including Malta, older generations of networks still continue to satisfy a significant number of needs in society. GSM-operating mobile handsets are still being sold in most countries and are normally prevalent amongst cohorts in the higher age groups. People with older devices may be left without Internet access if 3G is switched off (even if they can rely on 2G for voice and texting until it too is switched off). Apart from old mobile phones, there are 4G-compatible devices that do not support VoLTE and cannot be updated to support it.

Survey results[90] published by the MCA in March 2020 have shown that almost one third (28.6%) of mobile phone subscribers, who did not own a smartphone, were over 65 years of age. Moreover, a host of M2M and IoT-based services, which require simple SIM-based connectivity needs such as; smart meters, security and safety alarms, phone in lifts and other remote-control modules are still dependent on legacy technologies. The European regulation on the in-vehicles emergency calls (e-call) too warrants due attention in order to ensure the continuous functionality of this system, post shutdown of 2G/3G networks. With different markets moving at different speeds, there is also a concern about roaming. Another issue linked to roaming is making sure customers whose home network hasn't enabled VoLTE can still make phone calls when visiting VoLTE-only countries.

Whilst the operators are making their own decisions on the timing and process of the switch-offs and most customers already have 4G (and increasingly 5G) capable devices (thus their service shall remain unaffected by an eventual switch-off), the MCA wants to ensure that all

[90] 2020 survey on the perception of mobile telephony users in Malta

customers, including users of old-mobile handsets, will not be treated unfairly and continue accessing the services they need.

The MCA will continue to facilitate the deployment of more energy efficient new technologies alongside the switch-off of legacy technologies by:

- promoting and facilitating the deployment of efficient new wireless and fixed technologies (such as fixed and mobile VHCNs) across Malta;
- promoting the re-use of existing physical infrastructure for the purposes of providing electronic communications networks and services;
- promoting co-location and sharing of network elements and associated facilities with providers of electronic communications networks in order to, amongst others, protect the environment;
- engaging with the local mobile operators on the eventual migration of services over 2G/3G networks to newer and more efficient technologies (which also have better green credentials) with a view to eventual switch-off of these legacy networks, whilst recognising that the operators are making their own decisions on the timing and process of the switch-offs;
- working closely with the mobile operators, and other affected stakeholders, to understand the issues that a 2G/3G switch-off will raise and to provide clarity on what is expected during this process;
- engaging with the mobile operators to help ensure customers, particularly vulnerable groups, receive the support they need so that they can continue to access their services, as the 3G and 2G networks are gradually switched off; and
- working closely with consumer groups and other relevant stakeholders to help raise awareness of any planned switch-offs.

5.2 Encouraging reduction in energy consumption of broadband equipment

With the strong increase in demand for broadband internet access services and digital applications the energy consumption of data transmission has increased. A potential source of reducing GHG emissions is in the operation of electronic communications equipment. It is important that the electrical efficiency of broadband equipment is maximised, while not reducing the service provided.

The MCA supports initiatives that could contribute to a reduction in the GHG emissions in the operation of the electronic communications equipment.

Amongst others, the MCA will encourage operators to consider committing to the 'European Code of Conduct on Energy Consumption of Broadband Equipment' (Code of Conduct).[91] The Code of Conduct sets out the basic principles to be followed by all parties involved in broadband equipment, operating in Europe, in respect of energy efficient equipment. The Code of Conduct sets the (maximum) electricity consumption for broadband equipment sold in the EU and manufactured or procured by participating companies.

The MCA will promote the use energy efficient electronic communications equipment by, among others:

- encouraging operators to commit to the 'European Code of Conduct on Energy Consumption of Broadband Equipment'; and
- encouraging initiatives designed to implement automatic sleep mechanisms in terminal equipment, such as routers and set-top-boxes, at certain times of the day or when not being used for long stretches of time.

5.3 Monitoring the environmental footprint of electronic communications

The three main operators providing electronic communications and services are already compiling environmental data related to reporting obligations such as, amongst others, the EU Taxonomy or as part of a voluntary accreditation to a specific environmental standard [such as the Science Based Targets initiative (SBTi)[92], or because they are driven by economic savings that result from a reduction in energy consumption of their network operations.

There is currently a lack of standardised data collection and common measurement methodologies for assessing the environment impact of digital technologies. This is a concern expressed by the EC, BEREC and the RSPG. In this regard efforts are underway to establish a common set of goals and establish a degree of harmonisation in the data collection process. These efforts are intended to enhance the level of coordination and reduce the administrative

[91] EU Code of Conduct on Energy Consumption of Broadband Equipment: Version 8.0 - target audience: Service Providers, Network Operators, Equipment and Component Manufacturers.

[92] The Science-Based Target initiative (SBTi) defines and promotes best practices in emissions reductions and net-zero targets in line with climate science and provides target setting methods and guidance to companies to set science-based targets in line with the latest climate science. It includes a team of experts to provide companies with independent assessment and validation of targets.

burden on the service providers in the data collection procedures. The creation of a universal framework with standardised targets aimed specifically at providers of electronic communications networks and services would benefit the electronic communications sector. Reporting would speed up adoption of sustainability strategies and expand and expedite the positive impact of these polices on the global environment.

BEREC's first report on sustainability "Assessing BEREC's contribution to limiting the impact of the digital sector on the environment" notes that one of the toughest challenges is the lack of available data, as well as the need to adopt a harmonized approach to methodologies and standards for assessing the environmental impact of digital technologies. BEREC is committed to addressing these challenges, taking part in processes on implementing a common and harmonized assessment methodology and transparency measures regarding the environmental footprint of electronic communications networks and services in the EU.

In October 2022 BEREC launched a questionnaire,[93] targeting a number of stakeholders including telecom operators, service providers, device manufacturers and other ICT industry players. Cognisant of the current lack of standardised data collection and measurement methodologies to evaluate the environmental sustainability of electronic communications networks and services, the objective of this questionnaire is aimed at mapping the most relevant indicators for the evaluation of the environmental footprint of the telecom sector. The objectives which underpin the collection of data are mainly four:

a) acquiring a better understanding of initiatives and measures by electronic communications undertakings to reduce the impact of the sector on the environment;

b) gaining the ability to monitor and record the progress registered of such measures through regular periodical reporting;

c) giving recognition to the improvement of certain key environmental sustainability indicators through sponsored campaigns, press releases and other public facing initiatives, which would project and consolidates the electronic communications sector's market positioning as an environmental champion; and

d) promoting and advocating the sector's potential capabilities to contribute towards the realisation of other sectors' low-carbon strategy by collecting and promoting non-sensitive commercial data (mainly IoT applications in real-life settings).

BEREC has been looking into how NRA's and electronic communications companies collect data relating to energy and electricity consumption, carbon footprint, water consumption, energy efficiency and share or recycled and reused products distributed. It is evident that companies use a variety of standards, protocols and guidelines to monitor sustainability. ISO

[93] BEREC questionnaire on indicators to measure environmental footprint of the telecoms sector

standards[94] and GHG protocol standards[95] are used the most, but BEREC notes that in most cases companies use a combination of different standards and protocols[96]. Whilst there are several standardised sustainability reporting frameworks, there is no unified framework for electronic communications sustainability reporting or a set of uniformly adhered-to-targets.

Each company currently chooses for itself which framework (if any) it follows and the targets it aspires to. Some companies are joining the SBTi, which sets quantitative goals that support the Paris Agreement and the necessary GHG emissions reduction trajectory (for mobile, fixed and data centre operators) aligned with the 1.5% global warming limit, and designed to substantially reduce the risks and effects of climate change. For the ICT sector specifically, the SBTi require mobile network operators to slash operational emissions by 45% between 2020 and 2030. Over the same period, fixed network operators must reduce their emissions by 62% and data centres by 53%.[97]

BEREC has reviewed NRA's and other competent authorities first actions on environmental transparency in the electronic communications sector via a dedicated questionnaire published in 2022.[98] To this end, In October 2023, BEREC published a report, providing a summary of the findings and a series of workshops with stakeholders to establish an overview of sustainability indicators currently used and perceived as relevant for assessing the environmental footprint performance of the electronic communications sectors.

Four NRAs have started to include environmental aspects in their data collection (BE-Belgium, ES - Spain, FI - Finland and FR - France) based on general provisions on data collection set out in the European Electronic Communications Code (EECC), and/or on additional competencies provided at national level, and/or in collaboration with other competent authorities and stakeholders. This activity mainly focuses on network operators (FI, BE, ES, FR), devices manufacturers (FR) and data centre operators (FR). Due to the novelty of the topic and the absence of standardised data collection, the sustainability indicators currently in use are diverse. The indicators mostly commonly collected by these NRAs relate to energy and electricity consumption, carbon footprint, water consumption, energy efficiency and the share of recycled and reused products distributed. In France, a law was passed at the end of 2021, extending the scope of the regulator ARCEP's data collection from electronic

[94] ISO 14001 and 15001 are standards that measure GHG, energy management and environmental management.

[95] GHG protocol splits its standard into categories: Corporate, City, Mitigation Goal, Policy and Action, Product, Project and SBTi Scope 3.

[96] Such as Global Reporting Initiative Standards (GRI) – a modular system with the following models: Universal, Sector and Topic, ITU-T standards – ITU SG 5 recommendations L1450 and L1470 focus on GHG, ETSI – European standard organisation with an extensive list of energy consumption standards, notably ETSI ES 203 228 and IEC TR – International Electrotechnical Commission IEC TR 62725:2013 are standards to measure GHG.

[97] https://sciencebasedtargets.org/resources/legacy/2020/04/GSMA_IP_SBT-report_WEB-SINGLE.pdf

[98] Draft BEREC Report on Sustainability Indicators for Electronic Communications Networks and Services – 9th March 2023.

communications' operators to devices' manufacturers, data centres' operators, network equipment manufacturers, online communication services and operating systems providers. This mandate serves to produce an annual survey ("Achieving digital sustainability") of the digital ecosystem. ARCEP has also started work on an environmental barometer for digital goods and services. Working with the French environmental agency, ADEME, ARCEP has issued a report on measuring the ICT environmental footprint through a life cycle and multi-component analysis. In November 2019, Finnish regulator Traficom contributed to a working group set up by the Finnish Ministry of Transport and Communications on climate and environmental strategy for ICT. The regulator started to collect data from the largest operators in Finland on their energy consumption and environmental impact. In Belgium and Spain, regulators are gathering data from the largest operators on the electricity consumption of different parts of the network. That includes datacentres, networks, offices, retail, modems/set-top boxes, the production and use of renewable energy, CO_2 emissions and water consumption. Although other NRAs do not have a specific mandate (ES, CY, SE, BA) they rely on national laws that transpose Article 20 of the EECC[99] ('information requests to undertakings'). The transposed provision empowers the NRAs to impose a reporting obligation on the operators and other industry players to ensure conformity with the provisions of, or decisions or opinions adopted in accordance with the EECC. At the request of an NRA, related stakeholders are required to provide information or documents that the NRA needs for clearly defined statistical or analytical purposes, reports, and studies within the competence of the EECC. However, the EECC does not explicitly authorise NRAs to collect data with reference to the environment.

Where timely and accurate data can be collected from electronic communications network and service providers, the MCA establishes a collaborative approach with the sector players to collect data and information on a voluntary basis rather than having to resort to any legal powers. At present there is no specific obligation in law providing the MCA with powers to seeks environmental sustainability data (such as tracking the emissions associated with electronic communications networks and services). The MCA believes that there is value in tracking the environmental footprint of the electronic communications networks and services. In line with the Life-Cycle Assessment (LCA) methodology, the MCA also believes that there is also value in collecting information from the entire digital ecosystem (content and application providers, operating system developers, device manufacturers and data centre operators, in addition to electronic communications operators) to be able to obtain reliable data that is crucial to assess and monitor the sector's environmental footprint, and the measures that have been implemented.

[99] Directive (EU) 2018/1972 of 11 December 2018 establishing the European Electronic Communications Code (EECC).

The MCA supports the development of a consistent and harmonised methodology and transparency measures to calculate the environmental impact of electronic communications and promote the harmonisation of such measurement indicators across the EU.[100]

The MCA will consider monitoring the evolution of the environmental impact of providers of electronic communications networks and services and the measures being implemented. This could include the monitoring of the carbon footprint, tracking energy consumption, and reporting on the progress towards environmental sustainability goals.

The purpose for collecting this information would be to formulate annual based statistics of the energy consumption of fixed and wireless electronic communications networks. Information that the MCA could consider collecting would include:

- the energy consumption of fixed access networks by technology;
- the energy consumption of mobile and wireless radio networks by technology;
- the energy consumption of other network components that are not included in the first two bullets;
- the percentage of energy used by the company's network(s) sourced from renewable energy;
- actions that the company is using to limit the energy use of networks or other negative environmental impacts; and
- information on any specific methodologies / standards being used for assessing the environmental impact of digital technologies.

[100] The 2022 adopted action plan on digitalising the energy system states that the EC explores the possibility to develop common indicators for measuring the environmental footprint of electronic communications services by Q4/2023. Building on this work, the action plan further calls on the Commission to establish an EU Code of Conduct for the sustainability of telecommunications networks by Q4/2025. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Digitalising the energy system - EU action plan. COM/2022/552 final:

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0552&qid=1666369684560.

5.4 Encouraging more responsible use of end-user equipment

There are many ways that providers of electronic communications networks and services can achieve their environmental sustainability targets. Focusing on GHG emission reductions and using energy from renewable sources is the most frequent approach, which is often combined with the transition to more energy-efficient access technologies. However, companies may do well to pay attention to the way their products and services influence their customers' environmental impact, and simultaneously, what their suppliers' environmental impact is.[101]

The majority of consumers of electronic communications services, digital services and applications have little or no knowledge about the environmental impact of their behaviour as digital citizens. Yet, research shows that end-user's equipment[102] accounts for at least 60% of the global ICT GHG emissions over its entire life cycle.[103] ARCEP has noted that in France, 80% of the environmental footprint from ICT is linked to devices. The impact is linked to the size of the devices with the most emissions associated with TV, followed by computers and smartphones. Moreover, when looking at smartphones, the French environmental agency concluded that 75% of the impact is associated with its production and only 25% can be linked to its use. This increases the relative importance of prolonging the lifespan of devices and ensuring adequate processes for recycling and re-use.[104] Whilst the MCA is not in a position to influence the manufacture stage of the end-users' devices it can, however, exert some influence over the 'cultural obsolescence' of these devices.

Every new smartphone is estimated to generate an average of 85 kgs in GHG emissions in its first year of use, 90% of which comes from raw material extraction, manufacturing and shipping. The projected global emissions for 2022 from smartphones are expected to be in the region of 146 million tons of GHG emissions.[105] A survey conducted by the MCA between July and August 2022 determined that the majority (71%) of end-users do not change their mobile handset for a new one in the first three years whilst 11% of respondents retain their handset for at least 2 years.

Extending the life cycle of end-user equipment [including customer premises equipment (CPE)], such as routers and set-top boxes (STEs), by undergoing a refurbishing process with the aim of reuse, would contribute to a reduction in the GHG emissions associated with

[101] i.e., scope 3 emissions. Scope 3 emission include emissions attributable to purchased goods and services and the use of products and services sold by telecom operators such a mobile phones, gateways and broadband routers.

[102] End-user equipment covers, amongst others, TVs, computers and mobile handsets.

[103] See Diagram 1: Breakdown of contributions to GHG emissions within the ICT sector in Section 3.

[104] Extract from BEREC external study 'Environmental Impact of Electronic communications', WIK and Ramboll (2022) based on several studies

[105] Deloitte Insights : https://www2.deloitte.com/xe/en/insights/industry/technology/technology-media-and-telecom-predictions/2022/environmental-impact-smartphones.html

manufacturing and shipping of new equipment. Such a measure would also lead to a reduction in waste of old equipment. The MCA is aware that one of the electronic communications operators in Malta conducts a refurbishing programme for CPEs returned by customers and at least, another operator offers customers the possibility of trading in old mobile handset for a discount on purchasing an upgrade.

The MCA sees itself playing a role in raising awareness of environmental impacts amongst consumers. The MCA can promote the added value to environmental sustainability that results from the extended use, reparability, reuse and recycling of end-user equipment. The MCA can also promote the implementation of low power and automatic sleep configuration on CPEs, when the equipment is not used for extended periods of time.

The MCA has identified the following potential actions that could encourage more responsible use of end-user equipment by consumers:

- Publishing information to keep consumers informed about the environmental impact of the end-user equipment and services they use.
- Promoting the added value to environmental sustainability that results from the extended use, reparability, the potential to extend the lifetime of products, reuse and recycling of end-user equipment.
- Increasing users' awareness about their ability to take action through, amongst others, aiding consumers making informed choices in favour of sustainable electronic communications products and services.

5.5 Promoting the proliferation of application and usage of IoT solutions

The availability and access to fixed and wireless electronic communications networks and services can engage a range of digital services and applications (such as IoT applications) which could assist in facilitating decarbonisation across various sectors of the economy. The proliferation of IoT applications aligns well with the enabling potential of electronic communications networks and services to decarbonise industry verticals and other sectors.

Digital technologies, such as for intelligent systems and smart mobility, are already available via the use of narrowband IoT (NB-IoT) solutions that run on 2G, 3G and 4G technology. AI, with the support of 5G and IoT (referred to as 'intelligent connectivity') will enable new use cases in a number of vertical sectors. In future, 5G standalone (SA) will enable massive machine-to-machine (M2M) communication solutions; real-time device-to-device networking; and ultra-reliable, low-latency functionality for things like autonomous devices and next-generation IoT. In addition, 5G offers new network management possibilities that could enable

a single physical network to support a number of virtual networks with different performance characteristics.

Although the proliferation of IoT applications is expected to increase organically in a growing digital economy there is still a lot of untapped market potential for the adoption of IoT in many sectors of the economy. Such vertical business sectors include, smart agriculture and precise farming, transport (including traffic control and optimisation), electricity, industry, waste management, smart buildings and smart cities, amongst others. Providers of electronic communications networks, services and digital applications play a proactive and pivotal role by offering digital solutions that foster more sustainable and green ecosystems. The MCA's objective is to support their efforts to enable them to drive such innovative digital solutions which have a positive impact on other industries and customers.

The MCA has identified the following potential actions whereby it could facilitate the proliferation of application and usage of IoT solutions to facilitate abatement of GHG emission of various economic sectors:

- Identifying those economic sectors that could benefit from the application of IoT with the aim of launching an awareness campaign, highlighting the advantages of the enabling potential of these technologies to facilitate abatement of GHG emissions.
- Collecting information on digital solutions (products, services and customer solutions) in which electronic communications networks and services have been implemented to decrease the environmental impacts of other sectors. Where available, indicators on what was the situation before and after the implementation of the digital solution.
- Showcasing digital solutions that inspire economic sectors to reach their environmental sustainability targets by achieving higher operational efficiency gains through, amongst other measures, integrating the use of digital services (such as IoTs) in their own operational activities.
- Organising a workshop offering relevant stakeholders the opportunity to learn and share experiences related to IoT technologies, services, activities and requirements.

5.6 Encouraging the postal sector to respond to the environmental challenges

The increase in parcel deliveries stemming from the significant growth in e-commerce exerts an impact on environmental sustainability goals, notably with respect to carbon emissions and circular economy considerations. Whilst the MCA has, as yet no specific legal obligations to

address sustainability issues of the postal sector, it is recognised that postal and parcel delivery operators are already acting and seeking further ways to respond to the challenges of environmental sustainability.

Postal market players are already taken proactive measures to take sustainability issues into account, such as reducing GHG emissions, introducing electric vehicles, introducing parcel lockers, reusable packaging, green buildings and educational measures. As parcel business and the associated delivery grow consistently, postal services face unprecedented challenges to strike the right balance between implementing the green transformation whilst, at the same time, addressing the ever-increasing economic sustainability of the postal services, especially those covered by the universal service obligations.

The MCA will consider the sharing of good practices in reducing GHG emissions of the postal sector and raising end-users' awareness in the field of environmental sustainability of the postal sector via publication of information. The MCA will also consider collecting data to monitor progress towards climate-neutral postal operations from the main postal service providers covering postal transport (the size and composition of the vehicle fleet); postal buildings (electricity use); and GHG emission reduction measures. Information from postal service providers on the carbon footprint of their postal services and their sustainability programmes would improve transparency and comparability for users and encourage providers of postal services to become more sustainable.

The MCA has identified the following possible actions that would facilitate the environmental sustainability credentials of the postal sector in Malta:

- sharing good practices implemented by postal operators in reducing GHG emissions, such as in the last mile delivery methods and their effect on the environment;
- raising end-users' awareness in the field of environmental sustainability of the postal sector and encouraging users to opt for more sustainable delivery alternative via publication of information; and
- developing a framework for monitoring the evolution of the environmental impact of providers of postal services covering postal transport (the size and composition of the vehicle fleet), postal buildings (electricity use), and GHG emission reduction measures.

6 Next Steps and Submitting Comments

In this document the MCA is outlining its potential role in encouraging the communications sector to increasingly consider its environmental sustainability whilst delivering networks and services that enable Malta to tackle the broader environmental challenge, including those brought about by climate change itself.

The MCA would welcome views of interested parties. These responses will be used to formulate a practical plan of action which may necessitate active engagement with various stakeholders, including the operators in the communications sector and other public bodies (some of whom have a direct remit in this area).

The MCA appreciates that respondents may provide confidential information in their feedback The MCA will take the necessary steps to protect the confidentiality of all such material in accordance with the MCA's confidentiality guidelines and procedures.[106] Respondents are, however, encouraged to avoid confidential markings wherever possible.

The MCA will continue engaging with industry stakeholders to understand their approach to running their businesses sustainably, including how they affect the environment, and are affected by both environmental change and the wider societal efforts to become more sustainable.

The MCA welcomes all written responses from stakeholders by **18th December 2023**.

Interested parties are asked to submit their responses in written form to the following recipient:

Chief of Policy and Planning
Malta Communications Authority
Valletta Waterfront,
Pinto Wharf,
Floriana, FRN1913,
Malta

Email: info@mca.org.mt

[106] In accordance with the MCA's confidentiality guidelines and procedures.

Appendix 1: Environmental Sustainability of the ICT sector - The European Perspective

The European Green Deal (EGD) is intended to make Europe the first climate neutral continent by 2050 and a leader in circular economy. Meanwhile, as an intermediate step towards climate neutrality, the EU raised its 2030 climate ambition by committing to cutting GHG emissions by at least 55% by 2030, on the way to net-zero by 2050. The 'Fit for 55 Package' is set to lead to a series of revisions and updates of the EU's legislation related to climate, energy and transportation, which are all aimed at aligning current laws with the 2030 and 2050 environmental sustainability goals. In line with European Green Deal goal and EU's digital strategy, environmental transparency of the digital sector is a topic addressed throughout the EU horizontal environmental legislation as well as by non-regulatory initiatives. This section outlines regulatory and policy instruments, which address different aspects of sustainability, having a relevance to the ICT sector.

Currently there is no overarching objective[107] within the key regulatory instruments applying to the electronic communications sector [EU Electronic Communications Code (EECC) and Broadband Cost Reduction Directive (BCRD)] to promote environmental sustainability. However, measures in the BCRD concerning the re-use of physical infrastructure (including duct access) and civil works co-ordination can contribute to environmental goals,[108] and Article 44 EECC provides scope for competent authorities to impose colocation and sharing of network elements in order to protect the environment in the context of rights of way.[109] In addition, the proposed draft Gigabit Infrastructure Act[110] (GIA) could reduce costs and mitigate the environmental impact of deploying VHCNs. Also of note is the Decision No 243/2012/EU establishing a multiannual radio spectrum policy programme which includes in the objectives to be pursued by the EC and Member States to "reduce the Union's carbon footprint by enhancing the technical efficiency and energy efficiency of wireless communication networks and equipment".[111]

[107] For example, competent authorities are given a general objective under article 3 EECC to promote connectivity to VHCN, competition, the internal market, and the interests of citizens.

[108] In particular BCRD recitals 13, 18, 26 and 29.

[109] Where an operator has exercised the right under national law to install facilities on, over or under public or private property, or has taken advantage of a procedure for the expropriation or use of property, competent authorities may impose co-location and sharing of the network elements and associated facilities installed on that basis, in order to protect the environment, public health, public security or to meet town- and country-planning objectives.

[110] https://digital-strategy.ec.europa.eu/en/library/gigabit-infrastructure-act-proposal-and-impact-assessment

[111] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32012D0243

Key legal instruments on environmental sustainability include the Eco-design Directive[112] and EU labelling framework, the Waste of Electronic Equipment Directive (WEEE)[113] and the Energy Efficiency Directive, currently under revision. Additionally, the Corporate Sustainability Reporting Directive (CSRD)[114] strengthened and modernised the requirements under EU law for all public-interest companies, including listed SMEs (approximately 50,000 companies in total, micro undertakings are not included), to report information regarding social and environmental impact. Companies subject to the CSRD will have to report in line with the European Sustainability Reporting Standards (ESRS), in order to standardize and improve transparency, akin to the standards already in place for financial accounting reporting. Common sustainability reporting standards will also allow for the digitalisation of sustainability reporting and can facilitate its supervision and enforcement. All information/data must be provided in machine readable format under the CSRD. These rules will apply from the financial year 2024, for reports to be published in 2025, to ensure that investors and other stakeholders can assess risks arising from climate change and other environmental issues.

As mentioned in the "Digitalising the energy system – EU Action Plan" the EC will explore the possibility to develop common indicators for measuring the environmental footprint of electronic communications services[115] (Q4 2023) with the aim to establish an EU Code of Conduct for the sustainability of electronic communications networks[116] (Q4 2025). It will also explore introducing separate reporting lines for indirect GHG stemming from data centre services and the purchase of cloud computing under the CSRD. This Action Plan aims to decouple the energy footprint of the ICT sector from the exponential growth of data.

The Directorate-General for Communications Networks, Content and Technology (DG CNECT) is conducting a study with the Commission's Joint Research Centre (DG JRC), which has already developed Codes of Conduct for Energy Efficiency in Data Centres[117] and Energy

[112] Directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products.

https://eurlex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02009L0125-20121204&from=EN

[113] Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) (recast) Text with EEA relevance.

https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=celex%3A32012L0019

[114] Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting (Text with EEA relevance)

https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:32022L2464

[115] The EC will work, in consultation with the scientific community and stakeholders towards boosting transparency by developing common indicators for measuring the environmental footprint of electronic communications services, building on the work already carried out by regulators and electronic communications providers.

[116] An EU Code of Conduct for the sustainability of telecommunications networks can help to steer investments towards energy-efficient infrastructures. The EC will work towards establishing such an EU Code of Conduct by 2025 building on the work done for measuring the environmental impact of electronic communications services.

[117] https://e3p.jrc.ec.europa.eu/communities/data-centres-code-conduct..

Consumption of Broadband Equipment.[118] The study will focus on the climate, energy, and environmental aspects of sustainability in fixed and wireless telco network operations, covering telecoms services to the extent that they impact networks, for instance, through the data traffic they generate.

Complementary to the CSRD, in 2022, the EC also adopted a proposal for a Directive on Corporate Sustainability Due Diligence (CSDD). This seeks to bring in the complexity of global value chains in due diligence focusing on both environmental sustainability, including pollution and biodiversity loss, and human rights (e.g., child labour and worker exploitation). As ECN/ECS are often plugged into global supply chains, this will be important for the sector in terms of improving transparency of the environmental impact of business activities and advancing the green transition. The CSDD will apply to EU companies in the designated categories 'Group 1' (all EU limited liability companies with over 500+ employees and excess of €150 million net turnover worldwide), and 'Group 2' (other limited liability companies operating in 'high impact' sectors, with over 250 employees and €40 million net turnover worldwide).[119] For non-EU companies, the rules would apply if the turnovers cited for Groups 1 and 2 are generated within the EU.

The EU Taxonomy Regulation[120] was adopted in 2020 with the objective of providing a classification system that defines and harmonises sustainability across all economic operators, including the digital and postal sectors. It aims at providing investors and policymakers with appropriate definitions which, economic activities can be considered environmentally sustainable. In principle, the EU Taxonomy aims to reduce the risk of "green washing" and to increase transparency for investors. To this end, it seeks to establish uniform criteria for screening of environmental impacts for the purposes of sustainable investment. Given that the EU Taxonomy's scope is rather broad, in particular when aiming at non-financial reporting of relevant undertakings, it might have an impact on methodologies applied for measuring environmental impacts outside its immediate objectives. To ensure reliability, consistency and comparability of sustainability-related disclosure, existing indicators should be used as proposed by the European Parliament in its resolution of 29 May 2018 on sustainable finances and the indicators referred to in Regulation (EU) 2019/2088.

The EU Taxonomy Regulation amends the former Regulation on sustainability-related disclosures to mandate authorities established by previous Regulations to jointly develop technical standards in relation of contributions to the environmental objectives of the EU Taxonomy. The six environmental objectives covered by the EU Taxonomy are climate change mitigation, climate change adaptation, the sustainable use and protection of water and

[118] https://e3p.jrc.ec.europa.eu/communities/ict-code-conduct-energy-consumption-broadband-communication-equipment.

[119] For Group 2, the Corporate Sustainability Due Diligence rules will start to apply 2 years later than for Group 1.

[120] https://ec.europa.eu/info/law/sustainable-finance-taxonomy-regulation-eu-2020-852_en

marine resources, the transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity and ecosystems. Under the EU Taxonomy, the EC shall adopt delegated acts further specifying technical screening criteria, for the respective objectives.

The EC published a new legislative proposal in March 2022 for the Ecodesign for Sustainable Products Regulation (ESPR) revising the 2009 Eco-design directive, as part of the broader Sustainable Product Initiative (SPI).[121] The main objective of the ESPR is to increase sustainability and reduce the negative life-cycle environmental impact of products. Building on the existing Ecodesign Directive, the scope is expanded beyond energy-related products, establishing sustainability performance and information requirements on a wide range of products, along with the introduction of Digital Product Passports and a registry for relevant data. The ecodesign requirements focus on complying with rules on product durability; reliability; reusability; upgradability; repairability; possibility of maintenance and refurbishment; presence of substances of concern; energy use or energy efficiency; resource use or resource efficiency; recycled content; possibility of remanufacturing and recycling; possibility of recovery of materials; environmental impacts, including carbon and environmental footprint; and the expected generation of waste materials. The proposed text recalls the importance of using data-driven tools including the PEF methodology as laid down by the Commission Recommendation (EU) 2021/2279[122] as well as other parameters related to the environmental performance of the products.

In order to reduce waste generation, the proposal includes transparency requirements relevant to the destruction of unsold goods. Under certain circumstances,[123] it foresees the companies' ability to self-regulate by requesting the EC to examine their ecodesign measures as an alternative. In this case, the proposed self-regulation measures should achieve the same objectives as those set by the ESPR. Finally, other provisions include rules on labels indicating the performance of groups of products, measures regarding the destruction of unsold goods and obligations of online marketplaces concerning market surveillance.

Under the 2020 Circular Economy Action Plan and in line with EGD objectives on efficient use of resources, new requirements on ecodesign and energy labelling for mobile phones, cordless phones and slate tablets[124] were proposed by the EC in application of the Ecodesign Directive and the EU label Regulation. These new rules aim at ensuring better information on

[121] Proposed regulation on eco-design for sustainable products

https://environment.ec.europa.eu/system/files/2022-03/COM_2022_142_1_EN_ACT_part1_v6.pdf

[122] Commission Recommendation (EU) 2021/2279 of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations.

[123] By companies representing at least 80% of all units placed on the markets for the products concerned.

[124] Commission Regulation laying down ecodesign requirements for mobile phones, cordless phones and slate tablets pursuant to Directive 2009/125/EC of the European Parliament and of the Council and amending [reference to the revised Ecodesign Regulation on standby, networked standby and off mode, expected 2Q 2023]

the environmental performance of these products and to improve the energy efficiency, durability and repairability in the design of mobile and tablet devices. The draft Regulation on energy labelling for smartphones and tablets foresees the display of three types of information: energy efficiency classes, repeated free fall reliability class and repairability class. The proposed Ecodesign Directive notably stipulates for this category of products that consumer should be able to easily repair, upgrade and maintain these devices, and that they can be recycled and reused. It can be noted that the EC is also working on new ecodesign requirements for off mode, standby mode, and networked standby energy consumption of electrical and electronic household and office equipment[30] that could also improve the monitored environmental performance of electronic communication.

The EC also announced an upcoming initiative "Substantiating Green Claims - Environmental performance of products and businesses" that will require companies to substantiate claims they make about the environmental footprint, by quantifying the impact of their products/services using standardised methods. It should also complement the measures at law, by increasing the reliability, comparability and verifiability of environmental claims about products, via requirements that such claims can be substantiated and verified using life-cycle assessment method. The aim is to reduce 'greenwashing' and ensure that such claims are reliable, comparable and verifiable across the EU – thus helping commercial buyers and investors make more sustainable decisions and increase consumer confidence in green labels and information. A first step was already made in 2022 with the publication of the proposal for Empowering Consumers in the Green Transition which imposes an obligation to provide information on repairability ahead of purchase, and protection against unfair practices linked to early obsolescence.

On a voluntary or self-regulation level, initiatives such as the 'Code of Conduct for Broadband Communication equipment',[125] aims to harness the rise in electricity consumption of broadband equipment in Europe. Similarly, an updated best practice guidelines version for the EU's code of conduct for Data Centre Energy Efficiency[126] has been rolled out by the EC's Joint Research Centre (JRC) in early 2022.

In 2021, 26 CEOs of ICT enterprises formed the European Green Digital Coalition[127] and signed a declaration of support for the Green and Digital Transformation of the EU. This declaration entailed a number of commitments towards mitigating the carbon footprint of their

[125] Current version of code of conduct (V.8.0) valid from 1.1.2021

[126] Current version of code of conduct for the energy efficiency for Data Centre (V. 13.1.1)

[127] https://digital-strategy.ec.europa.eu/en/policies/european-green-digital-coalition

own organisations and maximising the sustainability benefits of digitalisation. The signatories pledged to become climate neutral or net-zero[128] by not later than 2040.

In early 2022, the EC issued the European Declaration on the Digital Rights and Principles for the Digital Decade[129] which emphasised the need for the lifecycle of digital products and services to generate the least negative environmental and social impact. Also, the EC Digital Strategy, 'Shaping Europe's Digital Future',[130] besides emphasising the importance of Europe's technological sovereignty by ensuring the integrated and resilience of data infrastructure, networks and communications, also stressed that the twin challenge of green and digital transformation go hand in hand.

[128] Carbon neutral refers to a policy of not increasing carbon emissions and of achieving carbon reduction through offsets. While net zero carbon means making changes to reduce carbon emissions to the lowest amount – and offsetting as a last resort. The offsetting is used to counteract the essential emissions that remain after all available reduction initiatives have been implemented. In both cases carbon offsetting removes CO_2 from the environment. For it to count, that removal must be permanent and accredited or licensed (definition sourced from the 'New Civil Engineer' website).

[129] https://digital-strategy.ec.europa.eu/en/library/declaration-european-digital-rights-and-principles

[130] https://ec.europa.eu/info/sites/default/files/communication-shaping-europes-digital-future-feb2020_en_4.pdf

Appendix 2: Reducing GHG emissions of electronic communications networks

This section consists of a non-exhaustive number of observations elicited from a review of various reports on good practices in reducing GHG emissions of electronic communications networks. The observations are the result of an assessment between different methodologies employed during the life-cycle phases of electronic communications networks, namely: (a) deployment; (b) operation; and (c) decommissioning. Some reports also identify the manufacturing process of electronic communications network elements as another major contributor to GHG emissions. This process, however, goes beyond the scope of this discussion paper.

Although this appendix depicts the take-up of such practices as potential solutions, it is recognised that the eco-system, scale of operation, market conditions and other circumstances, which these observations have been situated in, could vary from the local conditions. Direct transferability or applicability of some of the identified good practices may, therefore, be partially or completely unfeasible in the current domestic setting.

Network Deployment

Various reports suggest that the most significant environmental impact associated with the deployment of electronic communications network is linked to cable laying in asphalt. These impacts could be mitigated through increased re-use of physical infrastructure (such as duct sharing), or if that is not possible, through micro trenching techniques. Mast sharing could also limit the environmental footprint associated with the deployment of mobile networks.

The WIK-Consult and Ramboll study for BEREC on the "Environmental impact of electronic communications" makes reference to Solivan (2015) - Life-Cycle Assessment on fibre cable construction methods.[131] Solivan (2015) takes a life-cycle assessment approach to fibre cable construction methods and sub-categorises the deployment process into three main sequential phases: (a) Excavation; (b) Laying; and (c) Recovery (covering). Solivan further clarifies that at excavation phase studies distinguish between asphalt and green spaces as well as whether excavated material is reused at recovery phase or not.

The following observations, some of which are pragmatic or intuitive in nature, have been identified for this first phase, namely the construction (excavation, laying, recovery) of the network elements, in the deployment process of fibre networks:

[131] Shan Solivan (Stockholm 2015) MSc Thesis entitled Life Cycle Assessment on fibre cable construction method presented at the Industrial Ecology, Royal Institute of Technology

- The smaller the excavated material the less impact on the environment. Large excavations lead to more land disruption and higher fuel consumption to operate machinery.

- In green spaces, the ploughing technique offers the least impact on the environment since no mass is generated and no transportation of such would be involved.

- In asphalted ground conditions, micro-trenching (typically a slot-cut trench of less than 20 mm wide and between 120 mm – 300 mm deep)[132] is the preferred method for cable-laying. Traditional trenching requires significantly more production of new asphalt (for re-asphalting), and more fuel consumption for transportation of material and operation of machinery.

- 'Blowing technique' of fibre between existing manholes has significantly lower impact compared to alternative deployment as no civil works are involved. According to a white paper by the Fibre to the Home Council Europe: Innovative FTTH Deployment Technologies,[133] blowing of fibre can be performed through, amongst others, duct sharing, sewer pipes and cable de-coring.

- Where there are no technical limitations the co-location or sharing of existing physical infrastructure access (PIA) such as ducts and poles is encouraged.[134]

- Foundation for masts constitutes a major environmental impact for mast deployment, thus, utilising existing foundation infrastructure is encouraged (saving civil works associated with the construction of foundation).

- Mast-sharing could limit the environmental footprint related to the mobile network deployment.

- Although considered less environmentally efficient than PIA, co-ordination of civil works (e.g., joint planning of 5G and FTTH deployments) can, in principle, reduce the environmental impact of network construction.[135]

[132] Micro trenching and Street Works: An advice note for Local Authorities and Communications Providers (Nov 2011)

[133] White Paper: Innovative FTTH Deployment Technologies (2014) – Fibre to the Home Council Europe

[134] Utilities and Services (Regulations of Certain Works) Act, Cap 81 of the Laws of Malta

[135] BEREC's report on the 'Environmental impact of electronic communications' December 2021

Network Operations

Mobile and fixed networks are arguably estimated to account for a maximum of around one-fourth of the of the overall GHG emissions generated by the ICT sector. Approximately 90% of this estimate is generated by the operations of network whilst the remaining 10% are created during the deployment and decommissioning phases.[136] The circa 25% GHG emissions contribution of the networks is, however, debatable with some studies attributing a figure as high as 35% (best case scenario)[137] GHG emissions, whilst other studies put a lower estimate of 22% contribution for the network. The variances in such estimates largely emanate from the different scopes of activities and terminals considered.

The Supply Side: It is widely considered that newer generations of electronic communications networks are more energy efficient than their predecessors. For example, 5G is claimed to be 90% more energy efficient per traffic unit than legacy 4G networks, according to Nokia and Telefonica.[138] However, other studies tend to limit the claimed 5G efficiencies to some specific conditions.

Various reports shed some light on the environmental impact of various technological options at the network operation level. The following observations are predominately gathered from BEREC's 2021 report on the 'Environmental impact of electronic communications'.[139]

- Various studies commonly agree that fibre-based technology is less energy demanding than legacy copper-based solutions.
- Fixed networks are generally more efficient than wireless networks in the transmission of a given volume of data[140].
- 5G standalone (also referred as '5G SA') is widely considered to be more energy efficient than any of the previous generations of mobile technology. However, energy inefficiencies can set in when 5G SA is optimized to process high volumes of data to provide real-time access (ultra-low latency). Also, the overall energy consumption of 5G may well increase if added on top of previous generations hence the importance of decommissioning of some legacy networks.

[136] BEREC's report on the 'Environmental impact of electronic communications' December 2021

[137] Freitag Charlotte et al (2021) - The real climate and transformative impact of ICT: A critique of estimates, trends and regulations

[138] GlobeNewswire: "Nokia confirms 5G as 90 percent more energy efficient (December 02, 2020)"

[139] BEREC's report on the 'Environmental impact of electronic communications' December 2021

[140] Another report cited by BEREC's study estimated that the total energy consumption by a hybrid Fixed Wireless Access solution in Swedish urban areas were five times higher than pure fibre-based solution.

- Wi-Fi equipment, both for general use and IoT applications, are a substantial source of energy consumption but when configured to 'race to idle' the Wi-Fi access point uses the least amount of power when in idle mode.

- The energy consumption of fixed access networks supporting IoTs is determined by the level of traffic and different access network technologies have different energy efficiency for different data transmission volumes:[141]

  i. when the site IoT traffic is low up to 100 kb/s 4G Wireless (LTE) access can be more efficient;

  ii. when Wi-Fi background traffic is modest, shared corporate Wi-Fi networks with Passive Optical Networks (PON) backhaul are the most energy efficient option; and

  iii. at higher traffic rates, Gigabit Ethernet passive optical network (GPON) access provides the most efficient solution.

- Studies show that sub-optimization (e.g.; for redundancy or QoS purposes) of network utilisation and operation of parallel networks (e.g.; running legacy technology alongside more modern networks) are sources of higher levels of energy consumption.[142]

- Drawing on the previous point, scenarios involving the shutdown of legacy 2G and 3G networks and replacing them with newer generations of technologies such as 5G SA represent energy savings. Other studies further stress that 4G mobile network is over four times more energy efficient per gigabyte than 3G network and 5G SA network is seven times more efficient than 4G.[143] Lower operational complexity of new technologies is an added benefit.

- The implications of legacy networks switch-off need to be carefully examined in order to assess the impact on some M2M technologies and the continued use of older handsets by some cohorts (mainly elderly). Another key consideration to take into account is the European regulation on the in-vehicle emergency call (e-call).

[141] Gray, C., Ayre, R., Hinton, K., Tucker, R.S.: Power Consumption of IoT Access Network Technologies, 2015 cited in BEREC's report on the 'Environmental impact of electronic communications' December 2021

[142] The authors of the BEREC's report have drawn these conclusions on a number of academic studies, which are appropriately cited in the same report.

[143] Greening digital companies: Monitoring emissions and climate commitments (ITU & World Benchmarking Alliance, 2022):

- A New Zealand-based study found that Optical Fibre Technology, on average generates, 35% less emissions than Copper, 21% less than Hybrid Coax Fibre and over 90% less than fixed wireless broadband.[144]

- The network sub-optimal utilisation issue can be mitigated by the adaptation of the energy consumption to the current level of data traffic.

- The shifting ability of technology (particularly 5G SA networks) into low power mode and temporary shutdown of certain equipment can also potentially contribute to energy savings.[145]

- Network sharing is also considered to limit energy consumption when compared to the simultaneous operation of different networks. In principle, this involves an MNO selectively switches off some of its base stations and channel its own traffic to active base stations operated by other MNOs in the same cellular network.

- Powering electronic communications networks and equipment by renewable energy is a key measure to reduce the GHG emissions however, accessibility to renewable sources of energy is not always possible because it may be unavailable on the grid. A suitable option would be to procure Renewable Energy Certificate (REC)[146], particularly to address the Scope 2 location-based energy requirements. Installation of photovoltaic panels is also a viable alternative when renewable energy from the grid is not possible, yet limited space availability for the installation of the necessary infrastructure may pose challenges in this area.

- Supply chain sources constitute most of Scope 3 GHG emissions, over which an ECN provider exercises limited control. The Carbon Disclosure Project (CDP)[147] provides support service to members who solicit their suppliers' disclosure of the environmental data of the services they supply. This model-based service will enable the ECN provider to improve the accuracy of the estimates of its Scope 3 emissions inventory.

- Carbon-offsetting is a complementary measure to the decarbonisation initiatives taken by an ECN provider in the three identified life-cycle phases. Projects and initiatives

[144] Greening digital companies: Monitoring emissions and climate commitments (ITU & World Benchmarking Alliance, 2022)

[145] For example, a French wireless service provider, Free Mobile (part of Iliad group) has taken the initiative of putting the antennas on standby on the 2600 MHz frequency from midnight to 05:00 am in order to reduce the energy consumption.

[146] REC are normally equivalent to 1 MWH.

[147] The Carbon Disclosure Project: https://www.cdp.net/en/info/about-us

aimed at compensating for shortfalls in emission abatement can take place both locally as well as in other jurisdictions, particularly in developing countries.

The Demand side: The usage, method of content delivery and type of device can all be variable elements which have a direct bearing on the bandwidth utilisation and the related energy consumption. As underlined earlier in Section 3 of the document, the GHG emissions from terminal equipment constitute the major share (between 60% and 80%) of the overall emissions from the ICT sector. In the context that end-users have a degree of control over at least two of these elements (usage and choice of device type) energy-saving options at the end-user level deserve some attention in an overall strategy for the reduction of energy consumption in the ICT sector.

Given the growing environmental awareness of consumers' impact resulting from their own activities, environmental impact information about energy consumption of devices and the method to access content are now increasingly being demanded by consumers and is increasingly forming part of the customer retention strategy of some market players. The same information could also be useful to inform any awareness campaigns aimed at cohorts, who due to lack of knowledge or awareness, are still indifferent about their own behavioural impact on the environment. An additional and complementary objective is to promote more responsible consumption of digital content in general.

- A study cited by BEREC's external study report (Yan et al. (2019)) determined that the main energy consumption for web browsing and instant messaging application is the smartphone itself whilst heavy data applications such as video, VR applications and video chat such as FaceTime, the 4G wireless network is the main energy consumption source.

- Another study conducted in a controlled environmental setting, compared ten minutes of reading a web page with video-streaming across multiple devices and networks. The outcome determined that; for accessing a webpage for reading, a smartphone via 3G consumes less energy than doing the same activity via Wi-Fi on a desktop. However, viewing a 10-minute video clip via 3G on a smartphone is more energy intensive than doing the same thing via Wi-Fi on a desktop.

- Raising end-users' awareness about the environmental footprint of different technologies can be considered to engender a virtuous behaviour, highlighting amongst others, the elevated environmental footprint associated with unlimited data plans.

- Colour-coded labelling provides useful and easily accessible information to consumers about the energy efficiency of some electrically powered devices. A survey commissioned by the EC claimed that 85% of European consumers[148] consult energy

[148] BEREC's report on Environmental impact of electronic communications

labels prior to purchasing. No data or other information on such behaviour by Maltese consumers could be found (the study involved nine member states and Malta was not included). The eco-design directive covers a range of electronic devices from computers to set-top boxes. A survey to determine the extent of use by Maltese customers of such labels in deciding on the purchase of electronic devices and an awareness campaign to promote the use of such labels (provided a study establishes low use) may contribute towards the environmental sustainability of the sector.

- A more recent study, also cited in BEREC's report [Schien et al. (2020)], involved a comparative analysis of the electricity consumption of the distribution and viewing of TV via terrestrial, satellite, cable broadcasting and streaming across different end user devices. The study concluded that viewing content via satellite, cable and streaming produces more CO_2 equivalent than viewing the same content via terrestrial transmission. The study also noted that in case of streaming, the network equipment accounts for greater electricity consumption than the devices themselves, which are normally small viewing devices such as smartphones and tablets.

- The current consumption model of electronic devices (e.g., handsets, routers and other connected devices) are generally centred around buying a new device. Low incentives for reparability and reuse tend to facilitate quicker obsolescence[149] with negative impact on the environment. Alternative sales and marketing model based on rentals, sharing and refurbishing of terminal devices and equipment can contribute to higher longevity of such devices. Promoting consumer awareness in this regard (particularly 'cultural' obsolescence) can be an effective measure in promoting longer retention of consumer devices[150].

The Decommissioning Phase of Fixed Access Networks:

The roll-out of fibre networks is gradually replacing copper networks. Options to deal with end-of-life legacy networks include: the de-installation and disposal of the disused network or leaving it in situ. The latter option has advantages because it doesn't disturb the site and avoids the use of heavy machinery for digging. However, it can also crowd the site when limited space is required to accommodate new technologies. Another disadvantage has to do with copper theft, which recently has been on the increase – a few isolated cases of copper theft were also reported in Malta.

[149] There are at least three types of obsolescence within the context of digital sustainability cited in the ARCEP report (refer to footnote 51); 'Cultural' obsolescence derived from fads, fashion, desire for change and the cult of the new, Software obsolescence, driven by updates of the OS and apps and eco-design) and Hardware obsolescence that is largely a function of adaptability to future technologies, reparability)

[150] Achieving Digital Sustainability – ARCEP December 2020:

https://en.arcep.fr/uploads/tx_gspublication/achieving-digital-sustainability-report-dec2020.pdf

Network operators, consulted as part of the BEREC study, underlined that the greatest environmental impact of decommissioning stage stems from waste and disposal of the elements of the equipment including cables, CPE and poles.

At the decommissioning stage of network infrastructure and CPE, the best practices identified are: (i) Reusing, (ii) Refurbishing and (iii) Recycling equipment.

Incentives, monetary or otherwise, can be considered to motivate customers handing back old devices in order to optimise their end-of-life. Several service providers (e.g., Iliad, Telia and Liberty Global, O2, Proximus and Orange) have programmes of reusing and refurbishing of equipment. It is estimated that Liberty Global refurbished 2,116,398 units avoiding approximately 3,459 metric tons of waste in 2020 and Traficom (Finnish NRA) reported that a Finnish company called Swappies[151] is specialising in fixing smartphones and computers, allowing consumers to extend the use of the devices.

A local initiative with a similar objective consists in one of the local operators offering a small monetary reward in exchange of handing in old mobile handsets, whilst another operator has rolled out a trade-in initiative where the value of an old mobile phone is estimated and can be exchanged for a discounted upgrade. Another local mobile network operator claimed to have reduced the waste of CPE by as much as 80% by refurbishing the CPE returned by customers, which is then inserted back in the service chain.

[151] Founded in 2016 in Finland, Swappie is Europe's leading technology company for refurbished iPhones. By professionally refurbishing all devices in its factories and selling them directly, they are able to offer iPhones that work like new at a much lower price. https://swappie.com/en/

Appendix 3: Sustainability initiatives by the electronic communications providers

The MCA has engaged with the three main providers of fixed and wireless electronic communications networks and services in Malta in order to better understand their current environmental sustainability measures and goals which they have set for themselves on this front. The following highlights some of the measures which are being taken by the three main providers to reduce their own environmental impact while delivering networks and services that can help enable other sectors to decarbonise and become more efficient.

Epic Communications Limited (referred to as 'Epic')[152] – Under the governance of a dedicated sustainability steering committee, Epic employs measures at the network operation, head office as well as at the customer level which make a positive contribution towards the environmental sustainability of the sector.

Initiatives taken at the network operational level include:

Epic has taken several initiatives that allow its equipment to switch to power-saving state or sleep mode during low traffic periods. More specifically, all new base stations operate Multi Carrier Power Amplifiers (MCPA) which reduce the power consumption when the traffic is low or zero. The Broadcast Control Channel (BCCH) is also equipped with power savings features that control the output power of the time slots on the BCCH carrier.

Other power-savings measures include the following technologies:

- PSU-power saving is a feature that seeks to optimise efficiency of the power system regardless of the load, temperature and input voltage.
- Traffic aware power saving feature on UMTS which permits the switching off a layer of frequency during night-time, when traffic is normally at its lowest levels.
- Low Energy Schedule Solution for 4G and 5G allows the re-scheduling of downlink data transmission in such a way to reduce energy consumption.
- LTE: Micro sleep Tx enables discontinuous transmission on downlink to save energy during low traffic. With this feature there will be minimal power emission during OFDM symbols that are not used for transmitting user data.
- Data Centre power efficiency: Epic has implemented free-cooling configuration for the equipment hall cooling. Free cooling works by monitoring the external air temperature and, in situations where the delta temperature difference between the external air

[152] https://www.epic.com.mt/environment/

temperature and return air temperature exceed a predefined threshold, ducts are opened, and external air is used to cool the equipment hall. This solution works efficiently in the winter months pushing the Power Usage Effectiveness (PUE) down to around 1.3 as against a PUE of 1.5 -1.6 for the peak summer months.

Initiatives taken at head-office level include:

- An initiative towards a paperless office was initiated in 2013, when the company was still owned by Vodafone and continued after Epic took ownership of the company in 2020. Epic has since enhanced this initiative and implemented a paperless onboarding process for all of its employees and suppliers, opting for digital processes to further reduce its overall paper consumption in all areas of the organisation. Epic estimates that the paperless working environment has resulted in the reduction of over 75% of its paper consumption.

- Every Epic property is furnished with a reverse osmosis water fountain for its employees to refill water bottles made of recycled material provided to them at the start of their employment journey, thereby reducing the volume of plastic bottles used by its employees.

- Epic promotes the responsible disposal of waste by having available dedicated collection boxes at its head office where employees, and visitors, may dispose of batteries and e-waste separate to all other waste. Additionally, all trash bins at Epic properties are segregated to collect general, organic and recycled waste to separate at source.

- To further reduce the generation of e-waste at its head-office, Epic extends the lifespan of its office IT equipment through several measures, including purchasing equipment with modular components that can easily be upgraded and replaced. Through sufficient maintenance and care, the useful life of IT equipment is prolonged further. Once equipment is no longer fit for use it is given a second life through donation schemes to organisations in need.

- The office environment of the operator is centrally controlled through an automatic climate and lighting control to reduce energy consumption.

- By implementing and promoting a hybrid remote-work program for its employees at its head-office, Epic controls and reduces the carbon emissions generated by its employees commuting to work.

Initiatives taken at customer level include:

- As part of its initiative to reduce paper use throughout its business, Epic has implemented paperless customer journeys whereby all documentation required for

customers to subscribe to Epic services in addition to any other modification, thereafter, is shared, signed and stored digitally.

- Epic has replaced all plastic bags with reusable nonwoven fabric bags and has committed to replace any damaged Bag for Better bag for free at each of its retail stores throughout Malta and Gozo.

- To further reduce its impact on e-waste, Epic launched a phone trade-in program in 2023 where customers can trade in their old mobile devices in exchange for credit on a new mobile device. Phones that are traded-in are refurbished to be given a second life or reused for parts to extend the life of other devices. Epic also sells refurbished mobile devices from all of its retail stores to give the devices a second life.

- To further reduce its impact on the environment, internet devices and packaging are manufactured using recycled plastic materials. The latest Epic Fibre box also comes with built-in energy saving functions to help its customers reduce their carbon footprint.

The above outlines Epic's initiatives contributing towards environmental sustainability, which is only one pillar of Epic's full ESG strategy. Epic's strategy also covers the social and corporate governance pillars which, therefore include additional measures and initiatives.

GO Plc (referred to as 'GO') – In 2020 GO carried out an analysis to quantify and categorise, according to scope 1 and 2, the carbon emissions resulting from its use of energy. In 2021 GO extended its analysis to scope 3.[153] The analysis established that the operational energy use of the company generates circa 45,000 tons of CO_2 equivalent, of which, 79% constituted of scope 3 emissions resulting from upstream (suppliers) and downstream (customers) activities as well as from employees working remotely. The company estimates that around 7000 tons of carbon emissions are scope 2 and by 2025 it targets 25% of all its energy requirements shall originate from renewable sources.

GO is on track to reduce it carbon footprint by 21% by 2024 and source 25% of its energy needs from renewable sources. GO's emission reduction targets were developed in line with the Paris Agreement to keep global warming below 1.5℃ consists of a 46.2% reduction by 2030 and a 90% reduction by 2045.

GO's environmental sustainability strategy rests on three pillars: (1) Reduce, (2) Replace (3) Transform.

On the reduction efforts GO has continued its FTTH deployment programme and the gradual switch-off of its copper network, which demands higher energy per gigabit of data transmitted. The company is also rolling out its 5G network technology, which will be expected to usher an

[153] https://www.go.com.mt/go-green

era of higher data transferability efficiency, antenna optimisation and standby features during transmitters' idle periods. The company is working towards the decommissioning of its legacy 3G technology as soon as it will be able to have 'voice' carried on the VoNR (voice over new radio). A migration programme form large and legacy exchanges to smaller and more efficient ones is also being implemented and is expected to lead to a reduction in the carbon footprint of these exchanges.

On the replacement front, during 2022, GO invested in PV panels at the new headquarters in Zejtun which are expected to generate circa 1 MWh of renewable energy. The new headquarters are being specifically built to be sustainable offices. The project is targeted to be completed by end 2025. The company is also planning to gradually replace its fossil-fuel powered vehicles with an electric fleet.

In a bid to minimise the obsolescence of the customer premises equipment (CPE) all devices returned by customers are tested, and where possible, refurbished and reintroduced in service. This measure is extending the life cycle of the CPE and is estimated to have reduced equipment waste by 80% whilst contributed to a reduction of more than 300 tonnes in CO_2 emissions per annum.

GO is also transforming its business processes to assist its customers so they too can contribute towards reducing their own carbon footprint by minimising the need of having the customers physically visiting the company's outlets to effect payment of bills and renew their service contracts. This is being primarily realised through the digitisation of bills and contracts and is contributing towards mitigating one of the sources of scope 3 (downstream) emissions.

Another complementary measure is the hybrid-working arrangement for most GO's employees, which is resulting in a drastic reduction in the daily commuting. GO employees have also undergone training to enhance their knowledge on climate change and how their individual behaviour can be modified to contribute positively towards the sustainability of the environment. GO introduced a tool to minimise its carbon footprint by allowing the technicians' appointments to be scheduled according to the least travel distance possible, which contributes significantly towards fuel efficiency and reduction in emissions.

On the enablement front, in March 2022 GO acquired the majority shareholding in the IoT green tech company SENS Innovation Group Limited. SENS is an energy management company that leverages IoT-based technology to reduce energy consumption and associated costs for commercial buildings. This investment combines both of GO's vision to invest in green technology but also to help its customers reduce their own carbon emissions.

At the end of 2022, GO launched new IoT solutions based on its narrowband-IoT nationwide network (NB-IoT) which allows business customers to, not only improve their operational efficiency, but also to become greener because NB-IoT requires less energy to operate.

Melita Limited (referred to as 'Melita')[154] – Melita formalised its commitment to decarbonisation through the Science Based Targets initiative (SBTi).[155] The SBTi is a collaboration between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). The SBTi aims to drive ambitious climate action in the private sector by enabling companies to set and adhere to science-based emission reduction targets. Melita's official target is a 42% reduction in its direct and indirect greenhouse (GHG) emissions by 2030, using 2020 as its base year.[156]

Melita achieved carbon neutrality in 2022, one year ahead of its previously announced target of being carbon neutral by 2023. Being carbon neutral means that the carbon emissions from the daily running of Melita's business, which include indirect carbon emissions from the electricity used to provide internet, mobile and other services, are balanced by carbon reduction and offset activities. Melita's calculations and progress are independently verified by Schneider Electric, a global specialist in energy efficiency and sustainability.

Melita maintains energy efficient and environmental management systems in line with ISO certification in energy management (ISO 50001) and in environmental management (ISO 14001).[157] The Energy Management certificate, ISO 50001, is awarded to businesses that are committed to addressing their energy impact by conserving resources via efficient energy management. This standard offers a practical way for the development of an energy management system (EnMS) to track and optimise an organisation's energy use. The Environmental Management ISO 14001 provides a framework for taking actions to reduce overall environmental impact with a continuous improvement approach, such as installing intelligent heating, lighting and cooling systems to reduce energy usage.

In 2023 the company's operations consume just over 1,000 MWh of electricity a month, with a full year forecast for 2023 of 13,070 MWh. This generates around 4,500 tonnes of CO_2 emissions annually. From January to August 2023, approximately 42% of electricity has been consumed by the Master Telecom Data Centre followed by the Mobile RAN (30%), Hybrid-Fixed Coaxial (HFC) Network (20%), head office (6%) and retail shops (1%). At a more granular level, around three fifths of the electricity used by the data centre is driven by customer-based equipment, whilst the remaining two fifths is used to power the network equipment. By the end of July 2023, the company switched almost a quarter of its vehicles (24%) to electric, including many small, highly efficient cars. During the second half of 2023,

[154] https://www.melita.com/sustainability/

[155] https://www.melita.com/melita-carbon-neutral-and-future-focused/

[156] Refer also to Melita's ESG Report 2022:
https://www.melita.com/wp-content/plugins/melita-custom-landing-pages/img/esg/melita-esg-report.pdf

[157] https://www.melita.com/melita-receives-three-iso-certifications-for-environment-energy-and-health-and-safety/

Melita will add a further 14 vans, making 39% of the fleet electric. Melita aims to electrify all cars and vans of its fleet, by 2025.

Tackling the emissions generated from electricity is far more challenging in Malta due to the lack of available renewable sources of energy. The most viable alternative is to invest in the building of solar panels. This, however, poses its own challenges as space where photovoltaics (PVs) can be installed is limited due to variety of reasons including visual aspects and limitations associated with installing PVs on agricultural land and securing of permits. Melita has installed an 84 Kw capacity solar farm on the roof of its data centre and improved both its Power Usage Effectiveness (PUE) of the same data centre as well as its cooling technology. Currently, Melita is completing two PV installation projects on industrial rooftops. This project is expected to produce circa 10% of the company's electricity requirements of its operations.

Melita has also introduced a parking app which allows employees and visitors to pre-book a parking space when visiting the Head Office – this system is contributing to reducing the driving time and the resulting emissions due to parking space shortage.

Melita replaced its radio network in 2018 with an advanced solution that permits a reduction in spectrum usage during low traffic intervals (mainly night-time) that resulted in a circa 7% reduction of the 4G RAN power consumption. Melita has upgraded its mobile network to 5G across Malta and Gozo, resulting in greater energy efficiency. In May 2023, Melita started upgrading its fixed broadband network, with a technology platform that provides faster, more reliable internet access with lower energy consumption.

On the enabling front Melita's machine-to-machine (M2M) and Internet of Things (IoT) connectivity supports other industries to implement their own decarbonisation measures (such as car-pooling and fleet management, waste management and digital health care). Melita's IoT applications are largely implemented in a variety of settings in other European countries including Italy, Germany and Sweden, but the company believes there could also be potential for IoT applications in different local settings.[158]

Melita also carries out awareness campaigns aimed at encouraging customers to ensure that their old handsets are properly recycled. The company provides recycling facilities in its offices and stores and regular incentives for customers to bring old handsets in for recycling.[159] Reduction of paper and single use plastic are encouraged across all Melita sites, with separation and recycling of waste being strongly encouraged.

[158] https://www.melita.com/melita-business-enables-5g-iot-nationwide/

[159] https://www.melita.com/melita-committed-to-dial-down-e-waste/

All Melita's waste electrical and electronic equipment (WEEE) is collected by GreenPak, through the ERA authorised national scheme and recycled through certified facilities.

Employee awareness of sustainability is heightened through activities such as participation in the European Sustainable Development week. The Melita Foundation has environmental protection and sustainability as one of its pillars; in 2022 €69,000 were allocated to funding environmental projects.

Appendix 4: Reducing GHG emissions of postal services

The table below illustrates a number of good practices adopted and/or planned to be implemented by various postal operators in order to reduce their GHG emissions.

Type of energy scope affected	Sustainability measure	Economic benefit	Potential economic and other drawbacks	Environmentally sustainable benefit
Scope 1	Operating a green fleet has been the single most common measure adopted by postal operators across the EU and beyond. Alternative substitutes to fossil fuel-operated delivery assets included: electrified vans, last mile urban e-bikes, pedal electric cycle, bicycles, posties on foot, substituting airfreight with train freight, where possible.	Economising on fuel costs.	Substantial capital investment to purchase electric vehicles and install charging pillars.	Substantial reduction in carbon emissions.
Scope 1	Sharing of last-mile infrastructure, including multi-operator parcel lockers.	Economising on initial capital and installation costs and maintenance costs. Fewer drivers and delivery assets and resources are required.	Loss or dilution of brand equity associated with having own and unshared infrastructure. Poorly located parcel lockers may be a source of unnecessary car trips by customers.	Reduction in carbon emissions as door-to-door package delivery are minimised.
Scope 1	Maximisation of load/space capacity of delivery vehicles to reduce trips	A source of fuel economy/ minimising the need for recharging of vehicles.	Delayed deliveries may result in mounting customer complaints and damaged brand equity.	Reduction in number of trips and the associated carbon reduction.
Scope 1	City-centres micro-consolidation logistics facility (aka micro-hubs).	A source of fuel economy and greater efficiency resulting from shorter delivery times.	Too many micro-distribution hubs may aggregately use up a lot of physical footprint and higher consumption of utilities.	Micro-hubs make logistic sense in the 5 km range from the final destination, where a variety of eco-friendly modes of mobility are available.

Type of energy scope affected	Sustainability measure	Economic benefit	Potential economic and other drawbacks	Environmentally sustainable benefit
Scope 1	Simultaneous charging for multiple vehicles in same location.	Increasing charging capacity will lead to higher charging productivity, which will increase the viability of the e-vehicles fleet from an availability readiness perspective.	Initial capex of the solution can be substantial. Further investment may include the upgrading of the existing power network installed in the location, to avoid compromising the electricity requirements of other equipment on the same premises.	Reduction in energy usage from the grid and thus a reduction in scope 2 GHG emissions.
Scope 1	Some postal operators have introduced a 2-tier system which differentiate between urgent and non-urgent deliveries.	Route-optimisation has a direct and sometimes significant reduction effect on fuel consumption.	Some QoS deterioration is possible for the non-urgent mail.	This system allows for route-optimisation, resulting in less carbon emissions.
Scope 2	Installation of photovoltaic cells on postal premises.	A source of energy saving relating to a reduction in utility bills.	Substantial initial capex and in some cases loss of roof space, which could hamper other alternative uses.	Reduction in the use of otherwise fossil-fuel generated electricity.
Scope 2	Use of electricity from the grid supplied partly or fully by renewable sources.	In some cases, where this energy source is available, users benefit from reduced energy bills as tariffs are lower.	n/a	Reduction in scope 2 carbon emissions
Scope 2	Reduction in electricity and natural gas usage.	Long-term reduction in the utility bills.	Replacing non-fully depreciated and energy-hungry equipment with energy-efficient equipment can represent a considerable initial capex.	Reduction in carbon emissions.
Scope 2	Installation of UV filtering films on apertures.	Better insulation will lead to a reduced demand for energy consumption, which in turn will lead to a reduction in utility bills.	n/a	Reduction in carbon emissions.

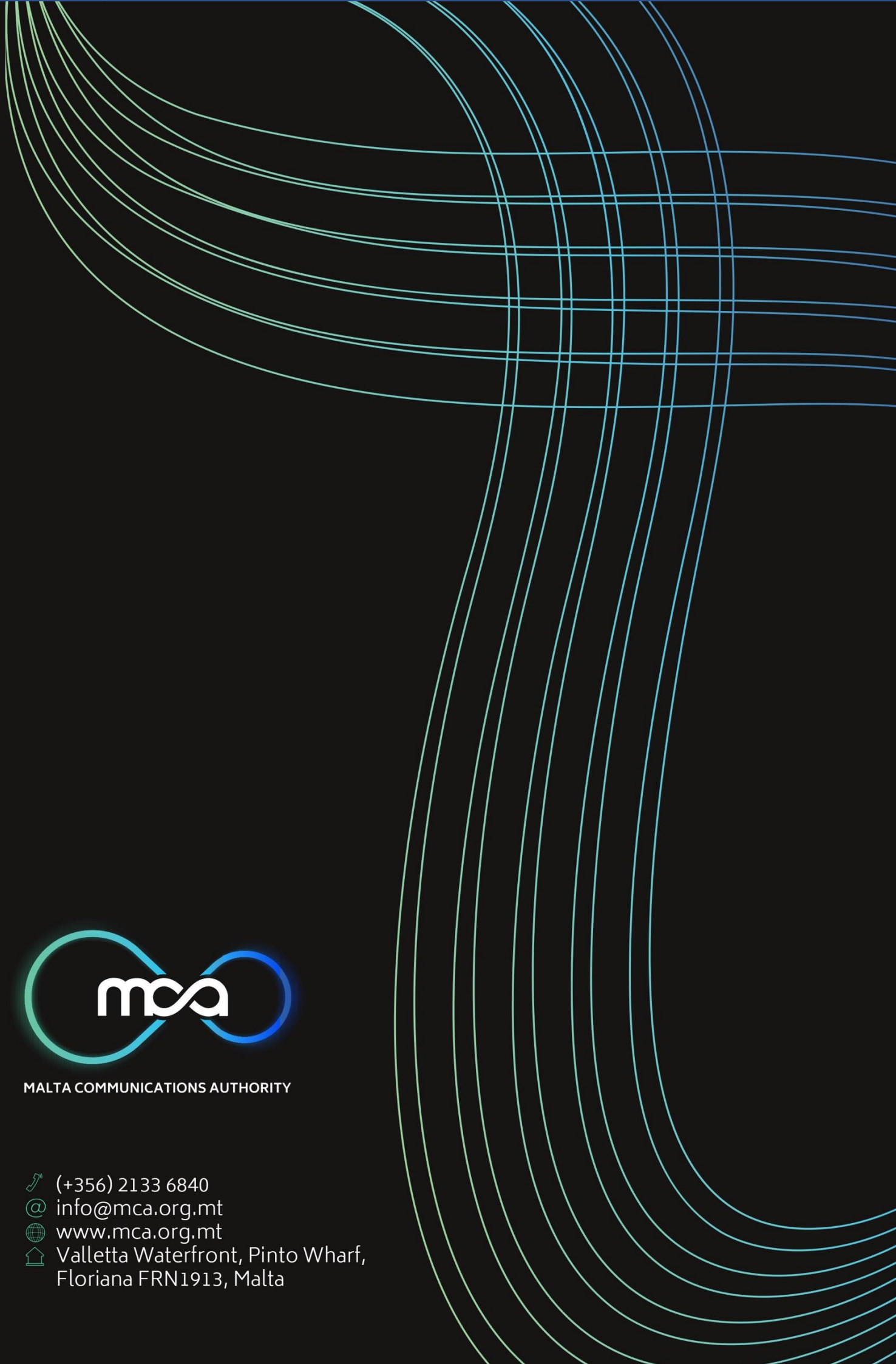
Type of energy scope affected	Sustainability measure	Economic benefit	Potential economic and other drawbacks	Environmentally sustainable benefit
Scope 2	Bundling of consignment and centrally distributed.	Delivering mixed mail items can be a way to increase productivity of deliveries and potentially lowering the costs per delivered item.	n/a	Reduction in emissions when the postal operator is still using fossil-fuel operating vehicles.
Scope 2	Waste management of packing material / energy recovery from disposal of waste.	Employing a waste management system and reap positive brand benefits. When energy recovery from waste disposal is technically possible and economically feasible, savings in some energy costs will ensue.	Recovery of energy from disposal of waste assumes large postal operation. Substantial capex to purchase the energy recovery equipment may be required.	If the energy recovered replaces any purchased electricity a reduction in scope 2 emissions can be possible
n/a	Reduction in use of plastic and chemical free printing plates.	When plastic used for the packaging of postal items is replaced by less costly environmentally friendly packaging material this measure may result into a cost reduction. Same rationale applies to chemical free printing plates.	Some environmental materials (and solutions) can sometimes be procured at prices, which are even higher than mass-produced and mainstream materials. This situation is still transitory and may well change in the future once the use of environmentally sustainable materials become more prevalent	Less plastic entering the waste stream
n/a	Use of recycled and recyclable material for packaging.	Depending on whether the recycled material is more economical than its equivalent mainstream material, savings can be reaped.	Some environmental materials (and solutions) can sometimes be procured at prices, which are even higher than mass-produced mainstream materials.	Preservation of scarce natural resources.

List of acronyms/abbreviations

ADSL	Asymmetric digital subscriber line
AI	Artificial Intelligence
B & M	Brick and Mortar
B2C	Business to Consumer
BCCH	Broadcast Control Channel
BEREC	Body of European Regulators for Electronic Communications
BIS	Bus Information System
CAPs	Content and Application Providers
CDP	Carbon Disclosure Project
CO2	Carbon Dioxide
CPE	Customer Premisses Equipment
CSDD	Corporate Sustainability Due Diligence
CSRD	Corporate Sustainability Reporting Directive
EC	European Commission
ECN	Electronic Communications Network
ECS	Electronic Communications Service
EECC	European Electronic Communications Code (Directive)
EGD	European Green Deal
ERA	Environment and Resources Authority
ERGP	European Regulators Group for Postal Services
ESG	Environmental, Social and Governance
ESPR	Eco-design for Sustainable Products Regulation
ESRS	European Sustainability Reporting Standards
ETNO	European Telecommunications Network Operators' Association
EU	European Union
FTTC	Fibre to the cabinet
FTTH	Fibre to the home
FWA	Fixed Wireless Access
GeSI	Global Enabling Sustainability Initiative
GHG	Greenhouse gas
GPON	Gigabit Ethernet Passive Optical Network
GRI	Global Reporting Initiative Standards
GSM	Global System for Mobile Communications
GT	Gigatonne
HEMS	Home Energy Management System

HFC	Hybrid Coax Fibre
ICT	Information and Communication Technology
IEA	International Energy Agency
IIoT	Industrial Internet of Things
IoT	Internet of Things
ISO	International Organization for Standardization
ITU	International Telecommunications Union
JRC	Joint Research Centre
LCA	Life-Cycle Assessment
LCDS	Low Carbon Development Strategy
LTE	Long Term Evolution (4G)
M2M	Machine-to-Machine
MCA	Malta Communications Authority
MCPA	Multi Carrier Power Amplifiers
MESGA	Malta Environment, Social and Governance Alliance
MIMO	Multiple-Input Multiple-Output
MNO	Mobile Network Operator
NB-IoT	Narrow band Internet of Things
NECP	National Energy and Climate Plan
NSE	National Strategy for the Environment 2050
OECD	Organisation for Economic Co-operation and Development
OFDM	Orthogonal Frequency-division Multiplexing
OSCAR	Online Solution for Carbon Analysis and Reporting
PEF	Product Environmental Footprint (Methodology)
PIA	Physical Infrastructure Access
PON	Passive Optical Network
PUE	Power Usage Effectiveness
PV	Photovoltaic
QoS	Quality of Service
REC	Renewable Energy Certificate
RSPG	Radio Spectrum Policy Group
RTN	Real-time Navigation
SBTi	Science Based Targets initiative
SDS	Sustainable Development Strategy 2050
SIMO	Single Input Multiple Output
SME	Small and Medium Enterprises
STEs	Set-top boxes

UMTS	Universal Mobile Telecommunications Service
UPU	Universal Postal Union
VDSL	Very High Bitrate Digital Subscriber Line.
VHCN	Very High-Capacity Networks
VoLTE	Voice over LTE
VoNR	Voice over New Radio
VR	Virtual Reality
WEEE	Waste Electrical and Electronic Equipment (Directive)
WRI	World Resources Institute
WWF	World Wide Fund for Nature
5G SA	5G Stand Alone



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