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Using XBRL for Sustainability Reporting under the European Green Deal

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ABSTRACT

The European Green Deal brings into attention a new strategy to support the transition to a society that will meet the challenges of climate change and environmental degradation, improving the quality of life. Given the multitude of actors involved in the process of collecting, processing and communicating information on the impact of different activities on the environment and citizens, it is necessary to have a legal framework on sustainability reporting as rigorously as possible, in order to ensure the comparability in time and space of the information provided. For this information, reported at the European Union (EU) level, to allow decision-making at the right time, it is necessary to use digital technologies to facilitate the process of collecting, analysing and interpreting information. In this paper the authors tried to offer a practical example on how eXtensible Business Reporting Language (XBRL) works in order to highlight the benefits of this modern language in the context of the Green Deal. In this regard, using Altova MissionKit 2023, the authors designed an XBRL taxonomy which is the basis for the development of an instance in which we find some representative indicators for the circular economy, an environmental objective of the EU taxonomy. The XBRL language simplifies the transfer of information from sustainability reports prepared in different countries to the European Commission, improving and accelerating the decision-making process.

Key words: *European Green Deal; sustainability reporting; circular economy; EU taxonomy; digital technologies; XBRL;*

JEL Classification: *O13, O33, Q56*

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1. Introduction

Since its inception, the European Union paid a special attention to the environment and the sustainable development. The European Green Deal is a growth strategy which target is to transform the EU into a "fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use" (European Commission, Brussels, 2019). The implementation of this strategy requires a special attention in identifying sectors and activities with an impact on sustainable growth, while respecting the environment and citizens, so that investment is oriented towards sustainable projects.

Our paper concentrates mainly on the circular economy, as part of the European Green Deal strategy, and try to show, by a practical example, including specific indicators, how to improve the sustainability reporting in the European Union by using a modern language.

In the Communication of the Commission regarding the monitoring framework for the circular economy (European Commission, Strasbourg, 16.01.2018) there are presented ten indicators grouped into four stages and aspects of the circular economy: production and consumption; waste management; secondary raw materials; competitiveness and innovation. This framework, made available online (https://ec.europa.eu/eurostat/web/circular-economy/indicators/monitoring-framework), is subject to a continuous updating process (European Commission, Brussels, 11.03.2020a).

Reviewing the literature on circularity indicators, Corral-Marfil, Arimany-Serrat, Hitchen and Viladecans-Riera capture in their study the classification of indicators into three categories (Corral-Marfil et al., 2021): environmental indicators (energy consumption, water consumption, contaminating emissions and the generation, management and reuse of waste); social indicators (on human capital, social capital and human rights, anticorruption and bribery) and corporate governance indicators (referring to directors, executive board, audit committee, meetings and remuneration of directors, along with gender diversity among directors, corruption and bribery).

Considering the amount of information about sustainable activities collected and analysed at European level, an important role in improving the process of communication can have the use of XBRL.

XBRL can be defined as "an open, platform-independent, international standard for the timely, accurate, efficient, and cost-effective electronic storage, manipulation, repurposing, and communication of financial and business reporting data" (Bergeron, 2003). This language is based on XML, but one major difference is that XBRL expresses meaning while XML articulates only syntax (Hoffman and Watson, 2010). It increases the transparency in reporting in the sense that "it is easier to see the complete detail of all the information provided by the company" without increasing the level of detail and in that "it makes it much easier to find the information the user is seeking" (Eccles and Krzus, 2010) and "has an essential role to play in making the information in an integrated report as accessible and useful to as many stakeholders as possible" (Eccles, cited by Monterio, 2010).

As Monterio asserted (Monterio, 2013), XBRL could bring many opportunities and benefits to integrated reporting because it: makes integrated reporting data easily consumable by software applications, Web browsers, and other tools; ensures data is computer readable; allows data to be reused over and over; virtually eliminates data errors by eliminating rekeying of information and manual calculations; preserves data structure and context; embeds more complex business rules within data; preserves data integrity; enables data to be comparable; and helps build trust in and credibility around data.

XBRL projects ongoing around the world are regarding both public and private organizations, this language adapting to various aspects of reporting (internal financial reporting of organizations; preparation of financial statements required by regulatory bodies in the field of accounting; business reporting to various tax authorities, banks, non-bank financial institutions, statistical institutes and other bodies; credit risk assessment; exchange of information between government departments or other institutions, such as central banks; storage, exchange and analysis of other information on the activities of different organizations etc.).

Now, we can see that XBRL is intensively used in collecting, processing and distributing non-financial information and brings benefits to the preparers and users of information in non-financial reports around the world. Among the recognized European entities that have been involved in the creation of taxonomies for sustainable activities we mention: Carbon Disclosure Project and Climate Disclosure Standards Board, European Banking Authority, European Insurance and Occupational

Pensions Authority, Global Reporting Initiatives, Spanish Accounting and Business Administration Association, Sustainability Accounting Standards Board.

The European Union "has long pursued a leading role in policies to tackle climate change" and the European Commission "is continuing to pursue climate action in a challenging international setting, amidst growing geopolitical tensions, the rise to power of climate change deniers in major emitters, a pandemic and the ensuing economic slowdown" (Siddi, 2020).

The Green Deal (European Commission, Brussels, 2019) concentrates on climate and environmental-related challenges and includes measures such as: increasing the EU's Climate ambition for 2030 and 2050; supplying clean, affordable and secure energy; mobilising industry for a clean and circular economy; building and renovating in an energy and resource efficient way; accelerating the shift to sustainable and smart mobility; from "Farm to Fork": a fair, healthy and environmentally friendly food system; preserving and restoring ecosystems and biodiversity; a zero pollution ambition for a toxic-free environment. The European Green Deal also includes elements such as (European Commission, Brussels, 2019): pursuing green finance and investment and ensuring a just transition; mobilising research and fostering innovation.

The European Lab Project Task Force (ELPTF), established by EFRAG in line with the European Commission's request, published on March 2021 a report integrating proposals for a relevant and dynamic EU sustainability reporting standard-setting (European Financial Reporting Advisory Group, 2021). At the same time, the EFRAG Board president published a report in which proposes the creation within EFRAG of a non-financial reporting pillar alongside the existing financial reporting pillar, to be organized as a public-private partnership (Gauzès, 2021).

In April 2021, the European Commission published the proposal for a European directive on the reporting of sustainability information by companies, considering the recommendations of the PTF-NFRS, the recommendations of the EFRAG president on the changes in the EFRAG's governance, the information obtained from contracting different consultants (European Commission, Brussels, 2021). This proposal, following the Commission's commitment in the European Green Deal to revise the Non-Financial Reporting Directive (Directive 2014/95/EU, with subsequent amendments and completions), aims to build on international sustainability reporting initiatives – such as the Global Reporting Initiative, Sustainability Accounting Standards Board, International Integrated Reporting Council, Climate Disclosure Standards Board and Carbon Disclosure Project – and contribute to them (European Commission, Brussels, 2021).

Particularly relevant it is considered by the Commission the proposal of the IFRS Foundation to create an International Sustainability Standards Board (ISSB) at the request of International Federation of Accountants (IFAC). In fact, IFAC believes that "thanks to its independence, good governance and procedural compliance record, the IFRS Foundation is uniquely placed to establish an independent ISSB", which "to establish IFRS standards for sustainable development" (https://www.ifac.org/content/ifac-responds-proposed-amendments-constitution-ifrs-foundation). The existence of a single set of globally accepted standards would increase the comparability of information reported by entities and simplify the process of interpreting information and making decisions.

A critical role in implementing the Green deal in different sectors have the digital technologies, which allow for distance monitoring of air and water pollution, or for monitoring and optimizing how energy and natural resources are used. Thus, the Commission propose to explore measures to ensure that digital technologies can accelerate and maximize the impact of policies concerning the climate change and the protection of environment (European Commission, Brussels, 2019). European Commission considers that green and digital transformation should be made at the same time (European Commission, February, 2020) and will have impact on every part of the economy, society and industry (European Commission, Brussels, 10.03.2020).

As regards the reporting of sustainability information, the European Commission states that companies should mark-up this information, more precisely, present it in the single electronic reporting format eXtensible HyperText Markup Language (XHTML) (European Commission, Brussels, 2021). Such a requirement for digital mark-up has already been introduced in the European Union in the case of consolidated financial statements presented in accordance with IFRS (Commission Delegated Regulation (EU) 2019/815, with subsequent amendments and completions), the existence of common standards facilitating digitization.

Obviously, digital reporting should not stop at companies, being of particular importance to all entities carrying out activities covered by the Green Deal or collecting information on these activities. By well organizing the data and ensuring its availability almost in real time, it is possible to anticipate major problems and as better as possible manage resources and measures to be taken.

In the Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions concerning the financing of sustainable growth (European Commission, Brussels, 2018), it is presented an Action Plan which is part of broader efforts to connect finance with the specific needs of the European and global economy for the benefit of the planet and the society. The most important and urgent action of this plan was considered the elaboration of a unified EU classification system – or taxonomy – which to provide clarity on which activities can be considered sustainable, being essential in supporting the orientation of the flow of capital.

The EU's Taxonomy Regulation (Regulation (EU) 2020/852), which came into force in July 2020, creates a legal basis for the EU Taxonomy and presents six environmental objectives (climate change mitigation; climate change adaptation; the sustainable use and protection of water and marine resources; the transition to a circular economy; pollution prevention and control; and the protection and restoration of biodiversity and ecosystems) and four fundamental conditions an activity must meet to qualify as sustainable (contributes substantially to one or more of the environmental objectives; does not significantly harm any of the environmental objectives; is carried out in compliance with the minimum safeguards provided in regulation; complies with technical screening criteria that have been established by the Commission).

As mentioned by the EU Technical Expert Group on Sustainable Finance, "the need for a sustainable Taxonomy pre-dates the Green Deal, but it is an important enabler of the Green Deal's comprehensive sustainable economy reforms" and "the key environmental objectives are consistent between the Taxonomy framework and the economic sectors targeted for policy reform under the Green Deal" (EU Technical Expert Group on Sustainable Finance, March, 2020a).

The taxonomy key users are represented by the financial market participants offering financial products in the EU, as defined in the Regulation (EU) 2019/2088, the large companies who are already required to provide a non-financial statement under the Non-Financial Reporting Directive (Directive 2014/95/EU, with subsequent amendments and completions), the EU and the member states, when setting public measures, standards or labels for green financial products or green (corporate) bonds.

The European Commission created the taxonomy compass, an information technology tool which facilitates the use of the EU taxonomy, by allowing users to navigate easily through its contents. The information is structured here using NACE (General Industrial Classification of Economic Activities within the European Communities) for industry classification.

As we can see in the Regulation (EC) no 1893/2006, with subsequent amendments and completions, the structure of NACE includes four levels (sections, divisions, groups and classes), covering 21 sectors and 615 classes of economic activities. Thus, NACE is derived from ISIC (International Standard Industrial Classification of All Economic Activities), which means that it has the same items at the highest levels (sections, divisions), but it is more detailed at lower levels (groups and classes).

In order to mark sustainability information, a digital taxonomy of sustainability reporting standards applicable in the European Union will be required. We must not make confusion between the EU Taxonomy, that is based on the Regulation (EU) 2020/852, being just a classification system for sustainable economic activities and the XBRL taxonomy needed, that is a dictionary that store, through labels, information on the names and identifiers of the concepts used in reporting and many other features that describe them, as well as information on the links between different concepts, which makes it easy for both humans and computers to understand the information communicated.

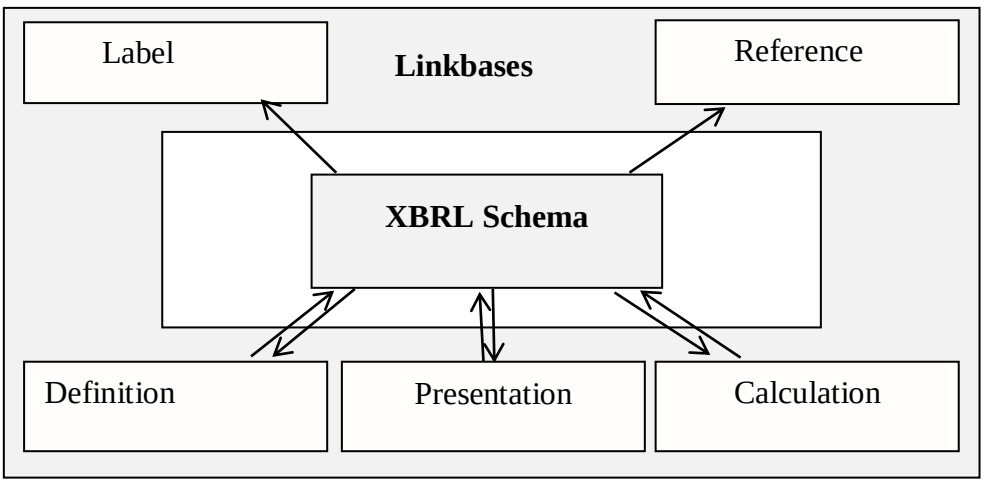
In the structure of the EU taxonomy for sustainable activities we find thirteen of the sectors of the economy (Arts, entertainment and recreation; Construction and real estate activities; Education; Energy; Environmental protection and restoration activities; Financial and insurance activities; Forestry; Human health and social work activities; Information and communication; Manufacturing; Professional, scientific and technical activities; Transport; Water supply, sewerage, waste management and remediation), and the environmental objectives pursued in these sectors aim at biodiversity, climate adaptation, climate mitigation, circular economy,

pollution prevention and water. Thus, in order to meet the EU's climate and energy targets for 2030 and reach the objectives of the European Green Deal, it is vital that we direct investments towards sustainable projects and activities (https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en).

The EU Technical Expert Group on Sustainable Finance recognizes that some important activities are not captured by the NACE codes (e.g. urban and regional planning for low carbon development including avoided journeys, support for lower carbon personal choices such as vegetarian diets, and investments to maintain public natural capital such as natural forests and wetlands) and some additions have been made in the taxonomy to the existing NACE framework (EU Technical Expert Group on Sustainable Finance, March, 2020b).

The XBRL taxonomy is "a body of knowledge for some business domain expressed in a standardized electronic format" (Hoffman and Watson, 2010). It contains an XBRL schema (that stores information about taxonomy concepts), in the forms of an .xsd file, and linkbases, often referred to as layers (calculation, definition and presentation, that manage the relations between taxonomy concepts; label, that associate taxonomy concepts with text labels defined in various languages; reference, that connect concepts with authoritative literature), in form of .xml files (Debreceny et al., 2009). In ***Figure no. 1*** we render the main components of an XBRL taxonomy.

Figure no. 1. The content of the XBRL taxonomy



Source: Own projection of the authors

XBRL revolutionized financial and non-financial reporting around the world and will have a huge impact in the European Union, which aims to reach high targets in a relatively short time, including sustainable development, while respecting the environment and citizens. Our paper tries to support the EU efforts in implementing the Green Deal, by providing a practical example on how digital technologies, more precisely, XBRL, can be introduced in the process of collecting information on circular economy from member states and processing it in order to transform the EU into a society that will face the challenges of climate change, improving the quality of life.

2. Materials and methods

Following the indicative timetable from the roadmap of the key policies and measures needed to achieve the Green Deal (European Commission, Brussels, 11.12.2019), the European Commission adopted in March 2020 a new circular economy action plan.

Our research focuses mainly on the crosscutting actions related to "mainstreaming circular economy objectives in the context of the rules on non-financial reporting, and initiatives on sustainable corporate governance and on environmental accounting", respectively on monitoring the progress by "updating the Circular Economy Monitoring Framework to reflect new policy priorities and develop further indicators on resource use, including consumption and material footprints" (European Commission, Brussels, 11.03.2020b). We mention that the circular economy objective has already been integrated into the EU's Taxonomy Regulation (Regulation (EU) 2020/852).

This first action under discussion is of particular interest because sustainability standards are essential for the scope of the Green Deal. In this regard, the European Commission has proposed the elaboration of a Corporate Sustainability Reporting Directive (CSRD) that envisages the adoption of EU sustainability reporting standards and requested that the European Financial Reporting Advisory Group (EFRAG) develop the draft standards on sustainability reporting.

For sustainability information to be as easily accessible and processed as financial information, similar classification methods and formats should be considered and this calls for enabling a digital XBRL taxonomy for EU sustainability reporting standards along the standard-setting process (European Lab Project Task Force, February, 2021).

ELPTF (European Lab Project Task Force, February, 2021) brings into attention the fact that the sustainability standards and disclosures are principle-based in nature, therefore the scope and size of the taxonomy should reflect: a) the granular disclosures required by sustainability standards (standardised tags); b) the entity-specific disclosures (extension tags); and c) the most common practice disclosures that are not derived from standards (common practice tags).

Based on EU taxonomy, which is a classification system for sustainable economic activities, and on the international digital sustainability reporting initiatives, we can create an XBRL taxonomy for EU sustainable activities. The taxonomy helps us to generate XBRL instances (reports in XBRL format) which can accelerate the decisional process as a result of the modular representation of the information.

In order to show the effects of using XBRL in reporting non-financial information, we built an XBRL taxonomy taking into consideration one of the environmental objectives in the EU taxonomy, more precisely, circular economy.

The concepts to be included in the main schema of this taxonomy, were identified by analysing different works published by renowned bodies that attempted to support the identification, measurement or quantification and reporting of non-financial information: Key Performance Indicators for Environmental, Social & Governance Issues: A Guideline for the Integration of ESG into Financial Analysis and Corporate Valuation (The European Federation of Financial Analysts Societies, 2009), Sustainability Reporting Guidelines (Global Reporting Initiative, 2011), Environment at a Glance Indicators – Circular economy, waste and materials (Organisation for Economic Co-operation and Development, 9 March 2020). Also, we analysed the content of some taxonomy already released for sustainability reporting around the world (https://www.sasb.org/structured-reporting-xbrl/, https://is.aeca.es/en/xbrl-taxonomy/, https://www.cdsb.net/priorities/xbrl/xbrl-project-governance).

There are currently a multitude of software products that allow working with XBRL taxonomies and instances, made available by companies such (https://www.xbrl.org/): Acsone, ADDACTIS Worldwide, Altova, AMANA consulting GmbH, Arkk Consulting Ltd., Batavia XBRL BV, CoreFiling, Ez-XBRL Solutions, Inc., Firesys GmbH, Fujitsu, GPM Systems, Invoke, Oracle, Reporting Standard XBRL, Semansys Technologies, UBPartner, Vizor Software etc. In

our study we chose to use three of the modules of the Altova MissionKit 2023 application (XMLSpy, MapForce and StyleVision) (https://www.altova.com/).

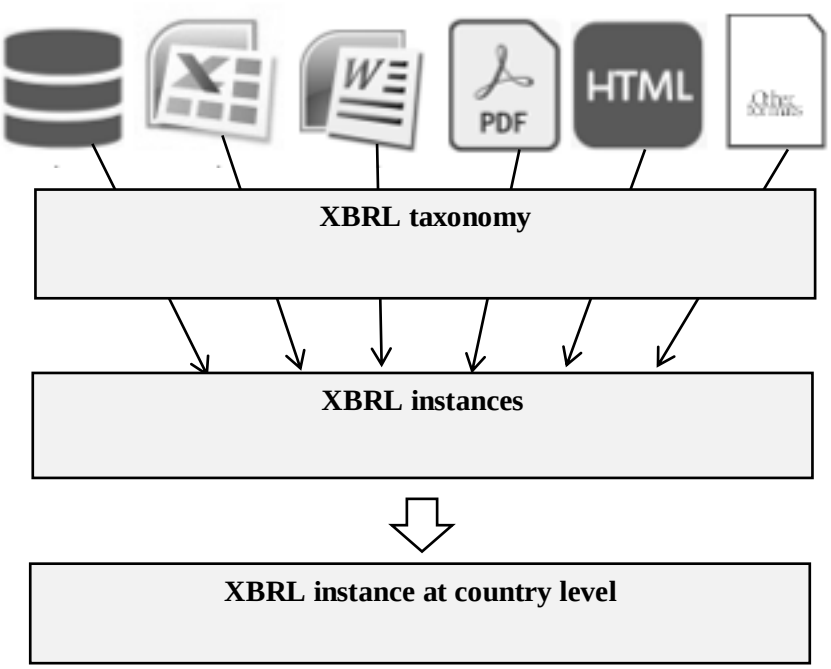
3. Results and discussions

To create the taxonomy and validate its content we used the XMLSpy module (module that received from the XBRL International consortium the status of XBRL certified software) . In the content of the taxonomy can be found: a schema file (eudir_20221231.xsd) and three linkbases files (eudir_lab20221231.xml eudir_pre20221231.xml, eudir_cal20221231.xml), where "eudir" represents an abbreviation for the European directives.

The XBRL Schema indicates different objectives of the European Green Deal and the types of relationships between the elements used in determining various indicators characteristic to the circular economy, also including some declarations of concrete and abstract concepts. The linkbases files created indicate the links between concepts and their readable expressions in a given language (in our example, English), the relationships between concepts in terms of presentation in the sense of indicating their hierarchy and the relationships between concepts in terms of calculating some values.

Every country should make available an XBRL taxonomy for companies and institutions, which have obligations concerning the circular economy, in order to prepare their sustainability reports in this modern format (***Figure no. 2***) and to easily collect the information required by the European Commission.

Figure no. 2. Sustainability information collected at country level



Source: Own projection of the authors

In our example, after mapping the content of an Excel document to XBRL, using MapForce, we managed to generate an XBRL instance in the field of sustainability reporting (***Figure no. 3***).

Figure no. 3. XBRL instance concerning the sustainability reporting (CircularEconomy.xml file)

```
<?xml version="1.0" encoding="UTF-8"?>
<xbrli:xbrl xmlns:eudir="http://www.europeandirectives.com/xbrl/taxonomy/cor"
    xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xl="http://www.xbrl.org/2003/XLink"
    xmlns:link="http://www.xbrl.org/2003/linkbase" xmlns:ref="http://www.xbrl.org/2006/ref"
    xmlns:xbrldt="http://xbrl.org/2005/xbrldt" xmlns:xbrli="http://www.xbrl.org/2003/instance">
    <link:schemaRef xlink:type="simple" xlink:href="C:\Users\asus\Desktop/Instance/eudir_20221231.xsd"/>
    <eudir:WasteQuantity contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="kt"
      decimals="0">50000</eudir:WasteQuantity>
    <eudir:WasteQuantityCollected contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="kt"
      decimals="0">10000</eudir:WasteQuantityCollected>
    <eudir:WasteQuantityGenerated contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="kt"
      decimals="0">40000</eudir:WasteQuantityGenerated>
    <eudir:WastePercentageDiverted contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="pureRef"
      decimals="0">0.05</eudir:WastePercentageDiverted>
    <eudir:WastePercentageIncinerated contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="pureRef"
      decimals="0">0.20</eudir:WastePercentageIncinerated>
    <eudir:WastePercentageLandfilled contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="pureRef"
      decimals="0">0.10</eudir:WastePercentageLandfilled>
    <eudir:WastePercentageRecycled contextRef="TwelveMonthsEndedAt_31Dec2022" unitRef="pureRef"
      decimals="0">0.65</eudir:WastePercentageRecycled>
  <xbrli:context id="TwelveMonthsEndedAt_31Dec2022">
    <xbrli:entity>
      <xbrli:identifier scheme="https://mfinante.gov.ro/ro/legal-persons/">99999999</xbrli:identifier>
      </xbrli:entity>
      <xbrli:period>
        <xbrli:startDate>2022-01-01</xbrli:startDate>
        <xbrli:endDate>2022-12-31</xbrli:endDate>
      </xbrli:period>
  </xbrli:context>
  <xbrli:unit id="kt">
  <xbrli:measure xmlns:kt="http://www.xbrl.org/dtr/type/numeric-2009-12-16.xsd">kt</xbrli:measure>
  </xbrli:unit>
  <xbrli:unit id="pureRef">
  <xbrli:measure xmlns:pure="http://www.xbrl.org/dtr/type/numeric-2009-12-
    16.xsd">xbrli:pure</xbrli:measure>
  </xbrli:unit>
</xbrli:xbrl>
```

Source: Own projection of the authors

Through the modular representation of information, XBRL aims, among other things, to reduce the asymmetry of information resulting from the incompatibility of reporting formats worldwide (Premuroso and Bhattacharya, 2008).

Such a representation allows automating the process of synthesizing information in sustainability reports and generating reports almost in real time by aggregating information from various sources, as well as simplifying the process of information analysis by various users (public institutions, statistical institutes, financial auditors etc.).

This XBRL instance presented previously can be viewed in different formats (HTML, RTF, Word etc.) and even different languages if we create label taking into consideration the language specific to each Member State. The StyleVision module of the Altova MissionKit 2023 application helped us to present the instance in a human-readable format (***Figure no. 4***).

Figure no. 4. XBRL instance generated based on a model created with StyleVision

CIRCULAR ECONOMY	12 Months Ended 2022-12-31
Waste quantity collected	10000 kt
Waste quantity generated	40000 kt
Waste quantity – Total	50000 kt
Waste percentage diverted	0.05
Waste percentage incinerated	0.20
Waste percentage landfilled	0.10
Waste percentage recycled	0.65

Source: Own projection of the authors

XBRL allows for easily collecting sustainability information from different countries in the European Union, the risk of errors in manipulated data being significantly reduced. Thus, regardless of the language which the information is published, it can be automatically extracted and analyzed, using an appropriate software, and the results or measure to be taken can be presented to users, timeliness, in various types of reports.

4. Conclusions

The changes supported by the environment in the last years determined the European Commission to think to a new strategy of economic growth. This strategy, proposes through the European Green Deal, requires for urgent measure to be taken in order to protect the natural capital of UE and the health of citizens. In order to ensure an efficient and effective communication at the European level it is very important to clearly establish which are the activities that have a substantial impact over the environment and to implement technologies capable to reduce this impact or to offer, almost in real time, the information necessary in taken the major decisions.

Given the extensive volume of information in XBRL taxonomies dedicated to sustainable reporting, in this paper we have chosen to design extremely limited variants of the content of an XBRL schema and some linkbases, but which to include the elements required by the XBRL standards and specifications, and the associated XML standards, in accordance with the requirements for the presentation of these elements, so that the verification and validation process using a dedicated software product (Altova MissionKit 2023) to proceed without any problem. Generating a more complex report based on the taxonomy created wasn't possible due to this limitation of our research.

Compared with other currently existing solutions (e.g. intelligent PDFs using eXtensible Markup Language, XHTML), XBRL allows for the improvement of decision-making process by reducing the possibility of errors due to

the automatic retrieval of data from different actors involved in the sustainability reporting process and reducing the time for analysis and interpretation of information collected from EU Member States because it is well structured and accompanied by well-organized electronic documentation which make possible easy preparing instances using the language specific to each member state and processing the information almost in real time after it is sent to the European Commission.

The future directions of research focus on the use of XBRL software products in processing the XBRL instances from European member states and generating different types of circular economy reports (statistics, urgent measures to be taken, communications etc.).

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