D3.3. Modelling the DigiGreen Post according to ESG factors

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List of abbreviations

AI -Artificial Intelligence
CSR - Corporate Social Responsibility
CSRD - Corporate Sustainability Reporting Directive
EC- European Commission
EEA - European Environmental Agency
EGD - European Green Deal
ERGP - European Regulators Group for Postal Services
EP - European Parliament
EPRS - European Parliamentary Research Service
EQF - European Qualification Framework
ESG (model) - Environmental, Social and Governance
ESRS - European Sustainability Reporting Standards
EU - European Union
EV - Electric Vehicles
GHG - Greenhouse Emissions
ICE - Internal Combustion Engine
ICT - Information and Communication Technology
NFDR - Non-financial Reporting Directive
NRA - National Regulatory Agency
RE - Renewable Energy
SOMO - The Centre for Research on Multinational Corporations
SGD - Sustainable Development Goals
UN - United Nations
UPU - Universal Postal Union
USO - Universal Postal Service Obligation
USP - Universal Service Provider
USPS - United States Postal Services

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1. Introduction to the D3.3. Modelling the DigiGreen Post according to ESG factors

This paper is produced as a part of the deliverables within the *Work package 3* (WP3). Its goal is to develop a joint skills ecosystem for the DigiGreen postal employees, thus contributing to the mapping of postal sectors' needs and the emerging job profiles in the digital and green economy as the main goal of the *DigiGreen Post - towards a more digital and greener postal era project*. The deliverable D 3.3. aimed at looking at the most convenient environmental, social and governance parameters necessary for postal service sector to become greener and more digital. The previous research done in the WP 3 which identified best green and digital practices in the postal services sector and green jobs that would support it has been integrated into this paper thus suggesting the model of DigiGreen post in terms of digital and green processes, products, functions, and skills for postal employees.

The joint skills ecosystem is presumed to build capacities of the postal employees so they can engage more profoundly in the green and digital transition and establish a sustainable growth strategy for the sector. The sustainable growth strategy, as we discuss in this paper, should be built around factors or parameters which fully embrace the environmental, social and governance aspect of postal business and operations. The ESG model is one of the most comprehensive models of sustainability today which employs these parameters therefore, we looked at prospects of the postal service sector implementing it in a dedicated and transparent way.

In Chapter 3 we analysed different sustainability frameworks which postal operators may use to track and measure their performance on carbon emissions and pollution. We argue there is a vague conceptualization of sustainability which produced different and inconsistent methodology for measuring climate impact. Therefore, we expressed an opinion that the sustainability framework needs to be enhanced by more coherent and standardised metrics which would bind operators and their associated companies to report and disclose both financial and non-financial information and indicators on climate impact. We find that even more important as the national legislations and climate action plans intend to follow more strictly the European Green Deal which we discussed in Chapter 4.

In Chapter 5, we scrutinised the most important figures and trends in the European postal service sector. Whereas the postal services have already embraced the digital, and to some extent green technology, we argue that the biggest challenge for the postal service sector today is the last-mile delivery and increase in the volume of parcels which are the main contributors of pollution.

In Chapter 6 we discuss in detail what are environmental, social and governance pillars which create a resilient ESG model and how it may be used by the postal service sector alongside with the European Union (EU) framework on non-financial disclosure to produce satisfying results in getting closer to the climate

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goals embedded in the European Green Deal (EGD). Lastly, we provided evidence why sustainable parcel delivery should be among the most relevant digital and green solutions and innovations for the postal service sector, and who are the actors that need to be involved in its design and implementation. We also suggested tools, services and products that need to be implemented so that postal service sectors operate on a truly circular economy basis, especially having in mind the findings from the *D 3.1. Synthesis report on DigiGreen findings.*

2. Methodology

As noted in Chapter 1, this paper is a contribution to the main objective of this project which is to map the postal sectors' needs and the emerging job profiles in the digital and green economy. Within the deliverable D 3.3. we employed desk research and combined it with the results from both quantitative and qualitative research methods that were applied in the WP3 - Creation of a Skills Ecosystem for DigiGreen Skilled Postal Employees.

The desk research included the analysis of the sustainability framework and sustainability reporting, including various sustainability reports of the postal services, questionnaires conducted among the European national regulatory agencies (NRAs), the EU legislative framework on postal services and the EGD's relations to the postal service sector. We also looked at the figures and trends and analysed the data in terms of environmental sustainability. We combined research on sustainability factors in the postal service sector and the main findings from questionnaires, interviews, training missions and literature reviews on policy documents and best practices which were done by the DigiGreen project partners within the D 3.1. Synthesis report on DigiGreen findings.

3. Framework(s) of sustainability

Sustainability as a concept and practice has been known for several centuries and it has been closely related to the context of forestry where it was used to argue that no more wood should be chopped than can be re-grown (Greiling et al. 2015). In the modern economy theory and political sciences, the debate on sustainability has been initiated in the early 18th century (Brander 2007).

The term *sustainability* as it is commonly understood today was popularised by the UN's World Commission on Environment and Development in the late 1980s. The report, *Our Common Future*, defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (EU 2017). In the following years and decades, sustainability became a key concept in development policies of the global and the European institutions. In the 2010s the EU adopted the strategy of sustainable development as one of its long-term goals (EU 2017) whereas the UN in 2015 adopted the Sustainable Development Goals (SDGs) aimed at addressing poverty, inequality, climate change and environmental degradation. International agreements such as the Paris Agreement on

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climate change in 2015 also referred to a need for international cooperation in addressing sustainability challenges and today it serves as the main focal point on addressing climate change globally.

Today, business and corporations have embraced sustainability as its core principle developing a corporate social responsibility (CSRs) as a model to measure "the responsibility of enterprises for their impacts on society" (Greiling et al. 2015) while governments and organisations worldwide have developed policies and initiatives to promote sustainability in various economic sectors, from energy and agriculture to transportation and urban planning.

Increasing number of sectors and companies today are expected to develop and use different methodologies to measure sustainability risks and opportunities as sustainability today remains an open concept with myriad interpretations and context-specific understanding[1] (Purvis et al. 2018) due to the different historical and cultural traditions (Camilleri 2015).

Although methodologies might significantly differ from one another, they generally follow on the three pillars which refer to sustainability as suggested by the UN SGDs goals. The *environmental, social and economic* pillars are the three essential pillars of sustainability which need to be understood as interconnected and interdependent.

Environmental aspect refers to preserving and protecting the environment and natural resources. It suggests practices and strategies aimed at reducing pollution, conserving energy, and water, promoting biodiversity, and minimising the negative impact of human activities on ecosystems. Key aspects of environmental sustainability include renewable energy, waste reduction, sustainable agriculture, and conservation efforts (Safdie, 2023).

Social aspect is dedicated to promoting social well-being, equity, and justice within societies. It encompasses efforts to ensure that all individuals and communities have access to basic needs, such as education, healthcare, food, and shelter, and that their human rights are respected and protected. Key aspects of social sustainability are social inclusion, diversity, labour rights, and community engagement (Safdie, 2023).

Economic aspect focuses on economic prosperity and stability while ensuring that it doesn't come at the expense of the environment or society. It suggests responsible economic practices that consider long-term impacts, such as investing in sustainable industries, fair trade practices, ethical business conduct, and the economic growth that benefits a broad range of stakeholders rather than just a few (Safdie, 2023).

Although sustainability may involve additional aspects such as cultural and political, the three core pillars mentioned remain essential in a framework of understanding and measuring sustainability. Compared to the corporate sector, accountability for financial and non-financial information on business operations has always been higher in the public sector in general, especially with respect to state owned enterprises which are expected to disclose more social and environmental information than private companies as they are

[1] More on a vast implementation and critical debate on sustainability can be found here: https://link.springer.com/article/10.1007/s11625-018-0627-5.

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legitimated by public contracts (Greiling et al., 2015). It is important to note that differences across different member states and within economic sectors influenced the fact that the EU framework on the disclosure of the non-financial reports did not provide a specific one-size-fits-all solution (Camilleri, 2015). That resulted in non-binding reporting and different CRS tools and standards which were at disposal for corporate businesses, state enterprises and non-governmental institutions (Camilleri, 2015).

The European Commission made a step forward in 2014 when it implemented the *Directive 2014/95/EU on the disclosure of non-financial and diversity information* (the 'Non-financial Reporting Directive' – NFRD) yet it still allowed a certain degree of flexibility in disclosing non-financial information and indicators on greenhouse gas emissions, water and air pollution, the use of the energy resources and health and safety measures (Camilleri, 2015).
The need to review and renew the NFRD came with the implementation of the *European Green Deal* as an essential document that sets guidelines for funding economic activities that support environmental, social and governance-related objectives (EPRS, 2021). In January 2023, the EC voted for new rules on corporate sustainability reporting incorporated in the new *The Corporate Sustainability Reporting Directive (CSRD).* The companies subject to the CSRD will have to report according to *European Sustainability Reporting Standards (ESRS)*. The standards were developed by the EFRAG, previously known as the *European Financial Reporting Advisory Group*, an independent body bringing together various different stakeholders. The standards will be tailored to EU policies, while building on and contributing to international standardisation initiatives (EC 2023) and they will be mostly applied to entities with more than 500 employees.

The adoption of the CSRD will still provide some time for the companies to adapt to the new rules while in the meantime they will continue to report on environmental matters, social matters and treatment of employees, respect for human rights, anti-corruption and bribery and age, gender, educational and professional diversity on company boards as required by the NFRD (EC 2023).

One of the possible and currently available metrics that measures environmental, social and economic dimension both in the corporate world and public sector is ESG metrics which refers to the environmental, social and governance (economy) aspect. The ESG metrics alongside the CSRs incorporates the UN SGDs goals in the businesses and operations while modifying it according to their needs and changing demands.

In the following subchapters we will see how the EGD can offer numerous opportunities for the postal sector to contribute to the EU legislative on the climate goals.
By embracing sustainable practices, adopting green technologies, and aligning with EU policies, the postal sector can not only benefit the environment but also position themselves as responsible and forward-thinking organisations in the eyes of customers and regulators.

Likewise, having in mind there are different sustainability metrics that can vary on specific goals and priorities of each postal organisation, we will look more closely into the ESG metrics and see how tracking and reporting on its pillars can help the postal sector to reduce environmental footprint and contribute to a more sustainable future.

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3.1. European Green Deal and Postal Sector

This subchapter will investigate opportunities and obstacles of the postal sector in contributing to the EGD's goals and circular economy, namely in terms of sustainable transport, sorting, logistics and distribution operations and activities.

The EGD is the European most comprehensive framework for sustainable development encompassing an ambitious aim to achieve a complete decarbonisation of the European economy by 2050 (EC 2019). It is a significant contribution to global endeavour of climate change mitigation, proposing a set of policy frameworks and strategies which stipulates the member states and requires from them to transform their various national sectors of economy in a more sustainable, environmentally friendly and, preferably, just manner. In the following years, under the EGD and considering a more ambitious climate policy efforts and a need for economic recovery after pandemics, the European Commission published *A New Circular Economy Action Plan for a Cleaner and More Competitive Europe* (EC 2020) and revised circular monitoring framework which aims to enhance methodology of tracking progress in the transition to a circular economy in the EU (EP 2023).[2]

While the EGD covers a wide range of various economic sectors that are extremely carbon intensive and highly climate vulnerable such as energy, transport, agriculture, and more, it does not have a specific focus on the postal sector. However, the postal sector can and should play a role in contributing to the EDG's objectives by adopting, actively promoting and implementing environmentally friendly practices in their operations (ERGP 2021) and thus accelerating their own transition into the circular economy.

Postal sectors' operations are inextricably related with the sector of transport which is one of the main polluters in general. The transport sector's GHG emissions have been on a continuous rise from 1990 - 2020 and represent as much as a quarter of EU's total emissions now.

Road transport constitutes the highest proportion of overall transport emissions — in 2020 it emitted 77% of all EU transport GHGs (EC 2019, EEA, 2022). Transport is, therefore, one of the pillar drivers in the EDG. It is expected that, within less than a decade, there will be at least 30 million zero-emission cars on European roads whilst refuelling infrastructure is expected to grow to 1/3 of current refuelling facilities by 2030 (EC 2019). One implementation pillar in zero-emission vehicles will be the plan of digitalisation of the transport sector and automation in transport equipment (and vehicle) manufacture (Rajković et Domazet, 2022).

Apart from transport, the postal sector main operations are related to sorting and distribution which will also need to adjust and contribute to the climate neutrality policy by adopting environmentally friendly practices. Circular economy is in the words of the European policy makers, a growth model which is regenerative instead of being linear. It gives back more to the planet then it takes away from it trying to spend its resources within planetary boundaries, reduce its consumption footprint and double its circular material

[2] https://www.europarl.europa.eu/legislative-train/carriage/new-circular-economy-action-plan/report?sid=7201

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use rate in the coming decade (EC 2020). In terms of the postal sector, the contribution to the circular economy and the EGD goals would be adoption and adherence to environmentally friendly and sustainable models and practices to minimise the environmental impact of mail delivery services. Some of the concrete examples of such models and practices refer to:

- Greening logistics - optimising transportation and delivery networks to reduce emissions by using electric or low-emission vehicles, consolidating deliveries, and implementing efficient routing systems
- Sustainable packaging - encourage the use of sustainable packaging materials and practices, such as recyclable or biodegradable packaging materials and reducing excess packaging
- Energy efficiency - adopting renewable energy sources, implementing energy-saving technologies, and reducing energy consumption in their operations
- Emission reduction - setting targets to reduce their carbon emissions and track their progress toward achieving these goals
- Recycling, waste prevention and reduction - recycling programs, minimising waste in postal operations, prevention of excessive waste.

Although there is a large body of evidence-based literature and company-based good practices regarding sustainability practices of postal operators around the globe, namely in terms of eco-design, eco-driving, circular economy, climate change mitigation, environmental awareness etc. (PostEurop, 2016), the *European Regulators Group for Postal Services* (ERGP) in their report and survey conducted among the 30 National Regulatory Agencies (NRAs) on the environmental impact and the EGD of the postal sector reveals that 80% of NRAs don't have environmental sustainability included in their national postal regulatory framework (ERGP 2021).

Likewise, when asked whether they have experience with incorporating environmental sustainability aspects in the regulation of the postal sector, 93% of the NRAs answered they don't. As the main obstacle in incorporating these aspects in the regulatory framework, most of the NRAs mentioned "it is difficult to identify specific measures, as they first need a clear framework to contextualise their actions and decisions" (ERGP, 2021).

Although most of the NRAs don't have legal obligations concerning sustainability matters, most of the postal operators have clear environmental sustainability goals that range from greening their fleet, efficient resource consumption such as using green energy in their postal offices and recycling (ERGP, 2021) with different scopes of applicability among the countries.

While it is encouraging that most of the postal operators have already taken steps to implement green transition, the downside is that the NRAs don't have a standardised and clear framework on sustainability goals as well as methodology which would measure the carbon intensity of the sector. Having in mind the discussion on sustainability framework in Chapter 3 and new EU directives that are catching up with goals of the EGD, that does not come as a surprise. Another obstacle in contributing to the EGD is the nature of the postal sector itself, which is on the one hand, dependent and on the other hand interrelated with the other sectors and providers and their own developmental path to the green transition. Not all postal sector providers have access to the capital investment necessary to support and "sustain" their sustainability. As the ERGP report notes "being green can be expensive in the long run - if a company wants to switch to a fully sustainable model, it does not mean that its suppliers and partners must follow it" (ERGP, 2021).The clear regulatory framework on sustainability and environmental goals alongside with the commitment of

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postal operators to green their internal operations, incentives to strengthen the postal operators who are comparatively disadvantaged in the market may be helpful in the middle term to facilitate their road in contributing to the EGD goals, resource efficient models and circular economy.

In the following subchapter we will look more closely into the ESG models and measures of sustainability and see how the postal sector can further benefit from them.

3.2. The Environmental, Social and Governance (ESG) model and analysis of its factors

The Environmental, Social, and Governance (ESG) model is one of the sustainability frameworks that companies and organisations use to evaluate and report on their performance according to environmental, social, and governance factors. ESG was popularised in the early 2000s and gained significant importance first in the business world as investors, consumers, and stakeholders started to disclose non-financial factors when making decisions about more transparent investments, partnerships, and purchases (Stedman, 2023; Tocchini et Cafagna, 2022).

According to some authors and proponents, the ESG model of metrics should be perceived as closely related to the business sustainability and CSR yet different. The business sustainability looks at standard profit and loss calculations and company relationship to the environment, while CSR is a self-regulating approach for a company to take actions that aim for societal benefits (Stedman, 2023).

On the other hand, ESG is a form of metrics which sees sustainability as an internal motivation to guide organisations or company's capital investment (Tocchini et Cafagna, 2022) and it presents a formalised strategy that includes measurable goals and process for tracking, managing, and reporting on them (Stedman, 2023).

The ESG reports include qualitative and quantitative non - financial information that is based on their importance to a company's business success and to its various stakeholders. An organisation or a company identifies the ESG issues that are most relevant or critical to its operations, success and stakeholders through an ESG materiality assessment, which is a guide or a blueprint for ESG strategies (Pratt, 2023). By the ESG materiality assessment, organisations and companies can identify what environmental, social and governance issues are most important for them so they can prioritise them and determine how to address them (Prati, 2023). The difference between the mentioned sustainability frameworks is illustrated in **Figure 1.**

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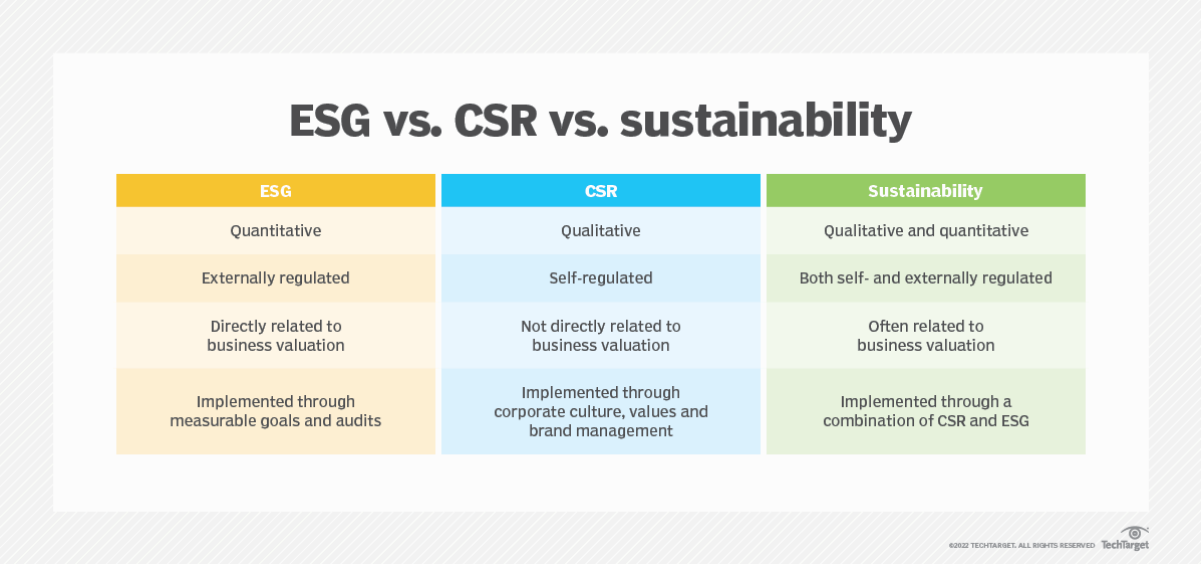
Figure 1. ESG parameters in comparison with CSR and (business) sustainability



Source: Lutkevich, 2023.

The ESG shares environmental, social and governance (economy) factors with the similar sustainability metrics. According to some authors (Stedman, 2023) *environmental factors* in the ESG pertain to companies or organisations environmental impact and sustainability efforts and include the following examples:

- energy consumption
- water usage
- greenhouse gas emissions and overall carbon footprint
- waste management

- air and water pollution
- deforestation
- biodiversity loss
- adaptation to climate change

S*ocial factors* include a company's or organisation's relationships with their employees, customers, communities, and other stakeholders and include some of the following examples:

- company's treatment of employees
- supply chain workers, customers, community members and other groups of people
- fair pay and living wages
- diversity, equity and inclusion programs
- workplace health and safety
- fair treatment of customers and suppliers
- responsible sourcing
- oversight of supply chain partners

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- community engagement
- charitable donations and social advocacy

Governance factors include organisation or company's internal structure and organisation and transparency and may include some of these examples:

- composition of managing boards and boards of directors
- executive compensation
- financial transparency
- shareholders rights
- regulatory compliance
- risk management
- data privacy policies
- ethical business practices
- rules on corruption, bribery, conflicts of interest and political lobbying

All the factors may be illustrated as three pillars (Figure 2).

Figure 2. Three pillars of ESG

Source: Stedman, 2023

The benefits for a company or organisation to use the ESG metrics are numerous, yet there is a process which includes steps necessary to establish the desirable ESG practices and ideas which will serve as an ESG program. Proponents and practitioners of the ESG propose the following steps to be included in developing the ESG strategy in the company or organisation. The discussion between board members, management,

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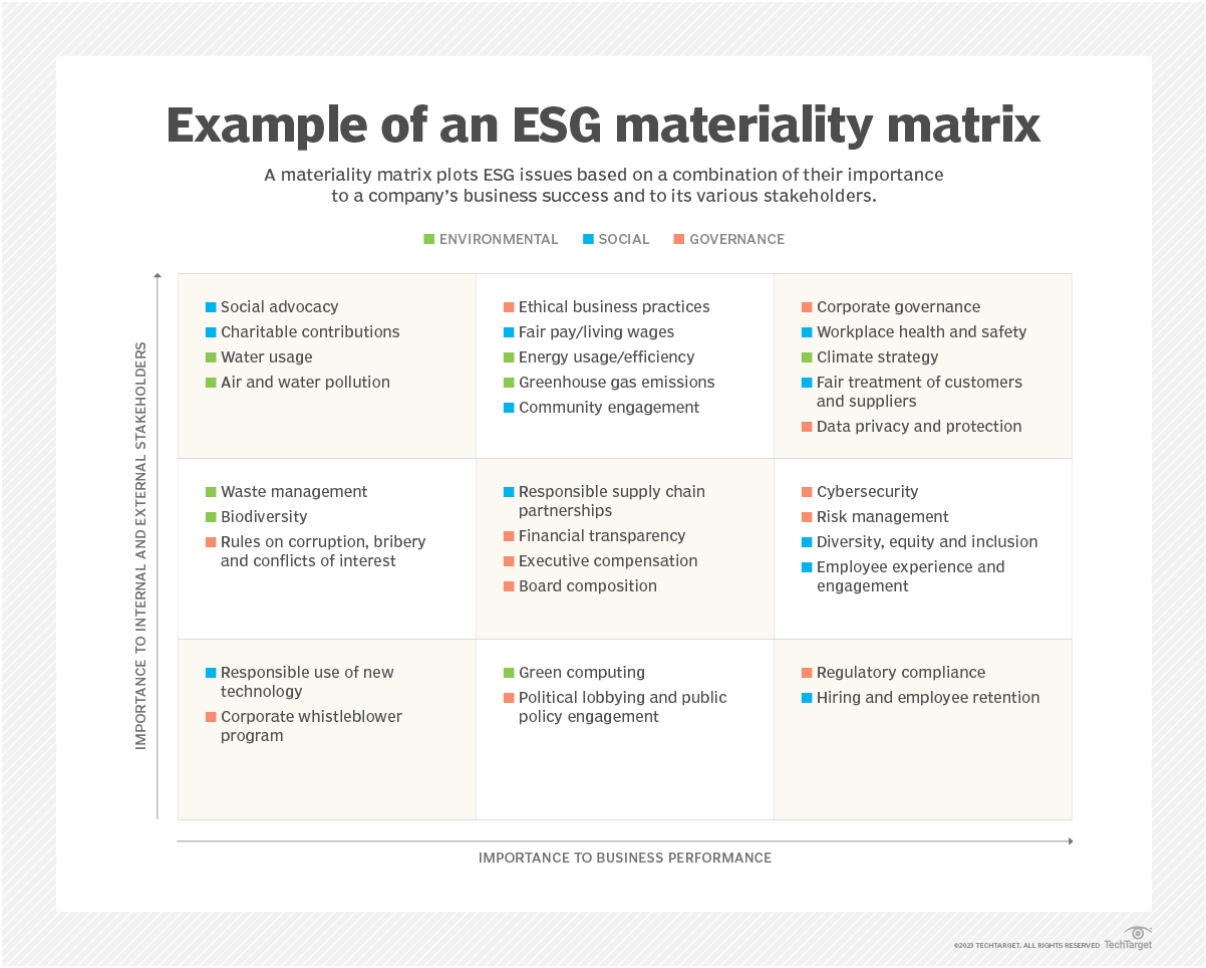
and employees as well as the other stakeholders such as customers, suppliers and local or regional community should be initiated in the first place to determine what of the mentioned ESG factors are important to business. In the second phase, the inputs gathered can be incorporated to the ESG materiality matrix. The ESG factors which are considered the most relevant to the business and operation should be put on x-axis, moving from the least to the most critical along the line. The same holds for those ESG factors which are recognized as the most important to internal and external stakeholders (Stedman, 2023; Pratt, 2023). The example can be seen here (Figure 3).

Figure 3. Example of an ESG materiality matrix



Source: Pratt, 2023

After assessing the materiality of different ESG factors, the current performance levels, policies and practices and statistics on the ESG factors should be documented in order to design a strategy for future progress and comparison of the ESG factors (Stedman, 2023). In the following steps, the objectives and performance targets for the ESG strategy should be set up, and an implementation plan needs to be made. The organisation or company should choose among numerous reporting and disclosure requirements. Once the

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ESG program is operational, the ESG data can be collected, analysed and reported (Stedman, 2023). The ESG audits should involve internal or third-party to verify that ESG data, performance metrics and reports are accurate and comply with accepted standards (Stedman, 2023).

Performance and progress of the ESG program implemented is measured through various ESG metrics, that can be both quantitative and qualitative. Quantitative metrics may include greenhouse gas emissions, energy and water usage, generated waste, employee turnover rates, etc, while qualitative metrics may include favourable labour conditions, community engagement etc. (Stedman, 2023).

The ESG uses various reporting and disclosure frameworks now which resulted in voluntary disclosures and reports different in quality and the scope. As the EGD requires a more standardised approach, the expectations of companies and organisations on their ESG performance is expected to be more tightened. The European Union's CSRD which was implemented in 2023, creates new ESG reporting standards for some 50,000 companies starting in 2025.

In Chapter 5 we will discuss in detail what would be green and digital parameters which postal operators may employ in their businesses and therefore create a strong framework for ESG reporting.

4. The EU regulatory framework of postal services, figures, and trends

Historically, the postal services have been immensely important in national development worldwide. The development of national roads, railway infrastructure and aviation has been inextricably related with the need to transport mail around the country as efficiently as possible (UPU 2011). Apart from that, postal services were the primary means of written communication and media networks. They played a crucial role in national development of countries. At some point, they provided financial services with a postal savings system designed to serve the population (UPU 2011). Reliable postal services were also essential in the terms of economic development providing and facilitating the distribution of raw materials and other products.

Postal services have been regarded as one of the 'essential' economic sectors in the pandemics of COVID-19 and thus proved to have a strong resilience to the global crises. They enabled governments to better respond to global challenges while connecting people across the world and enabling the flow of goods and products in times of unprecedented human disconnection in the modern world. Today there are more than 600 000 post offices worldwide, the postal sector operates the largest physical distribution network on the planet. Over 1.5 million vehicles as well as countless motorcycles and aeroplanes are used daily to deliver those services, covering billions of kilometres every year. The postal operators have 5.5 million employees worldwide (UPU 2011).

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In the EU more than 1,8 million people were employed in the postal sector in 2018 which equals to almost 1% of the total EU employment. The postal and delivery sector generated around 110 billion EUR in revenue (Cerpickis et al. 2022). The postal sector includes postal and courier activities - the pick-up, transport and delivery of letters and parcels. Men represent 60% of the total labour force in this sector. The highest rates of workers employed in the postal sector per 10,000 inhabitants is in Central and Eastern Europe - Czechia, Slovakia, Hungary and Slovenia (Eurostat, 2019).

Postal services have sustained significant reforms since the 1990s as well as all other sectors which are part of the "network industries". In Europe, *Directive 97/67/EC of the European Parliament and of the Council of 15 December 1997 on common rules for the development of the internal market of Community postal services and the improvement of quality of service* set a cornerstone in the EU regulatory framework which aimed to transform the postal services in terms of its operations, provision of its services and management. The main objectives of the *Directive 97/67/EC* were to establish a single market for postal services, open the postal market to competition, harmonise technical standards and guarantee universal postal service for all users in the EU. *The Directive 97/67/EC* has been amended with *Directive 2008/6/EC* which expanded some of the common rules and standards. The universal postal service obligation (USO) becomes a pillar of the Directives obliging the EU countries to guarantee a permanent, affordable and universal postal service delivering letters and parcels within and across the territory on 5 working days a week (Directive 2008/6/EC). In terms of financing, EU countries are not allowed to use exclusive or special rights in provision of postal services. Universal services have tariffs which have to be affordable for all users, be transparent and non-discriminatory (Directive 2008/6/EC).

EU countries are obliged to establish independent NRAs which need to perform different tasks, from issuing licences and authorization to postal operators, regulating prices postal operators charge for services, establish standards for quality of services, define and monitor the USO, analyse the market of postal services and deal with customers rights and protection (Directive 2008/6/EC).

Various stakeholders are involved in the postal services. The EC is monitoring developments in the postal market and commissions a number of studies and statistics on the postal services. Other key stakeholders include national operators and other postal operators, NRAs, users, different social partners, and ministries.

Postal service sector is quickly changing worldwide due to rapid technological innovation, changes in customers' needs, ecological demands and increasing liberalisation of the market (Memnon et al. 2013). Innovations in field information and communication technology like e-mail, telephone, video and audio conferences and data exchange have had a significant impact on the postal services in the previous decade, yet approximately 6,8 billion people worldwide still could not have used high-tech services ten years ago (Memnon et al., 2013).

The rapid growth in digital and green technology and solutions has been forcing an industry to replace traditional letter postal service delivery methods with more contemporary and environmentally friendly ones. The most recent study of the EC on the assessment of development of letter and parcel delivery markets in the EU, UK and the EFTA countries in the period 2017-2021 shows that two opposing trends are going on in the postal service sector (Cerpickis et al, 2022).

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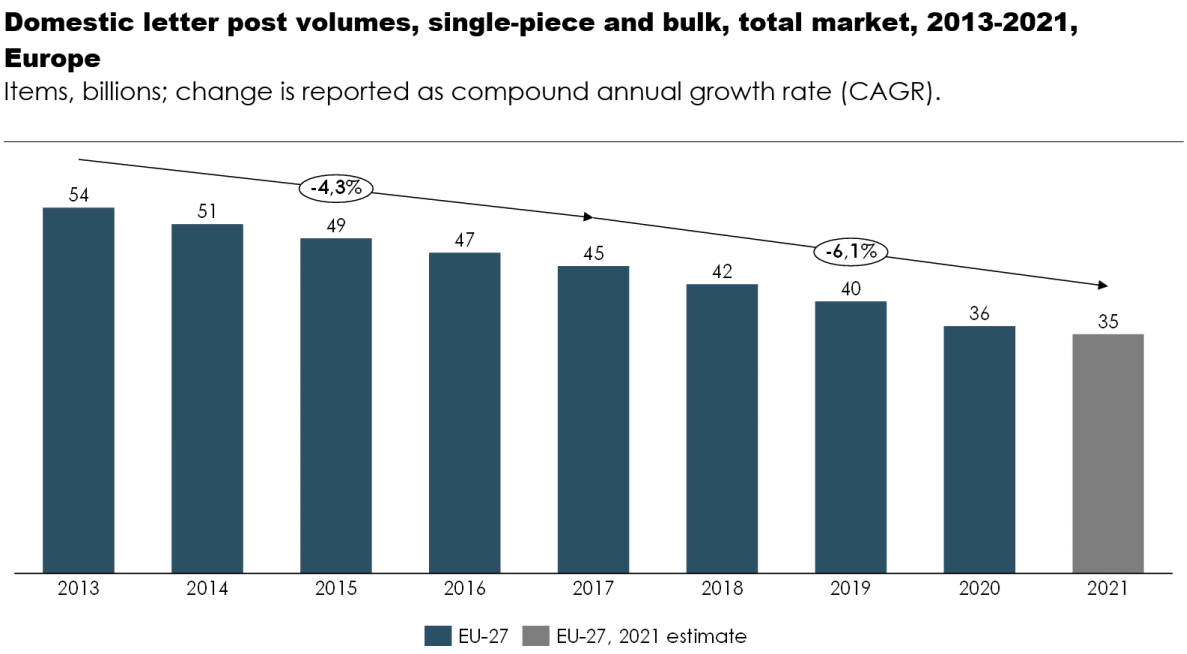
The substitution of letter mail for electronic alternatives continues to drive letter mail volumes down. In the 2017 to 2021 time, letter mail volumes declined by on average 6.1 percent per year, compared to 4.3 percent per year 2013 to 2017 as presented in the Figure 4 (Cerpickis et al., 2022).

Figure 4. Domestic letter post volumes, single-piece and bulk, total market in Europe (2013-2021)



Source: Cerpickis et al., 2022.

The decline of the domestic letter post volumes contributed to the cost per item delivered to increase substantially (Cerpickis et al., 2022). Thus, the universal Postal Service Providers

(USPs) have increased prices and reduced the cost of their business and operations. The opposite trend can be noticed with parcel post delivery. The COVID-19 heavily transformed European (and global) consumer behaviour. E-commerce continued its increase in period from 2013-2021 with an increase rate of 14,6% in the period 2017-2021 (Figure 5) and boosted further liberalisation of the market, especially in the courier and express services market.

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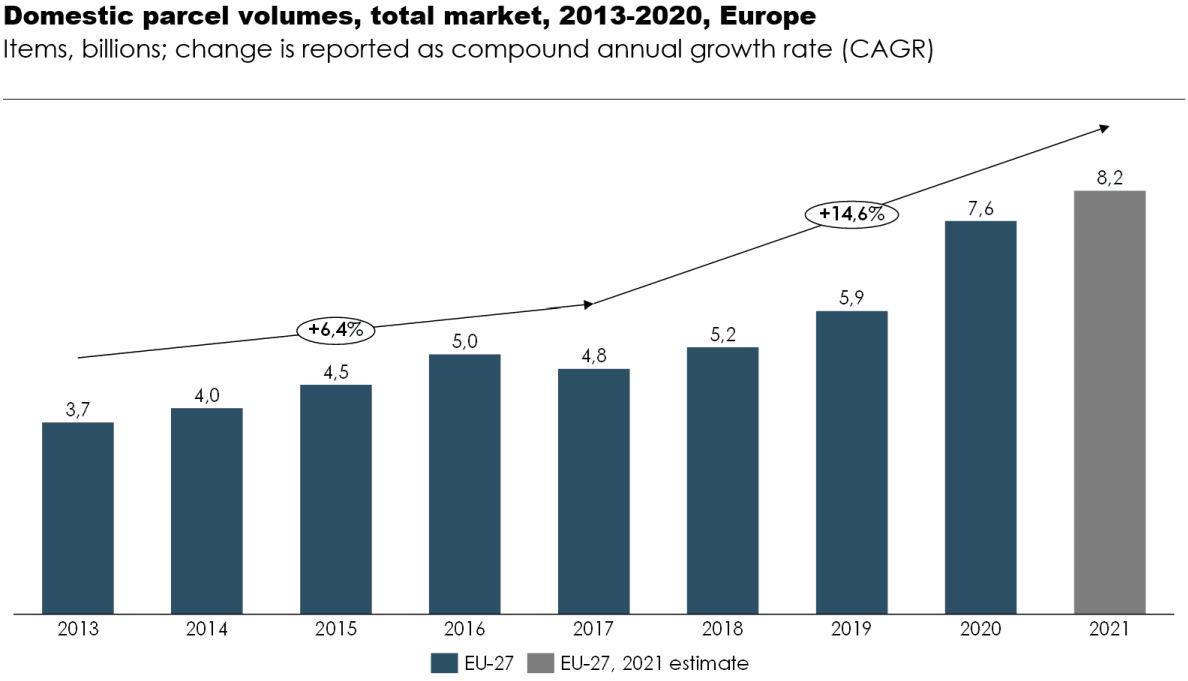
Figure 5. Domestic parcel volumes, total market in Europe (2017-2021)



Source: Cerpickis et al., 2022.

The similar (opposing) trends can be observed globally. Domestic letter post-volumes recorded a 13,6% decline in the period between 2019-2021 which marks the record in mail volume losses in the 21st century. The volume increased marginally by 0,5% over 2021 in comparison to 2020 - representing the single largest increase in the last 15 years (UPU 2022). On the other hand, global domestic parcel volumes increased by 33,6% in the period 2017-2021 (UPU 2022).

The increase in demand for parcel delivery has attracted many new players in the postal service market and introduced new business models which now compete with traditional postal operators, especially concerning the last-mile delivery (Cerpickis et al., 2023). Some European countries have already answered to these challenges by making the USO requirements in the terms of delivery frequency and speed stricter and setting new price regulations (Cerpickis et al., 2023).

In terms of environmental impact, one might expect that decline in letter post delivery[3] has contributed to a decrease of overall CO2 in the postal service sector but it is quite the opposite.

[3] One letter mail within its whole cycle produces on average 47 grams of CO2 (Menmon et al., 2013: UPU, 2022).

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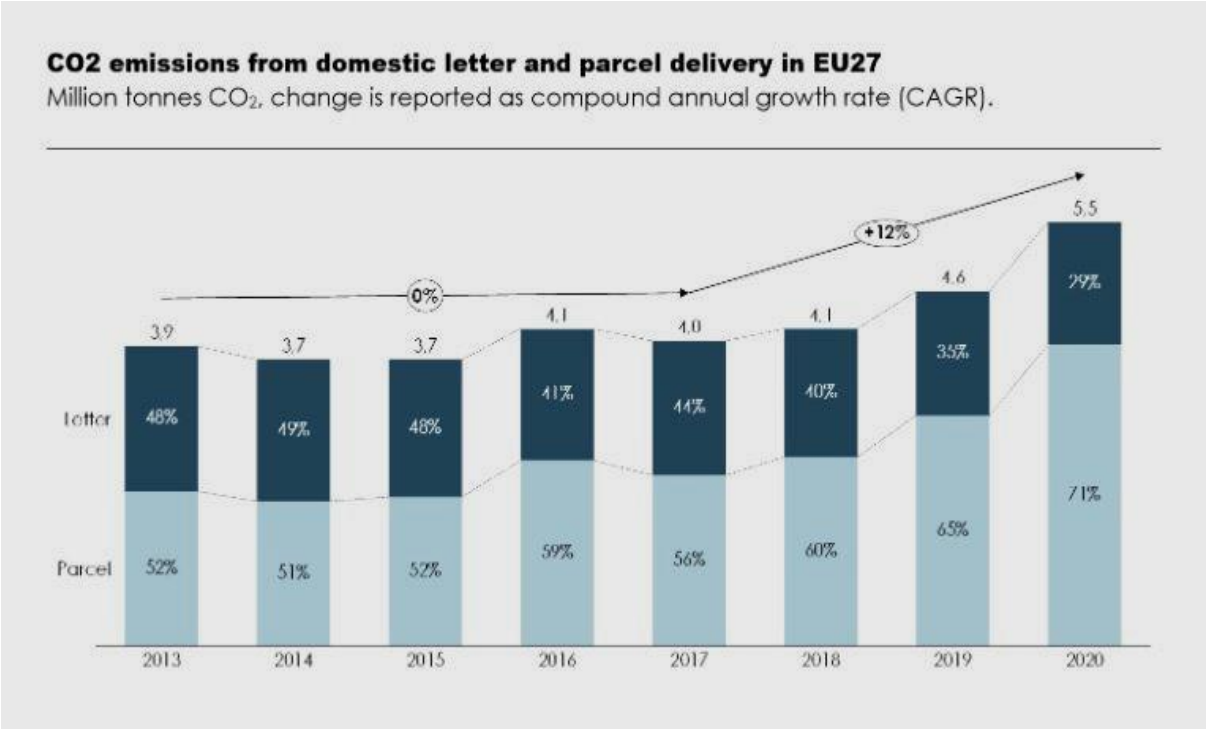
While the overall CO2 emissions from domestic letter mail and parcel deliveries were relatively constant in the period 2013 - 2016, due to the boom in e-commerce they increased by an average of 12% annually in the period from 2017 - 2021 (Figure 6).

Figure 6. CO emissions from domestic letter and parcel delivery in EU 27 from 2013 - 2020



Source: Cerpickis et al, 2023.

In the **Figure 6** we can see that in 2013 the letter and parcel delivery almost equally contributed to the CO2 emissions whereas in 2020 the parcel delivery contributed to more than 70% in the overall CO2 emissions in the European postal service sector. This big leap is not only because more parcels are being delivered but the fact that parcel delivery requires more logistical and transportation capacity than letter mail delivery (Cerpickis et al., 2023).

With such a rapid development of e-commerce and the increase in the volume of parcels, reducing the total CO2 emissions of delivery activities will pose one of the biggest challenges for the postal service sector, and it will require a systematic approach (UPU 2022). The two relevant reports on emissions from e-commerce noted that the growth of e-commerce will continue to rise, expecting it to represent almost a quarter of total global retail sales by 2025 (Higgs 2022; SOMO Report 2021). The growth of online sales means more delivery vehicles on the streets and therefore more carbon emissions and traffic congestion, especially in urban areas. The so-called *last mile* represents the most critical concept within the e-commerce chain referring to the final stage in a parcel's journey from distribution depot to customers' doorstep (Higgs 2022).

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The last mile itself accounts for up to half of total delivery carbon emissions in e-commerce (Higgs 2022). The *Stand.Earth* report from 2022 estimated the last mile carbon emissions of 90 courier companies across Europe, India and North America and found out that the top six worst polluters (among which are UPS, FedEx, Amazon Logistics, DPD, and DHL eCommerce Solutions) emit annually 4.5 megatons of CO2 emissions. That is roughly equivalent to CO2 emissions from 600,000 US homes' energy use for one year, or from one million petrol passenger vehicle journeys and they account for over two-thirds of total CO2 emissions across all parent companies taken into research.

In addition, these six companies primarily rely on subcontracting delivery services. Having in mind these indicators, these companies will need to substantially accelerate their efforts to achieve their fleet electrification or emissions targets (Higgs 2022; SOMO Report 2021) which will require systematic approach and the strong investment in the whole delivery chain.

A green and digital transition of the postal service sector will measure its success only if a broad spectrum of stakeholders will be dedicated to it (UPU 2022; EC 2023). The state and local government authorities can play a leading role in accelerating the last-mile emissions reduction efforts of retail, e-commerce, and parcel delivery companies. The introduction of a new political framework, policies and regulations may facilitate more sustainable solutions, and engage key players (such as community members and companies) to address air pollution and congestion issues. Place-based interventions are essential complements to the measures taken by companies themselves, such as electrifying fleets and using smaller delivery vehicles. It is therefore crucial that local authorities, in collaboration with local stakeholders, take up a leading role in addressing the negative environmental impacts of last-mile deliveries (UPU 2022; SOMO Report 2021).

5. DigiGreen Post in the making

5.1. Digital parameters in the implementations of DigiGreen: innovation strategies and practices

As discussed in the previous chapters, the main present and future challenge for the postal service sector is to ensure sustainability in terms of standardised metrics and clear and common goals to protect the environment, prevent pollution and secure the rational use of energy. The sustainability framework that has been largely discussed in this paper is the ESG framework which has numerous benefits for postal operators.

The ecological sustainability, social responsibility and good governance practices embedded in the ESG model refer to a broad scope of digital and green parameters. Only by embracing and adherently following these parameters may the postal service sector improve their sustainability and contribute to global climate agreements and the EU directives which aim to reduce greenhouse gas emissions and prevent the further environmental impact. The figures and the trends in the postal delivery market we discussed in Chapter 4 urge the postal service sector's operators and other players even more to tackle the climate challenges.

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The postal sector is constantly evolving as it is shaped by new technologies. The growth of e-commerce has to be seen as an opportunity rather than an obstacle to move to more sustainable retail and consumption practices (ERGP 2021; 2023).

The digital solutions and innovations in the postal service sector refer to the use of various tools and means provided by Information and communication technology (ICT), alternative means of delivery and AI driven technologies (Bellos et al. 2023). They are among crucial digital solutions and innovations that are already, to a different extent, implemented in the postal service sector in order to enhance efficient, environmentally and customers' friendly postal service.
The different yet interconnected practices which need to be consider as the desirable in the environmental, social and governance areas in postal service sector for achieving climate and sustainability goals are the following:

1. E-post (allows users to send and receive letters and documents digitally to decrease excessive use of paper)
2. Digital payment and invoicing (enable customers to pay for postal services and for postal agencies to manage their finances)
3. Online tracking and tracing (as real-time tracking and tracing may increase users' satisfaction and trust especially those who seek both efficient and environmentally friendly service)
4. Drones (maybe useful for remote or hard-to-reach areas in delivery of small parcels)
5. Autonomous delivery (robots may be used for last-mile delivery in urban areas)
6. Automated sorting and routing (optimises the handling of mail and parcels and increases efficiency and delivery time)
7. Internet of Things (refers to smart technology tools that optimises energy use, track delivery vehicles and manage facility operations)
8. Mobile applications (allow workers to access information and communicate with users)
9. Parcel lockers and pick-up points (allows users to collect or return their parcels in their immediate environment)
10. Big data analytics (analyse postal data to gain insight in customer behaviour and delivery patterns, optimises services)
11. E-commerce integration (to reduce environmental pollution)
12. Protection of devices, personal data and privacy
13. Chatbots and AI customer support (to handle inquiries, track parcels and enhance assistance to users)
14. Blockchain for Parcel Tracking (to ensure security and transparency of parcel tracking and integrate shipment information)
15. Augmented reality - AR (utilises AR for training postal workers)
16. Data sharing with other postal services (to improve tracking and delivery of parcels)[4]

[4] This list is not conclusive, however, it represents the most common feature of digital solutions and innovations (AnPost 2023; Memnon et al. 2023, Bellos et al. 2023).

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5.2. Green parameters in the implementation of DigiGreen Post: sustainable practices - eco-friendly products, practices and circular economy approaches

To reduce the effect of global warming and make the environment greener and energy efficient, the postal service sector needs to couple the digital innovations and solutions with the green ones. The green solutions and innovations are, like digital, to a different extent present in the current business and operations of postal operators. The green parameters in the postalservice sector may range from energy saving production and consumption, energy efficient building systems, energy efficient usage of resources such as electricity, heating/cooling, water, paper and waste (UPU 2022; USPS 2022).

Looking at it more closely, we can distinguish between different yet similar and interconnected innovations and solutions that refer to "green" and can help to boost new models of green investment and job creations necessary to support the technological change in the postal service sector:

1. Electric vehicles - EVs (may significantly reduce carbon emissions, as well as it can be more affordable mode of transport and delivery in the long run)
2. Sustainable packaging (biodegradable and recycled materials can help reduce the pollution alongside with programs enabling all parties in supply chain as well as users to reuse packaging)
3. Last-mile delivery optimization (helps to optimise the logistics and transport cost as well as fuel consumption; usage of EV can be especially beneficial in urban areas making it less congested and polluted)
4. Carbon offsetting and reporting (investment in carbon offset programs may compensate the fuel consumption; reporting and tracking on carbon emissions to set targets for climate sustainability)
5. Renewable energy - RE (solar panels and wind turbines may be employed to encourage sustainable energy consumption)
6. Energy-efficient buildings (embedded in high energy performance certificates)
7. E-operations and communicators (refers to set of business operations which encourage reduction of paper)
8. Networking and collaboration (eco-friendly postal service sector needs to join forces with other industries which are closely related to postal service sector such as transport)
9. Multi-modal transport (the increase in volume of rail freight is crucial for meeting the climate goals and shift from dominant modes of road, air and maritime transport)
10. Public awareness campaigns (educate the public on the importance of sustainable practices)
11. Green procurement (helps to choose suppliers with sustainable policy and practices alongside a whole supply chain)

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12. Public incentives and regulations (needed to sustain green policies of postal operators and third parties)[5]

As it can be seen in the subchapters 5.1. and 5.2. the postal service sector has different yet intertwined digital and green innovations, solutions, and practices at its disposal. Looking at the ESG model, these green and digital parameters mainly refer to the environmental pillar and to some extent social (in terms of responsible supply chain partnerships) and governance pillar (in terms of risk management, compliance, accounting integrity and transparency).
The postal service operators which will heavily invest today in the green and digital sustainable development of their business and operations will gain a long-term competitive advantage (ERGP, 2021).

As the ERGP report from 2023 argues, local and national incentives are welcomed towards the pathway to a DigiGreen Post, yet a comprehensive effort is needed to bring all involved stakeholders together (ERGP 2023). One cannot expect that merely implementing green and digital technological solutions on the level of a company will meet the climate goals. The set of regulations such as strategies of NRAs, legal framework (such as clear national legislative on sustainable post service sector), standardised sustainability metrics and green/digital working skills are necessary to adapt to environmental developments at the same speed (ERGP, 2023) if we want to establish the DigiGreen Post.

5.3. The DigiGreen Post in practice: Lessons learned

The project *DigiGreen Post - towards a more digital and greener postal era* which aims to bring resilience to the postal service sector, focusing primarily on provision of upskilling for postal employees in green and digital competence areas, analysed current situation in three European countries, Greece, Romania, and Ireland. DigiGreen Post partners used questionnaires, interviews, training missions and DaCum's to assess the situation and the future postal sectors' needs in developing job profiles which would adhere to the ecological, social and governance (ESG) principles and green and digital competences that constitute them. The European Qualification Framework (EQF) was employed as a unified European reference framework for green and digital competences which helped to determine which skills are necessary for digital and green transformation of the postal operators (Bellos et al., 2023).

[5] Ibid.

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Cross analysis among the Greek, Romanian and Irish postal service sector show that three countries have different degrees of green and digital innovations and solutions already practised in their postal operators' business, yet they demonstrate similar challenges in terms of developing them more strongly to achieve climate resilience. Most notably, respondents from all three countries said they are, to a lesser degree, aware of the green policies and the climate agreements such as the EGD and whether they are practised in their organisations (Bellos et al., 2023)

Other similar surveys conducted in the waste management sector and the European automotive industry show employees being poorly informed about the green (and just) transition in their respective organisations. Hence, these surveys show a twofold problem that needs to be addressed in modelling a strong sustainable and resilient service/industries/sector which need to be transformed. One is that green policies and legislations are often understood as too abstract for employees who are more focused on practical, everyday tasks and problems. Second is that low awareness on green transition indicates a need for a more sustained vocational training and education programs which would prepare the employees for green transition and ensure equal job opportunities for all (Rajković et Domazet, 2022; Rajković et Lucić, 2023).

Another important finding from cross analysis conducted within the *DigiGreen Post - towards a more digital and greener postal era* project is that all three countries express s strong need to enhance and promote ICT, as one of the most crucial elements of digital innovation and solution especially among the lower management (Bellos et al. 2023). The digital skills are generally more represented than green ones among the postal operators, thus the postal operators in all three countries have a substantial need to enhance the aspect of green solutions that would contribute to the circular economy.

Respondents have also expressed a strong interest in upskilling, especially in terms of postal employees' sustainable logistics, eco-friendly packaging methods, and energy-efficient transportation (Bellos et al. 2023). The training among the employees should be targeted having in mind that respondents in all three countries express different degrees of present state of affairs and future needs within the sector.

As concerning various digital and green competencies within the postal sector that could serve as foundational postal occupational profiles and bridge existing gaps between the postal operators between the three countries, the cross analysis has detected skills related to digital communication, online order processing, and cybersecurity as the most important ones.
Furthermore, the cross analysis concludes that green and digital skills are interconnected. That can be particularly noted in the case of Ireland which is advanced both in green and digital technological innovations and thus in the skilled workforce that needs to support it.

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Lastly, as postal services integrate digital platforms for tracking and communication, employees need to manage these tools in an environmentally responsible manner. This includes optimising data centres' energy consumption and ensuring that the digitization efforts align with sustainability objectives (Bellos et al., 2023).

6. Conclusion

Within the deliverable *D3.3. Modelling the DigiGreen Post* according to the ESG model we discussed various sustainability frameworks for measuring climate impact in different sectors, and opted for the ESG metrics which incorporates the UN SGDs goals and value both quantitative and qualitative non-financial parameters necessary to contribute to the carbon neutral economy. We also demonstrated how the environmental, social and governance pillars which create the ESG metrics may be used by the postal service sector alongside with the EU framework on non-financial disclosure that would provide standardised methodology and reporting for sector and businesses.

In other chapters we tackled the figures and trends in the European postal service sector. We concluded that the biggest challenge for the postal service sector today is the last mile in delivery and increase in the volume of parcels which are the main contributors of pollution from the postal service sector. Apart from delivery and logistics, the postal sectors' operations are inextricably related with the sector of transport and its pathway to a carbon neutral economy will be inseparable from the developments in the sector of transport.

Having said that, it is impossible to expect that the postal service sector can effectively contribute to the broader climate goals without collaboration of all stakeholders within the industry itself, EU countries, local governments, and educational institutions. The interplay of all these actors is imperative, especially in the design of desirable green and digital technological innovations and solutions as well as training programs (such as upskilling or new green jobs) which would bridge the gap between different European postal operators.

As the D3.1. Synthesis report on DigiGreen findings shows there are similarities as well as differences between the Greek, Romanian and Irish postal operators in terms of green and digital innovations and solutions practised. The cross analysis (questionnaires, interviews, training missions and DaCum's) assessed the future postal sectors' needs in developing job profiles which would adhere to the ecological, social and governance (ESG) principles and green and digital competences that constitute them.

The postal service sector, therefore, has numerous options at disposal to become a DigiGreen, a resilient and climate neutral sector. According to the literature and research, the first step would be *clear environmental protections* embedded in NRA's and national legislations (ERGP, 2021; 2023). The optimism in this regard has been shed recently as the EGD pressures the EU to develop more standardised metrics for reporting on green transition. The European Union's Corporate Sustainability Reporting Directive (CSRD) which was implemented in 2023, created new ESG reporting standards for some 50,000 companies which will need to start to implement it from 2025. The postal operators will have an easier approach to measure

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their own environmental impact and set concrete targets to reduce environmental cost and emissions. Another important macro-policy is the mechanism of public support. Whereas the EC brought financial packages for mitigation of climate change, the green investment and green growth are still lacking capital to facilitate their pathway to sustainability in the long run (ERGP 2021; UPU 2011).

On the sectoral level, the DigiGreen Post may use *green procurement* in order to acquire goods, resources and services for its sustainable operations. By giving preference to products with a lower impact on the environment, the demand side can contribute to sustainable consumption and production (UPU 2011). The available public support and incentives are an important prerequisite for a green procurement, so that postal service operators don't have to be squeezed in a 'bad dilemma', i.e. to choose between the providers of services and goods which are more affordable and accessible yet carbon intensive.

In Chapter 4 we discussed the growth of e-commerce because of digital technologies, change in consumers' behaviour and lastly, the COVID-19 pandemics. The last mile itself accounts for up to half of total delivery carbon emissions in e-commerce and represents one of the biggest obstacles for the postal service sector to become sustainable. Therefore, *sustainable parcel delivery* should be among the most relevant digital and green solutions and innovations for the postal service sector. It is becoming a growing area of interest, especially for the third-party logistic providers who operate in the urban areas (Pilati et al., 2020). The success of its implementation will depend on national and local incentives, public (financial) support, green procurement, and the endeavours of the transport sector itself, which needs to transform ICE dependent vehicles to EVs. Some European postal operators such as Deutsche Post and La Poste have already set goals to replace traditional delivery vehicles with low and carbon neutral alternatives in a due time (ERGP, 2023).

On the sectoral and companies/operators' level, the green and digital innovations and solutions are to be found in technological tools, services and products which contribute to the *circular economy*. *Renewable energy* (such as solar power, optimising the energy efficiency of buildings, lighting) and *circular waste management* (reusable packaging, sorting and delivery) implemented both in facilities and providers can reduce energy and resource consumptions and find the way to users/consumers who have to purchase power to shop sustainably.

According to the ERGP's report in 2021, only 16 out of 30 postal operators are currently using renewable energy to power at least some of their postal establishments (ERGP, 2021) which indicates there is a space for progress.

It is important to note that green transition should not be advocated through merely technological lenses. The ESG model of sustainability places an equal importance to both environmental aspects of green transition (such as digital and green solutions and innovations we discussed widely in this paper) as well as social and governance ones. In terms of social pillar, educating postal service staff will be necessary in order to support the digital and green technological innovations, either by upskilling and/or creating new green occupation profiles. Within the *DigiGreen Post - towards a more digital and greener postal era* project the targeted upskilling and reskilling is strongly suggested due to the gaps and different state of affairs on technological development and competence framework among different postal operators in Europe.[6] The good practice from the postal operators show that a holistic approach between technological advancement and

[6] The detailed competence areas developed for the postal service sector may be found in the DigiGreen Competences Chart developed within the *D3.4.Chart of DigiGreen Competences- Definition of the core competencies for the New Curricula* (Paliokas et al., 2023).

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green jobs is required in order to achieve sustainable postal operations. The DPDHL Group in Germany have set clear goals to be reached by 2025[7] where the upskilling is targeted according to the green and digital innovations implemented.

Lastly, the research and practice indicate that development of the circular economy is unequally distributed across Europe due to the differences within and across the regions and states (Weghmann, 2023). The larger operators and companies settled in the more developed regions have competitive advantage in terms of reaching sustainable development. As the ERGP study on NRAs in the postal service sector shows, financially stronger operators are in a better position to sustain new challenges (ERGP, 2021). To mitigate this imbalance, the financial incentives should be more available to smaller postal service providers to boost their investment in EV's and renewable energy. Multi-stakeholder and multi-sectoral approach which is dedicated to all actors involved in the postal service industry is a key answer to how the postal service operators may become the DigiGreen ones, i.e. climate-resilient and environmentally friendly.

[7] For example, to reduce local air pollution by using bicycles or e-cars for 70% of all transports, a better CO2-efficiency by 50% compared to 2007, more than 50% of the revenues that incorporate green solutions, at least 80% of the workers that receive trainings in order to be able to contribute to environmental and climate activities of the company (ERGP, 2021).

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