Andrea Giacomelli

Mark to Target Information: idiosyncratic forward-looking information and its use to define primary ESG indicators
Mark to Target Information: idiosyncratic forward-looking information and its use to define primary ESG indicators

Andrea Giacomelli
Ca’ Foscari University of Venice; KnowShape Italy

Abstract
Forward-looking information is taking on an increasingly important role in firms’ decision-making processes, in communicating with stakeholders and in improving market information. Its relevance is also increased due to recent structural breaks, namely the Covid-19 pandemic and the Ukrainian war, which make historical data uninformative. In the last period forward-looking information has been the object of different international regulations for firms and financial institutions and its scope has expanded from financial performance to ESG sustainability performance. Despite its relevance, forward-looking information is still a confusing topic, in terms of contents and applications, especially in the context of ESG, where there is a need for greater clarity and standardization of the definitions of the ESG indicators.

To address these issues, this paper introduces two contributions. The first one is an analytical definition of idiosyncratic forward-looking information, called Mark to Target Information (MtTI), which is suitable for representing both the financial and the ESG sustainability performance. MtTI refers directly to firms’ plans and their risk indicators, thus differing from forecasts and systematic forward-looking information (based only on macroeconomic or sector scenarios). The second contribution is the introduction of formal criteria for identifying, within the general definition of MtTI, a list of primary ESG indicators which must be considered for the establishment of ESG information standards. These indicators are called “MtTI-based ESG indicators” and they refer directly to a firm's ESG sustainability plan and its risk indicators.

Keywords: Forward looking information, idiosyncratic information, enterprise risk management, expert judgment, ESG information, ESG risk, ESG sustainability disclosure, ESG transition plan

JEL Codes: D81, D82, G32, K32, Q01, Q51

Address for correspondence:
Andrea Giacomelli
Department of Economics
Ca’ Foscari University of Venice
Cannaregio 873, Fondamenta S.Giobbe
30121 Venezia - Italy
e-mail: andrea.giacomelli@unive.it

This Working Paper is published under the auspices of the Department of Economics of the Ca’ Foscari University of Venice. Opinions expressed herein are those of the authors and not those of the Department. The Working Paper series is designed to divulge preliminary or incomplete work, circulated to favour discussion and comments. Citation of this paper should consider its provisional character.
1. Introduction

1.1 Relevance of the idiosyncratic forward-looking information and its adoption in ESG sustainability

The adoption of structured forward-looking information on business activities of firms (that is, idiosyncratic forward-looking information) allows to pursue the following different objectives:

- To overcome all the significant and recognized limits of historical information (that is, backward looking information) in supporting the decision-making processes of the firms.
- To improve business management practices.
- To satisfy the information needs of all the different stakeholders.
- To anticipate the proactive management of financial distress at its initial stage when it is still possible to implement effective intervention strategies to prevent the causes of possible critical financial distress and the subsequent default.
- To improve the performance of banks' lending activity through the evolution of information quality and of the methodologies to assess creditworthiness and its monitoring.
- To increase the efficiency of the capital markets, both credit and equity.
- To improve the practices of strategic planning, considering the risk dimension in a structured way.
- To improve risk management practices.
- To improve the formulation and disclosure of firms' ESG sustainability plans.

In particular, today idiosyncratic forward-looking information is assuming an increasingly important role for the following three reasons:

- The extent of firms' perspective performances that are object of planning is increasing. In addition to the traditional financial performance, the perspective ESG performance is becoming more and more strategic. Therefore, a firm needs to adopt forward-looking ESG information in order to formulate the ESG transition plan and to disclose the ESG sustainability strategies to all the stakeholders.

- In the last years several international and national regulations regarding the structured adoption of forward-looking information have been introduced. The recipients of these regulations are both firms and financial institutions (banks and insurance companies). For comments on the most significant sources of regulation related to forward-looking information, see paragraph 1.2.

- Historical information (that is, backward-looking information) is not of much use due to the significant structural breaks that have occurred in recent years: the Covid-19 pandemic and the Ukrainian war have profoundly changed the economic context of firms.

ESG transition is thus one of the main reasons for adopting idiosyncratic forward-looking information.

In this framework, it is relevant to define forward-looking ESG indicators in a methodologically founded and shared way for the following reasons:
• The forward-looking nature of ESG information and metrics related to the ESG sustainability plans and to the risks affecting the implementation of such plans (transition risks).

• The need to introduce and promote standards on the individual ESG indicators to be adopted and on the modalities and purposes of their summary representation.

• The need to introduce and promote standards on firm performance reports, including ESG sustainability performances reports, for all types of firms.

• The principles underlying the ESG disclosure requirements for non-financial firms contained in the EU Taxonomy Regulation\(^1\). For details see the paragraph 1.2.2 below.

The evolution of the European Regulatory Framework on ESG disclosure, contained in different documents under consultation, which include the Corporate Sustainability Reporting Directive\(^2\) and the related European Sustainability Reporting Standards of EFRAG\(^3\). For details see the paragraph 1.2.2 below.

The evolution of the International Regulatory Framework on ESG disclosure, contained in different documents under consultation, which include the Sustainability Disclosure Standards of IFRS - ISSB\(^4\). For details see the paragraph 1.2.2 below.

1.2 Sources of regulation
In the last years several international and national regulations have been introduced regarding the structured adoption of forward-looking information on financial and ESG performances. The recipients of these regulations are both firms and financial institutions (banks and insurance companies). The most significant sources of regulation related to forward-looking information (for both performances) are summarized below.

1.2.1 Sources of regulation on financial performance

IFRS 9 on Financial Instruments of IFRS - IASB
On July 2014 the IFRS International Accounting Standard Board issued the completed version of IFRS 9. The objective of this international accounting standard is to establish principles for the financial reporting of financial assets and financial liabilities. The financial reporting aims to present relevant and useful information to users of financial statements for their assessment of the amounts, timing and uncertainty of an entity’s future cash flows.

One of the most innovative elements of IFRS 9 is the definition of impairment requirements aimed at providing users of financial statements with more useful information about an entity’s expected credit losses on financial instruments (that are, the estimate of credit losses over the life of a financial instrument). The impairment model requires an entity to recognise expected credit losses

---

\(^1\) European Parliament and Council (2020)  
\(^2\) European Commission (2021)  
\(^3\) European Financial Reporting Advisory Group (2022)  
\(^4\) IFRS Foundation – ISSB (2022)
over all the life of a financial instrument and to update the amount of expected credit losses recognised at each reporting date to reflect changes in the credit risk of financial instruments.

To achieve this objective, the impairment model requires the use of forward-looking information, processed by probabilistic models for risk quantification. In fact, IFRS 9 explicitly requires that the impairment quantification has to be based on forward-looking information, going beyond the backward-looking information on credit losses (incurred loss) of the traditional approach which characterized the previous IAS 39. In doing so, IFRS 9 aims to lay the foundations for the preparation of accounting information that allows to represent in advance the effects of financial distress whose probability of occurrence has been assessed as significant.

When measuring expected credit losses for a specific financial instrument, IFRS 9 requires that an entity should consider:

a) The probability-weighted outcome: expected credit losses should represent neither a best nor worst-case scenario. Rather, the estimate should reflect the possibility that a credit loss occurs and the possibility that no credit loss occurs.

b) The time value of money: expected credit losses should be discounted to the reporting date.

c) Reasonable and supportable information that is available without undue cost or effort.

However, whenever an entity does not have reasonable and supportable information that is available without undue cost or effort to measure lifetime expected credit losses on an individual instrument basis, in that case, lifetime expected credit losses shall be recognised on a collective basis. The assessment of lifetime expected credit losses can be done on a collective basis (for example on a group or sub-group of financial instruments) for ensuring that lifetime expected credit losses are recognised when there is a significant increase in credit risk even if evidence of that increase is not yet available on an individual level. Also performing the collective assessment, the information to use must incorporate not only past due information but also all relevant credit information, including forward-looking macroeconomic information.

**Guidelines on Loan Origination and Monitoring of EBA**

The EBA Guidelines on loan origination and monitoring require that banks make use of idiosyncratic forward-looking information in the credit granting process to analyse the creditworthiness of firms that are banks’ counterparties. The forward-looking information concerns the financial dimension of the counterparty firms.

In paragraph 31 it is said that “The credit risk appetite should be implemented with the support of appropriate credit risk metrics and limits. These metrics and limits should cover key aspects of the credit risk appetite, as well as client segments, currency, collateral types and credit risk mitigation instruments. When relevant, credit metrics should be a combination of backward-looking and forward-looking indicators and should be tailored to the business model and complexity of the institution.”

The paragraph 31 highlights the need not to limit the creditworthiness analysis to historical data only (backward-looking). Given the limitations of these historical indicators, it is required to evolve the creditworthiness analysis by integrating historical information with forward-looking information. This integration has the purpose of correcting the historical information with all the aspects concerning the new objectives that characterize the prospective management of firms.
Furthermore, in paragraph 156 it is specified that the required forward-looking information must also be idiosyncratic, in fact, in paragraph 156 it is said that “Institutions should assess the sustainability and feasibility of the borrower’s financial position and the future repayment capacity under potential adverse conditions that may occur in the duration of the loan agreement. To this end, institutions should carry out a single- or multifactor sensitivity analysis, considering market and idiosyncratic events, or a combination of any of them.”

A set of metrics for credit granting and monitoring are identified in Annex 3 of the EBA Guidelines. These metrics, coherently with the requirements discussed above, must be assessed using a forward-looking perspective at the idiosyncratic level of the individual firm. For example, within the metrics for micro, small, medium-sized and large enterprises a firm’s future cash flow analysis is required.

The EBA Guidelines on loan origination and monitoring, although they introduce innovative components into banking regulations in relation to the use of idiosyncratic forward-looking information, present the following two open issues which must be address:

1. Giving a structured definition of forward-looking information: within the EBA Guidelines, a structured definition of forward-looking information is not given. The regulation lacks structured methodologies for the formulation and representation of idiosyncratic forward-looking information. Furthermore, the EBA Guidelines do not define characteristics of forward-looking information quality which must be guaranteed to have reliable information.

2. Considering idiosyncratic forward-looking risks: lacking a structured definition of idiosyncratic forward-looking information, the EBA Guidelines do not define how the risks associated with forward-looking information should be considered. This is a relevant issue, given that idiosyncratic forward-looking information must be used:
   • in the overall credit granting processes and
   • in sensitivity analysis to assess the sustainability and feasibility of the counterparty’s financial position and the future repayment capacity.

**Insolvency Directive of the European Parliament and of the Council**

On 20 June 2019 the European Parliament and the European Council have adopted the Directive (EU) 2019/1023, that is the so-called “Insolvency Directive”. This Directive lays down rules on:

a) preventive restructuring frameworks available for debtors in financial difficulties when there is a likelihood of insolvency, with a view to preventing the insolvency and ensuring the viability of the debtor.

b) procedures leading to a discharge of debt incurred by insolvent entrepreneurs.

c) measures to increase the efficiency of procedures concerning restructuring, insolvency and discharge of debt.

The fundamental objective of the Insolvency Directive is to improve the effectiveness of preventive restructuring frameworks, in order to prevent the build-up of non-performing and impaired loans. To reach this purpose, the Directive requires that EU Member States shall ensure that debtors have access to one or more clear and transparent early warning tools which can detect
circumstances that could give rise to a likelihood of insolvency and can signal to them the need to act without delay\(^5\). The information necessary to feed the early warning tools must therefore necessarily be forward-looking.

The abovementioned early warning tools may include the following\(^6\):

a) Alert mechanisms when the debtor has not made certain types of payments.

b) Advisory services provided by public or private organisations.

c) Incentives under national law for third parties with relevant information about the debtor, such as accountants, tax and social security authorities, to flag to the debtor a negative development.

Moreover, the Directive requires that, where there is a likelihood of insolvency (detected through the early warning tools), debtors should have access to a preventive restructuring framework that enables them to restructure, with a view to preventing insolvency and ensuring their viability, without prejudice to other solutions for avoiding insolvency, thereby protecting jobs and maintaining business activity\(^7\). It can therefore be said that the provisions required by the Insolvency Directive aims to allows firms, for which a future financial distress is foreseen, to access preventive restructuring frameworks and avoid a probable future condition of insolvency.

1.2.2 Sources of regulation on ESG performance

The main regulations on ESG performance are the European Taxonomy, the European Sustainability Reporting Standards of EFRAG and the Sustainability Disclosure Standards of IFRS – ISSB.

For the sake of synthesis, the contents of these three regulations are reported directly in the Appendices. In particular, the main contents of the European Taxonomy are described in Appendix 1, the main contents of the European Sustainability Reporting Standards of EFRAG are described in Appendix 2 and the main contents of the Sustainability Disclosure Standards of IFRS – ISSB are described in Appendix 3.

Concluding this short review on the main sources of regulation, it is to underline that all the above regulations, although they foster the introduction and the adoption of forward-looking information to overcome the limits of traditional historical information (current and past), do not provide clear definitions of the forward-looking information's contents that must be considered in order to properly apply the regulations.

This lack of clear definitions applies both to the forward-looking assessment of financial performance and to the forward-looking assessment of ESG sustainability performance.

1.3 Literature

At the time of writing, by analysing the literature on forward-looking information it can be seen that there are no studies attempting to give a formal and general definition of forward-looking

\(^5\) See Insolvency Directive – Article 3, paragraph 1

\(^6\) See Insolvency Directive – Article 3, paragraph 2

\(^7\) See Insolvency Directive – Article 4, paragraph 1
information. Moreover, no studies specifically addressing idiosyncratic forward-looking information has been identified. Currently, two predominant research areas relating to forward-looking information can be identified:

- The determinants of the level of forward-looking information disclosures within firms’ reports.
- The use of forward-looking indicators to improve market insights and risk measurement.

The first research area is focused on the analysis of forward-looking information within firms’ reports. The studies within this research area focus on the analysis of the characteristics and the determinants of the forward-looking information used in the disclosures contained in the firms’ reports.

A seminal work in this research area is “Australian Evidence on Corporate Governance Attributes and their Association with Forward-looking Information in the Annual Report” (O’Sullivan, Percy, & Stewart, 2008) that aims to investigate the role played by a firm’s corporate governance framework in the decision to voluntarily disclose forward-looking information in the financial reports. The sample used for the analysis includes all the published financial reports of Australian firms in 2000 and 2002. The results reveal that, with respect to the year 2000, the corporate governance category, the audit quality, the consisting of the presence and independence of the audit committee, its meeting frequency, the use of a big 6 auditor and the auditor’s independence, are all determinants that are positively associated with the level of forward-looking information disclosed in the financial reports. However, with respect to the year 2002, the level of forward-looking information disclosed in the financial reports does not seem to be driven by the same factors since, in that year, none of the governance categories are significantly associated with the firm’s decision to publish forward-looking information in financial reports.

Another work in this research area is “The Determinants of Forward-Looking Information Disclosure” (Alkhatib, 2014) that aims to empirically establish the level of forward-looking information disclosure in firms listed on the Jordanian stock exchange and further it aims to establish the determinants of forward-looking information disclosure for those firms. The paper identifies five factors that could affect the level of forward-looking information disclosure: sector type, auditor type, total assets, profitability, and leverage. The results reveal that the profitability seems to be the most effective variable, with a significant positive correlation with the level of forward-looking disclosure. The auditor type and the total assets seem to be effective only in the industrial sector. The paper concludes that profitable companies tend to disclose more forward-looking information. Moreover, the results reveal that large sized firms who are audited by international audit firms are likely to disclose more forward-looking information than those who have not been audited by an international audit firm.

In more recent years, with the development of various frameworks for the integrated reporting, studies have been conducted that analyse the determinants of forward-looking information within integrated reports. Within this context we can mention “Determinants of forward-looking disclosures in integrated reporting” (Kılıç & Kuzey, 2018). This study aims to examine the nature and extent of forward-looking disclosures in early examples of integrated reporting and to investigate the determinants of those disclosures. The sample used for the analysis includes the reports of 55 non-financial firms whose reports are available in the Integrated Reporting Examples Database for the year 2014. The statistical results are derived by carrying out a multivariate ordinary least squares regression. The results reveal that the majority of the firms tended to provide qualitative forward-looking disclosures rather than quantitative. Further, the results reveal...
that gender diversity and firm size are positively correlated to the level of forward-looking disclosures, whereas leverage is negatively correlated to the level of forward-looking disclosures. No significant impacts have been found relatively to board size, board composition, profitability and industry.

Another study that analyses the determinants of forward-looking information within integrated reports is “Forward-looking information in integrated reports: Insights from best in class” (Mio, Marchini, & Medioli, 2020). This study aims to analyse if the integrated reports that are now being published disclose more forward-looking information or backward ones. The Integrated Reporting requires a future-oriented approach, thus, in such a context, this study explores the extent and characteristics of forward-looking information in reports that are recognized as best practices. The results reveal that even among the best in class integrated reports, there are differences in the disclosure of forward-looking information and that the information needs of stakeholders regarding future-oriented disclosure do not seem to be fully met.

The second research area is focused on the use of forward-looking indicators to improve market insights and risk measurement. One of the seminal works in this research area is “Systemic risk analysis using forward-looking distance-to-default series” (Saldias, 2012). The study aims to develop a method to monitor systemic risk in the European banking system. This method relies on forward-looking Distance-to-Default indicators that are generated using option prices information from systemically important banks and the STOXX Europe 600 Banks Index. The forward-looking Distance-to-Default indicators provide 4 methodological advantages in monitoring vulnerabilities in the banking system over time: 1) they capture interdependences and joint risk of distress in systemically important banks; 2) their forward-looking feature endow them with early signalling properties; 3) they produce simultaneously smooth and informative long-term signals and quick and clear reaction to market distress and 4) they incorporate additional information through option prices about tail risk and correlation breaks.

Another study in this research area is “Portfolio Optimization Using Forward-Looking Information” (Kempf, Korn, & Saßning, 2014). This study aims to develop a new family of estimators of the portfolio covariance matrix that relies solely on forward-looking information. The forward-looking estimators are derived only from current prices of plain-vanilla options. The results reveal that a minimum-variance optimization strategy based on these forward-looking estimators outperforms several benchmark strategies, including various strategies based on historical estimates, index investing, and 1/N investing. Although the historical benchmark strategies improve when more recent data is used, they never outperform the strategies that relies on the forward-looking estimators. Thus, the results suggest that investors are better off relying on forward-looking information than on backward-looking data.

Another study in this research area is “Forward-looking disclosure and corporate reputation as mechanisms to reduce stock return volatility” (Bravo, 2016). This study aims to analyse if forward-looking disclosures and corporate reputation lead to a reduction in stock return volatility. The sample used for the analysis is composed of 73 reports of non-financial firms included in Standard and Poor’s 100 in the year 2009. The results reveal that the financial forward-looking information disclosed in annual reports helps to reduce stock volatility. Moreover, the results also indicate that, although the level of disclosure has a significant effect on stock volatility, the effect of this disclosure is further varied depending on corporate reputation, in fact, in addition to the level of disclosed information, the interpretation and the effectiveness of forward-looking information depends on the reputation of a firm.
One recent study in this research area is “Measuring bank risk: Forward-looking z-score” (Hafeez, Li, Humayun Kabir, & Tripe, 2022). This study aims to develop a forward-looking method to construct the z-score by incorporating analyst forecasts in order to overcome the limits of the classic z-score that is criticized for being a backward-looking measure. The empirical results of the study show that the forward-looking z-score can predict the movement of the standard z-score one quarter ahead of time, and its predictive ability on banks’ downward risk is better than the standard z-score. Moreover, the results reveal that the predictive ability of the forward-looking z-score improves after the Dodd-Frank Act of 2010, especially for large banks, showing the consequences of strengthened regulation and transparency. The forward-looking z-score is also significantly associated with the probability of default and market-based risk measures and can provide predictive signals for banks' future profitability. Overall, the findings of this study suggest that the forward-looking z-score mitigates the shortcomings of the standard z-score and provides a reliable early warning signal for banks' future risk and performance.

1.4 Objectives of the paper

Currently, forward looking information remains an ambiguous concept from the analytical point of view. This ambiguity leads to numerous misunderstandings. The existence today of a multiplicity of practices for the use of forward-looking information, varying widely both in logic and purpose, confirms the interpretative confusion surrounding said use. Therefore, the adoption of forward-looking information is a particularly challenging topic both for firms and regulators. For example, the use of projections of historical data (obtained by forecasting models) has significant and recognized limits in the applications for firms. Accordingly, the adoption of forward-looking information cannot be limited to the use of these projections. Given its relevance, an exhaustive and methodologically founded analysis of forward-looking information becomes necessary.

In particular, in order to adopt forward-looking information in a structured manner, three methodological open issues must be addressed:

1. Highlighting that there are different types of forward-looking information, to be used differently and for different purposes.
2. Analytically defining the content and properties of the forward-looking information, as it is currently an ambiguous concept, and it is therefore referred to very different contents and uses.
3. Explaining how to represent and read information relating to the future, as the multiplicity of different possible events that can occur must be considered and the reference to a single point value, that is suitable in the case of historical information, is therefore not sufficient.

This paper, in the first part, aims to shed light on the above open issues, pursuing 2 main objectives.

The first objective of the paper is to introduce a general classification of the different forms of forward-looking information by relying on a limited number of dimensions. Within this classification, attention is paid on the idiosyncratic forward-looking information category.

The second objective of the paper is to introduce the Mark to Target Information (MtTI): an analytical definition of the contents and properties of the idiosyncratic forward-looking information which is applicable to all types of firms due to its generality.
The MtTI describes the targets that a firm pursues, the risk of different possible deviations from these targets and their impacts on the firm’s stakeholders, in order to support the firm’s decision-making processes by providing awareness on the different events that can take place in the future. In the definition, the information sources for laying out the MtTI and the manners of its representation in the reports are also analysed.

After the general introduction of the MtTI, the paper, in the second part, focuses on its application to the ESG sustainability.

Currently, a deeper understanding of ESG information is necessary, both for the lack of an analytical definition and because its interpretation is still heterogeneous, involving numerous application issues.

To confirm this interpretative confusion surrounding ESG information there is the multiplicity of indicators and ESG ratings used in the market, which differ both in logic and purpose. Such confusion is also at the origin of greenwashing and sustainability-washing.

In particular, in order to adopt reliable and standardized ESG information, three open issues must be addressed:

1. Defining the extent of the three ESG pillars and their interrelationships on a theoretical level.
2. Introducing a standard definition of the individual ESG indicators, to provide consistent and comparable ESG information.
3. Introducing a formal definition of ESG risks, on the basis of which to develop robust methodologies for the assessment of physical risk and transition risk.

In order to shed light on the above open issues, the third objective of this paper is to introduce the formal criteria that must be adopted to identify a list of primary ESG indicators that can contribute to the establishment of ESG information standards.

Finally, the fourth objective of this paper is to introduce an analytical definition of “MtTI-based primary ESG indicators” which satisfy the abovementioned criteria to identify a list of primary ESG indicators.

The MtTI-based primary ESG indicators refer directly to firms’ ESG sustainability plans, to the risks that characterize such plans (including physical risk and transition risk in a forward-looking perspective) and to their impacts on stakeholders and on the environment.

The MtTI-based primary ESG indicators give an analytical contribution to the establishment of ESG Information Standards and on the improvement of the ESG disclosure.

The remainder of this paper is structured as follows. Section 2 introduces a short classification of forward-looking information. Section 3 contains the definition of Mark to Target Information (MtTI). Section 4 analyses the contribution of MtTI to the improvement of current practices of using forward-looking information. Section 5 introduces explicit criteria to define an exhaustive list of primary ESG indicators; the analytical definition of MtTI-based primary ESG indicators is then provided. Section 6 analyses the contribution of these primary ESG indicators on improving ESG disclosure and its use. Section 7 concludes.
2. Short classification of forward-looking information

Forward-looking information refers to events related to future time horizons. However, there are different types of information with this general characteristic, such as forecasts, market scenarios, target values in business plans, description of monetary policy scenarios, etc. The different types of forward-looking information can be defined on the basis of the following four classification dimensions.

2.1 Dimension 1: Scope of application and type of variables to consider

First of all, the forward-looking information can be differentiated on the basis of the type of variables to which it refers:

- Variables describing the future outcome of a natural process: these variables are relevant for the analysis of and disclosure about climate change and environmental sustainability. They are considered in the sustainability plans of firms and for the measurement of environmental risks. For these reasons, they fall within the scope of the idiosyncratic forward-looking information, on which this paper focuses.

- Variables describing the future outcome of a production process: these variables include both mechanical and digital processes and the production of services. These variables are relevant for the production planning, the investment decisions on new technologies and the ESG transition analysis. They are also considered in the assessment of the operational risks of firms. For these reasons, they fall within the scope of the idiosyncratic forward-looking information, on which this paper focuses.

- Variables describing an individual's future behaviour: these variables include consumption, investments, health and social activity. For a single individual it is possible to specify objectives and behavioural decisions in a structured and unambiguous way. Therefore, for this type of variable, forward-looking information can have as distinct contents both an individual's objective and the outcome of an individual's behaviour; a priori, in fact, the objective may be different from the outcome of an individual's behaviour due to risk factors that do not allow the individual to achieve his objectives. It should be noted that this type of variable is object of the idiosyncratic forward-looking information, on which this paper focuses.

- Variables describing the future performance of a legal entity: legal entities include firms (corporates, SMEs, financial institutions) and public institutions. The variables considered are the KPIs that measure the financial performance and the ESG performance of these legal entities. It is also possible for legal entities to specify in a structured and unambiguous way the objectives for the various KPIs, included in business plans and in sustainability plans. For this type of variable, therefore, forward-looking information can have as distinct contents both the targets and the outcome of the performance; a priori, in fact, the target may be different from the performance outcome due to risk factors that do not allow the firm to achieve its objectives. It should be noted that this type of variable is object of the idiosyncratic forward-looking information, on which this paper focuses.

- Variables describing the future characteristics of a social group composed of a plurality of subjects with diversified objectives that are, in many cases, opposed to one another: groups such as an economic system, sectors of economic activities, regulated markets, regional communities or countries are included. The variables considered are sector indices, market prices, macroeconomic indicators, demographic variables. These variables are influenced by the objectives of many subjects and by the complex mechanisms of interaction between them, which it is too burdensome to specify in a structured way. For this type of variable, therefore,
forward-looking information only refers to the outcome of the interaction between the subjects. It should be noted that this type of variable describes the context that influences the decisions of individuals and single legal entities.

2.2 Dimension 2: Contents of the single variables

The contents of a variable of interest, that is the interpretation of the values the variable can assume, vary according to the purpose and the type of use of the forward-looking information. In order not to lengthen the discussion, reference will be made to the contents only in a univariate perspective; the same contents can however be extended also to a multivariate perspective in relation to a set of variables of interest.

For the same variable, forward looking information presents the following different types of content:

- **The value realized in a future time horizon**: for variables describing the future behaviour of an individual or a legal entity, the value realized in the future can be different from the target value of the subject due to the materialization of risk factors.

- **The target value of an individual or a legal entity**: it may be different from the value realized in a future time horizon due to risk factors that do not allow the subject to achieve its target. It should be noted that this type of content is a specific object of the idiosyncratic forward-looking information, on which this paper focuses.

- **The deviations from a target value**: for variables describing the future behaviour of an individual or legal entity, the deviation represents the possible difference between the target value of the subject and the value realized in a future time horizon. This information content allows to face, with awareness, the risk that characterizes the firm’s business activity in the future and its consequences on stakeholders. It should be noted that this type of content is a specific object of the idiosyncratic forward-looking information, on which this paper focuses.

- **Event of interest**: it is a possible future event, different from the target of a subject, which is the object of a specific analysis process (for example, the default of a firm during the analysis of its creditworthiness, or a cyber-attack in the cyber risk analysis process).

- **Probability distribution**: it describes the plurality of the future alternative values of a variable. In the domain of the future values of the variable of interest, the probability distribution allows to differentiate the various scenarios by their probability of occurrence. This information content is essential in risk analysis practices and Enterprise Risk Management (ERM) processes. It should be noted that this type of content is an object of the idiosyncratic forward-looking information, on which this paper focuses.

- **Expected value**: analytically, the expected value is the first moment of the probability distribution of a variable. The expected value can be both conditional and unconditional to a given information set.

- **Most probable value**: analytically, the most probable value is the mode of the probability distribution of a variable. The mode differs from the expected value for variables characterized by asymmetric probability distribution.

- **Forecast of the variable**: analytically, the forecast is the projection of a variable into the future provided by a statistical or econometric model estimated on historical data.

- **Scenario**: it is a possible future value of a variable with respect to which the consequences for other variables of interest are to be analysed using scenario analysis techniques. An instance of these techniques is represented by stress tests.
The value of the systematic component of a variable: it is the future value of a variable given by the dynamics of the main variables (namely, the systematic components) that describe the context that influences the variable (for example, for the turnover of a firm, the dynamics of the economic system and/or of the firm sector). The systematic value can refer both to variables that describe the behaviour or the performance of a single subject (for example, the creditworthiness of a firm, whose systematic component is constituted by the macroeconomic dynamics of the country in which it operates) and to variables influenced by the decisions of many subjects (for example, the market price of a share, whose systematic component is constituted by the dynamics of the stock market index on which it is listed). The content of the systematic forward-looking information is used for massive applications on aggregate variables, such as for example the valuations of the portfolios of banks and asset managers, where the errors of approximation due to considering only the systematic component are offset at the aggregate level.

The idiosyncratic value of the variable: it is the future value of a variable that considers the dynamics of the characteristics (namely, the idiosyncratic components) affecting only that particular variable and no other (for example, for the turnover of a firm, the dynamics of orders). The content of the idiosyncratic forward-looking information supports specific applications, such as for example, the granting of a loan to a specific firm by a bank, for which the specific characteristics of the firm itself cannot be left out. It should be noted that this type of content is a specific object of the idiosyncratic forward-looking information, on which this paper focuses.

Qualitative content: it refers to future events whose characteristics can only be described by using texts. All the contents previously presented are, instead, quantitative.

Cause-effect relationship between one variable and others: it is the description, mathematical or qualitative, of the relationships that explain the future values of a variable as an effect of the values assumed by other variables, which therefore represent the causes. These relationships are essential for risk analysis and for the formulation of business plans. It should be noted that this type of content is an object of the idiosyncratic forward-looking information, on which this paper focuses.

Evidence that supports the identification of specific future events: such evidence is often constituted by formal documentation that qualifies and describes the characteristics of the events, regardless of their probability of occurrence (for example, in firms, loss events listed in the internal risk governance regulations or delivery events described in the sales agreements that regulate product quality standards and delivery times). These contents are used by auditors for the assurance of the forward-looking information.

The level of aggregation of a variable: the future values of a variable must be considered at different levels of aggregation to satisfy different purposes. For example, the future turnover of a firm must be considered at the level of geographical areas for sales budgets and at the level of individual economic activity for disclosure purposes.

Deterministic value: the future value of a variable, which in most situations is random, in some particular situations can be known with certainty, as additional information contents are available that provide the justifications for its realization. These justifications are often constituted by documents with legal value that set obligations and rights regarding future events (for example, for a product’s sales volume, the information content consisting of a multi-year supply contract already signed).
2.3 Dimension 3: Sources and measurement

Forward-looking information presents the following different types of sources and methods for measuring the contents of the variables of interest:

- **Unstructured expert judgment**: it is a source of quantitative and qualitative contents that are formulated directly by the experts without adopting a formalized and tracked process. As for the quantitative content, unstructured expert judgment allows to define target values, specific point scenarios, and to identify the most intuitive and immediate events of interest.

- **Structured expert judgment**: it is the collection of the expert knowledge on the variable of interest through a formalized and tracked process. This source allows to formalize the assumptions of the firm’s plans (business plans, ESG sustainability plans, treasury budgets). Furthermore, it allows to define the most complex quantitative contents, such as intervals, deviations from the targets and their causes (significant risk factors), subjective probability distributions, cause-effect relationships with other variables. It should be noted that this type of source is peculiar to the idiosyncratic forward-looking information, on which this paper focuses.

- **Algorithms or models calibrated on historical data**: they provide the forecasts of the variables of interest. These forecasts have various forms, such as point values, intervals or probability distributions. The most widely used algorithms are regression models, Artificial Intelligence algorithms and machine learning. Regression models are also used to calculate the future values of the systematic component of the variable of interest. This type of source is the most used for the variables describing the future characteristics of a social group, but it presents some limits of applicability for the variables describing single subjects (such as individuals and legal entities), which constitute the peculiar object of the idiosyncratic forward-looking information. In particular, the limits of applicability are costs, data availability and structural breaks.

- **Market prices**: for some variables it is possible to consider forward prices referring to different future time horizons. The forward prices can be the result of a quotation or can be calculated from spot prices using the non-arbitrage principle.

- **Public and private sources**: the public sources of forward-looking information are expert judgment provided by public institutions (namely, central banks, public research institutes, statistical institutes), forecast models managed by the same public institutions and market prices. These public sources mainly cover the variables that describe the future characteristics of social groups (sectors of economic activities, regulated markets and economic systems, etc.). The private sources are expert judgment and the forecast models of information providers and private research centres, but above all, the expert judgment of the managers of legal entities (namely, industrial companies and financial institutions). These private sources make it possible to cover the variables that constitute the peculiar object of the idiosyncratic forward-looking information.

- **Sources’ update frequency**: the most reactive source, for variables describing a legal entity, is the expert judgment of firm’s managers, which allow for a high frequency updating of the forward-looking information. On the other hand, the forecast models on aggregate variables (describing sectors of economic activities, regulated markets and economic systems) are the less reactive sources, as the data on these variables are updated with a significantly lower frequency and require an update in model calibration.
2.4 Dimension 4: Manners of representation

The content of a variable, for example the deviations from a target value, can be represented in many alternative manners. However, the manners of representation for the same variable depend on the purpose and the use of the forward-looking information. In particular, the forward-looking information presents the following different manners of representation:

- **Single point value**: this representation is sufficient only for deterministic contents. In fact, it is a manner of representation of the forward-looking information that is not sufficient for random variables, as it does not allow to consider risk and uncertainty.

- **Small number of alternative point scenarios**: this representation is used for the outcomes of sensitivity analysis, stress test analysis and worst-case analysis. In relation to the consideration of risk, these analyses have many computational advantages, nevertheless they are burdened by some information limits. In fact, since they focus on a few specific scenarios, these analyses give no awareness about the consequences that can occur for different, more severe and in any case possible scenarios. The lack of this awareness can significantly limit the decision-making process of firms and their stakeholders.

- **Continuous set of values**: in this case, the content of a variable is represented by a set of multiple alternative values (such as, for example, ranges or lists) aimed at considering all the possible scenarios. Intervals are an intuitive and comprehensive way of representing risk. However, the informative advantages of this manner of representation require a considerable computing effort.

- **Compound representation**: in this case, for the same variable, quantitative and qualitative contents and the evidence contained in the supporting documentation are integrated. This manner of representation allows to obtain the greatest possible information detail.

- **Level of detail**: for the same variable, the manners of representation must be differentiated according to the types of stakeholders to whom the forward-looking information is addressed. In particular, the level of detail of the representation must be differentiated. For stakeholders such as auditors and bank’s supervisor, a representation of maximum detail is necessary, for stakeholders such as customers and suppliers of an industrial firm a summary representation is more appropriate.
3. Mark to Target Information: definition

The idiosyncratic forward-looking information refers to the multiplicity of the possible outcomes of a firm’s performance that could occur in explicit future time horizons. The performance of every single firm must be articulated in financial performance and ESG sustainability performance. Idiosyncratic forward-looking information is significantly relevant for the decision-making processes of firms and their stakeholders, as it allows:

- To improve the capability of firms (e.g., banks, insurance companies, corporates and SMEs) to assess and manage uncertainty about the achievement of their financial and ESG sustainability targets.
- To make all the stakeholders of a firm aware of the different possible impacts that can be generated by the different events that can characterize the firm’s performance.

This section, first of all, introduces an intuitive description and then an analytical definition of idiosyncratic forward-looking information, denominated Mark to Target Information (MtTI).

From an intuitive point of view, idiosyncratic forward-looking information must include all the key performance indicators (KPIs) which represent all the types of performance that are of interest to the stakeholders. Thus, not only the financial performance but also the ESG sustainability performance. Therefore, the KPIs to consider represent the different business dimensions: available capital, profitability, liquidity, environmental sustainability, social sustainability, etc.

For each KPI of interest, the idiosyncratic forward-looking information must explicitly refer to the targets to be pursued in a specific future time horizon. This because in the future the firm events that will take place will be the consequence of pursuing the targets set from the management board during the formulation of the firm’s plans.

However, it is essential to underline that the idiosyncratic forward-looking information do not have to define what the exact outcome will be for each KPI, as it is not possible to forecast the future reliably. Instead, the idiosyncratic forward-looking information must indicate what a firm intends to do in predefined future time horizons; these indications are more reliable than forecasting which events will take place.

But a firm is not always able to achieve its targets, despite its efforts. Therefore, defining the firm’s objectives is not enough (it could only be a dream book).

For each KPI, all the possible deviations from the target values must also be considered.

In particular, there are two reasons why it is necessary to consider all the possible deviations from target values in order to have a comprehensive forward-looking information:

- Since the information refers to the future, it is impossible to known which event will be realised.
- The possible deviations are very different in extent and severity of their impacts on stakeholders.

Therefore, the adoption of idiosyncratic forward-looking information requires a change of approach as compared to the analysis of historical information. In the analysis of historical information (backward looking) it is sufficient to consider only a point value for each variable of interest, that is the single realized data. Otherwise, adopting idiosyncratic forward-looking information it is not possible to use the same approach. To face the future a single point scenario is not enough. In order to face the future, for each variable of interest, all the possible alternative outcomes that the
firm can experience and the spectrum of their consequences on stakeholders must be considered. In fact, only this information allows the firm to be resilient.

For each KPI, the deviations from target values are caused by specific factors, which are called risk factors (for example, deviations from targets for cost performance indicators are due to operational risk and commodity risk factors, while deviations from targets for sales performance indicators are due to commercial risk factor). The identification of the deviations’ causes is necessary in order to choose the most suitable interventions to adopt for managing the deviations’ effects in case they are negative for a firm and its stakeholders.

The set of all the possible deviations is called risk profile, which is jointly influenced by multiple risk factors. Therefore, it is highlighted that considering the risk dimension is fundamental to obtain an exhaustive idiosyncratic forward-looking information.

The idiosyncratic forward-looking information must also consider which and how many impacts on the stakeholders are generated by the spectrum of the possible deviations from the targets. Many deviations, in fact, can generate several types of negative impacts for a firm and its stakeholders, which differ greatly from the type of impact generated by the target value.

In this context, however, a firm can play an active role, through the adoption of interventions to improve the type of impact on stakeholders generated by the deviations. In particular, the improvement of the impact on the stakeholders can consist in being able to preserve the same impact generated by the target value for all the time horizons considered in the plan.

A classic example of intervention to improve the impact of deviations is to absorb the loss generated by deviations using the economic capital. Let us consider the Profit & Loss KPI and let us assume that its target value is a positive profit. The impact generated by this target value on a certain stakeholder, for example a bank, is the firm’s solvency.

Therefore, deviations from the target representing a loss would generate negative impacts on the same stakeholder, namely the bank, as the occurrence of a loss would lead to the firm’s insolvency. Adopting the economic capital as an intervention to manage these deviations makes it possible to absorb the loss and improve the impact on the stakeholder, as the impact on the bank would return to be the firm’s solvency (the improved impact would return to be equal to the one generated by the target value consisting of a positive profit).

The adoption of these interventions for improving the impact of the deviations is the purpose of risk management processes.

As already pointed out, the identification of the interventions for improving the impact of a deviation depends on the causes of the deviation itself, that are the risk factors that have been previously identified. This is why risk analysis is relevant from a management perspective.

In particular, the same level of deviation can lead to absolutely different consequences, according to the interventions adopted by a firm.

It follows that the information on the risk profile, which represents all the possible deviations from the target values, must be integrated with the assessment of the impacts on the firm and its stakeholders.

Therefore, additional information is needed to identify with certainty the features of the impacts of the deviations on all the stakeholders, based on the specific interventions that a firm can and wants to adopt.

This additional information, which must be given for each KPI of interest and for all the stakeholders involved, must allow the identification of the following four topics:
1. The impact generated by the achievement of the target.

2. The deviations that generate impacts which can be considered equal (or similar) to the one generated by the target value.

3. The deviations that generate impacts which differ critically from the one generated by the target value, but that the firm is able to improve adopting an available intervention which allows to make the impacts equal (or similar) to the one generated by the target value. Therefore, it is not sufficient to assess only the impacts directly generated by a single deviation, but, in addition, it is necessary to consider all the improved impacts that a firm can reach by adopting appropriate interventions for the various deviations that it may face. For these reasons, the information content of interest is obtained from the combination of the information on the deviations from the target values integrated with the information on how a firm intends to manage those deviations.

4. The deviations that generate impacts which differ critically from the one generated by the target value and that, simultaneously, a firm is unable to improve adopting any available intervention. These are the impacts that can be harmful to stakeholders, on which therefore the idiosyncratic forward-looking information must give maximum evidence and provide the greatest possible awareness. The deviations that generate these impacts are called critical deviations.

The additional information described above must be explicated in a multi-period perspective for the overall time horizon of the plan. The analysis must be dynamic, that is to say, in the overall time horizon of the plan the interventions adopted in one period limit the availability of the interventions in subsequent periods (for example, loss deviations absorbing the available capital in the first period seriously limit the management of deviations in subsequent periods). Furthermore, from a multi-period point of view, it must be considered that the occurrence of a deviation generates impacts that can cause, over time, new forms of deviation and therefore amplify the possibility of further deviations from the targets in subsequent periods.

Summarising the intuitive description given above, the MtTI considers the following scope:

- all the KPIs necessary to describe a firm’s future financial performance and ESG sustainability performance.
- all the different stakeholders impacted by a firm’s future performance.
- the plurality of alternative events that may occur in the future.
- only the available information that currently provides certain indications about the features of the impacts on the stakeholders.

In addition, for each KPI considered, the MtTI:

- Identifies what a firm want to do, namely, the firm’s targets and how it intends to reach them.
- Considering that a firm can fail to reach its target and deviations can occur, it identifies the plurality of possible deviations of which a firm is currently able to identify the causes (risk factors).
- Divides the plurality of possible future deviations in two categories: the deviations generating impacts on stakeholders that are currently certain and bearable (equal or similar to those generated by the target value) and all the other deviations considered critical as they generate impacts that are not bearable (harmful), or which do not currently have features that are
identifiable with certainty. In fact, to be reliable, the content of the idiosyncratic forward-looking information must consider only information that is available at the current time and impacts with features that are certain.

The MtTI is aimed at providing awareness of the various forms of possible critical issues on the future that can be currently identified by a firm pursuing its targets. This awareness is needed for a firm to make ex ante decisions and for stakeholders for relating to the firm.

On the other hand, for each KPI considered, the MtTI does not identifies:

- The exact outcome of the firm’s performance that will be achieved, because the MtTI is not a forecast.
- The full spectrum of the deviations and their causes because some causes cannot be identified on the basis of current information (e.g., the causes of the Ukrainian war in January 2022). The MtTI limits itself to considering the risk and formally distinguishes it from uncertainty.

On the basis of these intuitive considerations, the following analytical definition of the MtTI content is introduced.

The MtTI is defined considering the four classification dimensions introduced in the previous section 2: Scope of application and type of variables to consider (see paragraph 3.1), Contents of the single variables (see paragraph 3.2), Sources and measurement (see paragraph 3.3) and Manners of representation (see paragraph 3.4).

### 3.1 Dimension 1: Scope of application and type of variables to consider in MtTI

The MtTI is applicable for all types of firms: industrial (both large corporates and SMEs), banks and insurance companies.

For every firm, the MtTI consider all the different performance dimensions. It has to be highlighted that not only the traditional financial performance must be considered; the prospective relevance of corporate sustainability requires in fact to also consider the ESG (Environmental, Social, Governance) performance.

The MtTI refers to the KPIs that have to be considered in the different firm's plans for each performance dimension: financial plans on multi-year horizons, treasury plans on different monthly horizons, ESG sustainability plans on multi-year horizons in a long-run perspective. Therefore, the MtTI considers:

- Financial KPIs
- Treasury KPIs
- ESG KPIs (Environmental, Social, Governance). For further information on ESG KPIs see section 5.

For each KPI, the MtTI allows to consider different levels of aggregation, systematizing and expanding the information to be prepared in the planning processes. In particular, the same KPI can be evaluated at the level of individual economic activity carried out by a firm or at the aggregate level of the firm as a whole. As will be analysed in paragraphs 5 and 6, the different levels of aggregation are also required at the regulatory level.
The MtTI can play a significant role for firms, particularly in the following application areas: Strategic and operative planning, Credit Risk, Enterprise Risk Management (ERM), Analysis of forward-looking scenario (stress testing, sensitivity), ESG Sustainability transition, ESG Risk. For an analysis of the contributions that MtTI can give in all these application areas, see section 4. From the foregoing it is therefore made clear that the scope of application of the MtTI is extremely broad.

3.2 Dimension 2: Contents of the single variables in MtTI

In this paragraph, an analytical definition of the Mark to Target Information’s content for every KPI of interest is introduced.

Definition: Let be $y_{i(t)}$ the value of the specific $i$-th KPI of interest for the firm, referred to a specific future time horizon $t$, with $t = 1, \ldots, T$, where $T$ is the overall horizon of the multi-period firm’s plan that is formulated at the current time, $t = 0$.

For each $i$-th KPI, the content of the Mark to Target Information (MtTI) is articulated in the following three components.

3.2.1 Component 1: target values

Let be $\varphi(y_{i(t)})$ the target value for the specific $i$-th KPI of interest for the firm in the specific future time horizon $t$, as defined in the strategic planning process.

The set of target values relating to the different time horizons of the plan, from $t = 1$ to $t = T$, is defined by the vector:

$$\Phi_{[t=1; t=T]} = \left[ \varphi(y_{i(t=1)}), \varphi(y_{i(t=2)}), \ldots, \varphi(y_{i(t=T)}) \right]$$

The individual target values are conditional on the information set, defined as $I_{t=0}$, available at the current time $t = 0$ when the plan is being formulated. This conditioning is indicated with:

$$\Phi_{[t=1; t=T]}|I_{t=0}$$

The conditioning, in addition to $t = 0$, can also be subsequent, if the assumptions of the plan are updated or the plan is revised.

For further comments see the sub-paragraph 3.2.4 “Comments to component 1” below.

3.2.2 Component 2: domain of the possible deviations

Let be $\left(y_{i(t)} - \varphi(y_{i(t)})\right)$ the domain of the possible deviations from the target value for the specific $i$-th KPI of interest for the firm in the specific future time horizon $t$, with $t = 1, \ldots, T$, for considering the overall time horizon of the plan.

The deviations from the target value $\left(y_{i(t)} - \varphi(y_{i(t)})\right)$ represent the risk related to the specific $i$-th KPI of the plan. The risk of deviations from the target values, therefore, constitute an essential component of the idiosyncratic forward-looking information.
A complete risk analysis (and therefore an exhaustive idiosyncratic forward-looking information) also requires, in addition, to consider the probability distribution related to the domain of the possible deviations.

Analytically, in order to perform this the risk analysis, it is convenient to directly refer to the probability distribution of the specific \(i\)-th KPI, denoted as \(f(y_{i(t)})\).

The shape and the dispersion of this probability distribution directly depend on the firm’s decisions formalized by the plan’s target value. However, it is not possible to adopt general (parametric) distribution hypotheses, as the shape of the specific \(i\)-th KPI varies significantly from firm to firm, based on the nature of the plan and its riskiness.

Furthermore, from the dynamics point of view, dependence between the probability distributions relating to the single time horizons is assumed since, during the implementation of the plan, the extent of the possible deviations depends on those that have occurred previously. This involves the need to consider the joint probability distribution for the entire horizon of the plan, from \(t = 1\) to \(t = T\).

Based on these considerations, the joint probability distribution for the entire horizon of the plan of the specific \(i\)-th KPI is indicated by:

\[
f(y_{i(t=1)}, \ldots, y_{i(t=T)}; \Phi_{i[t=1; t=T]} | I_{t=0})
\]

In particular, this joint distribution, denominated MtTI based risk profile, is dependent on the plan’s objectives \(\Phi_{i[t=1; t=T]}\) and it is conditional on the current information set \(I_{t=0}\).

Since for each KPI the deviations are caused by specific risk factors, defined as the vector \(x_{k(t)}\), the joint probability distribution over the entire horizon of the plan can be modelled according to these risk factors. In analytical terms:

\[
f(y_{i(t=1)}, \ldots, y_{i(t=T)}; \Phi_{i[t=1; t=T]} | I_{t=0}) = h_{i(t=0)}(x_{k(t=1)}, \ldots, x_{k(t=T)})
\]

However, it is not possible to specify a general functional form for \(h_{i(t=0)}\), as the risk profiles of the specific \(i\)-th KPI vary significantly from firm to firm, based on the nature of the plan.

It should be noted that this Component 2 of the MtTI is characterized by the following innovative element: in the definition of the KPIs’ probability distribution, the target values defined subjectively by the firm are analytically introduced as its essential feature. In this way, the risk profile of the KPIs adopted in the firm’s plans analytically depends on the decisions of the firm formalized in the targets.

The implications of the characteristics of the deviations’ probabilistic model will be analysed in paragraph 3.3 (Sources and measurement of MtTI).

For further comments see the sub-paragraph 3.3.5 “Comments to component 2” below.

### 3.2.3 Component 3: ex ante critical deviations for stakeholders

In the domain of the possible deviations (see Component 2 above) it is necessary to identify which subset generates critical impacts on stakeholders. The possible deviations included in this subset are defined as critical deviations for stakeholders. To identify these critical deviations, it is necessary to introduce an additional information component consisting of the following five elements:

1. **List of stakeholders impacted by the \(i\)-th KPI**
The value assumed by the specific $i$-th KPI can produce different impacts on different stakeholders. The MiTI must therefore define the complete list of impacted stakeholders, considering the stakeholders both internal and external to the firm. The generic stakeholder is indicated by $j$.

2. **Impacts on stakeholders generated by deviations**

Let be $w(j)_{i(t)}$ the impact on the firm’s $j$-th stakeholder generated by the deviations of the specific $i$-th KPI in the specific time horizon $t$, which is defined by the function:

$$w(j)_{i(t)} = g_{i(t=0)} \left( y_{i(t)} - \varphi(y_{i(t)}) \right)$$

with $t = 1, ..., T$, for considering the overall time horizon of the plan. The impact is considered only if the firm is able to demonstrate that at time $t = 0$ the features of the impact itself are identifiable *ex ante* with certainty. In other words, at time $t = 0$ it must be possible to fully specify the function $g_{i(t=0)}$.

3. **Impacts on stakeholders generated by target**

Let be $\widehat{w}(j)_{i(t)}$ the impact on the firm’s $j$-th stakeholder generated by the target value of the specific $i$-th KPI in the specific time horizon $t$. This is a particular case of the previous definition by setting: $y_{i(t)} = \varphi(y_{i(t)})$. Therefore, analytically we have:

$$\widehat{w}(j)_{i(t)} = g_{i(t=0)}(0)$$

With $t = 1, ..., T$, for considering the overall time horizon of the plan.

4. **Ex ante available interventions to improve the impact of deviations on stakeholders**

Let be $\Omega_{n(t=0)}$ the vector of parameters describing the characteristics of the specific $n$-th intervention that can be adopted by the firm to improve the impact on stakeholders generated by the deviations. The intervention is considered only if the firm is able to demonstrate that the specific intervention is currently available, at time $t = 0$, and that it can be adopted without any restrictions up to the specific time horizon $t$. This feature of the intervention is defined *ex ante* availability.

The list of all the *ex ante* available interventions that can be adopted by the firm is indicated by:

$$\Omega_{(t=0)} = \{ \Omega_{n(t=0)} \} \quad \text{with} \quad n = 1, ..., N$$

A classic example of intervention to improve the impact of deviations is to absorb the loss generated by deviations using the economic capital. In this general definition, the adoption of the economic capital is interpreted as follows. Let us consider the Profit & Loss KPI and let us assume that its target value is a positive profit. The impact generated by this target value on a certain stakeholder, for example a bank, is the firm’s solvency. Therefore, deviations from the target representing a loss would generate negative impacts on the same stakeholders, namely the bank, as the occurrence of a loss would lead to the firm’s insolvency. Adopting the economic capital as an intervention to manage these deviations makes it possible to absorb the loss and improve the impact on stakeholder, as the impact on the bank would return to be the firm’s solvency (in other words, the improved impact would return to be equal to that generated by the target value consisting of a positive profit).
Nevertheless, the adoption of the economic capital is not suitable as an intervention for managing the impacts of deviations of other KPIs relating to other types of firm performance, such as liquidity.

However, this general definition also allows to consider liquidity KPIs and the specific interventions to be adopted, in this case the liquidity buffer (instead of the economic capital), to improve the negative impacts generated by some liquidity deviations.

Let us consider the free cash flow KPI and let us assume that its target value is a positive free cash flow. The impact generated by this target value on a certain stakeholder, for example a firm’s supplier, is the regularity of the firm’s payments.

Therefore, deviations from the target representing a negative free cash flow would generate negative impacts on the same stakeholders, namely the firm’s supplier, as the occurrence of a negative free cash flow would lead to a past due event. Adopting the liquidity buffer as an intervention to manage these deviations makes it possible to avoid the past due event and improve the impact on stakeholder, as the impact on the firm’s supplier would return to be the regularity of the firm’s payments (the improved impact would return to be equal to the one generated by the target value consisting of a positive free cash flow).

This general definition also allows to consider engineering KPIs (for example, GHG Scope 2 emissions) and the related interventions to be adopted to manage the impacts of deviations from the targets, which are interpreted in terms of transition risk management (for further details on this topic see section 5).

This general definition therefore also allows to consider the interventions for improving the impacts of ESG sustainability performance.

5. Certainty of the features of the impacts improved by the intervention

Let be $w(j)^{\Omega_{n(t=0)}}_{i(t)}$ the improved impact on the firm’s $j$-th stakeholder in the specific time horizon $t$, generated by the intervention $\Omega_{n(t=0)}$ adopted by the firm after a deviation occurred. The improved impact is indicated by the function:

$$w(j)^{\Omega_{n(t=0)}}_{i(t)} = g_{i(t=0)}^{\Omega_{n(t=0)}} \left( y_{i(t)} - \varphi \left( y_{i(t)} \right) ; \Omega_{n(t=0)} \right)$$

with $n = 1, ..., N$ and $t = 1, ..., T$

The improved impact is considered only if the firm is able to demonstrate that the adoption of the intervention generates an impact for which, at time $t = 0$, its features are identifiable ex ante with certainty. In other words, at time $t = 0$ it must be possible to fully specify the function $g_{i(t=0)}^{\Omega_{n(t=0)}}$.

The set of all the $N$ possible improved impacts $w(j)^{\Omega_{n(t=0)}}_{i(t)}$, that the firm can demonstrate ex ante to be able to generate through the adoption of the related interventions for managing the deviations, is indicated by:

$$W_{i(t)}^{\Omega} = \left\{ w(j)^{\Omega_{n}}_{i(t)} \right\}$$

with $n = 1, ..., N$ and $t = 1, ..., T$

On the basis of these five information elements discussed above, in the domain of the possible deviations (Component 2) the two following auxiliary subsets $L_{i(t)}(y_{i(t)})$ and $L_{n(t)}^{\Omega}(y_{i(t)})$ can be identified:
Let be \( L_{(t)}(y_i) \) the subset of deviations generating the same impact of the target on the stakeholders \( \tilde{w}(f)_{(t)} \). This subset it is analytically defined as follows:

\[
L_{(t)}(y_i) = \{ (y_i(t) - \phi(y_i(t))) : g_{(t=0)}(y_i(t) - \phi(y_i(t))) = \tilde{w}(f)_{(t)} \}
\]

For simplicity’s sake, it is not considered when the impacts are different from the targets’ impacts, but they are in any case substantially similar to them from the stakeholders’ point of view. This case would only burden the definitions without significant implications.

Every deviation \( (y_i(t) - \phi(y_i(t))) \) which does not belong to the subset \( L_{n(t)}(y_i) \) involves, therefore, unexpected and potentially harmful impacts on stakeholders. If such impacts occur, the intervention \( \Omega_{n(t=0)} \), selectable from the list \( \Omega_{(t=0)} \), must be adopted, if it exists, to improve the impact in order to preserve the stakeholders.

Let be \( L_{n(t)}(y_i) \) the subset of deviations that are managed through the adoption of the intervention \( \Omega_{n(t=0)} \), generating an improved impact \( \tilde{w}(f)_{(t)}^{\Omega_n} \) which is equal to the impact of the target on the stakeholders \( \tilde{w}(f)_{(t)} \). This subset it is analytically defined as follows:

\[
L_{n(t)}^{\Omega}(y_i) = \{ (y_i(t) - \phi(y_i(t))) : g_{(t=0)}^{\Omega_n}(y_i(t) - \phi(y_i(t)); \Omega_{n(t=0)}) = \tilde{w}(f)_{(t)} \}
\]

For simplicity’s sake, it is not considered when the impacts are different from the targets’ impacts, but they are in any case substantially similar to them from the stakeholders’ point of view. This case would only burden the definitions without significant implications.

The definition of the two auxiliary subsets \( L_{(t)}(y_i) \) and \( L_{n(t)}^{\Omega}(y_i) \) allows to define the subset of the \textit{ex ante} critical deviations for stakeholders:

Let be \( C_{(t)}(y_i) \) the subset of \textit{ex ante} critical deviations that produce an impact, improved or not, which is different from the impact of the target on the stakeholders \( \tilde{w}(f)_{(t)} \).

Thus, these critical deviations do not belong neither to the subset \( L_{(t)}(y_i) \) nor to the subset \( L_{n(t)}^{\Omega}(y_i) \). Therefore, the subset of the \textit{ex ante} critical deviations is analytically defined as follows:

\[
C_{(t)}(y_i) = \{ (y_i(t) - \phi(y_i(t))) : (y_i(t) - \phi(y_i(t))) \notin \{ L_{(t)}(y_i) \cup L_{n(t)}^{\Omega}(y_i) \} \}
\]

It should be noted that all deviations for which the firm is unable to demonstrate at time \( t = 0 \) the certainty of the features of the generated impact, whether improved or not, are included in the critical deviations’ subset.

Therefore, in summary, the criticality of the deviations concerns both:

- the generation of impacts significantly different from the impact of target, which the firm is unable to improve by any available intervention; and
- the uncertainty about the features of the generated impact.

To consider the entire time horizon of the plan, from \( t = 1 \) to \( t = T \), the analysis of the impacts generated by the deviations must be extended from a single-period logic to a multi-period logic. According to the single-period logic, reference is made to a chain of two causal relationships:
• The risk factors that affect the KPI cause deviations from the targets, according to the abovementioned function:

\[ h_i(t=0)(x_k(t=1)) \]

• The deviations generate impacts on the stakeholders, according to the abovementioned function:

\[ g_i(t=0)(y_i(t=1) - \phi(y_i(t=1))) \]

If other subsequent periods are considered, however, the impact generated in the first period is no longer the final result of the analysis, but its dynamic effects must also be considered. The previous chain of causal relationships must therefore be extended to consider that the impact generated by a deviation in one period (that is, the final result of the single-period logic) can cause other types of deviations in subsequent periods, thus transforming itself into a new risk factor which amplifies the possibility of further deviations from the targets. This transformation is called the "long-run risk effect".

The multi-period logic therefore refers to a chain of three causal relationships:

• The risk factors that affect the KPI cause deviations from the targets.

• The deviations generate impacts on the stakeholders.

• The impacts on the stakeholders, indicated by \( w(j)_{i(t=\tau)} \), are transformed over time into new types of risk factors affecting the KPI, indicated by the vector \( x_{k^*(t>\tau)} \), which can therefore cause other deviations in subsequent periods. This third causal relationship is a transformation function that is called "long-run risk effect" and is defined as follows:

\[ x_{k^*(t>\tau)} = v_i(t=0)(w(j)_{i(t=\tau)}) \]

For the analysis of the prospective performance of a firm and its impacts on stakeholders along the time horizon of a plan, the long-run risk effect is fundamental because it highlights that an initial deviation has significant amplifying effects. By applying the single-period logic, these amplifying effects would not be taken into consideration, thus underestimating the risk of the plan itself and therefore limiting the awareness of its impacts.

Therefore, it can be concluded that the risk analysis must focus on the deviations from targets considering both the causes and the impacts that are generated. However, when moving from a single-period to a multi-period logic, it is also necessary to consider the long-run risk effect, according to which the impacts that are generated by the deviations are transformed over time into new causes of deviations in subsequent periods.

For further comments see the sub-paragraph 3.2.6 "Comments to component 3" below.

It should be noted that the Component 3 of the MtTI is characterized by the following two innovative elements: the generalization of both the method for assessing the impacts of deviations (that is, the impacts of risks) and the method for summarizing the characteristics of a risk profile (that is, the domain of deviations).

The assessment of the impacts of the deviations is generalized considering:

• All the typologies of stakeholders that are impacted by a firm’s performances, not considering only those impacted by the financial performances (for example banks, suppliers, etc), but considering also those impacted by the ESG performances.
• All the typologies of impacts on stakeholders generated by deviations.

• The full range of interventions that a firm can adopt in order to improve the impacts of the deviations on the stakeholders.

In particular, considering any type of intervention for any KPI deviation (financial or ESG KPI) caused by any type of risk (risk factor), the steps of the forward-looking risk management’s process have to be generalised in the following way:

1. Assessing the impact generated by the deviation that is caused by a specific risk factor.
2. Comparing this impact with the one generated by the target, to verify any worsening.
3. If the comparison shows that the impact generated by the deviation must be improved, an appropriate intervention to manage the risk factor that caused the deviation has to be adopted.

• All the different time periods in a long run perspective for considering the overall time horizon of the firm’s plans.

Based on this general assessment of the impacts on stakeholders generated by the deviations, the definition of Component 3 also introduces a generalization of how to summarize the characteristics of a risk profile (that is, the deviation domain) for all the KPIs of interest.

In fact, for each KPI the domain of the possible deviations (Component 2) is divided into two subsets:

• deviations that generate impacts on stakeholders, whether improved or not, whose features are identifiable ex ante with certainty and equal to the impact generated by the target value.

• critical deviations, which generate negative ex ante impacts, or which are characterized by the uncertainty of the generated impact.

The process of defining the MtTI contents, described in paragraphs 3.2.1, 3.2.2 and 3.2.3, is summarized in the following figure:

Figure 1
The 3 components of the definition of MtTI are commented and exemplified below.

3.2.4 Comments to Component 1: target values
The target value that the firm is pursuing is not the expected value (intended as the first moment or mean) of the KPI’s probability distribution. The expected value, being defined on the basis of the integral of the entire probability distribution, is affected by the shape of the distribution, therefore by the risk of not reaching the target itself. For further details see paragraph 3.3 below. Furthermore, it should be noted that the target does not indicate what will happen, as it is not a forecast, but what the firm intends to do in predefined future time horizons. For the implications of this difference, see section 4.

3.2.5 Comments to Component 2: domain of the possible deviations
Considering explicitly the risk is a core component of idiosyncratic forward-looking information. In MtTI the risk is represented by all the possible deviations from the target value, differentiated by magnitude and severity of the impacts.

A two-tail representation of risk is adopted (two-sides risk), considering both the deviations below the target and the deviations above the target. In fact, it is limiting to use a single-tail representation of risk (one-side risk) in a long run perspective, considering all the horizons on which a business plan is articulated.

Every type of deviations, both the one with a negative interpretation and the one with a positive interpretation in terms of impacts on a given time horizon, can generate impacts with opposite interpretation on subsequent time horizons.

For example, with regard to the Revenue KPI, deviations above the target in the first period of the plan can lead to significant problems, such as low production quality and strong marginal cost growth to increase production capacity, which can generate negative impacts on revenues in subsequent periods.

Furthermore, it should be noted that the MtTI does not indicate what will happen for each KPI in terms of a point value, but instead limits itself to indicating a range (domain) of possible outcomes for each KPI and the related impacts on stakeholders. The considered risk factors make it possible to explain only a part of the domain of possible deviations and related impacts. Other possible deviations, and therefore other impacts remain unknown as it is not possible to identify ex ante all the risk factors to which the firm will be exposed in the future.

Despite these limitations, the domain of alternative events provided by MtTI allows the firm and its stakeholders to significantly limit the decision-making errors due to the lack of awareness of the extent of the deviations from the targets that the firm may have to face. In fact, only the awareness of a possible event allows a firm to take the necessary decisions to be able to deal with the event, if it will occur. In other words, only this awareness allows a firm to be resilient. Otherwise, a firm can passively suffer the consequences of the event, without being able to react adequately.

3.2.6 Comments to component 3: ex ante critical deviations for stakeholders
With regard to the interventions to improve the deviations’ impact on stakeholders, it has to be highlighted that for different KPIs there are generally different interventions to be taken; moreover, also on the same KPI it is possible to adopt different interventions for different levels of deviation from the targets.
Furthermore, it is necessary to distinguish between:

- the deviations that the firm can manage, based on the interventions currently available (risk capacity), and the deviations that the firm wants to manage (risk appetite) once it has ascertained the possibility of being able to do so.

- the deviations that are mandatory to manage, following specific regulations to protect stakeholders and the deviations that it is discretionary to manage based on the firm’s intentions.

With regard to the impacts improved by the intervention, it has to be highlighted that only the awareness of the certainty of the features of the impact justifies the adoption of the interventions for managing the deviation by a firm.

In fact, only the awareness of the certainty of the features of the impact immediately allows a stakeholder to decide if and how to interact with a firm, making the adoption of the intervention by a firm and its communication useful.

For these reasons, the MtTI focuses only on the interventions for managing the deviations that generate impacts on stakeholders for which the features can be identified in a univocal way. In other words, interventions for managing the deviations that generate certain impacts.

Finally, with regard to the subset of critical deviations, it has to be highlighted that, after having identified it, it is necessary to represent whether the critical deviations in this subset are marginal or how plausible they are. This issue is discussed in the next paragraph 3.4 on the manners of representation of MtTI.

3.3 Dimension 3: Sources and measurement of MtTI

The definition of the contents for every KPI, as discussed in the previous paragraph, involves a significant set of questions and issues about the sources, the collection and the subsequent arrangement of the MtTI. In order to address these complex issues, in this paragraph the following topics will be discussed:

- First of all, the theoretical motivation concerning the identification of the sources of the MtTI, which lead to the following conclusions:
  - historical data (that is, backward looking information) are often non-informative sources and, therefore, are biased sources.
  - expert judgment, defined as the knowledge of managers that have formulated the firm’s plans, is often a necessary source of information in order to obtain an unbiased forward-looking information, but it must be collected in a structured way.

- Subsequently, the sources of information’s characteristics for each of the three components of the MtTI contents, identifying which methods can be adopted to collect and process them.

- Finally, the properties of the MtTI that the identified sources allow to satisfy.

It should be noted that the identification and use of information sources requires particular attention and adequate theoretical foundations in the presence of significant structural breaks such as the Covid-19 pandemic and the recent war in Ukraine.

3.3.1 Theoretical motivations
To introduce the theoretical reasons for identifying the sources of the MtTI, the KPIs' probabilistic model (introduced in component 2 of paragraph 3.2.2) is interpreted in terms of Data Generating Process (DGP)\(^8\) and its characteristics are then analysed. In econometrics, in fact, the observed data are considered drawn from a probabilistic mechanism called DGP. The historical data are assumed to be representative of the DGP from which they are drawn. The interpretation and the usage of the observed data must therefore be deduced from the characteristics of the DGP itself.

To this end, the analysis of the statistical-econometric characteristics of the KPIs' probabilistic model (DGP), describing the future values of KPIs over the firm's plan time horizon, is articulated in the following two topics: marginal distribution characteristics and dynamic characteristics.

1. **Marginal distribution characteristics**

First, the distributional characteristics are analysed at marginal unconditional level, that is, referring to a single KPI at a specific time period.

The marginal unconditional distribution, denoted as \(f(y_{i(t)})\), directly depends on the target value that the firm pursues in a given future horizon and on the risk of its achievement, which affects the severity and the significance of the possible deviations. Consequently, in many cases, the modal value of the probability distribution (denoted by \(\arg\max f(y_{i(t)})\)) can be represented by the target value, especially when the target is easily achievable by the firm.

The distribution shape is generally asymmetric as the deviations are not symmetric. In fact, the deviations that underperform the target value are more likely to occur than the deviations that overperform the target. Other scale indicators, such as the expected value and the median, that are instead affected by the overall shape of the distribution (in particular by its level of asymmetry, as computed on the basis of the integral of the probability distributions), are generally different from the target value. Generally, in the commonest practices, these different scale indicators are confused and considered as synonyms because it is usual to implicitly assume a symmetric distribution (often Gaussian), for which mode, median and expected value coincide and are independent of the level of dispersion and asymmetry of the distribution.

Finally, the level of dispersion and the tails of the marginal distribution depend on the severity of the possible deviations and on the type of risk factors causing them.

2. **Dynamic characteristics of the DGP**:

The dynamic characteristics of the DGP over the firm's plan horizon are now analysed. For each KPI of interest, the distributional characteristics at marginal unconditional level (that is, referred to a specific time period) change significantly over the time, in terms of both scale indicator and level of dispersion. This time variability is due to the dynamics of the target value and to the risk on its achievement, which, in turn, influences the severity and significance of the possible deviations. In fact, the target value set by the firm changes systematically over the time according to the dynamics of the KPIs defined in the firm strategy and included in the multi-year plan.

The significant variability over the time of the unconditional distributions characteristics involves that the stochastic process \(y_{i(t)}\), which describes the evolution of a firm's KPI over the time horizons of the plan, is not stationary. In particular, looking at different distributional

\(^8\) For an introduction to the concept of DGP, see Hendry D. (1995) and Davidson R., MacKinnon J. (2004)
characteristics (scale indicator and level of dispersion), the stochastic process $y_{i(t)}$ is both first-order and second-order non-stationary\(^9\).

The non-stationarity property means that every empirical observation of the KPI value, interpreted as the realisation of a single random variable of the stochastic process $y_{i(t)}$, describes the outcome of pursuing a different target and of facing a different risk for achieving that target.

Furthermore, from a dynamic point of view, dependence is also assumed among the marginal distributions relating to specific time periods since, during the implementation of the plan, the extent of the possible deviations depends on those that have been previously realized. Therefore, $y_{i(t)}$ has to be defined as an autocorrelated stochastic process.

It should be noted that the non-stationarity of the second order and the autocorrelation structure of the stochastic process $y_{i(t)}$ is also motivated by the long-run risk effect introduced in paragraph 3.2.3, according to which an initial deviation has significant amplifying effects on the distributions of the deviations of the KPI relating to subsequent periods in the plan, since the impacts that are generated by the deviations are transformed over time into new risk factors. The long run risk effect is therefore a source of second order non-stationarity.

It should be noted that the non-stationarity of the KPIs it is even more relevant in the presence of significant structural breaks such as the Covid-19 pandemic and the recent war in Ukraine.

The characteristics of the DGP, as described above in this paragraph, lead to the following conclusions regarding historical data as a source of information for the contents of the MtTI (target, risk profile, critical deviations for stakeholders) on the KPIs considered in firms’ plans:

- The non-stationarity of KPIs means that each single historical data only describes the outcome of pursuing a specific past target and of managing any deviations from it. Therefore, the historical data does not contain any information on new target currently pursued by a firm and on the risk the firm is currently facing. The historical data (that is, backward-looking information on KPIs) therefore represent a biased information with respect to the pre-established targets that a firm currently aims to pursue in the future time horizon. In other words, this bias is due to the fact that the backward-looking information refers to past targets and it does not contain any relevant information on the targets that a firm aims to pursue in the future time horizon.

- Moreover, the second-order non-stationary characteristic means that historical data generally are a biased information also with respect to the future possible deviations from targets that a firm has to face. Therefore, the possibility of obtaining unbiased estimates on the future KPIs risk profile from historical observations is limited, as historical observations may be non-informative on the forward-looking risk profile.

In conclusion, from the foregoing, it is highlighted that historical data often constitute a biased source of information and therefore other information sources must necessarily be adopted.

The characteristics of the DGP, as described above in this paragraph, lead to the following conclusions regarding expert judgment as a source of information for the contents of the MtTI (target, risk profile, critical deviations for stakeholders) on the KPIs considered in firms’ plans:

\(^9\) For further details see Hamilton J. (1994)
• An essential element in the analytical definition of the DGP, as discussed in paragraph 3.2.2, is the vector $\Phi_{[t=1:T]}$, containing the target values for all the plan's time periods. These targets are defined by the firm's management; thus, these target values can be provided only by the firm's managers.

• Furthermore, another essential element in the analytical definition of the DGP are the deviations from the targets and their causes (risk factors). Considering the limited relevance of the historical data discussed above, even the evaluation of the deviations can only be provided by managers who know the firm's business and have participated in the formulation of the plan.

On the basis of these considerations, the key source of the MtTI is constituted by the expert judgment, defined as the knowledge of the firm's managers, often unstructured, based on which the assumptions of the plans are set. In fact, the internal managers know the business in detail, they have taken part in setting the targets and they can therefore express motivated views on the magnitude of the possible deviations, their causes and their effects.

However, in order to be used as a source of the MtTI, expert judgment must be structured for supporting the firm's decision-making process, its stakeholders and the firm's reporting.

In particular, in order to obtain a structured expert judgment, there are two issues that must be addressed: the expert judgment quality and the method of collection.

As regard the expert judgment quality, it is obtained and improved by two conditions:

• The systematic monitoring and empirical validation of the contents of the MtTI, which is carried out by comparing the realised performance and the domain of the deviations identified ex ante through expert judgment. In particular, the quality of the expert judgment can be evaluated with the same techniques of empirical validation (also called, backtesting methods) used for evaluating the models calibrated on the historical data; thus, the quality of the two information sources can be directly compared.

• The existence of legal consequences of its contents. These consequences are introduced by several recent regulations, discussed in paragraph 1.2, which require the disclosure of the firm's plans making them binding. These legal consequences are reflected both in the responsibility of the firm's board of directors and in the economic effects of the covenants on the targets included in the contracts for financing the plans.

As regards the collection, expert judgment must be collected directly from the firms' managers. The conditions for carrying out this direct collection, in a structured and traceable way, are:

• The availability of web-based platforms (not unstructured file-based solutions, like Excel™ spreadsheets) in order to formally involve all the firm's managers.

• The adoption of self-explanatory and intuitive interfaces, in order to reduce the training and the effort to provide information, removing the need of assistance to all the experts involved, which is expensive and time consuming.

• The appreciation, from the involved managers, of the value and the benefits generated by the collected information for the firm, in order to justify the collection costs and times.

3.3.2 Sources of information
On the basis of the theoretical motivations discussed above, the details of the sources of information for each of the three components of the MtTI contents, that have been defined in paragraph 3.2, will now be discussed.

1. **Sources of information for Component 1 (target values)**

   The target values for each KPI must reflect the firm’s intentions and its views on the future. The firm’s views on the future are formalized in the assumptions system of the firm’s plan. These assumptions are formulated mainly on the basis of the expert judgment of the firm’s management.

   It should be noted that it is not sufficient to define the targets on the basis of historical data without justifying the reasons why these historical data are representative of the firm’s intentions about the future time horizon of the plan. These justifications are also based on management’s expert judgment.

2. **Sources of information for Component 2 (domain of the possible deviations)**

   The risk to which a firm will be exposed in achieving the targets must also be explicitly considered in the assumptions system of a plan. This risk is analytically represented for each KPI by the domain of the possible deviations from the target and by its causes (risk factors). The explanation of the causes is fundamental in order to identify the interventions to be adopted to improve the impacts of the deviations on the stakeholders. The magnitude of the deviations in the domain is assessed on the basis of both historical data and management’s expert judgment.

   The causes of the deviations are instead identified mainly on the basis of management’s expert judgment.

   In addition, an exhaustive risk analysis (and therefore exhaustive forward-looking information) also requires the assessment of the probability distribution relating to the domain of the possible deviations. Since the historical data is not often informative, for the theoretical reasons provided above, and since such data is not often even available in many firms, the probability distribution of the KPIs can be assessed on the basis of the manager’s expert judgment.

   Adopting expert judgment, instead of historical data, as the source of information to evaluate a probability distribution, is a well-established solution in the probability theory literature; this solution is based on the concept of subjective probability\(^{10}\).

   It should be noted that subjective probability distributions and related risk indicators can be obtained relying only on expert judgment, without using estimation techniques that combine expert judgment and historical data such as Bayesian estimation methods. Multiple scientific methodologies have been developed to evaluate subjective probability distributions\(^{11}\).

---

\(^{10}\) For further details see De Finetti B. (1990) and O’Hagan A. (2019)

\(^{11}\) A solution for evaluating subjective probability distributions based on expert judgment, which solves some of the best-known problems in the literature and in the application practices, has been developed by KnowShape, a research spin-off of the Ca’ Foscari University of Venice. In particular, the solution implemented by KnowShape allows to collect expert judgment in a structured way and to estimate subjective risk profiles using a hypothesis-free approach on distributions. For more information see www.knowshape.com
The risk analysis based on expert judgment allows to overcome the following limits of traditional risk models calibrated on historical data (that is, backward looking information):

- **Bias**: the analysis of the DGP of the KPIs underlines that the deviations from the past targets are often not informative about the future deviations from the targets currently pursued by a firm. The adoption of expert judgment allows to consider the current evolution of risk factors according to the updated knowledge of the firm’s management.

- **Inertia**: the risk measures estimated on historical data, being often not very reactive to the value of the last observed data, are significantly inertial. The adoption of expert judgment, on the other hand, makes risk assessment very responsive to the market context and adhering to business development.

- **Cost**: the calibration of traditional risk models on historical data is very expensive and cumbersome in terms of process. The risk models based on historical data adopted for example by banks (which are subject to the regulatory constraints of the sector) are impractical for many firms, especially SMEs. Adopting structured expert judgment, on the other hand, risk can be measured without the need of heavy historical databases, with much lower costs for a firm.

- **Availability / existence of historical data**: the risk assessment through expert judgment is a general solution to apply, and the only one that can be adopted when historical data do not exist or are not available to the firm. The assessment of ESG transition risk represent a relevant instance of lack of historical data. In fact, the transition to a sustainable economic system is only at the beginning and historical data relating to this process are very few if not non-existent.

- **Completeness of information**: the adoption of expert judgment allows not to leave out the knowledge of management, which is often complementary to the content of historical data, and therefore to obtain a complete set of information on forward looking risks.

- **Structural breaks**: historical data do not allow to represent the consequences of structural breaks on the risk profile and therefore that do not support decision-making processes in the most urgent and critical situations for a firm and its stakeholders. A very significant example of these issues is the use of historical data to estimate the risks following Covid and the war in Ukraine. Instead, the adoption of expert judgment makes it possible to represent the consequences of structural breaks on risks according to the most updated knowledge of the firm’s management and thus to support decision-making processes in the most urgent and critical situations for a firm and its stakeholders.

From what has been discussed above, it can be understood how the structured expert judgment can provide significant contributions and developments to risk measurement techniques.

A more detailed discussion about the adoption of expert judgment, not limited only to the risk analysis as above, is carried out in the next paragraph 3.3.3, where the properties that the sources of the MtTI allow to satisfy are presented.

By only using expert judgment, probability distributions and therefore risk indicators can be obtained that have the same analytical characteristics (e.g., confidence intervals on the deviation domain) as the outputs produced by classical risk models calibrated on historical data. Adopting only expert judgment therefore does not bind to more limited or more approximate risk assessments from an analytical point of view.
The risk estimation results obtained by only using expert judgment are therefore directly comparable with the risk estimation results obtained using traditional models calibrated on historical data. In particular, the same empirical validation techniques (back-testing methods) can be used for the results obtained with both information sources.

It should be noted that Component 2 of the MtTI, for what concerns its sources, is characterized by the following innovative elements:

- the theoretical justification for which the analysis of the forward-looking deviations risk must be based mainly on subjective probability distributions which can only be obtained adopting the management's expert judgment (that is, the same knowledge that guides business decisions) as the source of information.
- the theoretical justification for which the analysis of the forward-looking deviations risk must not be based in most cases on risk models estimated on historical data, as this source of information is non-informative and biased.

3. Sources of component 3 (ex ante critical deviations for stakeholders)

The expert judgment of a firm’s management is the main source of information for indicating:

- The types of impacts generated by the deviations.
- What interventions to adopt for improving the impacts of the deviations on the stakeholders.

Consequently, the identification of the critical deviations generating critical impacts on stakeholders is also based on the management's expert judgment as the source of information.

3.3.3 Properties that the sources of MtTI allow to satisfy

The properties that the identified sources of the MtTI allow to satisfy will now be analysed. In particular, the identified sources of the MtTI allow to satisfy the following four properties:

1. Exhaustiveness conditional to current information set $I_{t=0}$
2. Reliability conditional to current information set $I_{t=0}$
3. Unbiasedness conditional to current information set $I_{t=0}$
4. Timeliness and updatability

It should be noted that only the simultaneous satisfaction of these four properties makes it possible to obtain forward-looking idiosyncratic information suitable for supporting the decision-making processes of firms and their stakeholders.

1. Property 1: Exhaustiveness conditional to current information set $I_{t=0}$

The property of exhaustiveness is defined as follows: forward-looking idiosyncratic information must consider and provide awareness on the possible alternative outcomes which can characterize business activity. These possible alternative outcomes are identifiable on the basis of the current information set $I_{t=0}$.

The forward-looking information’s content cannot consist only of a single specific scenario (e.g., the expected outcome, the most probable scenario, or a single forecast).

In fact, if this scenario does not occur (which is very likely), the impacts of all possible alternative scenarios remain completely unknown both for the firm and for its stakeholders, severely limiting their decision-making process.
In the forward-looking information, it is therefore necessary to overcome the reference to a single forecast or few scenarios and move on to consider the domain of all the possible scenarios that may occur. To be aware of the impacts that may occur in the future, for each KPI of interest for the firm the MtTI considers the domain of all possible future events, that are the target value the firm is pursuing (Component 1 defined in paragraph 3.2.1) and the domain of the possible alternative deviation from the target, describing the risk (Component 2 defined in paragraph 3.2.2). The risk profile is therefore an essential element for obtaining exhaustive forward-looking information. Therefore, these two components, which are identified mainly on the basis of structured expert judgment, allow the MtTI to satisfy the property of exhaustiveness. It should be noted that the exhaustiveness refers only to events that can be identified on the basis of current information, acknowledging the uncertainty and the impossibility of knowing all the possible future events.

2. Property 2: Reliability conditional to current information set \( I_{t=0} \)

The property of reliability is defined as follows: for each KPI, the idiosyncratic forward-looking information must provide specific evidence on the following three topics:

a) **Reliability of the target values set by the firm**: evidence must be provided, on the basis of the current information set \( I_{t=0} \), on what are the binding commitments for the firm on the declared targets.

   This evidence is required because the targets of the firm can be set too optimistically or can be biased for opportunistic reasons.

b) **Reliability of the possible deviations (risk)**: evidence must be provided, on the basis of the current information set \( I_{t=0} \), on what are the causes of the specific levels of deviations considered.

   This evidence is required because the experts can provide biased information on the possible deviations, either intentionally or due to an inadequate perception of the risks implicit in the firm targets. This inadequate perception, in the scientific literature, has been named “disaster myopia” (see Haldane, 2009).

c) **Reliability of the impacts on stakeholders**: evidence must be provided, on the basis of the current information set \( I_{t=0} \), on the ex ante certainty of the features of the impacts generated both by the target and by the deviations. The evidence on the impacts generated by the deviations must concern both the impacts generated directly by the deviations and the impacts improved by the firm through the activation of an appropriate interventions.

   This evidence is required because the different impacts of the deviations are not always identifiable ex ante with certainty. In fact, a firm may not be able to know ex ante how it will manage the possible deviations, because it does not know ex ante whether it will be able to implement an intervention to manage those deviations.

In the definition of the contents and sources of the MtTI, previously discussed, the following elements are considered that allow to satisfy the property of reliability:

a) **Reliability of the target values set by the firm**: due to the various recent regulations described in paragraph 1.2, the targets set by the firm entail legal consequences, which make the firm’s plans binding and require such plans to be disclosed. The targets set by the firm also entail
economic effects due to the covenants on the targets included in the contracts for financing the plans.

b) Reliability of the possible deviations (risk): the structured collection of information on the deviation domain requires the identification of the causes (namely, the risk factors) of the different levels of deviation.

The explanation of the causes of the deviations, supported by documentary evidence, is necessary for giving to stakeholders correct and easily interpretable information about the considered deviations. However, it should be noted that the risk factors considered on the basis of the current information set \( I_{t=0} \) allow to specify and qualify only a part of the domain of possible deviations; other possible deviations inevitably remain unknown.

c) Reliability of the impacts on stakeholders: in describing the Component 3 in paragraph 3.2.3, it was seen that in the MtTI an impact is considered only if a firm is able to demonstrate that at time \( t = 0 \) the features of the impact are identifiable \textit{ex ante} with certainty. This applies both to the impacts generated directly by the deviations and to the impacts improved by the firm through the activation of the appropriate intervention. Therefore, for other deviations, the features of the generated impacts remain uncertain.

This information content provides evidence to stakeholders on the type and interpretation of the impacts considered.

3. Property 3: Unbiasedness conditional to current information set \( I_{t=0} \)

The property of unbiasedness is defined as follows: the idiosyncratic forward-looking information must verify that the sources of information (adopted for representing the domain of the future values of each KPI) are not affected by bias factors, that are identifiable on the basis of the current information set \( I_{t=0} \).

To theoretically analyse the unbiasedness of the information content, it is necessary to refer to the non-stationary characteristic of the stochastic process (introduced above in this paragraph) that describes the evolution over time of each firm's KPI. Historical data are always biased if they refer to time periods in which the targets pursued by a firm are different from the current targets that a firm is pursuing. In particular, the bias factor is equal to the difference between the current target value and the past one.

Instead, expert judgment, adopted as the source of the MtTI, it is not biased with respect to the future values of the KPIs because it is directly representative of the targets that the firm is effectively pursuing and of the risks on their achievement, i.e., of the possible deviations that may occur in the future.

The adoption of expert judgment therefore allows MtTI to satisfy the property of unbiasedness.

4. Property 4: Timeliness and updatability

The property of timeliness and updatability is defined as follows: the forward-looking idiosyncratic information for each KPI must be updated very quickly and easily, both in relation to processes and costs, in order to promptly represent the evolution of business and its impacts. The structured expert judgment, adopted as the source of the MtTI, allows:

- To be updated quickly and at low cost, compared to updating historical data.
- To quickly exploit all the new knowledge available in the firm, which would otherwise be neglected. The knowledge of management is often the only source of information available to promptly update the firm’s prospects about targets, risks and impacts on stakeholders.
• To make the risk assessment highly responsive to the market context and consistent with business development.

• To represent the consequences of structural breaks according to the knowledge of the firm’s managers thus supporting decision-making processes in the most urgent and critical situations for a firm and its stakeholders. A very significant example of structural breaks and their consequences can be found in the recent Covid-19 pandemic followed by the war in Ukraine.

The adoption of expert judgment therefore allows MtTI to satisfy the property of timeliness and updatability, also allowing to overcome the recognized limits of historical data from this point of view (inertia, cost, completeness of information, management of structural breaks discussed above in paragraph 3.3.2).

3.4 Dimension 4: Manners of representation of MtTI

This section deals with the manners of representation of the contents of the three components of the MtTI that were defined in paragraph 3.2. Representing and disclosing in a simple and intuitive way the multiplicity of the contents of the MtTI, avoiding many technicalities, is a fundamental condition for a widespread use of the MtTI by the various stakeholders of the firm. Several issues need to be addressed in this regard. The first is that some contents of the MtTI, such as the domain of deviations from the targets, can be represented in many alternative forms. The second is that other contents of the MtTI represent detailed information that must be suitably summarized in order to obtain an effective and easily usable disclosure.

The representation proposed in this paragraph consists of a report divided into four sections that allow to obtain an adequate level of detail while still guaranteeing a summary representation of the contents of the MtTI:

• section a) target (representation of the MtTI’s contents of Component 1)
• section b) deviations from target (representation of the MtTI’s contents of Component 2)
• section c) not critical impacts on stakeholders (representation of the MtTI’s contents of Component 3)
• section d) summary indicators of critical deviations

The representation in the proposed report is a combination of: quantitative information, qualitative information, that motivates and describes the numbers, and references to documentary evidence for firm’s internal purposes and audit purposes.

The 4 sections of the proposed report are analysed below.

3.4.1 Section a) target

This section of the report must include:

• The list of KPIs and the time horizons considered in the plan
• For each specific KPI and time horizon:
The description and reasons of the assumptions on target values. In fact, plans presented without motivating the assumptions are difficult to interpret by the stakeholders.

Only for firm’s internal purposes and for audit purposes: the identification of the documentation justifying the assumptions on the targets, which can also be used as documentary evidence in auditing processes. This documentation must be required by the firm’s internal governance regulations.

3.4.2 Section b): deviations from target

This section of the report, for each KPI and time horizon of the plan, must include:

- The description and reasons of the assumptions on the possible deviations from the targets, considering the whole domain of the possible future values of each KPI of interest, in order to overcome the limits related to partial information deriving from the analysis of one or a few deviation scenarios.

- In describing the assumptions on the deviations, the indication of the risk factors that are the main causes of the deviations (risk identification).

Considering the deviations from the targets and their causes, in formulating the firm’s plans, allows the firm’s top management and its stakeholders to interpret the forward-looking risks in an intuitive and immediate manner. This is due both to the fact that the risks are directly related to the KPIs that already support the firm’s decision-making process and because these risks are simply expressed in terms of deviation from the targets, without introducing more technical metrics that are difficult to understand (e.g., volatility, VaR, Unexpected Loss, etc.). The forward-looking risks thus interpreted are called MtTI-based risks.

- The corridors of values for representing all the possible significative deviations. In fact, the most intuitive way of representing the plurality of the possible deviations is to use corridors of values to summarize the possible deviations. The corridors can be calculated in different ways: as confidence intervals, as intervals defined by interpretable thresholds, etc.

It should be noted that, moving from backward looking to idiosyncratic forward-looking information, the representation of KPIs in the reports can no longer be carried out using single point values but it is necessary to use corridors of values.

- Only for firm’s internal purposes and for audit purposes: the identification of the documentation justifying the assumptions on the deviations, which can also be used as documentary evidence in auditing processes. This documentation must be required by the firm’s internal risk governance regulations.

It should be noted that this section b) of the MtTI dimension 4 is characterized by the following innovative element: prospective reports are introduced in which each KPI is represented by using corridor values rather than point values, calculated according to methodologically founded approaches, thus representing in an intuitive way the possible deviations from the targets that can occur. These corridors constitute the forward-looking risk of the KPIs which is formally included in the reporting.

3.4.3 Section c): not critical impacts on stakeholders

This section of the report includes the impacts that a firm is able to demonstrate, at time $t = 0$, to be identifiable ex ante with certainty and to be not harmful to the stakeholders. It should be noted that this section therefore focuses only on the impacts that are not critical on the basis of the
current information set \( I_{t=0} \). All the critical impacts are instead considered in the following section d).

In particular, this section of the report, for each KPI and time horizon of the plan, must include:

- The impact on stakeholders generated by the target value.
- The subset of deviations generating impacts that are equal (or similar) to the one generated by the target value.
- The subset of deviations for which a firm can and intends to adopt interventions that produce an improved impact that is equal (or similar) to the impact generated by the target value. In particular, according to the definition given in paragraph 3.2.3, for each deviation a firm must report the details on:
  
  a) What intervention it intends to adopt to manage the deviation itself.
  b) The availability of this intervention for the entire time horizon.
  c) The certainty of the consequence by adopting this intervention.

- Only for firm’s internal purposes and for audit purposes: the identification of the documentation justifying the impact assessments, which can also be used as documentary evidence in auditing processes. This documentation must be required by the firm’s internal governance regulations.

It should be noted that this section c) of the report represents a generalization of the Risk Appetite Statement, as:

- The firm’s Risk Capacity is represented by the interventions adoptable by the firm for generating an improved impact that is equal (or similar) to the impact generated by the target value.
- The firm’s Risk Appetite is represented by the subset of deviations (both below and above the target) for which a firm intends to adopt an intervention to generate an improved impact that is equal (or similar) to the impact generated by the target value. In relation to the Risk Appetite the firm must explain, for each KPI, how and why it intends to manage the deviations that represent the risks.
- The following elements of the Risk Appetite Statement must be formally included in the governance documents:
  - the qualitative and quantitative description about the interventions adopted by the firm.
  - the deviations that can be managed by the different interventions.
  - the indication of limits, responsibilities and roles for managing the deviations.

### 3.4.4 Section d): summary indicators of critical deviations

In this section of the report, for each specific KPI and time horizon of the plan, a summary assessment about the significance of the critical deviations must be provided. All the others not critical deviations and their impacts are instead included in section c) of the report.

Since there are many possible critical deviations, it is necessary to disclose a summary indicator on their significance; in fact, this indicator is an essential additional information element for understanding the robustness and resilience of the firm’s plans.

Having the probability distribution of the deviations at hand, an effective summary indicator is the probability of the critical deviations.
In fact, probability is associated with ranges of different values (probability is always referred to ranges of values for continuous variables, never to single point values) and is therefore a synthetic way for measuring the significance of the set of multiple possible critical deviations. The intuitive interpretation of this summary indicator is carried out in terms of the percentage of critical deviations on the total of the identified deviations. Referring to the definitions in paragraph 3.2, the analytical definition of the critical deviations probability, for each specific $i$-th KPI and time horizon $t$ of the plan, is given by:

$$\text{Prob}\left(C(t)(y_i)\right) = \int_{C(t)(y_i)} f(y_{i(t)}) \, dy_i$$

where $C(t)(y_i)$ is the subset of ex ante critical deviations that produce an impact, improved or not, which is different from the impact of the target on the stakeholders $\tilde{w}(j)_{i(t)}$.

Therefore, a plan is robust-to-risk if the probability of critical deviations is low. In this case, the negative impacts for stakeholders are also marginal. It should be noted that other statistical measures are useless, as well as being too technical (e.g., density, VaR, volatility, etc.). Only the intuitive value of probability is enough to obtain an assessment of the significance of future critical deviations.

Therefore, to summarize, the MtTI report with its four sections allows to represent:

- The firm’s targets articulated for the entire time horizon of the plans (financial plan, treasury plan and ESG sustainability plan).
- The extent of the possible deviations that may occur, indicating the specific causes.
- The not critical deviations that generate impacts, improved or not, with features that can be identified ex ante with certainty and that are not harmful to the stakeholders.
- The significance of all the other deviations which, on the other hand, are critical in terms of impacts on stakeholders. This significance is summarized by the probability of critical deviations.

An operational platform for producing the MtTI has been developed by KnowShape\textsuperscript{12}

The KnowShape platform allows:

- To collect in a structured way all the necessary sources of information described in paragraph 3.3.
- To lay out all the components of the information content described in paragraph 3.2.
- To produce the report described in paragraph 3.4.

\textsuperscript{12} KnowShape is a research spin-off of the Ca’ Foscari University of Venice. For more information, see previous note 11 and the website www.knowshape.com
4. **MtTI contribution to the improvement of current practices for the use of forward-looking information**

Forward-looking information must be adopted in many areas of application, and it is already the object of many practices, which however have well-known limits. MtTI allows to overcome some limits characterizing the main and currently widespread practices for the use of forward-looking information.

In this section, for each of the practices considered below, the following two topics will be analysed:

- The limits of the practice under analysis, also specifying any new management and regulatory needs that are not currently covered.
- The contributions of MtTI to overcome the limits identified above.

4.1 **The formulation of firm’s plans (business plans, treasury plans, ESG sustainability plans) relying on the point values of KPIs only**

In firms’ plans, the practice of considering only a single future scenario (e.g., base scenario, forecast, etc.) does not provide awareness about the extent of the impacts of all the possible alternative scenarios and it leaves the firm’s stakeholders unknowingly exposed to such impacts.

By contrast, MtTI, by specifying both the target values set by the firm and all the possible deviation scenarios, considers systematically the whole domain of the possible scenarios and provides awareness about the range of the possible impacts.

For further information see paragraph 3.2, in which this characteristic of MtTI has been discussed.

4.2 **Scenario analysis**

The simplest practice to consider the effects of risks is scenario analysis articulated in its various forms (e.g., stress test, sensitivity analysis, etc.). In particular, in formulating firms’ plans, scenario analysis allows to consider deviations.

However, defining individual specific scenarios without explicitly defining their positioning within the deviations’ domain, does not provide awareness about the significance of the analysis of these scenarios. In fact, every single scenario has a very low probability of being realized. Consequently, assessing the impacts of single alternative scenarios, ignoring the others, does not allow to understand which part of the deviation domain is critical for the stakeholders.

By contrast, MtTI considers the whole domain of the possible deviations, and it allows to identify the threshold values for the deviations beyond which the impacts are critical for the stakeholders.

This information allows a firm to identify in advance all the interventions needed to manage the deviations that are necessary to achieve an adequate level of business resilience. Moreover, considering the whole domain provide awareness about the significance of the deviations that are critical for the stakeholders.

For further information see paragraphs 2, 3.2 and 3.4, in which this characteristic of MtTI has been discussed.
4.3 The projection of historical data to estimate the future values of a firm’s KPIs

A widespread practice for producing forward-looking information on firms’ KPIs is the adoption of forecasts. Technically speaking, a forecast is the projection of historical data (backward-looking information) into the future through a model\(^\text{13}\) (e.g., Regression Models, Machine Learning or Artificial Intelligence forecasts).

A forecast can be related to both a point value and an entire probability distribution. It has to be highlighted that, from an interpretative point of view, a point forecast is different from a target that a firm freely defines in its plans. In fact, a point forecast refers to a value realized in the future, while the target is a value that the firm intends to achieve. The two values are logically different because the value realized in the future, with respect to the target, also depends on the risk of the deviations that a firm has to face. From an empirical point of view, the value realized in the future and the target value are equal only when the firm precisely reaches its target value. However, the forecast, which is aimed at identifying the realized value in the future, can be biased. In fact, the future value of a KPI is caused by the business processes for pursuing current targets and for managing deviations. However, the forecasts project in the future the historical information content which is related only to the past targets, and which does not contain any information on the new target currently pursued by the firm. Therefore, the forward-looking information obtained through the forecasting models presents a biased information content with respect to the future values of KPIs since it is based only on historical data that cannot consider the current targets that are to be pursued.

In particular, the bias due to past targets generally does not allow to obtain unbiased forecasts of both the KPIs’ expected point values and the KPIs’ density \(f(y_{i(t)})\).

By explicitly considering only the targets that the firm is pursuing and the risk of possible deviations that may occur in a specific future time horizon, MtTI represents an unbiased information content on the KPIs’ values over the future time horizon.

For further information see paragraphs 3.2 and 3.3, in which this characteristic of MtTI has been discussed.

4.4 The estimation of risk measures based on historical data only

According to best practices in risk management, quantitative risk indicators are estimated from historical data (e.g., default probability estimated on historical balance sheet data or on equity prices). On the other hand, risk assessments conducted without using estimates from data are considered to be of minor importance.

However, historical data are not always informative about the extent of the firm’s possible current and prospective deviations and the causes of such deviations (risk factors), especially after the occurrence of significant structural breaks (namely the Covid-19 pandemic and the Ukrainian war) and changes in business strategies. Therefore, risk estimates based on historical data can be significantly biased.

Moreover, with regard to the new management and regulatory needs, it has to be highlighted that the current risk management practices, based only on historical data, do not allow to cover the following topics:

\(^{13}\) For further information see Hamilton J. (1994) and Davidson R., MacKinnon J. (2004)
Long Run Risk Estimation: new risk factors, such as ESG and demographic risk factors, materialize over a long period of time. Therefore, there are no time series on these risks.

Emerging risk: risk factors with characteristics (probability distribution, interdependence with other factors, etc.) evolving significantly, or risk factors related to new events, never occurred previously. Considering emerging risks is a relevant issue for the correct implementation of an integrated risk management framework and, consequently, for a correct corporate governance. In fact, being able to manage these risks is a necessary condition for integrating risk and strategy, in order to guarantee business resilience, that is, the ability to be prepared to manage unexpected events.

This ability is necessary to conduct business in a context, such as the current one, which is increasingly uncertain and complex. Of course, there can be no time series on these risk factors.

By contrast, MtTI highlights that risk analysis in terms of probability distributions can be based on subjective probability models by adopting the expert judgment of the firm's managers as its only source. This approach is theoretically justified by the scientific literature on the topic. In particular, MtTI systematically considers manager's most recent knowledge about the deviations currently faced by the firm and therefore it allows a prompt update of the risk assessments. Furthermore, MtTI also provides theoretical justifications for the cases in which the use of historical data involves biased risk estimates.

In other words, MtTI indicates that risks can be estimated without historical data, avoiding all the limits that they entail.

For further information see paragraph 3.3, in which this characteristic of MtTI has been discussed.

Finally, as regards the new management and regulatory needs, it has to be highlighted that MtTI allows to cover:

- Risk measures calculated in a structured way even without historical data.
- Long-run risk based on the information of multi-period plans.
- Emerging risks through expert judgment.

4.5 Subjective evaluation of expected frequency and severity to assess risks in the absence of sufficient historical data

Lacking structured historical data, the best practice of risk assessment in ERM systems, both in financial institutions and industrial firms, consists in a judgmental quantification through the “expected frequency multiplied by expected severity” approach.

The frequency refers to the occurrence of the risk factor, while the severity refers to the measurement of the impact on the KPI which is affected by the risk factor. This “frequency-severity” approach is not referable to a risk measure as it quantifies the expected value of the impact on the KPI. By definition, risk refers to unexpected events, while everything that is expected must be separated from risk measures. In risk management terminology this difference is well known14. Referring to the loss impacts on a KPI, risk management terminology distinguishes between the Expected Loss (EL) and the Unexpected Loss (UL), explicitly referring the risk measure to the UL component. Risk, in other words, is the part of the Unexpected Loss that goes beyond the EL value. The “frequency-severity” approach, on the other hand, explicitly refers to the EL.

Furthermore, it has to be highlighted that the difference between the EL and the UL is well known and acknowledged at the accounting and regulatory levels as well. Indeed, the EL is considered in terms of provision, while the UL is considered in terms of economic capital. A relevant example of this difference is credit risk. The IFRS 9 standard requires that provisions must be quantified in terms of forward-looking EL caused by credit risk. Basel III requires banks’ regulatory capital to be quantified in terms of UL caused by credit risk. Therefore, it is highlighted that the result of the “frequency-severity” approach does not constitute a judgmental approximation of a risk measure, but an estimate of the EL, which is a different and complementary concept with respect to the risk measure (UL).

By contrast, MtTI measures risk only in terms of unexpected deviations of the KPI, referring to the risk factor to justify the causes of the deviations in order to choose the intervention for their management. MtTI therefore represents an evolution for risk assessment with respect to the “frequency-severity” practice, as it allows to shift from an Expected Loss (EL) estimate to an Unexpected Loss (UL) estimate by solely relying on the expert judgment of the firm’s managers as its information source. For further information see paragraphs 3.2 and 3.3, in which this characteristic of MtTI has been discussed.

4.6 The adoption of systematic forward-looking information

It is not possible to generically discuss the adoption of “forward-looking information”. In this context, it is necessary to specify whether the forward-looking information is systematic or idiosyncratic. In fact, this distinction has significant practical implications (for further information see paragraph 2).

Systematic forward-looking information does not allow to consider the specific business evolution of a firm. This is due to the fact that while the business evolution of a firm is related to the targets that the firm is pursuing and the riskiness of achieving these targets, the systematic forward-looking information limits itself to considering the component of the business evolution which is given by the future dynamics of the economic system and/or of the firm sector. Systematic forward-looking information is not sufficient to discriminate the specific business evolution of firms, the potential deviations from the targets and the causes of these targets. Therefore, systematic forward-looking information does not allow to identify the most appropriate intervention to manage the possible deviations for each individual firm.

A relevant example of the use of systematic forward-looking information is the current practice in IFRS9\(^{15}\). In fact, in the current practice for IFRS 9, the forward-looking analysis is limited only to the systematic component, which is focused on macroeconomic analysis or, at most, on sector analysis.

The systematic forward-looking information adopted in IFRS 9 is suitable for supporting the management of a credit portfolio, where:

- The common movements due to the systematic components are very significant, as they affect every firm and then portfolio dynamics.
- The specific dynamics of the single firms, due to the idiosyncratic component, tend to compensate each other.

\(^{15}\) For further information see IFRS Foundation – IASB (2017) *IFRS 9, Financial instruments*
Furthermore, as regards the new management and regulatory needs, it should be noted that systematic forward-looking information does not allow to improve the credit risk assessment processes in a forward-looking perspective in order to support the relationship management with the individual firm, as required by the EBA LOM (see paragraph 1.2.1). In fact, this regulation explicitly requires using idiosyncratic forward-looking information.

MTI is explicitly introduced to overcome the drawbacks of systematic forward-looking information. In fact, MTI allows to support the decision-making process of individual firms on the basis of their specificities, directly considering the information on the firm’s targets and the risk on their achievement, rather than only considering the effects of macroeconomic dynamics. For further information see paragraphs 2, and 3.2, in which this characteristic of the MTI has been discussed.

Finally, with regard to the new management and regulatory needs, it should be noted that, since it explicitly considers the firm’s financial plan, MTI allows to improve the credit risk assessment processes in a forward-looking perspective to support the relationship management with the individual firm, as required by the EBA LOM.
5. Definition of MtTI-based primary ESG indicators

In this second part of the paper, it will be described how the MtTI can represent a solution to a very relevant issue today: the definition and the representation of a set of primary ESG indicators, to be adopted in corporate sustainability reporting, and which allow to improve information quality and the comparability between the firm’s ESG performances.

In fact, the definition and the disclosure of ESG information is today one of the main reasons for the use of idiosyncratic forward-looking information.

In this paragraph 5, first the criteria for defining an exhaustive list of primary ESG indicators are introduced, then a formal definition of the contents of primary ESG indicators that meet these criteria is presented.

The analysis of the contribution of these primary ESG indicators to the improvement of ESG disclosure and its use follows in paragraph 6.

It should be noted that the proposal of formal criteria to be met and the analytical definition of the contents of the primary ESG indicators constitute a contribution to the much-debated goal of introducing and promoting an ESG indicators’ global standard to be considered by all firms.

5.1 Criteria to define an exhaustive list of primary ESG indicators

The criteria that must be adopted to identify an exhaustive list of primary ESG indicators that can be adopted as ESG information standards are now proposed.

In fact, such standard ESG indicators must satisfy a system of formal and shared criteria and they cannot derive from drawing up a simple list.

The paper argues that the list of primary ESG indicators must satisfy the following four criteria simultaneously:

- Criterion 1: The primary ESG indicators must refer to common and science-based firm level objectives.
- Criterion 2: The primary ESG indicators must incorporate a forward-looking perspective.
- Criterion 3: The primary ESG indicators must quantify the risks affecting the interdependent ESG and financial performances both in the short-term and in the long-run.
- Criterion 4: The primary ESG indicators must be compliant with the ESG disclosure regulations.

Criterion 1 (common and science-based) motivations

The international sustainability policy objectives are science-based and they are defined at the level of the entire economic system. An example is given by the Paris Agreement.

To achieve these objectives at the system level, however, it is necessary to decline them in a coherent system of objectives defined at the level of individual firms in terms of threshold values to be achieved through the implementation of firms’ sustainability plans.

At the European level an example is given by the thresholds of the technical screening criteria for each single economic activity of the EU Taxonomy, which explicitly incorporate the contents of international agreements 16.

---

16 Following is an example of threshold for a technical screening criterion: Infrastructure enabling low carbon water transport* for the DNSH assessment vs Transition to a circular economy objective:
These firm-level thresholds must therefore be common to all firms (at least at a sector level and/or at the individual economic activity level) and science-based. In fact, the definition of sustainability, and therefore of the sustainability objectives that firms plan to achieve in their transition processes, must be common for all firms and shared by all their stakeholders. If each firm uses its own definition and pursues its own sustainability objectives individually set, a fragmented context is generated that can lead to:

- A limited cumulative impact, which is insufficient to solve the global problems of ESG sustainability.
- The inefficient use of firms’ investments and assets.
- The formulation of transition plans that violate the DNSH (Do No Significant Harm) principle.
- Conditions favourable to greenwashing and sustainability washing phenomena.

By contrary, adopting common sustainability objectives for all firms, which are declined by the international policy goals, allows to:

- Maximize the cumulative impact of the transition process, which is focused on a limited number of objectives.
- Direct the entire economic system in the same shared direction of ESG sustainability.
- Efficiently manage firms’ investments and activities.
- Meet the DNSH (Do No Significant Harm) principle.
- Significantly contain the phenomena of greenwashing and sustainability washing.

Furthermore, the common sustainability objectives for all firms must be based on scientific evidence, which by definition is public and shared by all specialists. Therefore, adopting science-based definitions and objectives certainly helps the sharing and the acceptance of objectives by all firms and their stakeholders. Referring to science-based and public objectives contributes to adopt targets, in the sustainability plans, that are consistent with each other, without a single target having negative impacts on the achievement of the others (DNSH principle).

On the basis of these considerations, the Criterion 1 requires that primary ESG indicators must refer to common and science-based firm level thresholds. In particular, this criterion requires that:

- The typology of each KPI considered in the primary ESG indicators must be the one indicated by the scientific literature.
- Each typology of KPI considered in the primary ESG indicators must be measured according to the methods established by the scientific literature.
- For each KPI considered in the primary ESG indicators, the firm level threshold value that defines the achievement of the sustainability objective must also be the one indicated by the

“At least 70% (by weight) of the non-hazardous construction and demolition waste (excluding naturally occurring material defined in category 17 05 04 in the European List of Waste established by Decision 2000/532/EC) generated on the construction site is prepared for reuse, recycling and other material recovery, including backfilling operations using waste to substitute other materials, in accordance with the waste hierarchy and the EU Construction and Demolition Waste Management Protocol.”
scientific literature. Science-based thresholds are in fact more easily shared and adopted by everyone.

**Criterion 2 (forward-looking) motivations**

Considering only backward-looking information for primary ESG indicators is not sufficient for the following two reasons:

- Historical data cannot be interpreted without the comparison to a reference value that allows to understand whether the observed performance is positive or insufficient in terms of ESG sustainability (for example: how can one tell, without having a reference value, whether a 15% observed reduction in GHG emissions is a positive or insufficient result?).

- In addition, historical data on ESG indicators constitute a partial information because they photograph the current and past situation of a firm without providing any indication on what a firm should do to reach its sustainability targets and in what time horizons.

Therefore, additional information is necessary to allow the interpretation of the historical data for each primary ESG indicators: this information consists of a threshold value which, for Criterion 1, must be science-based and shared by all firms.

Therefore, by combining the current historical information and the science-based threshold required by Criterion 1, the firm’s current ESG sustainability gap is obtained.

The firm’s current ESG sustainability gap with respect to the science-based thresholds allows to interpret and measure the current situation of the firm. Moreover, the firm’s current gap indicates the need or not to undertake a transition process.

Once the current gap has been measured, in order to evaluate a firm from an ESG point of view, it is necessary to know the future path that a firm intends to undertake to bridge the gap and thus achieve an appropriate ESG sustainability performance.

Therefore, the primary ESG indicators must be focused on the specific transition path that a firm intends to undertake. This transition path can be defined only by using idiosyncratic forward-looking information.

In particular, in order to bridge the firm’s current ESG sustainability gap, it is necessary to define the target values for each period in which the transition plan is articulated.

Furthermore, the targets of the ESG transition plan, in order to be credible, must be financially covered. To this end, the coverage of both the costs and the components of fixed assets introduced by the ESG transition plan must therefore be incorporated into the firm's financial plan.

Moreover, also the revenues introduced by the ESG transition plan must be incorporated into the firm's financial plan.

Therefore, according to this criterion, the primary ESG indicators must provide information on:

- The firm’s current ESG sustainability gap with respect to common and science-based thresholds required by Criterion 1.

- The targets and timing that a firm intends to pursue in the future to bridge the current ESG sustainability gap with respect to the thresholds. This second information is forward-looking (in fact, it is linked to a firm’s ESG sustainability plan) and it is essential for assessing the type of impact generated by the firm's targets on the stakeholders and the environment.

- The costs, fixed assets and revenues components directly related to the ESG plan. Even this third information is forward-looking (because it’s linked to the firm's financial plan) and it is essential for assessing the financial coverage of the ESG sustainability plan.
It should be noted that, according to this criterion, backward-looking information is only instrumental for calculating the firm’s current ESG sustainability gap: historical data can be interpreted only if they are linked with a science-based threshold. Furthermore, it should be noted that also for monitoring the correct implementation of the transition plan, the interpretation of the historical data must be conducted with respect to the plan’s target values. Therefore, the thresholds values required by Criterion 1 and the target values declined in the plans (forward-looking information required by this Criterion 2) are also indispensable for evaluating and using the firm’s backward-looking information.

**Criterion 3 (risk-based) motivations**
The ESG targets, required by Criterion 2, may not be achieved due to the materialization of ESG risk factors or other unexpected events, thus generating significant impacts on stakeholders and on a firm’s future performance. Therefore, the extent of possible deviations from the ESG targets that a firm may have to face and the impacts (both on stakeholders and on the environment) generated by such possible deviations must be systematically considered. In fact, the impacts generated by the deviations can be significantly different from those generated by the targets. A firm must be aware of the impacts generated by the deviations in order to be able to avoid them by setting up preventive interventions for managing the possible deviations. Only this awareness allows a firm to be resilient. The analysis of the deviations, considering both the causes and the generated impacts, constitutes the risk-based perspective that Criterion 3 requires to adopt. Consequently, the primary ESG indicators must also consider ESG risk indicators that measure:

- the deviations of the KPIs of the sustainability plan in function of their causes (ESG risk factors);
- and their effects, that are impacts on stakeholders and on the environment.

It should be noted that the analysis of the impacts of the deviations required by this Criterion 3 is complementary to the analysis of the impacts of the plan’s targets required by Criterion 2. ESG risk indicators must be forward-looking, as they must directly refer to the deviations from the plan’s KPI targets.

The risk dimension is essential to provide exhaustive forward-looking information as required by Criterion 2, covering the whole domain of possible future events and their consequences on the stakeholders and on the environment. In other words, the exhaustiveness of the forward-looking information means that it is necessary to consider all the ESG impacts generated by the firm, both by the targets and by the possible deviations.

According to this criterion 3, all the different relevant ESG risk factors must be considered, that are:

- Physical risks, both acute and chronic.
- Transition risks, including specific ESG risk factors that can materialize over multi-year horizons, such as changes in the regulatory or technological context.

The ESG risk indicators to be considered must be declined over all the time horizons considered in the ESG sustainability plan. ESG risks must therefore be assessed both in the short-term and in the long-term.

Long-term risk analysis also requires considering that the effects in more distant years depend on how things will go in the nearest years. This because the impacts generated by the deviations are
transformed over time into additional causes of deviation (that are, risk factors), amplifying the possibility of further and significant deviations from the plan’s targets.

Moreover, the assessment of ESG risk indicators requires also to consider the dependence between the deviations of the KPIs representing the firm’s ESG performance and the deviations of the KPIs representing the firm’s financial performance. This dependence can be both simultaneous (short-term impacts), or distributed over time, with long-term impacts.

The dynamic dependence between the ESG performance and the financial performance applies in both directions of the cause-effect relationship.

Naturally, the ESG performance, due to the impacts it generates on the behaviour of stakeholders (including customers and suppliers) influences the financial performance over time. In addition, the possible deviations from the ESG targets, which may occur during the implementation of the sustainability plan, have significant direct impacts on the firm’s financial KPIs such as changes in costs, in the level of fixed assets and in the debt structure to finance their purchase.

But the dependence in the other direction is also relevant. In fact, the deviations of the financial KPIs can have an impact on the financial coverage of the ESG sustainability plan and therefore on its implementation.

For example, to highlight the relevance of this topic, let us consider the impacts that the financial performance today, with production costs increasing due to the Ukrainian war, generates in terms of slowing down transition plans in the short-term and therefore on firms’ ESG performance.

Therefore, due to this dependence among the KPIs that describe the two types of performance, the primary ESG indicators must consider risks indicators both for the ESG performance and for the financial performance.

Summarizing all the different considerations discussed above, according to this third criterion the primary ESG indicators must also consider ESG risk indicators which provide information articulated as follows:

- The risk indicators must be explicitly referred to the deviations of the KPIs of the sustainability plan, identifying:
  - the causes of these deviations (that are, all the ESG risk factors that affect the firm).
  - the impacts on stakeholders and the environmental dimensions generated by these deviations (that are all impact risks generated by the firm).

- The risk indicators must refer to all the time horizons of the plan, from the short-term to the long-term, also considering the evolution of risk factors over multiple time horizons.

- The risk indicators must measure the effects of the interdependence between ESG performance and financial performance.

**Criterion 4 (compliance) motivations**

According to this criterion, the primary ESG indicators must be compliant with all current regulations on ESG disclosure. The compliance criterion strongly guides the choice of primary ESG indicators.

As already described in paragraph 1.2.2, the main sources of regulation on ESG disclosure are the EU Taxonomy, the European Sustainability Reporting Standards of EFRAG and the Sustainability Disclosure Standards of IFRS – ISSB.

In Appendix 1 on EU Taxonomy, in Appendix 2 on the Standards of EFRAG) and in Appendix 3 on the Standards of IFRS – ISSB, the main contents of these three regulations are first described and
then the specific requirements that the regulations introduce for the definition of primary ESG indicators are analysed.

In particular, the compliance criterion is essential for defining primary ESG indicators that contain target values explicitly referring to thresholds with legal value, and which are therefore the expression of objectives defined, at the level of the entire economic system, by public institutions on the basis of scientific evidence.

It should be noted that the GRI Standards of the Global Reporting Initiative are not considered in the definition of this compliance criterion since, although currently very widespread and considered in sustainability reporting, they are not a regulatory source, but principles defined by a private body.

**Conclusions on the four criteria**

These four criteria introduced above can be satisfied by the MtTI as:

- the definition of the plan’s target values in the MtTI can incorporate common and science-based values as required by criterion 1
- the MtTI explicitly considers the ESG sustainability plans that formally describe the transition process to be implemented in the future according to the forward-looking perspective as required by criterion 2
- the MtTI allows to consider the risks over the entire time horizon of the sustainability plan (from short-term to long-run) as required by criterion 3.
- the MtTI allows to consider all the compliance contents on ESG disclosure introduced by the EU Taxonomy, the European Sustainability Reporting Standards of EFRAG and the Sustainability Disclosure Standards of IFRS - ISSB, as required by criterion 4

Therefore, an analytical definition of the content of primary ESG indicators, adopting the four dimensions of the general definition of MtTI introduced in paragraph 3 and satisfying the four criteria introduced in paragraph 5.1, is introduced below.

The indicators thus analytically defined are called MtTI-based primary ESG indicators and are directly linked to the firm’s ESG sustainability plan.

It should be noted that the MtTI-based primary ESG indicators aim to identify only a minimum list of contents strictly necessary and generally applicable to all firms; naturally, each firm can also consider other complementary ESG indicators to enrich and detail its ESG disclosure.

**5.2 Dimension 1: Scope of application and type of variables to consider**

The MtTI-based primary ESG indicators include the following list of specific variables (KPIs):

1. Pillar E KPIs (Environmental KPIs) defined in the ESG sustainability plan, for each of which the targets and possible deviations must be quantified.

   In particular, for compliance constraints, these KPIs are selected in the technical screening criteria of the EU Taxonomy. Considering these KPIs is necessary for the formulation of the CapEx Plan to reach the regulatory alignment thresholds provided by the EU Taxonomy. Therefore, these Pillar E KPIs differ on the basis of the economic activities carried out by the firm and the related technical screening criteria.
2. Economic and financial KPIs directly impacted by Pillar E KPIs, both in terms of target values and possible deviations. In fact, the implementation of the ESG sustainability plan (and therefore the targets and possible deviations of the ESG KPIs) generates direct impacts on the firm’s prospective financial KPIs (both on the target values and on the possible deviations of the financial KPIs), which must therefore be considered in its financial plan.

In particular, the following components of the financial KPIs, in order to consider and measure the financial impacts of the sustainability plan, must be considered:

- The Turnover component directly related to the ESG plan: the positive or negative changes in turnover deriving from the activities included in the ESG plan. The Turnover component can be expressed either in terms of absolute amount or in terms of percentage of the total.

- The OpEx component directly related to the ESG plan: the operating costs to be incurred to carry out the activities included in the ESG plan. The OpEx component can be expressed either in terms of absolute amount or in terms of percentage of the total.

- The CapEx component directly related to the ESG plan: the costs of fixed assets to implement the transition process envisaged by the ESG plan. The CapEx component can be expressed either in terms of absolute amount or in terms of percentage of the total.

- The component of loans directly related to the ESG plan: the amounts, maturities and typologies of financial instruments adopted to finance the investments envisaged by the ESG plan. The loan component can be expressed either in terms of absolute amounts or in terms of percentage of the total.

It should also be noted that the financial KPIs, in terms of their possible deviations from the targets of the financial plan, also generate direct impacts on the Pillar E KPIs. In fact, these possible deviations of the financial KPIs generate direct impacts on financial coverage of the ESG sustainability plan and therefore on the feasibility of its correct implementation by the firm. Therefore, the direct impacts can be both on the target values and on the possible deviations of the Pillar E KPIs included in the ESG sustainability plan.

For now, the list of ESG KPIs is limited only to Pillar E. In fact, it is not considered appropriate to immediately include variables on Pillars S and G in the list as there is not yet a sufficient and ripe sharing on these issues and, moreover, the related regulatory texts are still being defined.

All indicators are considered from a forward-looking perspective. As regards the Pillar E KPIs, however, their valuation at the backward-looking level is considered preliminary for assessing the sustainability gap on the basis of which the target values are then set.

All KPIs must be assessed both at the level of individual economic activity, according to the requirements of the EU Taxonomy, and at the aggregate firm level, according to the EFRAG and ISSB requirements.

The list of KPIs defined above allows to meet the following criteria to define the list of primary ESG indicators:

- Considering the technical screening criteria of the EU Taxonomy allows to meet the Criterion 1 (common and science-based). This because the technical screening criteria are science-based, and they must be considered by all firms that fall within the scope of the EU Taxonomy.

- Given that the firm’s ESG sustainability plans and the firm’s financial plans are directly considered, the Criterion 2 (forward-looking) is satisfied.
- Given that explicit reference is made to the KPIs that describe both the environmental performance (pillar E) and the financial performance, according respectively to the contents of the EU Taxonomy and the EFRAG and ISSB standards, the Criterion 4 (compliance) is satisfied.

5.3 Dimension 2: Contents of the single variables
The content of the MtTI-based primary ESG indicators, for each single KPI in the list defined above (paragraph 5.2), is divided into the following three components.

5.3.1 Component 1: target values
The general definition of Component 1, provided in paragraph 3.2, is integrated by the details necessary for the application to ESG sustainability.

The individual target values of the Pillar E KPIs are explicitly defined, for each time horizon of the CapEx plan, on the basis of the sustainability gap with respect to the common and science-based thresholds contained in the technical screening criteria of the EU Taxonomy. In particular, the targets in the CapEx plan have to be set in order to bridge the current sustainability gap and thus to achieve a satisfactory sustainability performance.

The individual target values of the financial KPIs are defined in such a way as to incorporate the financial impacts of the ESG sustainability plan into the financial plan.

The Component 1, as defined here, allows to meet the following criteria to define the list of primary ESG indicators:

- Considering the technical screening criteria of the EU Taxonomy allows to meet the Criterion 1 (common and science-based). This because the technical screening criteria are science-based, and they must be considered by all firms that fall within the scope of the EU Taxonomy.
- Directly considering the target values of both ESG and financial plans allows to meet the Criterion 2 (forward-looking).
- Given that explicit reference is made to the target values that must be contained in the CapEx Plan envisaged by the EU Taxonomy, which also meets the EFRAG and ISSB standards, Criterion 4 (compliance) is satisfied.

5.3.2 Component 2: domain of the possible deviations
The general definition of Component 2, provided in paragraph 3.2, is integrated by the details necessary for the application to ESG sustainability.

The deviations from the target of Pillar E KPIs are defined by explaining their causes (risk factors), which must include:

- Physical risk factors, both acute and chronic.
- Transition risk factors that directly violate the assumptions of the firm's ESG sustainability plans. In particular, for the transition risk, both factors external to the firm (such as the current changes in the regulatory context) but also those internal to the firm (such as failing to correctly implement new technologies due to internal staff's lack of training) must be explained.
- ESG risk factors that can materialize over long multi-year horizons.
• Deviations of the financial KPIs that may affect the implementation of the sustainability plan and therefore cause deviations of the Pillar E KPIs

The deviations from the targets of financial KPIs are defined by explaining their causes (risk factors) directly linked to the ESG sustainability plan, which must include:

• Physical risk factors that cause significant unexpected losses.
• Transition risk factors that significantly modify the financial impacts of the firm’s ESG sustainability plans.
• Deviations of the Pillar E KPIs which can directly cause deviations of the financial KPIs.

In the context of this definition of the MtTI-based primary ESG indicators, all the traditional risk factors of the financial KPIs (such as for example commodity risk, operational risk, commercial risk, credit risk, etc.) must not be included as they are independent from the ESG sustainability plan.

It should be noted that in this component 2 the analysis of forward-looking risks is focused on the deviations from the targets, considering only the causes (that are, the risk factors that affect the firm’s performance). The analysis of forward-looking risks regarding the impacts of the deviations is dealt with in the following Component 3.

The deviations of all KPIs must be considered for all the time horizons considered in the ESG sustainability plan. The risks that affect the firm’s performance are therefore assessed both in the short-term and in the long-term.

This Component 2, as defined here, allows to meet the following criteria to define the list of primary ESG indicators:

• Considering the risk factors that affect the firm’s performance and the interdependence between the deviations of the ESG KPIs and the deviations of the financial KPIs (for both directions of the cause-effect relationship), Criterion 3 (risk-based) is satisfied.

5.3.3 Component 3: ex ante critical deviations for stakeholders

The general definition of Component 3, provided in paragraph 3.2, is integrated by the details necessary for the application to ESG sustainability.

The impacts generated on stakeholders by the deviations must be declined over all the time horizons considered in the ESG sustainability plan. Therefore, the impacts are assessed both in the short-term and in the long-term. In particular, to cover the entire multi-year horizon of the ESG sustainability plan, it is necessary to adopt a multi-period logic for the risk analysis and to consider the long-run risk effect introduced in paragraph 3.2.3, according to which the impacts generated by the deviations are transformed over time into new risk factors.

The impacts generated by the deviations of the Pillar E KPIs must be assessed considering:

• The different types of stakeholders impacted by the firm’s ESG performance.
• The physical environment, as the transition process related to Pillar E aims to generate impacts on the environment, in particular relating to climate change mitigation.
• The technological and the engineering interventions that a firm can adopt to improve the impacts of the deviations of the Pillar E KPIs.
• The long-run effect of the impacts generated on the environment, as they produce effects that have repercussions over time on the firm itself.

• The long-run effect of the impacts generated on stakeholders, as their decisions can be transformed over time into new risk factors for the firm.

In particular, the unexpected impacts generated by the ESG performance, both on the environment and on stakeholders, in the long-run can be transformed into new risk factors affecting the firm’s financial performance.

The impacts on stakeholders generated by the deviations of the financial KPIs must be assessed considering:

• The different types of stakeholders impacted by the firm’s financial performance.

• The interventions that the firm can adopt to improve the impacts of the deviations of the financial KPIs.

• The long-run effect of the impacts generated on stakeholders, as their decisions can be transformed over time into new risk factors for the firm.

In particular, the unexpected impacts generated by the financial performance, in the long-run can be transformed into new risk factors affecting the firm’s ESG performance, with unexpected impacts both on the environment and on the stakeholders, as the firm may not be able to guarantee the financial coverage of its ESG sustainability plan.

It should be noted that in this Component 3 the analysis of forward-looking risks is focused on the deviations from the targets, considering their impacts and the long-run effect, according to which the impacts generated on stakeholders are transformed over time into new types of risk factors affecting the firm’s performances, which can therefore cause other deviations in subsequent periods. The analysis of forward-looking risks as regards the causes of the deviations (that are, the risk factors that affect the firm’s performance) has, on the other hand, already been discussed in the previous Component 2.

This Component 3, as defined here, allows to meet the following criteria to define the list of primary ESG indicators:

• Considering the impacts of risks on stakeholders and therefore the risks generated by the firm both in the short- and long-term, Criterion 3 (risk-based) is satisfied.

The combination of Component 2 (deviations) and Component 3 (impacts of deviations), with regard to the general definition provided in paragraph 3.2, leads to consider the following chain of three causal relationships:

• The risk factors that affect the firm’s performance cause deviations from the targets.

• The deviations from the targets generate impacts on stakeholders.

• The impacts generated on stakeholders are transformed over time in new typologies of risk factors that affect the firm’s performance. These new risk factors can cause deviations in the subsequent periods. This third causal relationship is called long-run effect.

These three causal relationships allow to consider the double materiality introduced by the EFRAG Standards (for further information see Appendix 2), which requires to consider: materiality from the
impact perspective, materiality from the financial perspective and interdependencies between them.

In fact, the three causal relationships are interpreted as follows:

- ESG risk factors that affect the firm’s financial performance cause deviations from the financial KPI targets: this relationship allows to consider financial materiality.

- The deviations of Pillar E KPIs generate impacts on stakeholders and the environment: this relationship allows to consider the impact materiality.

- Long-run effect: this third relationship allows to consider the interdependencies between the two abovementioned relationships over time. In fact, according to the EFRAG definition "a sustainability impact may become financially material when it translates or is likely to translate into financial effects in the long-term".

The definition of primary ESG indicators also makes it possible to improve and generalize some aspects of the regulatory definition of double materiality; these improvements are analysed in paragraph 6.1.

The combination of Component 2 (deviations) and Component 3 (impacts of deviations) allows to meet the following criteria to define the list of primary ESG indicators:

- Considering the double materiality required by the EFRAG Standards, Criterion 4 (compliance) is satisfied.

5.4 Dimension 3: Sources and measurement

The MtTI-based primary ESG indicators include the information sources described at a general level in paragraph 3.3. This paragraph contains the integration of the details necessary for the application to ESG sustainability.

The ESG transition process is a topic that is being addressed for the first time today, on which therefore there is no previous experience and there are no particularly relevant historical data. Consequently, expert judgment plays a fundamental role as an information source for primary ESG indicators. Considering the relevance of this source of information, it is necessary to oversee its structure and quality.

To this end, a significant contribution is provided by the new regulatory context which makes ESG sustainability plans binding and requires their disclosure.

In fact, the EU Taxonomy introduces the CapEx Plan for Pillar E, specifying its contents and manners of representation. The EFRAG and ISSB standards expand the perimeter to the structured formulation of plans on pillars S and G. These requirements therefore entail the need for firms to structure the expert judgment by which all the assumptions of the ESG sustainability plan are represented.

The regulations requiring the formulation of the ESG sustainability plans also contribute to improving the quality of expert judgment by introducing legal consequences for its contents, which materialize both in the responsibility of the firm’s board of directors, which must approve the plan, and in the financial effects of the covenants on the targets included in the loan agreements for financing the plans. In addition, with regard to the European sustainability regulatory context, the CSRD contribute to improving the quality of expert judgment also through the introduction of statutory auditing obligations for the ESG sustainability plans subject to disclosure.
Finally, the EU Taxonomy requires that the firm’s CapEx plans must be formally considered by the banks for the calculation of the Green Asset Ratio (GAR); this requirement also contributes to improve the quality of the expert judgment used for the formulation of the CapEx plans, as it introduces additional levels of audit on the sustainability plans disclosed by the firms.

With regard to the details of the information sources of the three contents’ components of the MtTI-based primary ESG indicators (defined in the previous paragraph 5.3), it should be noted that the assessment of ESG transition risks - both for estimating the deviations from the transition plan’s targets (Component 2) and for assessing the impacts on stakeholders generated by these deviations (Component 3) - can only be carried out on the basis of the expert judgment of the managers and their advisors. In fact, as there is no previous experience on transition plans, there are no historical data on which to base the assessment of ESG transition risks.

Finally, as regards the properties satisfied by the MtTI-based primary ESG indicators, defined at a general level in the previous paragraph 3.3, it should be noted that:

1. Property 1: Exhaustiveness conditional to current information set $I_{t=0}$
   For each ESG KPI and for each financial KPI, all the impacts generated by the firm are considered, both by the targets and by the possible deviations for which the causes (risk factors) are explained.

2. Property 2: Reliability conditional to current information set $I_{t=0}$
   The reliability of MtTI-based primary ESG indicators derives from the quality of the expert judgment, discussed above, which is significantly improved by the requirements of the new regulations regarding the disclosure of sustainability plans. In particular, the reliability of the possible deviations (risk) is satisfied by the requirement of the EFRAG and ISSB Standards to represent the ESG risk factors, both physical and transitional; the reliability of the impacts on stakeholders is instead satisfied by the requirement of the EFRAG Standards to represent the impacts according to the impact materiality criterion.

3. Property 4: Timeliness and updatability
   The adoption of structured expert judgment makes it possible to promptly update the assessment of transition risks and systematically monitor ESG transition plans, comparing the performance achieved with the domain of the ex ante identified deviations. Furthermore, the adoption of structured expert judgment makes it possible to promptly adjust the targets of ESG sustainability plans according to the transition risks and to the corrective interventions that such a new and complex issue will certainly require.

This Dimension 3 allows to meet the following criteria to define the list of primary ESG indicators:

- Given that the EFRAG and ISSB standards’ requirements on the characteristics of the information to be used in the reports are met, Criterion 4 (compliance) is satisfied.

5.5 Dimension 4: Manners of representation

The MtTI based primary ESG indicators are represented according to the manners described at a general level in paragraph 3.4. This paragraph contains the integration of the details necessary for the application to ESG sustainability.
For each of the Pillar E KPIs defined in paragraph 5.2, a summary risk indicator is represented, that is the probability of critical deviations in terms of impacts on stakeholders and the environment. This probability measures significance of the deviations that generate critical impacts on stakeholders and therefore it allows to understand the robustness to risk and the feasibility of the ESG sustainability plan. The summary risk indicator must be represented for each time horizon of the plan in section d) of the proposed report, as defined in paragraph 3.4.

For each of the financial KPIs, defined in paragraph 5.2, a summary risk indicator is represented, that is the probability of critical deviations in terms of impacts on stakeholders. This probability measures significance of the deviations that generate critical impacts on the stakeholders and therefore it allows to understand the robustness to the risk of the financial coverage of the ESG sustainability plan. The summary risk indicator must be represented for each time horizon of the plan in section d) of the proposed report, as defined in paragraph 3.4.

This Dimension 4 allows to meet the following criteria to define the list of primary ESG indicators:

- Given that in section d) a summary risk indicator on critical deviations is represented and given that this indicator makes it possible to assess the robustness to risk and therefore the feasibility of the firm’s plans, Criterion 3 (risk-based) is satisfied.

- Given that, as required by the EFRAG and ISSB standards, the targets are represented in section a), the deviations from targets (the risks) are represented in section b), the summary risk indicator in section d) and the impacts on stakeholders are represented in section c), Criterion 4 (compliance) is satisfied.

The MtTI-based primary ESG indicators can be operationally laid out by the KnowShape platform\(^ {17}\). The KnowShape platform is specialized in the laying out of forward-looking ESG information, consisting of formal ESG sustainability plans, which is represented in reports compliant with the requirements of:

- EU Taxonomy
- European Sustainability Reporting Standards of EFRAG
- Sustainability Disclosure Standards of IFRS - ISSB

The KnowShape platform is complementary to platforms for the collection of historical ESG data (ESG backward-looking information) and constitutes a market solution that can be adopted by both industrial firms (corporates and SMEs) and financial institutions.

---

\(^{17}\) KnowShape is a research spin-off of the Ca’ Foscari University of Venice. For more information, see previous notes 11 and 12 and the website [www.knowshape.com](http://www.knowshape.com)
6. Contribution of MtTI-based primary ESG indicators to the improvement of ESG disclosure and its use

The MtTI-based primary ESG indicators defined in the previous paragraph provide the following contributions in the context of ESG disclosure:

- A set of proposals for the establishment of ESG disclosure standards at the regulatory level. This topic is discussed in paragraph 6.1.
- The adoption of standardized information that is compliant to the regulation for the integration of ESG risks into Enterprise Risk Management (ERM) processes. This topic is discussed in paragraph 6.2.
- The use of standardized information that is compliant to the regulation for the assessment of credit ratings integrated with ESG information. This topic is discussed in paragraph 6.3.

6.1 The establishment of standards on ESG disclosures

The paper focuses on the disclosure standards that are being defined at the regulatory level, without considering private initiatives such as, for example, the GRI Standards or others specialized information provider services.

In particular, in this paragraph some proposals are formulated to better detail some aspects that the regulations currently define too generally, thus leaving some open issues. Reference is made to the European Sustainability Reporting Standards (ESRS) of EFRAG, which at the time of writing are the most extensive regulatory source in terms of disclosure content since they adopt the double materiality principle. The Sustainable Disclosure Standards of ISSB, for the topics discussed here, are considered as a sub-case since they only consider financial materiality.

6.1.1 Limits of the current regulatory proposals on ESG disclosure: the materiality assessment process of EFRAG

The materiality assessment process of EFRAG envisages:

- Three scopes of analysis: impacts, risk, opportunities.
- The adoption of the double materiality criterion regarding the ESG performance (related to the impact materiality that is focused on the impacts generated by the firm's activities on its stakeholders and on the environment) and the financial performance (related to the financial materiality that is focused on the financial consequences of the sustainability matters), also considering the interdependencies between the two performances.

Comparing what is envisaged by the materiality assessment of EFRAG with the exhaustive content of the MtTI defined in the paper (that are summarised in Figure 1 in paragraph 3.2.3), it can be noted that the materiality assessment of EFRAG has some limitations, in fact, it does not explicitly consider some contents and some distinctions that are relevant for the information provision process that must be applied by firms.

**Limit 1:** the indeterminacy of the materiality assessment process’s application areas.

The materiality assessment process is referred without distinction both to issues aimed at defining the targets of the action plans, and to issues aimed at analysing the resilience of the action plans and the subsequent risk management.
The materiality assessment of the action plans’ resilience is necessarily subsequent (from a logical and temporal point of view) to the materiality assessment required for defining the targets. This because in order to analyse the resilience of an action plan is necessary that the action plan has already been defined in detail.

The analysis of the Draft ESRS suggests that the latter require both issues to be considered in order to represent the action plan in all its aspects. However, this requirement should be made explicit, without leaving any interpretative doubts on the matter. Furthermore, the very generic way in which the materiality assessment process is described does not allow to understand how to decline it in terms of target definition and resilience analysis, namely, to understand which assessments described in the Draft ESRS must be performed to define the targets and which to assess the resilience of the action plan.

**Limit 2**: the assessment of interdependencies between ESG performance and financial performance is characterised by incompleteness of the contents and indeterminacy of the application areas.

The Draft ESRS consider only one cause-effect direction of the interdependencies, according to which the ESG performance influences the financial performance. This aspect is limiting and distorted, especially in a long-term perspective in which the financial performance can cause significant constraints on the ESG performance after being influenced by the latter.

Furthermore, the interdependencies between ESG and financial performance are indiscriminately referred both to issues aimed at defining action plan’s targets, and to issues regarding the assessment of the resilience of an action plan, which require that the action plan has already been defined in detail. The analysis of the Draft ESRS suggests that the latter require both issues to be considered, however, this requirement should be made explicit, without leaving any interpretative doubts on the matter.

### 6.1.2 Proposals for improving of the current limits of the materiality assessment of EFRAG

The definition of MtTI-based primary ESG indicators introduces an exhaustive analytical context that allows to identify 3 proposals to address and improve the limits of the materiality assessment process listed in paragraph 6.1.1 above.

Preliminarily, as regards the terminology, it should be noted that in the definition of MtTI some concepts are called differently than in the Draft ESRS of EFRAG and are also exposed in a different way. These differences in the definition of MtTI allow for a generalization and a completeness that the Draft ESRS do not have. In particular, the MtTI definition considers only a two-sided risk, consisting of the deviations above and below the target, while, by contrary, the Draft ESRS of EFRAG consider risks and opportunities to differentiate the two tails. However, the meaning is the same.

**Proposal for Limit 1 - part a)**: the part a) of the proposal for Limit 1 is to distinguish the materiality assessment process to define the action plan’s targets from the one to identify the possible deviations from these targets, for the purposes of conducting the resilience analysis. This distinction must be applied to both the ESG performance and the financial performance of the firm.

In fact, as detailed below, the materiality assessment process for the targets and the one for the possible deviations differs in terms of: purposes, subject of the 3 scopes of analysis (risk, opportunities, impacts) and timing of execution.
Considering them separately allows to increase the structure of the firm's reports (avoiding overlapping and confusing different contents) and helps both the firm in preparing the reports and the reader in understanding its contents.

**Materiality assessment for action plan’s targets:**

- **Purpose:** assessment for the formulation of the action plan. It requires the definition of the target values of the ESG KPIs included in the action plan and the definition of the target values of the financial KPIs for the financial coverage of the action plan.

- **Object of analysis for risk and opportunities (two-sided risk):** to formulate the action plan and its financial coverage, the risk is intended as the identification of possible future scenarios (assumptions) according to which the target values are calibrated. This risk analysis is done on a limited number of scenarios.

- **Object of analysis for impact:** clarification of the impacts on stakeholders and on the environment generated by the action plan targets. This impact analysis is done with regard to the point value of each target.

**Materiality assessment for the possible deviations from the action plan targets:**

- **Purpose:** assessment of the action plan’s resilience. It requires the assessment of both the risk of not reaching the action plan’s targets and the risk related to the action plan’s financial coverage. It requires knowledge of the targets and therefore it must be performed after the materiality assessment for the targets.

- **Object of analysis for risk and opportunities (two-sided risk):** to assess the resilience of an action plan and the resilience of its financial coverage, the risk is intended as the domain of the possible deviations from the targets. This risk analysis is done on the entire domain of the deviations that affect a firm. The calculation of the deviations requires knowledge of the targets and therefore the risk and opportunities assessment phase must be performed after the materiality assessment for the targets.

- **Object of analysis for impact:** clarification of the various possible impacts on stakeholders and on the environment generated by the various possible deviations. This impact analysis is carried out on the entire domain of the deviations. It is proposed that the positive and negative impact assessment introduced by the Draft ESRS of EFRAG should be done with respect to the impact generated by the target; therefore, it must be performed after the materiality assessment for the targets.

**Proposal for Limit 1 - part b):** the part b) of the proposal for Limit 1 is to measure the resilience of action plans using a summary quantitative indicator for each of the KPIs considered. The resilience of action plans must be defined in a way that can be assessed by the firm and that is understandable by the reader, otherwise it would remain a very vague concept depriving both the firm and the stakeholders of essential information to support the decision-making process with a forward-looking perspective.

As an assessment criterion, it is proposed to assess the resilience of the action plan in terms of the criticality of the possible deviations from the targets identified in the materiality assessment process for the deviations. The criticality, according to the definition given in paragraph 3.2, qualifies both the deviations that generate impacts that cannot be tolerated by the stakeholders and the deviations from uncertain impacts for the stakeholders themselves. As a summary quantitative indicator, for each KPI of the action plan it is proposed to assess the resilience using
the probability of the critical deviations (as defined generally in paragraph 3.4 and in paragraph 5.5 for ESG indicators), that is, the percentage of critical deviations out of the total of those identified in the materiality assessment process for the deviations. This paper, therefore, proposes a methodologically founded and synthetic indicator to define and measure the resilience of a sustainability plan. By adopting this indicator, the first limit of the Draft ESRS is covered, because currently they do not provide precise indications in this regard. It should be noted that this proposal (limit 1 - part b) is functionally linked to the previous one (limit 1 - part a) as it requires the outcome of the materiality assessment process for the deviations from the action plan’s targets.

**Proposal for Limit 2:** the proposal for Limit 2 is to distinguish the assessment of the interdependencies between ESG and financial performances for the action plan’s targets and for the possible deviations from the targets, considering, in both assessments, both the cause-effect directions.

In fact, as detailed below, the assessment of the interdependencies between ESG and financial performance for the targets and the one for the possible deviations differ in the meaning and in the timing in which the cause-effect relationships between the ESG KPIs and the financial KPIs materialize. Considering them separately makes it possible to identify all the different significant cause-effect directions between ESG KPIs and financial KPIs, avoiding overlapping and confusing different interdependent relationships. It also allows to improve the structure of the firm’s reports and it helps both the firm in preparing the reports and the readers in understanding its contents.

**The assessment of the interdependencies between ESG KPIs’ targets and financial KPIs’ targets:**

With regard to the targets, it is proposed that the interdependencies between ESG and financial KPIs must be considered in relation to both the cause-effect directions for the different time horizons, from short- to long-term. The reasons are exemplified below:

- Example of significant direction from ESG (cause) to financial (effect): in formulating the action plan, the targets of the ESG KPIs influence the quantification of the financial KPIs’ targets for defining the financial coverage of the action plan. This is the direction considered in the Draft ESRS of EFRAG.

- Example of significant direction from financial (cause) to ESG (effect): in formulating the plan, the targets of the financial KPIs can constitute a constraint that influences the coverage of the action plan and therefore its formulation and the definition of the ESG KPIs’ targets. Therefore, regarding the interdependence between targets, this inverse direction is also significant compared to the one considered by the Draft ESRS of EFRAG.

**The assessment of the interdependencies between the deviations of the ESG KPIs and the deviations of the financial KPIs:**

Even for the deviations it is proposed that the interdependencies between ESG and financial KPIs must be considered in both the cause-effect directions for the different time horizons, from short- to long-term. In particular, considering long time horizons, both the deviations of the ESG KPIs and the deviations of the financial KPIs can generate significant effects on all the other firm’s KPIs through the long-run effect as described in paragraph 3.2. Therefore, all the cause-effect directions between the deviations must be taken into consideration. The reasons are exemplified below:
• Example of significant direction from ESG (cause) to financial (effect): in assessing the resilience of action plans, deviations from the ESG KPIs’ targets during the implementation of the action plan can raise costs and therefore cause financial KPIs’ deviations that are not consistent with the financial coverage of the action plan.

• Example of significant direction from financial (cause) to ESG (effect): in assessing the resilience of the action plans, the deviations of the financial KPIs (take as a reference the unexpected deviations of production costs for firms due to the Ukrainian war) can cause significant deviations on ESG KPIs (take as a reference the delay in the implementation of transition plans caused by unexpected deviations in production costs).

The proposals discussed above are summarized in the following graph, which contains a precise mapping between the MtTI contents (represented in Figure 1 in paragraph 3.2.3) and the contents of the Draft ESRS of EFRAG integrated by the proposals.

6.2 To integrate ESG risks in ERM processes
ESG risks are becoming one of the most important causes of risk as they impact value creation in the long term and corporate reputation.

The regulation on ESG sustainability disclosure (see Appendices 9 and 10) is heavily risk oriented and constitutes the first mandatory regulatory source of risk analysis for firms. Thus, this regulation also becomes a driver for introducing ERM systems in firms that do not already have them.

However, this is not just a regulatory issue but a strategic process, directed and supervised by the firm’s Board, the implementation of which is driven by pressures coming from investors, customers and other stakeholders.

Firm Boards are increasingly focused on identifying and assessing ESG risks, integrating such risks within the broader Enterprise Risk Management (ERM) process. In fact, it is perceived that
the failure to integrate ESG risks into ERM processes leaves firms exposed to significant business risks. In this context, the MtTI-based primary ESG indicators constitute a methodologically based solution for introducing in the ERM processes quantitative ESG Risk measures directly linked to the firms' ESG sustainability plans and which are compliant with the new disclosure regulations. In fact, since ESG risks are integrated in ERM processes, the risk measures considered in the definition of the MtTI (see paragraphs 3.2 and 5.3) allow to enhance the risk assessment phase of ERM processes. In particular, since there is no previous experience on transition processes, there are no historical data on which to base the assessment of multiple ESG risks. MtTI based primary ESG indicators consider ESG risk indicators, measured only on the basis of the expert judgment of the firm’s managers and their advisors, both for the estimation of deviations from the transition plan targets and for the assessment of the impacts on stakeholders generated by such deviations. The MtTI-based primary ESG indicators thus solve the problem of which information source to use in the risk assessment phase when historical series are missing.

6.3 To integrate ESG information into credit rating models

The integration of ESG sustainability information into the credit rating models for firms, and in particular of the information related to climate change risk, is required by different regulatory sources and different regulators:

- Guidelines on loan origination and monitoring (European Banking Authority, 2020)
- Guide on climate-related and environmental risks (European Central Bank, 2020)
- Principles for the effective management and supervision of climate-related financial risks (Bank for International Settlement, 2022)
- Final draft implementing technical standards on prudential disclosures on ESG risks in accordance with Article 449a CRR (European Banking Authority, 2022)

These regulatory sources explicitly recall the European regulatory framework on the ESG disclosure by non-financial firms that are assessed by credit ratings. In particular, the most relevant ESG disclosure references are:

- The EU Taxonomy (European Parliament and Council, 2020)
- The proposed Corporate Sustainability Reporting Directive (European Commission, 2021) and the connected EFRAG Sustainability Reporting Standards (European Financial Reporting Advisory Group, 2022)

The integration of ESG sustainability information into credit rating models is a topic that presents many open issues, on which there is currently limited literature. Moreover, the analysis of this literature highlights the existence of very different approaches, based on assumptions that are often very different and potentially opposed to each other.

In this context, the MtTI-based primary ESG indicators constitute a methodologically based solution to integrate forward-looking ESG information within credit rating models. In particular, the MtTI-based primary ESG indicators represent possible appropriate inputs for credit rating models for the following reasons:

- They are ESG indicators that meet the mandatory disclosure requirements. This compliance characteristic is necessary to feed credit rating models, which require data that are homogeneous, structured, certified and available for all firms.
• They are forward-looking ESG indicators. This characteristic is necessary to feed the credit rating models as the traditional historical data (backward-looking) do not currently contain significant manifestations of the effects of ESG risks.

• They are idiosyncratic forward-looking ESG indicators, directly linked to firms’ ESG sustainability plans. This idiosyncratic characteristic is necessary for credit ratings to be able to support the different phases of the credit process. In fact, it is essential to consider the specificities of a firm and its ESG plans, when making decisions about creditworthiness and monitoring aimed at the financing of such plans. It should be noted that systematic forward-looking ESG information, sufficient at the level of massive aggregate analyses (e.g., portfolio analysis), does not allow to consider the specificities of the individual firms’ sustainability plans. Using it, moreover, would lead to treating individual firms all in the same way with regard to the ESG component within the credit granting processes. By definition, in fact, the systematic ESG forward-looking information only considers the future trend of sectoral ESG characteristics or ESG characteristics common to several firms. The use idiosyncratic forward-looking information is required at a regulatory level (e.g., by EBA LOM) as well as in terms of management needs.

The specific methods for the integration of these indicators into credit rating models remain, however, outside the scope of this paper and should be explored by a dedicated research work.
7. Conclusions

Despite its relevance, forward-looking information is still a confusing topic, in terms of contents and applications, especially in the context of ESG, where there is a need for greater clarity and standardization of the definitions of the ESG indicators. To address these issues, this paper introduces four main contributions.

The first contribution of this paper is to introduce a general classification of the different types of forward-looking information by relying on a limited number of dimensions:

- Dimension 1: Scope of application and type of variables to consider
- Dimension 2: Contents of the single variables
- Dimension 3: Sources and measurement
- Dimension 4: Manners of representation

The second contribution of this paper is to introduce an analytical definition of idiosyncratic forward-looking information, called Mark to Target Information (MtTI), which allows to meet the needs of all the different stakeholders on all types of corporate performances (in particular, financial and ESG performances). This definition is articulated in the four dimensions classifying the different types of forward-looking information, and it introduces several innovative features.

With regard to Dimension 1 (scope of application and type of variables to consider), the MtTI:

- Is applicable to all types of firms (industrial, both large corporates and SMEs, banks and insurance companies).
- Refers to the KPIs considered in the different firm’s plans (financial plans on multi-year horizons, treasury budgets on different monthly horizons, ESG sustainability plans on multi-year horizons in a long-run perspective).
- Systematizes and expands the information to be prepared in the planning processes.

With regard to Dimension 2 (contents of the single variables), the MtTI is articulated in three components for each KPI of interest:

- Component 1: the target values for each individual KPI over the entire plan horizon.
- Component 2: the domain of the possible deviations from the target values, which represents the risk of the plan.

The risk indicators relating to deviations from the target values, therefore, constitute an essential component of idiosyncratic forward-looking information. These risk indicators are called MtTI-based risk indicators.

This Component 2 of the MtTI is characterized by the following innovative element: in the definition of the KPIs’ probability distribution, the target values defined subjectively by the firm are analytically introduced as its essential feature. In this way, the risk profile of the KPIs adopted in the firm’s plans analytically depends on the decisions of the firm formalized in the targets.

- Component 3: the ex ante critical deviations for stakeholders.

This additional information component serves to identify which subset of deviations, related to the domain defined in Component 2, generates impacts on stakeholders that differ critically from the one generated by the target value and that simultaneously the firm is unable to improve adopting any available intervention.

This definition of MtTI generalizes the typologies of stakeholders that are impacted by the performances of the firm, not considering only those impacted by the financial performances (for example banks, suppliers, etc), but considering also those impacted by the ESG performances.
This definition of MtTI also generalises the typologies of impacts on stakeholders generated by deviations and generalises the range of interventions the firm can adopt in order to improve the impacts of the deviations on the stakeholders.

With regard to Dimension 3 (sources and measurement), the MtTI definition:

- Introduces theoretical motivations for considering the historical observations source (backward-looking information) as being not informative about the forward-looking risk profile of KPIs. Such theoretical motivations are based on the distributional and dynamic characteristics of the KPIs probabilistic model (Data Generating Process).
- Introduces theoretical motivations for considering structured expert judgment (that is, the knowledge of the firm’s managers collected in a structured manner, on the basis of which the assumptions of the firm’s plans are set) as the necessary source of information to obtain unbiased assessments of the forward-looking risk profile of KPIs. Such theoretical motivations are based on the distributional and dynamic characteristics of the KPIs probabilistic model (Data Generating Process).
- Identifying the information sources in this manner, allows the MtTI to satisfy the following four properties: exhaustiveness, reliability, unbiasedness, timeliness and updatability.

Finally, with regard to Dimension 4 (manners of representation), the MtTI definition:

- Introduces an intuitive way of representing the multiplicity of possible future outcomes of firm performances, avoiding an overly technical approach; this representation is necessary to provide awareness of the risk affecting the firm’s plans and to encourage the widespread use of idiosyncratic forward-looking information by the various stakeholders of the firm.
- Introduces a summary indicator in order to represent the significance of the critical deviations for the stakeholders in an intuitive and easy-to-disclose way: the probability of the critical deviations.
- Determines the sections of the forward-looking report template.

In order to summarize, for each KPI the MtTI:

- Identifies what a firm want to do, namely, the firm’s targets and how it intends to reach them. On the contrary, it doesn’t forecast the future outcome of the firm’s performance.
- Considering that a firm can fail to reach its target and deviations can occur, it identifies the plurality of the possible deviations, that is the KPI risk profile.
- Provides awareness about the different impacts of the deviations on stakeholders, identifying the significance of the critical deviations generating harmful or uncertain impacts.

The MtTI allows to overcome some limits characterizing the main and currently widespread practices for the use of forward-looking information:

1. The formulation of firm’s plans (business plans, treasury budgets, ESG sustainability plans) relying on KPIs’ point value only (e.g., base scenario, forecast, etc.)
2. Scenario analysis (e.g., stress test)
3. The projection of historical data to estimate the future values of a firm KPIs (e.g., Regression Models, Machine Learning or Artificial Intelligence forecasts)
4. The estimation of risk measures based on historical data only (e.g., default probability estimated on historical balance sheet data)
5. Subjective evaluation of expected frequency and severity to assess risks in the absence of sufficient historical data (e.g., risk assessment in ERM processes in industrial enterprises)

6. The adoption of systematic forward-looking information (e.g., current practice in IFRS9)

After the general introduction of the MtTI, this paper focuses on its application to the ESG performance of firms, and defines a list of primary ESG indicators that can be considered for the establishment of ESG information standards.

The third contribution of this paper is to introduce the explicit criteria that must be adopted to identify a list of primary ESG indicators that can contribute to the establishment of ESG information standards. Such standard ESG indicators must satisfy a system of formal and shared criteria. The paper argues that the list of primary ESG indicators must satisfy the following four criteria simultaneously:

- Criterion 1: The primary ESG indicators must refer to common and science-based firm level objectives.
- Criterion 2: The primary ESG indicators must incorporate a forward-looking perspective.
- Criterion 3: The primary ESG indicators must quantify the risks affecting the interdependent ESG and financial performances both in the short-term and in the long-run.
- Criterion 4: The primary ESG indicators must be compliant with the ESG disclosure regulations.

The paper’s fourth contribution is to introduce an analytical definition of MtTI-based primary ESG indicators which satisfy all the four criteria mentioned above and which refer directly to a firm’s ESG sustainability plans and its risk indicators.

The primary ESG indicators are defined in the context of the MtTI as it satisfies the four criteria listed above for the following reasons:

- The MtTI allows to set the ESG sustainability plans’ targets incorporating science-based values, as required by Criterion 1.
- The MtTI definition considers the ESG sustainability plans, which describe the transition process to be implemented in the future according to the forward-looking perspective of Criterion 2.
- The MtTI is aimed at providing awareness about the risk affecting the firm perspective performance, so it allows to consider the physical and transition risks as required by Criterion 3.
- The MtTI structure allows to address all the compliance requirements on ESG disclosure laid out by the main ESG regulatory sources, in particular those laid out by the EU Taxonomy (technical screening criteria, CapEx Plan, etc.) and by the disclosure standards of EFRAG and ISSB, as required by Criterion 4.

The definition of the MtTI-based primary ESG indicators is articulated in the four dimensions classifying the various different types of forward-looking information and it introduces several innovative features.

With regard to Dimension 1 (scope of application and type of variables to consider), the MtTI-based primary ESG indicators refer directly to the KPIs defined within the EU Taxonomy (to date, the EU Taxonomy considers only Pillar E, but its extension to Pillar S has already been started):

- ESG KPIs contained in the technical screening criteria, which are considered within the sustainability plan (CapEx Plan).
• Financial KPIs (Turnover KPI, OpEx KPI and CapEx KPI) which are considered within the financial plan in order to measure the financial impacts of the sustainability plan.

These KPIs allow to represent both the environmental performance (pillar E) and the financial performance of a firm.

With regard to Dimension 2 (contents of the single variables), the MtTI-based primary ESG indicators are articulated in three components for each KPI of interest:

• Component 1: the target values of KPIs contained both in the ESG sustainability plan and in the financial plan.
  The target values of the ESG KPIs in the ESG sustainability plan are set in order to bridge the gap with respect to the science-based thresholds defined by the technical screening criteria of the EU Taxonomy. The current gap with respect to the science-based thresholds measures the extent of the ESG transition that a firm must undertake within the time horizon of the sustainability plan.
  The target values of the financial KPIs in the financial plan are set in order to incorporate the financial impacts of the ESG sustainability plan.
  The target values of these KPIs allow to represent both the environmental performance (Pillar E) and the financial performance of the firm from a forward-looking perspective and their interdependence.

• Component 2: an analytical definition of forward-looking ESG risks which refers to the deviations from the target for each KPI of interest, both ESG and financial, and to their interdependence in the short-, medium- and long-term.
  The ESG risk indicators are differentiated based on physical and transition risk.

• Component 3: the impacts on stakeholders generated by the deviations of the ESG and financial KPIs are differentiated so as to explicitly represent the critical impacts of physical and transition risk on both ESG and financial performance in the short-, medium- and long-term.

With regard to Dimension 3 (sources and measurement), in the definition of the MtTI-based primary ESG indicators:

• Structured expert judgment, based on which the assumptions of the ESG sustainability plans (CapEx Plan) and the related financial plan are set, is considered the most relevant source of ESG idiosyncratic forward-looking information.

• The reliability property of the expert judgment adopted in the sustainability plans can be considered satisfied thanks to the regulatory requirements of the EU Taxonomy and the disclosure standards (EFRAG and ISSB). In fact, the CapEx Plans must be approved by the firm’s Board of Directors, and this makes such plans binding. Furthermore, the CapEx plans are considered by the banks for the calculation of the Green Asset Ratio (GAR) and are therefore subject to audit.

Finally, with regard to Dimension 4 (manners of representation), the definition of the MtTI-based primary ESG indicators:

• Introduces a summary indicator for all the financial KPIs, in order to evaluate in an intuitive and easy-to-disclose way the significance of the critical deviations for the stakeholders due to physical risk.

• Introduces a summary indicator for all the ESG and financial KPIs, in order to evaluate in an intuitive and easy-to-disclose way the significance of the critical deviations for the stakeholders due to transition risk.
• Determines the sections of the report on the MtTI-based primary ESG indicators following the regulatory requirements for ESG disclosure (EU Taxonomy, disclosure standards of EFRAG and ISSB).

The MtTI-based primary ESG indicators as defined in the paper allow to provide the following contributions to the development of ESG disclosure and its use:

1. The establishment of ESG disclosure standards at regulatory level.
2. To integrate ESG risks in Enterprise Risk Management (ERM) processes.
3. To integrate ESG information into credit ratings models.
8. APPENDIX 1: EU Taxonomy for sustainable activities (Regulation EU 2020/852)

8.1 The general architecture of the EU Taxonomy for sustainable activities

The European Taxonomy has been introduced on 18 June 2020 by the European Parliament and Council with the Regulation (EU) 2020/852 (‘Taxonomy Regulation’)\textsuperscript{18}. The objective of the European Taxonomy is to define a set of unambiguous criteria to determine whether an economic activity can be considered environmentally sustainable, with the aim of establishing the degree to which an investment is environmentally sustainable. The provisions of the Taxonomy Regulation directly concern all firms subject to the obligation to draw up Non-Financial Statements (NFS) pursuant to articles 19a or 29a of Directive 2013/34/EU.

The main features of the European Taxonomy will be discussed below. Four topics will be discussed:

- **Topic 1**: Environmental objectives.
- **Topic 2**: Technical screening criteria.
- **Topic 3**: Steps for assessing the eco-sustainability of an economic activity.
- **Topic 4**: Types of economic activities.

**Topic 1 – Environmental objectives**

The environmental objectives are defined at the regulatory level and are common to all firms subject to the Taxonomy Regulation. In fact, to be considered sustainable, an economic activity must, first of all, pursue one or more of the six environmental objectives set out in the Regulation 2020/852. These environmental objectives are the following six:

- a) Climate change mitigation.
- b) Climate change adaptation.
- c) The sustainable use and protection of water and marine resources.
- d) The transition to a circular economy.
- e) Pollution prevention and control.
- f) The protection and restoration of biodiversity and ecosystems.

**Topic 2 - Technical screening criteria**

As previously seen, the objective of the European Taxonomy is to define a set of unambiguous criteria to determine whether an economic activity can be considered environmentally sustainable. These criteria take the name of technical screening criteria. It should be noted that the content of the technical screening criteria is not reported within the Regulation 2020/852. In fact, the technical screening criteria are defined by the European Commission through specific Delegated Acts\textsuperscript{19}.

\textsuperscript{18} For further information on the contents of the European Taxonomy and its requests of forward-looking information, see Giacomelli A. (2021), *EU Sustainability Taxonomy for non-financial undertakings: summary reporting criteria and extension to SMEs*, Working Papers Series, Department of Economics, Ca’ Foscari University of Venice, No. 29/WP/2021, ISSN 1827-3580.

\textsuperscript{19} At the time of writing, the European Commission has published the technical screening criteria relating only to the first two environmental objectives (climate change mitigation and climate change adaptation) through the adoption of the so-called Climate Delegated Act on June 4, 2021.
The technical screening criteria can be defined as a set of unambiguous criteria that allows to determine:

- Under what specific conditions it can be considered that an economic activity contributes substantially to the achievement of one of the environmental objectives.
- Under what specific conditions it can be considered that an economic activity does not significantly harm to one or more of the other objectives, namely the DNSH principle.

Other key requirements of the technical screening criteria are listed below:

- First of all, whenever possible the technical screening criteria must be defined as quantitative criteria with clarification of thresholds containing limit values; alternatively, explicit qualitative criteria should be used.
- Secondly, the criteria must be constructed considering the impacts both in the short- and in the long-term that can be produced by an economic activity towards each environmental goal.
- Finally, the content of the technical screening criteria must be determined on the basis of irrefutable scientific evidence. This is a fundamental requirement, thus leaving no room for subjective interpretative margins and allowing the adoption of a scientific and unambiguous certification of the environmental sustainability of an economic activity.

**Topic 3 - Steps for assessing the eco-sustainability of an economic activity**

To determine if an economic activity can be considered environmentally sustainable, pursuant to the Taxonomy Regulation, it is necessary to follow three sequential steps:

- **Step 1 - Substantial contribution:** assessing that the economic activity substantially contributes to the achievement of one or more environmental objectives on the basis of specific indicators and thresholds detailed in the relative technical screening criteria.
- **Step 2 - Do no significant harm (DNSH):** assessing that the economic activity does not significantly harm any of the remaining environmental objectives, on the basis of specific indicators and thresholds detailed in the relative technical screening criteria. The environmental objectives defined by the Taxonomy Regulation represent a set of objectives that shall be pursued synergistically to ensure an effective transition process towards an environmentally sustainable economic system. This synergy between the environmental objectives requires that an economic activity contributing to one of them must not significantly harm the others, so as to undermine the effectiveness of the transition process. In other words, the pursuit of one environmental objective shall not be achieved at the expense of the remaining ones.
- **Step 3 - Minimum safeguards:** assessing that the economic activity is carried out in compliance with minimum social safeguards. The minimum safeguards are a set of procedures that the firm shall implement in order to ensure that an economic activity is carried out in compliance with certain essential social principles laid down in the "OECD Guidelines for Multinational Enterprises" and in the "United Nations Guiding Principles on Business and Human Rights".

**Topic 4 – Types of economic activities**

Based on the outcome of the eco-sustainability assessment, economic activities carried out by firms can be divided into three types:
• **Taxonomy-aligned economic activity**: an economic activity that, on the basis of specific indicators and thresholds detailed in the relative technical screening criteria laid down in the European Commission Delegated Acts, substantially contributes to the achievement of one or more environmental objectives and that does not significantly harm any of the remaining environmental objectives.

• **Taxonomy-eligible economic activity**: an economic activity that is described in the European Commission Delegated Acts, irrespective of whether that economic activity meets any or all of the technical screening criteria laid down in those delegated acts.

• **Taxonomy-non-eligible economic activity**: any economic activity that is not described in the European Commission Delegated Acts.

### 8.2 A focus on the forward-looking information requests: the Article 8 CapEx Plan

The Article 8 of the Taxonomy Regulation introduces a set of disclosure requirements on the outcomes of the eco-sustainability assessment of economic activities carried out by firms. Specifically, Article 8 introduces a set of provisions to be applied to all firms subject to the obligation to draw up the Non-Financial Statement (NFS) and which concern additional information content in relation to what is already provided for NFS:

- First of all, Article 8 requires that firms subject to disclose the NFS must communicate, within the NFS itself, information on how and to what extent the economic activities they carry out can be considered sustainable from an environmental point of view.

- Secondly, Article 8 specifies a set of Key Performance Indicators (KPIs) that non-financial firms shall disclose within the NFS, in a proper section:
  - The proportion of their turnover derived from products or services associated with economic activities that qualify as environmentally sustainable, the so-called Turnover KPI.
  - The proportion of their capital expenditure (CapEx KPI) and the proportion of their operating expenditure (OpEx KPI) related to assets or processes associated with economic activities that qualify as environmentally sustainable.

On 6 July 2021, the European Commission drew up the **Delegated Act on Article 8** of the Taxonomy Regulation, which details the disclosure requirements pursuant to Article 8 both for non-financial firms and for financial ones. The contents of the Delegated Act relating to non-financial firms will be discussed below.

As previously seen, the Article 8 defines three KPIs that non-financial firms must disclose in their NFS: Turnover KPI, CapEx KPI and OpEx KPI. All of these three KPIs are calculated as ratios and their calculation methodologies are defined in Annex I of the Delegated Act on Article 8.

To illustrate how these ratios are calculated, it is necessary to consider the **CapEx Plan**. The CapEx Plan is a formal planning document that shall be articulated at the level of individual economic activities carried out by the firm, it shall be approved by the Board of Directors, and it shall specify the objectives that the undertaking has set regarding:

a) **The expansion of Taxonomy-aligned economic activities** carried out by the firm. This expansion must be completed within a period of five years.
b) The development of Taxonomy-eligible economic activities carried out by the firm to become Taxonomy-aligned within a period of five years.

In particular, in order to assess the alignment to the Taxonomy Regulation, the target values set in the CapEx Plan must be referred to the variables and thresholds contained in the technical screening criteria. The formulation of the CapEx Plan, therefore, requires providing idiosyncratic forward-looking information.

After defining what the CapEx Plan is, the methods for computing the numerator and the denominator for each of the three KPIs' ratios, which have to be provided by non-financial undertakings, are presented below:

**Turnover KPI:**
- **Numerator:** turnover derived from products or services associated with Taxonomy-aligned economic activities.
- **Denominator:** total turnover.

**CapEx KPI:**
- **Numerator:** part of the capital expenditure:
  - Related to assets or processes that are associated with Taxonomy-aligned economic activities.
  - Part of a plan (CapEx Plan) to:
    - a) expand Taxonomy-aligned economic activities.
    - b) allow other Taxonomy-eligible economic activities to become aligned to the Taxonomy Regulation's environmental sustainability criteria within a period of five years.
  - Related to the purchase of output from Taxonomy-aligned economic activities
- **Denominator:** it shall cover additions to tangible and intangible assets during the financial year considered before depreciation, amortisation and any re-measurements and excluding fair value changes. The denominator shall also cover additions to tangible and intangible assets resulting from business combinations.

**OpEx KPI:**
- **Numerator:** part of the operational expenditure:
  - Related to assets or processes associated with Taxonomy-aligned economic activities, including training and other human resources adaptation needs, and direct non-capitalised costs that represent research and development.
  - Part of a plan (CapEx Plan) to:
    - a) expand Taxonomy-aligned economic activities.
    - b) allow other Taxonomy-eligible economic activities to become aligned to the Taxonomy Regulation's environmental sustainability criteria within a period of five years.
- **Denominator:** it shall cover direct non-capitalised costs that relate to research and development, building renovation measures, short-term lease, maintenance and repair, and any other direct expenditures relating to the day-to-day servicing of assets of property, plant and equipment by
the undertaking or third party to whom activities are outsourced that are necessary to ensure the continued and effective functioning of such assets.

It is relevant to underline that in the Annex I of the Delegated Act on Article 8 the numerators of the ratios have to consider jointly:

- The economic activities that are already aligned; and
- The economic activities for which an alignment plan has been provided on the basis of the Capex Plan.

Therefore, by explicitly referencing to the Capex Plan, the alignment of the economic activities it is also related to the objectives of the undertaking.

Furthermore, in relation to the calculation of the numerator of the CapEx KPI and the OpEx KPI, both numerators respectively contain a portion of capital expenditure and a portion of operating expenditure defined in the CapEx Plan. Therefore, the KPIs introduced in the Annex I of the Delegated Act assume an idiosyncratic forward-looking nature related to the objectives of the undertaking.

In conclusion, a portion of the numerator that enters in the calculation formulas of CapEx and OpEx KPI consists of expenses related to the targets defined in the Capex Plan; this requirement introduces the dimension of planning and the idiosyncratic forward-looking information ex lege within the Non-Financial Statements, characterized up to now by a purely backward-looking perspective.
9. APPENDIX 2: European Sustainability Reporting Standards of EFRAG

9.1 The general architecture of the new EFRAG European Sustainability Reporting Standard


A fundamental and innovative requirement of the proposed CSRD is that firms within its scope would have to report their sustainability performance in compliance with a set of specific European sustainability reporting standards (ESRS) adopted by the European Commission as delegated acts, on the basis of technical advice provided by EFRAG.

On 27 April 2022, the EFRAG Project Task Force published the first set of ESRS Exposure Drafts for a public consultation. From the analysis of these Exposure Drafts it is already possible to define the general architecture and principles that will characterize the ESRS. This general architecture can be described on the basis of the following 4 elements:

1. Double Materiality
2. Three layers of disclosure
3. Three sustainability topics (ESG Pillars)
4. Three reporting areas

**Element 1: Double Materiality**

First of all, the Draft ESRS require that a firm has to disclose all material information on sustainability matters carrying out a double materiality assessment. Double materiality is the union of impact materiality and financial materiality.

A sustainability matter is material from an impact perspective if it is connected to actual or potential significant impacts by a firm on people or the environment over the short-, medium- or long-term (inside-out perspective). Thus, the impact perspective is referred to what is generated by a firm on people or the environment.

A sustainability matter is material from a financial perspective if it generates or may generate significant risks or opportunities that influence or are likely to influence the future cash flows and therefore the enterprise value of a firm in the short-, medium- or long-term, but it is not captured or not yet fully captured by financial reporting at the reporting date (outside-in perspective). Thus, the financial perspective is referred to the firm’s financial performance that is affected by sustainability matters.

Impact materiality and financial materiality assessments are intertwined and the interdependencies between the two dimensions must be considered in carrying out the double materiality assessment. In general, the starting point is assumed to be the assessment of impact materiality, as a sustainability impact may become financially material when it translates or is likely to translate into financial effects in the short-, medium-, or long-term.
From what was said previously, a sustainability matter is therefore considered material whether it is material from an impact perspective, a financial perspective or whether it is material from both perspectives.

Moreover, the Draft ESRD require that the materiality of any sustainability matters must be considered over an appropriate short-, medium-, and long-term time horizon, and they therefore require the use of **forward-looking information**.

**Element 2: Three layers of disclosure**

The Draft ESRS aim to promote relevant, faithful and comparable information in a proportional manner. In order to achieve these results, the Draft ESRS adopt a three-layers approach:

a) **Sector-agnostic disclosures**: the Draft ESRS provide a first layer of standardised disclosure requirements that are supposed material for all firms across sectors (sector-agnostic disclosures) and thus must be applied to all firm in the CSRD scope regardless of the sector in which they operate. It should be noted that these sector-agnostic disclosures are "supposed material". Therefore, if a firm, following the materiality assessment process, assesses some of these disclosures as non-material, it is not required to include them in the sustainability report.

b) **Sector-specific disclosures**: the Draft ESRS provide a second layer of standardised disclosure requirements that are supposed material for all firms in each given economic sector (sector-specific disclosures) and thus must be applied to all firm in the CSRD scope operating in a specific economic sector (the sector-specific standards are not included in the Draft ESRS as they are still under review). It should be noted that these sector-specific disclosures are "supposed material". Therefore, if a firm, following the materiality assessment process, assesses some of these disclosures as non-material, it is not required to include them in the sustainability report.

c) **Entity-specific disclosures**: the first two layers of disclosures requirements (sector-agnostic and sector-specific) are complemented by a third layer of entity-specific disclosures requirements, that is, a set of disclosures requirements relating to sustainability matters that a firm considers material from a double materiality perspective, but which are not included within the ESRS sector-agnostic or sector-specific disclosures. The entity-specific disclosures are material-by-construction as it is the firm itself that must identify which sustainability matters not included in the ESRS are material for its business.

**Element 3: Three sustainability topics (ESG pillars)**

A firm, disclosing the material sustainability matters (element 1) articulated in the three layers of disclosure (element 2), must cover all the three ESG sustainability topics (element 3): environmental matters, social matters; and governance matters.

Therefore, the Draft ESRS include three set of **Topical Standards**, one for each of the three ESG sustainability topics (environmental, social and governance matters), which contain the sector-agnostic disclosure requirements supposed to be material for the firm.

a) **Environmental Topical Standards**: environmental topical standards are composed of five standards, each of which addresses a specific environmental sub-topic. The five environmental
sub-topics are the same as the environmental objectives defined by the Taxonomy Regulation, that are:

1. Climate change mitigation and adaptation
2. Pollution
3. Water and marine resources
4. Biodiversity
5. Circular economy

Each environmental topical standard includes disclosure requirements on how to report on impacts, risks and opportunities related to its specific environmental sub-topic.

The relationship with the Taxonomy Regulation is evident in all environmental topical standards. In fact, within each of them there is a specific “Taxonomy Disclosure Requirement” where it is required that the firm shall disclose information required by Article 8 of the Taxonomy Regulation. The Article 8 of the Taxonomy Regulation requires that firms subject to the CSRD have to disclose information on the proportion of the turnover, capital expenditure (‘CapEx’) and operating expenditure (‘OpEx’) associated with economic activities that qualify as environmentally sustainable.

b) Social Topical Standards: social topical standards are composed of four standards each of which addresses a specific social sub-topic. The four social sub-topics are the following:

1. Own workforce
2. Workers in the value chain
3. Affected communities
4. Consumers & end-users

Each social topical standard includes disclosure requirements on how to report on impacts, risks and opportunities related to people, over the whole scope of a firm’s value chain (not only the firm’s own workforce but also all the other relevant affected stakeholders, for example: value chain workers, communities and consumers).

There is a link with the Taxonomy Regulation also within the social topical standards. In fact, one of the objectives of the social topical standards is to ensure that the reporting requirements enable firms to disclose alignment with international and European human rights instruments and conventions including, among others, the Taxonomy Regulation, especially regarding the approach and reporting needs set out by the “minimum safeguards”. With regard to the “minimum safeguards” of the Taxonomy Regulation, it has to be highlighted they are a set of procedures that a firm shall implement in order to ensure that an economic activity is carried out in compliance with certain essential social principles laid down by the OECD Guidelines for Multinational Enterprises and the United Nations Guiding Principles on Business and Human Rights.

c) Governance Topical Standards: governance topical standards are composed of two standards each of which addresses a specific governance sub-topic. The two governance sub-topics are the following:

1. Governance, risk management and internal control
2. Business conduct

Each governance topical standard includes disclosure requirements on how to report on impacts, risks and opportunities related to governance as a sustainability topic itself.
**Element 4: Three reporting areas**

In reporting all the material sustainability matters (element 1) articulated in the three layers of disclosure (element 2) for the three sustainability topics (element 3) as previously seen, a firm shall cover three reporting areas (element 4):

a) Strategy, governance and materiality assessment
b) Implementation measures
c) Performance measurement

**a) Strategy, governance and materiality assessment:** the first reporting area covers the general provisions applying to:

- The sustainability disclosure requirements that relate to the way sustainability is embedded in the firm business strategy and business model, its governance and to how the firm identifies and manages its material sustainability matters.
- The principles to be followed by the Topical Standards.

With regard to this first reporting area the firm is required to disclose, for each material sustainability matter, how the material sustainability matter is related to, interact with, and inform its strategy and business model.

Moreover, with regard to the strategy, the Draft ESRS require that a firm must describe the interaction between its material risks and opportunities and its strategy and business model, in order to provide an understanding of:

- Material sustainability risks and opportunities.
- The adaptation of its strategy and business model to such sustainability material risks and opportunities.

For this reason, the Draft ESRS require firms to disclose the **resilience of the firm’s strategy** and business model regarding its capacity to address its material risks and its capacity to leverage its opportunities in the defined time horizon.

**b) Implementation measures:** the second reporting area covers the general provisions applying to policies, targets, action plans and the resources adopted by a firm on a given sustainability topic.

With regard to this second reporting area the firm is required to disclose, for each material sustainability matter:

- The **policy** to manage the material sustainability impacts, risks and opportunities.
- The measurable outcome-oriented **targets** set to meet the policy’s objectives and the overall progress towards the adopted targets over time.

For each measurable outcome-oriented target, the firm is required to disclose:
- The baseline value and base year from which progress is measured.
- The timeframe to achieve the target, including any milestones or interim targets.
- The methodologies and significant assumptions used to define targets, including where applicable, the selected scenario, data sources, alignment with science-based methodologies, and national, EU or international policy goals.
• **The action plans** and **allocation of resources** to meet a firm’s policy objectives and targets.

The firm is required to disclose all relevant actions to meet the policy objectives and its targets. The action plan has a retrospective component, including key actions accomplished during the reporting period, and a **forward-looking component**, including key actions planned in the short-, medium- and long-term.

On the basis of the above, a firm must link in its sustainability report backward-looking and forward-looking information, to ensure a clear understanding of how its historical sustainability performance relates to the prospective management of its sustainability strategies.

c) **Performance measurement**: the third reporting area covers the general provisions applying to the metrics chosen to measure the firm’s performance in addressing each sustainability topic.

With regard to this third reporting area the firm is required to disclose, for each material sustainability matter the **performance measures**, as part of measuring progress in achieving the objective of the firm's policies to manage the material sustainability impacts, risks and opportunities.

Every Topical Standard includes a set of disclosure requirements to assess a firm’s performance related to the specific sustainability topic. These disclosure requirements require, where possible, quantitative measurements (otherwise qualitative disclosures) that must be conducted by a firm to measure its sustainability performance in relation to each individual material sustainability matter.

Moreover, always in the context of performance measurement, it should be noted that the assessment of the **potential financial effects over the short-, medium-, and long-term**, deriving from the specific material sustainability topic is often required. See, for example, all the Draft ESRS related to the Environmental Topic.

Finally, it can be noted that the first reporting area (Strategy, governance and materiality assessment) contains disclosure requirements addressing all the three ESG sustainability topics (environmental, social and governance matters), for this reason, the disclosure requirements related to this reporting area are covered by a specific set of **Cross-Cutting Standards**. Differently, the disclosure requirements related to the last two reporting areas (implementation measures and performance measurement) are covered inside the **Topical Standards**.

9.2 **A focus on the forward-looking information requests: the ESRS planning process**

As can be seen from the previous paragraph, the Draft ESRS require that a firm, in formulating its sustainability report, not only shall takes into consideration the backward-looking information but, above all, it must focus on the forward-looking information describing the future developments of the business model and strategy in relation to the material sustainability matters.

The request to provide forward-looking information is not merely a request to disclose qualitative information on management expectations on future business developments. On the contrary, the Draft ESRS explicitly require that a firm implements the following structured planning process:
1. First of all, the double materiality assessment must be conducted for all the sustainability matters using forward-looking information. In this way, sustainability impacts, risks and opportunities are identified.

2. After identifying the material sustainability impacts, risks and opportunities using a forward-looking perspective, the firm must:
   - Define the policies to manage those impacts, risks and opportunities, identifying a set of sustainability objectives.
   - Decline outcome-oriented targets to be achieved for pursuing the sustainability objectives defined within the policies.
   - Formulate the action plans on key actions planned in the short-, medium- and long-term, aimed to reach the firm’s policy objectives and targets.
   - Define the resources to be allocated to support the action plans’ implementation.

3. Finally, the firm must continuously monitor the sustainability performance to evaluate the progress of the plan through the time.

As just seen, the planning process requires firms to disclose forward-looking information about possible future events regarding material sustainability matters. For this reason, firms have to make estimates in conditions of uncertainty. Measurement uncertainty arises when metrics cannot be quantified directly and can only be estimated. However, due to the forward-looking perspective of the planning process, the use of reasonable estimates is necessary and unavoidable when preparing sustainability-related information. For this reason, the Draft ESRS state that, in order not to compromise the usefulness of sustainability information, disclosure metrics affected by significant uncertainties must be clearly and accurately described and the nature and the factors of this significant uncertainty explained. For this reason, the Draft ESRS 1 requires at paragraph 113, that a firm, when determining estimates regarding such possible future events, shall consider:

- their effect on risks or opportunities that influence or are likely to influence the future cash flows and therefore the firm’s enterprise value.
- their effect on actual or potential significant impacts on people or the environment.
- the full range of possible outcomes considering all relevant facts and circumstances.
- the likelihood of the possible outcomes within that range including low-probability and high-impact outcomes, which when aggregated, could become material.

However, at the current state, the inclusion of forward-looking information in the formulation of sustainability reports presents two limits which must be address:

1. **The indeterminacy of the materiality assessment process’s application areas:**
   The materiality assessment process is referred without distinction both to issues aimed at defining the targets of the action plans, and to issues aimed at analysing the resilience of the action plans and the subsequent risk management.
   The analysis of the Draft ESRS suggests that the latter require both issues to be considered, in order to represent the action plan in all its aspects. However, this requirement should be made explicit, without leaving any interpretative doubts on the matter.

2. **The assessment of interdependencies between ESG performance and financial performance is characterised by incompleteness of the contents and indeterminacy of the application areas:**
The Draft ESRS consider only one cause-effect direction of the interdependencies, according to which the ESG performance influences the financial performance. The Draft ESRS should also consider the relationship according to which the financial performance influences the ESG performance.
10. APPENDIX 3: Sustainability Disclosure Standards of IFRS – ISSB

10.1 IFRS ISSB Sustainability Disclosure Standards

In March 2022, the IFRS International Sustainability Standards Board (ISSB) published two Draft IFRS Sustainability Disclosure Standards: the Draft IFRS S1 “General Requirements for Disclosure of Sustainability-related Financial Information” and the Draft IFRS S2 “Climate-related Disclosures”

The Draft IFRS S1 “General Requirements for Disclosure of Sustainability-related Financial Information” sets out the core content and general principles that all the others IFRS Sustainability Disclosure Standards will have to follow. On the other hand, the Draft IFRS S2 “Climate-related Disclosures” requires a firm to disclose information that would enable an investor to assess the effect of climate-related risks and opportunities on its enterprise value.

Therefore, since the Draft IFRS S2 represents an operational declination of the general principles identified in the Draft IFRS S1 for the specific environmental topic of climate change, for the discussion of the general principles on which all the IFRS Sustainability Disclosure Standards will be based, the contents of the Draft IFRS S1 will be analysed below. However, whenever an operational focus is required, the content of the Draft IFRS S2 will be taken into consideration.

From the analysis of the Draft IFRS S1 it is possible to identify two relevant elements that define the general principles that will characterize the IFRS Sustainability Disclosure Standards:

**Element 1: Financial Materiality**

The objective of the Draft IFRS S1 is to require a firm to disclose material information about its significant sustainability-related risks and opportunities, that is useful to the primary users of general-purpose financial reporting (that are, investors) when they assess enterprise value and decide whether to provide resources to a firm. A firm must therefore disclose material information about all of the significant sustainability-related risks and opportunities to which it is exposed. Therefore, the assessment of materiality shall be made in the context of the information necessary for users of general-purpose financial reporting to assess enterprise value.

The enterprise value is the total value of a firm. It is the sum of the value of the firm’s equity and the value of the firm’s net debt. The enterprise value reflects expectations of the amount, timing and uncertainty of future cash flows over the short-, medium- and long-term.

On this point, a significant difference can be observed with the Draft ESRS of EFRAG. While the Draft ESRS require that materiality must be assessed from both a financial perspective and an impact perspective, the Draft IFRS S1 states that a sustainability matter is material only if it has an effect on a firm’s enterprise value, therefore, it refers to the concept of financial materiality only.

**Element 2: Four reporting areas**

The Draft IFRS S1 requires that the material sustainability-related financial information about the firm’s significant sustainability-related risks and opportunities (element 1), must be disclosed in four reporting areas:

a) Governance
b) Strategy
c) Risk management
d) Metrics and target

a) Governance: the first reporting area on governance includes sustainability-related financial disclosures aiming to enable users of general-purpose financial reporting to understand the governance processes, controls and procedures used by a firm to monitor and manage sustainability-related risks and opportunities.

b) Strategy: the second reporting area on strategy includes sustainability-related financial disclosures aiming to enable users of general-purpose financial reporting to understand a firm’s strategy for addressing significant sustainability-related risks and opportunities.

To achieve this objective, a firm is required to disclose, among others, information about:

- the significant sustainability-related risks and opportunities that the firm reasonably expects could affect its business model, strategy and cash flows, its access to finance and its cost of capital, over the short-, medium- or long-term.
- how the firm is responding to significant sustainability-related risks and opportunities.
- quantitative and qualitative information about the progress of plans disclosed in prior reporting periods.
- the resilience of its strategy (including its business model) to significant sustainability-related risks.

With regard to the resilience of its strategy, a firm must disclose information that enables users of general-purpose financial reporting to understand its capacity to adjust its strategy and business model to uncertainties arising from significant sustainability-related risks. To this end, a firm must disclose a qualitative and, when applicable, a quantitative analysis of the resilience of its strategy in relation to its significant sustainability-related risks and opportunities, including how the analysis was undertaken and its time horizon. When providing quantitative information, a firm can disclose single amounts or a range.

Given the relevance of this second reporting area on strategy, in order to analyse the operational declinations of the general principles outlined in the Draft IFRS S1, the strategy disclosure requirements contained in the Draft IFRS S2 (which focuses on the climate-change topic) are now analysed.

The Draft IFRS S2 requires that a firm must disclose information that enables users of general-purpose financial reporting to understand the effects of significant climate-related risks and opportunities on its strategy and decision-making, including its transition plans. Among other requirements, a firm must disclose:

- how it is responding to significant climate-related risks and opportunities including how it plans to achieve any climate-related targets it has set. This shall include:
  - information about current and anticipated changes to its business model.
  - how these plans will be resourced.
- quantitative and qualitative information about the progress of plans disclosed in prior reporting periods.
- the climate resilience of its strategy (including its business model) to significant physical risks and significant transition risks.
With regard to the **climate-resilience of its strategy**, in the Draft IFRS S2 is stated that a firm must disclose information that enables users of general-purpose financial reporting to understand the resilience of the firm’s strategy and business model to the significant climate-related risks and opportunities and related uncertainties. A firm shall use climate-related scenario analysis to assess its climate resilience unless it is unable to do so. If a firm is unable to adopt climate-related scenario analysis, it shall use an alternative method or technique to assess its climate resilience. When providing quantitative information, a firm can disclose single amounts or a range.

Among other requirements, for disclosing its climate-resilience, the Draft IFRS S2 requires a firm to assess its capacity to adjust or adapt its strategy and business model over the short-, medium- and long-term to climate developments in terms of:

- the availability of, and flexibility in, existing financial resources, including capital, to address climate-related risks, and/or to be redirected to take advantage of climate-related opportunities.
- the ability to redeploy, repurpose, upgrade or decommission existing assets.
- the effect of current or planned investments in climate-related mitigation, adaptation or opportunities for climate resilience.

c) **Risk management:** the third reporting area on risk management includes sustainability-related financial disclosures aiming to enable users of general-purpose financial reporting to understand the process, or processes, by which sustainability-related risks and opportunities are identified, assessed and managed. These disclosures shall enable users to assess whether those processes are integrated into a firm’s overall risk management processes and to evaluate the firm’s overall risk profile and risk management processes.

d) **Metrics and targets:** the fourth reporting area on metrics and targets includes sustainability-related financial disclosures aiming to enable users of general-purpose financial reporting to understand how a firm measure, monitors and manages its significant sustainability-related risks and opportunities. These disclosures shall enable users to understand how a firm assesses its performance, including progress towards the targets it has set.

A firm must disclose the **targets** it has set to assess progress towards achieving its strategic goals, specifying:

- the metric used.
- the period over which the target applies.
- the base period from which progress is measured.
- any milestones or interim targets.

Moreover, a firm must disclose:

- the performance against its disclosed targets and an analysis of trends or significant changes in its performance.
- the revisions to its targets and the explanation for those revisions.

Given the relevance of this fourth reporting area on metrics and targets, in order to analyse the operational declinations of the general principles outlined in the Draft IFRS S1, the metrics and targets disclosure requirements contained in the Draft IFRS S2 (which focuses on the climate-change topic) are now analysed.
The Draft IFRS S2 requires that a firm must disclose information that enable users of general-purpose financial reporting to understand how the firm measures, monitors and manages its significant climate-related risks and opportunities. These disclosures shall enable users to understand how the firm assesses its performance, including progress towards the targets it has set. To achieve this objective, a firm must disclose:

- **information relevant to the cross-industry metric** categories, which are relevant to firms regardless of industry and business model.
- **industry-based metrics** which are associated with disclosure topics and relevant to firms that participate within an industry, or whose business models and underlying activities share common features with those of the industry.
- **other metrics** used by the board or management to measure progress towards the targets.
- **targets** set by the firm to mitigate or adapt to climate-related risks or maximise climate-related opportunities (climate-related targets).

With regard to the climate-related targets, for each of them, a firm must disclose:

- metrics used to assess progress towards reaching the target and achieving its strategic goals.
- the specific target the firm has set for addressing climate-related risks and opportunities.
- the objective of the target (for example, mitigation, adaptation or conformance with sector or science-based initiatives).
- how the target compares with those created in the latest international agreement on climate change and whether it has been validated by a third party.
- the period over which the target applies.
- the base period from which progress is measured.
- any milestones or interim targets.

### 10.2 A focus on the forward-looking information requests: the IFRS planning process

As can be seen from the previous paragraph, Draft IFRS S1 requires, much like ESRS, that a firm, in formulating its sustainability strategies, not only shall take into consideration the backward-looking information but, above all, it must focus on the forward-looking information for assessing how sustainability risks and opportunities could reasonably be expected to affect its business model, strategy and cash flows over the short-, medium- or long-term, its access to finance and its cost of capital. The same is required by Draft IFRS S2, declining these general requirements in the specific context of climate change.

Like ESRS, also Draft IFRS S1 and S2, require that a firm implements a planning process:

1. First of all, the financial materiality assessment must be conducted for all significant sustainability related risks and opportunities that are expected to affect the enterprise value. The enterprise value is the total value of a firm. It is the sum of the value of the firm's equity and the value of the firm's net debt. The enterprise value reflects expectations of the amount, timing and uncertainty of future cash flows over the short-, medium- and long-term.
2. After identifying the material sustainability risks and opportunities, a firm must:
   - Define how to manage material sustainability-related risks and opportunities.
   - Set sustainability targets for managing sustainability-related risks and opportunities.
   - Formulate plans for reaching the targets.
   - Define the resources to be allocated to support the plans’ implementation.

3. Finally, a firm must continuously monitor the sustainability performance to evaluate the progress of the plan through the time.

As just seen, the planning process requires firms to disclose forward-looking information about possible future events regarding material sustainability-related risks and opportunities. For this reason, firms have to make estimates in conditions of uncertainty. Measurement uncertainty arises when metrics cannot be quantified directly and can only be estimated. However, due to the forward-looking perspective of the planning process, the use of reasonable estimates is an essential part of preparing sustainability-related metrics and does not undermine the usefulness of the information if the estimates are accurately described and explained. Even a significant uncertainty would not necessarily prevent such an estimate from providing useful information. Thus, a firm must identify metrics it has disclosed that are affected by significant uncertainties, disclosing the sources and nature of these uncertainties and the factors affecting the uncertainties.

For this reason, the Draft IFRS S1 require that a firm, when determining estimates regarding possible future events that have uncertain outcomes, shall consider:

- the potential effects of the events on the value, timing and uncertainty of the firm’s future cash flows, including in the long-term (the possible outcome).
- the full range of possible outcomes and the likelihood of the possible outcomes within that range.

However, at the current state, the inclusion of forward-looking information in the formulation of sustainability reports presents four open issues which must be address:

1. Giving a structured definition of forward-looking information: within the Draft IFRS S1 and S2, a structured definition of forward-looking information is not given. The standards lack structured methodologies for the preparation and representation of idiosyncratic forward-looking information.

2. Considering plans’ risks: the Draft IFRS S1 and S2 require firms to implement a structured planning process declined in target to be met in order to pursue sustainability objectives. However, nowhere in the Draft IFRS S1 and S2 it is stated how the firm have to consider the risk of action plans due to their forward-looking nature, in other words the risk of not reaching the targets set in the plans. In particular, the transition risk is strictly linked to the achievement of the sustainability objectives set within the action plans.

3. Define structured risk measurement methodologies: the Draft IFRS S1 and S2 require to evaluate how sustainability risks and opportunities could reasonably be expected to affect firm’s cash flows over the short-, medium- or long-term, its access to finance and its cost of capital. Nevertheless, for measuring the effects of sustainability risks and opportunities on a firm’s financial performance, the Draft IFRS S1 and S2 do not describe any concrete methodology.
Given this lack, a structured and shared methodology must be provided for measuring the effects that sustainability risks and opportunities have on a firm’s financial performance.

4. **Define structured methodologies for assessing the firm’s strategy resilience**: regarding the resilience of a firm’s strategy, no concrete assessment methodologies are provided. In the Draft IFRS S1 it is only required that a firm must disclose a qualitative and, when applicable, a quantitative analysis of the resilience of its strategy in relation to its significant sustainability-related risks and opportunities, including how the analysis was undertaken and its time horizon. Even in the Draft IFRS S2 there are no binding methodologies to be used by firms. In fact, the Draft IFRS S2 requires firms to use climate-related scenario analysis unless they are unable to do so. In this case they shall use an alternative method or technique to assess their climate resilience. Therefore, even from the Draft IFRS S2’s operative perspective, there is no agreement on which methodology should be requested and, with regard to the climate scenario analysis, the methods for carrying it out are not concretely defined.

Given that the resilience of a firm’s strategy and business model make it possible to determine the level of feasibility with which the firm can achieve its sustainability objectives, it is necessary to have assessment methodologies that are defined, shared and structured. Only in this way would it be possible to compare the ability of firms to pursue their own sustainability targets.
References


