Climate change skills for the new CFOs. A preliminary analysis on TCFD by Italian listed companies

Paola Vola, Lorenzo Gelmini[*]

Received: 20 October 2021
Accepted: 17 March 2022

Abstract

In the current context of climate change, and despite the general acceptance of the urgency of actions, accounting disclosure fails to outline financial climate-related risks. In this regard, considering the different environmental and sustainability frameworks, this paper adopts the Task force on Climate-related Financial Disclosure (TCFD) framework because it encompasses the potential substantial risks to financial results stemming from a corporation's climate dependency. It is noteworthy to investigate the changing role of the Chief Financial Officer (CFO) as climate-related disclosures are constructed and reported based on TCFD requirements, as transposed by the EU's recommendations. Based on these premises, this study analyzes the reporting requirements provided by the TCFD for the voluntary disclosure on climate change that must be addressed by contemporary CFOs.
Considering the required disclosure, it is possible to identify the competencies that CFOs must acquire in the immediate future (in terms, e.g., of environmental-managerial metrics that must be measured) and the soft skills that are required to collaborate with scientific experts who provide the technical side of the disclosed data.
The authors develop a content analysis of the most recent, available Non-Financial Declarations of Italian listed companies and then disentangle the results into distinct categories. This study expands the field of knowledge of a key future issue and, in so doing, it emphasizes the role of accounting in fostering/contrasting the necessary actions to manage climate change.

Keywords: Climate change, Climate-related financial disclosure, Non-financial information, CFO, Italian listed companies.

[*] University of Piemonte Orientale, DISSTE Department. E-mail: paola.vola@uniupo.it (corresponding author); lorenzo.gelmini@uniupo.it.

Management Control (ISSN 2239-0391, ISSNe 2239-4397), 2022, 2 – Special Issue
Doi: 10.3280/MACO2022-002-S1009

1. Introduction

In the recent years, people around the world have seen the growing toll of climate change in terms of environmental disasters; nowadays climate change represents the major threat to the economy because it could have a large impact in terms of reducing the potential future growth of the economy itself (Cotter, Najah, 2013; Abhayawansa, Adams, 2021; Bui *et al.*, 2021).

According to NGFS (2018), the climate change is related to the economic well-being through different effects, such as reducing labour productivity, diverting resources from investment in current productive capital and innovation to climate change adaptation.

Even it is obvious that different industries and sectors have a specific degree of sensitivity to climate change, it is also clear that the climate risk need to be considered in the global financial system.

The IMF (2018) points out that there is growing evidence that investors and financial markets do not immediately catch the impact of climate change shocks on inputs/outputs and productivity.

In this contest, in spite of the general acceptance about the urgency of climate change actions, disclosure fails in outlining the financial climate related risks.

Among different environmental and sustainability frameworks, the TCFD framework has the peculiarity of encompassing the potential substantial risks to financial results resulting from a corporation's dependencies upon climate.

Under this perspective, the impact of TCFD is relevant: in fact, the framework proposed, is different from the other disclosure frameworks, such as integrated reporting, because is rather focused on sustainability dependencies rather than sustainability impacts.

TCFD reporting aims to provide the finance sector with information about dependencies-related financial risks to which a corporation is exposed. It requires to propose different climate scenarios to demonstrate the resilience of companies' strategy and operations and thus risks.

Another element that characterizes TCDF disclosure is materiality assessment to evaluate and prioritizing companies' risks and opportunities in general.

In light of these considerations, it is worthy investigating the changing role of Chief Financial Officer (CFO) as climate-related disclosure are constructed and reported on the basis of TCDF requirements, as transposed by EU' recommendations.

In our research we analysed the reporting requirements provided by the Task Force on climate-Related Financial Disclosure (TCFD) for the voluntary disclosure on climate change that need to be addressed by modern CFOs.

Looking at the disclosure required, it possible to identify the competencies that the CFOs must acquire in the immediate future (in terms, for example, of environmental-managerial metrics that need to be measured) and the soft skills that are request to collaborate with scientific experts that provide the technical side of data disclosed.

We have conducted a content analysis, in the light of which the narrative information has been traced via a coding system (Krippendorff, 2013). More specifically the coding has been carried out on the basis of the work of Demaria and Rigot (2021) who identified 10 specific questions to disentangle the topic. Later, we made a more articulated focus to some companies which present relevant and original info inside their disclosure.

The content analysis has been conducted on the "Non-Financial Disclosure" (DNF) from 2017 onwards for Italian listed companies.

In order to select the sample, within the Italian listed companies, we have selected those belonging to the FTSE MIB, the index which consists of the most liquid and highly capitalized stocks listed on the Italian Stock Exchange (Lombardi *et al*. 2021). When disentangling the result into the different categories, it appears clearly that the technical content of disclosure (in terms of metrics and GHG scope emissions) is complete and accurate, whilst the managerial consequences are weak and incomplete.

The remainder of the paper is organized as follow: the first paragraph is devoted to the presentation of the climate change challenge and its economic consequences; the second section contains a literature review on the TCFD framework and on the CFO's, role related to climate change accountability; the third part presents the methodology adopted and the data sample selected; the fourth section contains that are discussed in the fifth paragraph; finally concluding remarks, limitations and further research are proposed.

2. The Climate Change and its economic consequences

The current pandemic represented an existential crisis, a reminder of our fragility; it has forced all of us to confront climate change, an epochal phenomenon, that will alter our live as it has never happened before.

Fortunately, the awareness has spread that all the biggest crises, both health and environmental, require a global courageous reaction.

In the recent years, people around the world have seen the growing toll of

climate change in terms of environmental disasters; nowadays climate change represents the major threat to the economy because it could have a large impact in terms of reducing the potential future growth of the economy itself (Cotter, Najah, 2013; Abhayawansa, Adams, 2021; Bui *et al*., 2021).

According to NGFS (2018), the climate change is related to the economic well-being through different effects, such as reducing labour productivity, diverting resources from investment in current productive capital and innovation to climate change adaptation.

It is clear that different countries will have a different level of damage: the magnitude of these consequences will depend on how much each individual country is affected by climate change and on how many countries will be able to adapt to it, redesigning production systems, international trade flows and consumer behaviours.

Even it is obvious that different industries and sectors have a specific degree of sensitivity to climate change, it is also clear that the climate risk need to be considered in the global financial system.

The actual climate scenario, especially the global warming, demands a transition toward greener economic activities, since greenhouse gas emissions cause further global warming.

In 2016, nearly 200 United Nations Frameworks Convention on Climate Change (UNFCCC) members have signed the Paris Agreement, dealing with greenhouse gas emissions mitigation, climate change, adaptation and finance.

The process of adaptation to climate change implies also the reallocation of labour force to those jobs aimed at reducing the negative effects of climate change. If adequate action is not taken, the impact of climate change on GDP and economic performance will be very relevant, even if it is difficult to determine the exact dimension.

The financial system could be destabilized by future rapid losses to carbon-intensive assets caused by the need to move to a greener economy. Green transition generates also indirect risks; this type of risks regards businesses that are not directly affected by climate change, but are key partners of organizations at are at direct risk, within the same supply chains.

Moreover, a general potential risk is represented by the raised awareness by consumers who would start turning to those companies with a lower emission production (or companies that belong to a low emission supply-chain).

In spite of the risks outlined, there are also significant economic opportunities that the transition will create, as well as how to execute it in a just and fair manner. According to Porter and Linde (1995), strict environmental regulations can induce efficiency and encourage innovations that help improve commercial competitiveness.

There are branches that are developing rapidly also on this basis of regulation: the introduction of stricter technological standards and carbon tax can give a great stimulus to the research in new energy sources.

However, the IMF (2018) points out that there is growing evidence that investors and financial markets do not immediately catch the impact of climate change shocks on inputs/outputs and productivity.

In this contest, in spite of the general acceptance about the urgency of climate change actions, disclosure fails in outlining the financial climate related risks.

Haque and Islam (2015) underlined that the pressures behind climate change accountability and disclosure come from various stakeholders, i.e., government bodies (regulators), institutional investors, environmental NGOs, and media accounting professionals.

Reporting in general represent a response to different needs: towards the government bodies (i.e., regulators), reporting aims at fulfilling obligations connected to the legislation on emissions rights, while towards corporate, reporting supports the image and reputation of the organization towards various types of stakeholders. Moreover, reporting for internal purposes provide a useful control tool to check goals fulfilment.

According to Milne *et al*. (2011), among the stakeholder pressures, climate change reporting is mainly driven by risk and risk management motivation. In other words, the need to disclose climate change information is induced by institutional investors' (who are the main financial stakeholders of corporations) belief that climate change: (a) is a relevant risk; (b) is the most important issue within sustainability; (c) is a relevant aspect for organizations' clients, who need climate change-related risks to be managed in their portfolio investment.

Current climate change related disclosure does not provide adequate information on the business financial implications of climate change, even if several frameworks has been proposed to addressing environmental topic.

3. Literature review

3.1. Climate related disclosure initiatives: the TCFD framework and implications

As noted by many scholars, among others, Lombardi *et al*. (2021), Abhayawansa and Adams (2021), Venturelli *et al*. (2019), a broad proposal of frameworks and standards were published to disclose climate related infor-

mation, integrating the non-financial information, including Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC), UN Global Compact and SDGs, Sustainable Accounting Standards Board (SASB), Climate Disclosure Standards Board (CDSB), Carbon Disclosure Project (CDP), Task Force on Climate-Related Financial Disclosure (TCFD).

Among the different aforementioned reporting frameworks, some emerge as the most adopted in practice, as the GRI.

Different guidelines and frameworks have promoted the spread of corporate sustainability reporting and disclosure to provide adequate climate change-related information (Cotter, Najah, 2013).

The study by KPMG (2021) recorded an increasing adoption of TCFD. This trend is interesting because it is in line with the current interest of a growing number of investors claiming the recognition of the materiality of climate-related risk to help them judges these risks (O'Dwyer, Unerman, 2020).

During COP 21, in 2015, the Financial Stability Board set up an international working group, the Task Force on Climate-related Financial Disclosures (TCFD), in order to create the necessary conditions for transparency regarding climate risks and opportunities and to make recommendations for a better harmonisation of the non-financial reporting framework.

The Task Force consists of 32 members from across the G20, representing both preparers and users of financial disclosures.

Specifically, the TCFD is intended to guide companies in providing clear, comparable and consistent disclosure to investors about governance, strategy, risk management and metrics practices.

The TCFD's 2017 report provides a new framework through a set of recommendations for companies to improve their climate change disclosure practices. Its final recommendations propose a grid of themes which is on the way to becoming the international reference for climate issues.

Corporate environmental and sustainability information follows voluntary or mandatory regulations. Undoubtedly, the EU directive represents the most relevant in the European scenario. In 2019, the European Commission extended its guidelines on non-financial reporting (Communication from the Commission, 2017) and integrated the recommendations of the Task Force on Climate related Financial Disclosures (2017) through its supplement on climate-related information reporting (Communication from the Commission, 2019).

According to these guidelines, "under the Non-Financial Reporting Directive, climate-related information should, to the extent necessary, include

both the principal risks to the development, performance and position of the company resulting from climate change, and the principal risks of a negative impact on the climate resulting from the company's activities" (par. 2.3 Communication from the Commission, 2019).

The European Commission highlights the same risks arising from the transition to a low-carbon and climate-resilient economy identified by TCFD (2017).

The TCFD framework has the peculiarity of encompassing the potential substantial risks to financial results resulting from a corporation's dependencies upon climate.

As outlined by O'Dwyer and Unerman, (2020), TCFD reporting is so distinctive, since it is based on modelling plausible future global warming scenarios.

As previously highlighted, corporate disclosure was also identified as a means to help the corporations themselves understand and adapt in a timely manner to the material climate risks and opportunities they face, thus reducing the likelihood of (or need for) even more disruptive abrupt changes in the future.

Under this perspective, the impact of TCFD is relevant: in fact, the framework proposed, is different from the other disclosure frameworks, such as integrated reporting, because is rather focused on sustainability dependencies rather than sustainability impacts.

TCFD reporting aims to provide the finance sector with information about dependencies-related financial risks to which a corporation is exposed.

It therefore discloses corporate sustainability dependencies information to financial stakeholders whose main sustainability information needs relate to these corporate dependencies (and risks flowing therefrom) (O'Dwyer, Unerman, 2020).

The concept of scenario represents the basis of TCDF: according to framework, corporations model their climate-related risks and opportunities for different levels of global warming – in other words, for a variety of global warming scenarios. These should include at least one low emissions scenario consistent with intergovernmental commitments to keep warming below 2° C above pre-industrial levels (TCFD, 2017) (after the IPCC (2018) report, a 1.5° C warming scenario is now more appropriate).

Climate scenarios are intended to allow a corporation to identify the challenges, risks and opportunities it might face at different possible levels of future global warming, with it being highly unlikely that actual global warming will be exactly as portrayed in any one of the scenarios (TCFD, 2017).

Taking into consideration the climate scenario, companies can demonstrate how resilient their corporation's strategy and operations are in different scenarios of future global warming. Furthermore, this can raise management awareness and focus executives' attention on developing strategies to improve such resilience.

TCFD (2017) details the general characteristic of scenario, since each of them need to be modelled by a corporation needs to be: "plausible", "distinctive … [and] differentiated", "internally consistent", "relevant" and "challeng[ing of] conventional wisdom and simplistic assumptions about the future". In order to made scenarios more effective, they need to be qualitatively communicated at a general level; additional use of quantification can make them more powerful tools as reporting corporations become more experienced with the type of analytics and modelling relevant for their scenarios (TCFD, 2017).

In making climate-related scenario analysis central to its recommendations, the TCFD recognized that this form of planning was likely to be unfamiliar and challenging territory for many corporations' managers and investors (TCFD, 2017).

Scenario planning therefore requires many managerial efforts by corporations: they need to develop new abilities in this type of planning compared to basing plans on the forecasting of averages commonly used. It also requires those corporations that do have experience in using scenario planning for infrastructure investments to adapt its use for modelling scenarios of long-term climate risks, opportunities and outcomes.

Development of corporate capacity and abilities to plan a meaningful climate-related scenario analysis therefore appears to be posing a major challenge.

Another key element proposed by TCFD is materiality, since it represents the basis of companies' evaluation and prioritization of the risks and opportunities in general.

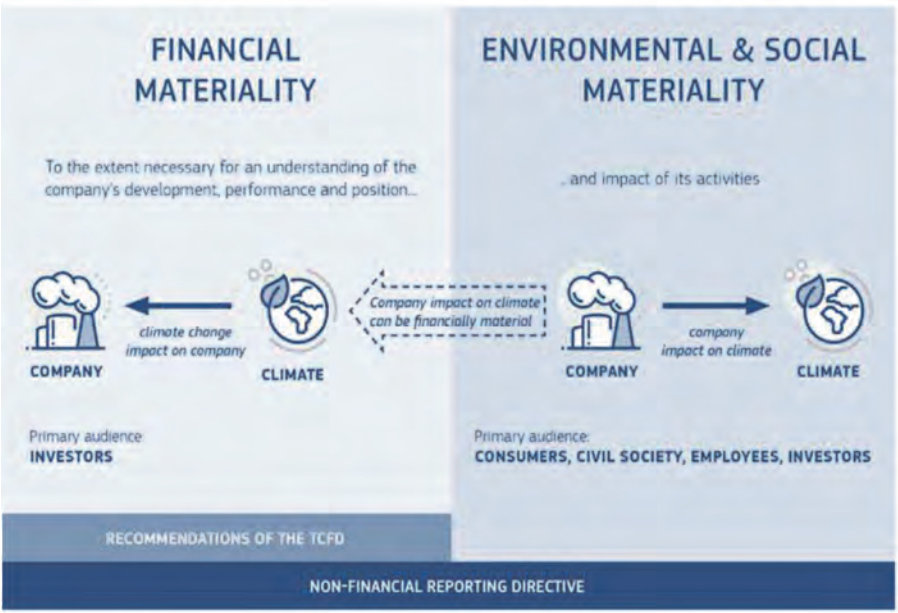
Materiality has tended to be defined using a financial reporting framing which accords it the role of ascertaining the importance of the disclosure of an item of information (or its omission) to users.

The concept has not, however, received a precise codification (Edgley, 2014) and a great variety of definitions has been proposed from professional accounting bodies, common law and statute rarely reaching complete agreement (Power, 1997).

The TCFD recommendations also imply that sustainability and finance professionals will need to work closely together in determining materiality

of climate-related risks. However, sustainability and other non-financial reporting professionals frequently use different concepts of materiality than their financial reporting counterparts (Canning *et al*., 2019; O'Dwyer, 2011). It is necessary that these different group of experts work to gain knowledge of and reconcile their respective notions of materiality.

Figure 1 - *Toward financial materiality*



Source: *European commission guidelines (2019); TCFD Status Report (2019).*

In light of the previous considerations, it is worthy studying the changing role of Chief Financial Officer (CFO) as climate-related disclosures are constructed and reported upon in compliance with TCFD requirements (Hall *et al*., 2015), as transposed by the EU's recommendations.

3.2. CFO and climate change accountability

In this evolving context, the CFO role has expanded significantly beyond that of a chief-accountant to one of co-decision maker in corporate governance and business strategy.

It is widely recognized that several factors, including investor pressure,

and the development of accounting standards are making climate change a CFO's business.

The Prince of Wales Accounting for Sustainability Project has gathered CFOs around sustainability since 2010. King and Atkins (2016) have coined the term "chief value officer" to call for a more inclusive way of looking at the role of the CFO.

As underlined in literature, among others, Rüschen and Eckey (2011), many CFOs serve as de facto "chief risk officers" who proactively manage risks that could impact the financial position of the company.

CFOs currently review a myriad of business risks facing their companies some of which derive from external drivers (e.g., global megatrends or government regulation), while others originate within their market sectors or are internal to the company. Increasingly, these risk factors are broadening both in scope and materiality, thus stimulating some CFOs to examine their impact on business performance, now and in the future. Environmental sustainability-related risks on the horizon include climate change, uncertainty about future fossil fuel use, resource scarcity, insecure or insufficient food supplies, ecosystem and biodiversity decline, and the global spread of diseases.

The CFO in his new role as a strategic manager and independent counterpart to the CEO covers a unique position to mitigate the risks and to turn them into opportunities. Following this perspective, scholars and practitioners provided a variety of qualifications for the modern CFO, i.e., "chief value officer" and "sustainability CFO."

Gibassier *et al*. (2020) further developed the role of the "sustainability CFO"; furthermore, Palmeiro and Gibassier (2020) argued that the CFO would become the next climate leader to follow.

Under this perspective, the sustainability CFO is exclusively responsible for the nonfinancial performance of the company also referred to as sustainability performance. Sustainability encompasses a broad range of themes, such as managing carbon footprints, assessing social impact, and participating in the creation of non-financial reporting standards.

Therefore, the core mission of sustainability CFOs is to monitor and report on how their organization contributes to a sustainable development, i.e., a development that meets the needs of the present without compromising the future generations to meet their own needs. Sustainability CFOs are often linked by a strong line to the chief sustainability officer and a dotted line to the CFO of the company.

The main duties of a sustainability CFO can be summarized in a tri-faceted mission, that encompasses bringing sustainability into decision-making pro-

cesses and act as the "business partner" of the organization, becoming the contact person of the organization for investors, auditors, and other stakeholders who inquire about topics that relate to nonfinancial performance, and boosting credibility of climate change related information spread by companies.

Thanks to their accounting background, modern CFOs are expected to bridge the rigor and savoir faire of accounting to the complexity and emergence of sustainability. Such inclusion should help trigger change toward a better inclusion of social and environmental concerns into the day-to-day practices of the organization.

In sum, we can affirm that the tasks of a sustainability CFO resemble the tasks of a traditional CFO only applied to nonfinancial issues. There are, however, some specific tasks assigned to the sustainability CFO due to the novelty of sustainability accounting. In particular, sustainability CFOs are highly engaged in the creation of sustainability accounting standards. They also have to communicate both internally and externally the workings and added-value of their job to the organization.

Considering that the first responsibility of CFOs is the reporting, in the current context, it means that CFOs need to consider both financial and nonfinancial performance. This includes maintaining an effective key performance indicator (KPI) reporting system and publishing reporting in corporate publications in a professional and adequate manner.

In spite of this general awareness, there has been little focus on why and how chief financial officers (CFOs) should pay attention.

In their role as financial stewards of companies, the CFO's primary role is to manage risk and improve corporate performance. Sustainability has the potential to assist CFOs as they face great pressure to reduce costs in the short-term while building the financial foundation for long-term growth.

Since research on CFOs and sustainability is still at an early stage, we focus here on the main tasks of modern CFO regards reporting.

In our research we analysed the reporting requirements provided by the Task Force on climate-Related Financial Disclosure (TCFD) for the voluntary disclosure on climate change that need to be addressed by modern CFOs.

Looking at the disclosure that is required, it possible to identify the competencies that the CFOs must acquire in the immediate future (in terms, for example, of environmental-managerial metrics that need to be measured) and the soft skills that are request to collaborate with scientific experts that provide the technical side of data disclosed.

TCFD provides 11 recommended disclosures related to 4 thematic areas, Governance, Strategy, Risk management, and Metrics and targets, as shown in the below Table 1.

Table 1 - *TCFD recommendations' disclosure core elements*

Governance	Strategy	Risk Management	Metrics and Targets
Disclose the organization's governance around climate-related risks and opportunities.	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	Disclose how the organization identifies, assesses, and manages climate-related risks.	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.
Recommended Disclosures	**Recommended Disclosures**	**Recommended Disclosures**	**Recommended Disclosures**
a) Describe the board's oversight of climate-related risks and opportunities.	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	a) Describe the organization's processes for identifying and assessing climate-related risks.	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.
b) Describe management's role in assessing and managing climate-related risks and opportunities.	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	b) Describe the organization's processes for managing climate-related risks.	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

Source: *TCFD, Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures (2017)*

We focus the attention on the thematic area of "Metrics and targets": the three TCFD recommended disclosure issues in this area include: a) the metrics used by the organizations on climate change; b) Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks; and c) the targets used by the organization to manage climate-related risks and opportunities and performance against targets.

The content of this section of TCFD disclosure is largely the responsibility of the CFO, who, consequently, has to broaden his skills and competencies towards technical sustainability issues.

4. Methodology and data collection

The method pursued in this study is essentially qualitative, since, as Hair *et al*. (2003) stated, it is the most appropriated and the only way to achieve research objectives research when "little is known about a research problem

or opportunity, where previous research only partially incompletely explains the research question, when current knowledge involves subconscious, psychological, or cultural material that is not accessible using survey and experiments, and if the primary purpose of the research is to propose new ideas and hypotheses that can eventually be tested with quantitative research."

We have conducted a content analysis, in the light of which the narrative information has been traced via a coding system (Krippendorff, 2013).

More specifically the coding has been carried out on the basis of the work of Demaria and Rigot (2021) who identified 10 specific questions to disentangle the topic.

Later, we made a more articulated focus to some companies which present relevant and original info inside their disclosure.

The content analysis has been conducted on the "Non-Financial Disclosure" (DNF) from 2017 onwards for Italian listed companies.

In order to select the sample, within the Italian listed companies, we have selected those belonging to the FTSE MIB, the index which consists of the most liquid and highly capitalized stocks listed on the Italian Stock Exchange (Lombardi et al. 2021).

Furthermore, consistent with Kvaal and Nobes (2010), we believe that large companies are most likely to be more attentive than smaller companies to the requirements and expectations of the global investor community. FTSE MIB companies fully address these requirements.

Moreover, all the FTSE MIB companies are also cross-listed and cross-listing has been identified as a determinant of financial and non-financial information quality, because these companies have to comply with international disclosure practices and international investors' needs (Meek and Saudagaran, 1990). In addition, the sample, being made up of several industries, and representing more than 80% of the total Italian market capitalization, could allow inferences to be made for the entire listed Italian companies. FTSE MIB sample is also widely used both in empirical researches based on multiple countries sample (Devalle *et al.*, 2010; Nobes, Stadler, 2015) and on the Italian context (Veltri, Ferraro, 2018).

Consequently, the analysis has been run among the non-financial reporting practices of the most representative Italian companies.

We have excluded for homogeneity reasons companies within the finance and banking industry and companies which have been incorporated outside Italy and for which DNF is not mandatory; in the end the sample comprises 21 companies.

Amongst the above, 10 companies (48% of the overall sample) explicitly mention the TCFD project and guidelines.

5. Results

The sample analysed can be observed from different point of view; for the study's purpose, it worth to depict the sample by industry and identify the locus in which TCFD disclosure is provide. Moreover, it is interesting to summarized how many companies are member or not of the TCFD. These characteristics of the sample are exposed in the following Tables.

Table 2 - *Companies by industry*

Industry	N.
Industrials	4
Energy	3
Public Services	2
Discretionary goods	1
	10

Table 3 - *The locus of the non-financial disclosure*

Locus	N.
Integrated Report	5
Sustainability Report	3
Stand Alone DNF	1
Financial Statements	1
	10

Table 4 - *Relationship amongst companies and TCFD*

Type	N.
Constituents	3
Partners	4
Nothing	3
	10

A significant majority of the companies belong to sectors particularly related to the theme of climate change (industrials and energy) and 70% of the sample has adhered, immediately or subsequently, to the TCFD: the environment to be examine therefore represents the ideal context of study, referring

to sectors with important impacts on climate and to environmentally-conscious companies.

At the very same time, a certain dispersion emerges in the place of representation and content of the DNFs, which only in a single case assume a separate and autonomous dignity with respect to the other reports.

As in their work (Demaria, Rigot, 2021), we did not limit our content analysis to a binary model (0, 1) but we made use of a more precise coding scale.

More specifically, each question is assigned a score of 1, 0.5 or 0 according to the relative presence of the disclosed information. A score of 1 corresponds to full compliance, a score of 0.5 partial compliance (information is not detailed) and a score of 0 to a lack of required information.

We investigate the disclosure following the TCFD recommendations about Metrics and Target, namely:

a) Metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process (general information coded as "I").
b) Scope 1, Scope 2, and if appropriate Scope 3 GHG emissions, and the related risks (Scope information coded as "S).
c) Targets used by organization to manage climate-related risks and opportunities and performance against targets (Target and Objectives, information coded as "O").

The results are represented in the Table 5 below (whereas the first row presents the sector: I-industrials, E-energy, P-public services, DG-discretionary goods) whereas the row "I" pertain, as in Demaria and Rigot (2021), to the general Info, the row "S" to the Scope and the row "O" to the objectives (and results).

Table 5 - *The score regarding metrics and targets*

		I	E	E	P	P	I	I	DG	I	E	Total
I	Energy and other information	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	10,00
I	Business risk indicator	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
I	Internal carbon price	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
I	Evolution	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	10,00
S	Scope 1 2	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	10,00
S	Scope 3	1,00	1,00	1,00	1,00	1,00	0,00	1,00	1,00	1,00	1,00	9,00
S	Details of Scope 3	0,50	1,00	1,00	1,00	0,50	0,00	1,00	1,00	1,00	1,00	8,00
S	Evolution	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	10,00
O	Objectives	0,50	1,00	1,00	1,00	0,50	0,50	0,00	0,50	1,00	0,50	6,50
O	Results against objectives	0,00	0,50	0,50	0,50	0,00	0,00	0,00	0,50	0,50	0,00	2,50
		6,00	7,50	7,50	7,50	6,00	4,50	6,00	7,00	7,50	6,50	66,00

Source: *our personal elaboration.*

In the following Section we comment results and add info regarding some of the companies included in the sample.

6. Discussion

Table 5 presents, as mentioned before, the 10 lines of disclosure, regarding metrics and targets, proposed by Demaria and Rigot (2021).

Since the overall disclosure score equals 100.00, apparently the average result of 66.00 ranks at more than 50% of the overall content: yet, a more discrete and line per line analysis led to different conclusions.

In effect, 4 questions received a 10.00 score and 2 questions 9.00 and 8.00 respectively: in other words, 57/66 (86% of overall score) have been reached with 6 questions only.

At the very same time, 4 questions reported a total score 8,50 (14% of the overall score) with 2 questions completely ignored and unanswered in the sample and 1 disclosed poorly and incompletely.

As such, when disentangling the result into the different categories, it appears clearly that the technical content of disclosure (in terms of metrics and GHG scope emissions) is complete and accurate, whilst the managerial consequences are neglected: there is not a proxy or metric for business risk, the internal carbon price has not been made explicit and, furthermore, the disclosure regarding quantitative objectives and the results (against the objectives) is weak and incomplete.

Table 6 summarises the questions by item (I, S, O as above) and per industry.

Table 6 - *Disclosure by type and by sector*

	I	E	P	DG	Total	Avg
I	8,00	6,00	4,00	2,00	**20,00**	5,00
S	13,50	12,00	7,50	4,00	**37,00**	9,25
O	2,50	3,50	2,00	1,00	**9,00**	4,50
	24,00	**21,50**	**13,50**	**7,00**	**66,00**	
Avg	6,00	7,17	6,75	7,00		

Source: *our personal elaboration.*

The average score per line confirms that the Scope is abundantly covered,

in terms of disclosure, by the companies in the sample, while the lowest results are in the field of results and objectives: 5 companies not even compare targets and results and the remaining 5 disclose only partially the process of results against objectives.

All in all, the informative quality of the DNF, intended through the model of Demaria and Rigot (2021), seems rather limited to the technical topics and not to those closely managerial: and in doing this, the informative potential is lowered and the transformative capability as well.

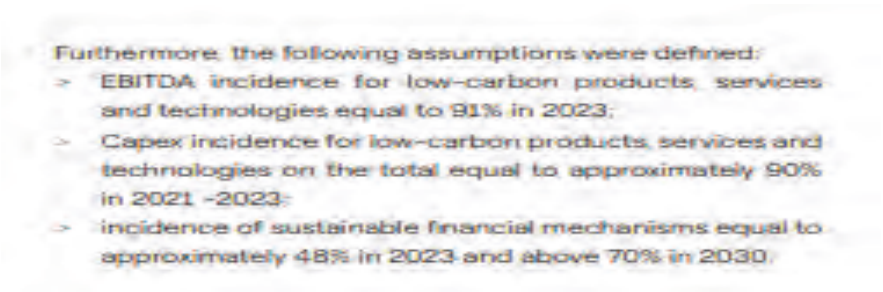
Two notable exceptions (Enel, Hera) are discussed below.

Enel

Within the construction of its expected sustainability metrics, Enel proposes a valuation that is also economic (e.g., the "financial metric", whereas it identifies some typically financial parameters (EBITDA, investments, financing) and it links them to activities with a limited content of emissions.

This is as follows in Figure 2.

Figure 2 - *Environmental and financial metrics at Enel*


Furthermore, the following assumptions were defined:
- EBITDA incidence for low-carbon products, services and technologies equal to 91% in 2023;
- Capex incidence for low-carbon products, services and technologies on the total equal to approximately 90% in 2021 -2023;
- incidence of sustainable financial mechanisms equal to approximately 48% in 2023 and above 70% in 2030.

Source: *Enel Sustainability Report 2020.*

Hera

Following the studies of Porter and Kramer, Hera has developed an original model of SV (Shared Value) via the process of C (Creating) and as such it proposes financial data in line with its CSV framework.

The model is explicitly and formally induced in the body of a document attached to the Sustainability Report and, from the model, the following data have been presented.

Figure 3 - *Environmental and financial metrics at Hera*

Indicator	Unit	2019	2020	2024 target	2030 target
EBITDA CSV Energy Drivers – Energy Transition and Renewables	Euro mln	33.3	51.6	68	
Share of BSC premium linked to CSV Energy Drivers	%	2%	4%		
Share of BSC premium linked to CSV Environment Drivers	%	8%	11%		
Revenue from energy production from coal or nuclear plants	Euro mln	0.0	0.0	0	0

Source: *Hera Sustainability Report 2020.*

Enel's and Hera's efforts appear to be highly appreciable as they constitute the (unique, inside the body of our sample) transmission belt between environmental and economic and financial topics; at the same time, they identify some necessary informative inputs for the agenda of newborn CFOs who will have to be capable to translate and to interpret more and more, in a synergic and continuous effort, environmental issues and performance into financial metrics.

7. Concluding remarks, limitations and further research

In light of the analysis conducted, the new challenges for modern CFOs regards first of all reporting requirements. In light of the growing importance of sustainability and climate related disclosure, CFOs need to implement the integration between financial and sustainability reporting; this process has become critical to guaranteeing companies' credibility towards stakeholders in general, also considering that the credit ratings are impacted by sustainability factors.

As far as concern CFO's competencies and skills, it is important to notice the capability to work together with scientific experts to melt financial and non-financial information; the focused is on the so called "soft skills" for CFOs.

Our investigation highlights that the disclosure about Target and Objectives is very poor. From this side, it emerges that CFOs should adopt new financial analysis tools and methodologies, that allows to better quantify managerial KPIs under environmental perspective, such as, i.e., Life Cycle Assessment (LCA), one of the most widespread approach used to analyze environmental impacts (Pomponi, Moncaster, 2017; Scheepens *et al.*, 2016).

CFOs should use also qualitatively weighting sustainability-related criteria to complement traditional financial analysis, in order include non-financial issues into their decision-making process.

Moreover, they should think in terms of portfolio approach that bundles high sustainability projects with high-ROI projects in order to meet unsatisfactory return rates.

Our findings underline that issue of carbon price in climate change related disclosure is neglected. CFOs should set an internal price for carbon for all investment projects in order to include the cost of carbon emissions in the calculations.

Moreover, the business risk indicator needs to be assessed accordingly to scenarios' definition. Our research outlines that this disowned.

Other considerations regard the approach to supply chain: CFOs should establish policies within the supply chain to better anticipate and manage the cost increases and volatility around resources, which are critical to the company's operational costs and risks.

Employee management represent another key point, since employee acquisition and retention seem to be increasingly affected by the company's sustainability performance and reputation. The CFOs' challenge is to work with human resources to maximize return on talent by improving recruitment and retention through their sustainability efforts.

At a macro-level, CFOs are expected to move beyond compliance to proactively anticipate and prepare for these new regulations that may increase cost of operations and have the potential to restructure market demand and terms of competition.

More in general, they have to enable communications in order to be in tune with public's sensitivity to sustainability issues, such as climate change. This aspect represents, country by country, an indirect driver of business success that influences the company's social license to operate.

In the very next years, we expect more CFOs to grasp the potential for sustainability thus maximizing business value for their organizations.

Through materiality assessment CFOs can play a vital complementary role in the following areas of corporate strategy and execution, helping organizations to identify the sustainability-related challenges and the magnitude of their impacts on business performance.

The study suffers, of course, from some limitations, in particular the size of the sample and the methodology adopted, which could be the subject of future scientific developments, aimed, also in the international logic that must inspire the theme of climate change, either at international comparisons

or at other research methods (for example, case studies and interviews with CFOs).

At the very same time a future fruitful avenue of research could be fostered by the analysis of the bank and insurance sector, which have been considered by TCFD itself like a relevant player in the field of climate change.

References

Abhayawansa S., Adams C. (2021), Towards a conceptual framework for non-financial reporting inclusive of pandemic and climate risk reporting, *Meditari Accountancy Research*, Vol. ahead-of-print No. ahead-of-print.

Bui B., Chelli M., Houqe M.N. (2021), Climate change disclosure ratings: the ideological play, *Meditari Accountancy Research*, vol. ahead-of-print No. ahead-of-print.

Canning M., O'Dwyer B., Georgakopoulos G. (2019), Processes of auditability in sustainability assurance–the case of materiality construction, *Accounting and Business Research*, 49(1), pp. 1-27.

Communication from the Commission (2017), Guidelines on non-financial reporting (methodology for reporting non-financial information), -- available at: www.eur-lex.europa.eu.

Communication from the Commission (2019), Guidelines on non-financial reporting: supplement on reporting climate-related information, -- available at: www.eur-lex.europa.eu.

Cotter J., Najah M.M. (2013), Corporate climate change disclosure practices and regulation: The influence of institutional investors. *Institutional Investors' Power to Change Corporate Behavior, International Perspectives*, Critical Studies on Corporate Responsibility, Governance and Sustainability, Vol. 5, Emerald Group Publishing Limited, Bingley, pp. 81-97.

Demaria S., Rigot S. (2021), Corporate environmental reporting: Are French firms compliant with the Task Force on Climate Financial Disclosures' recommendations?, *Business Strategy and the Environment*, 30(1), pp. 721-738.

Devalle A., Onali E., Magarini R. (2010), Assessing the value relevance of accounting data after the introduction of IFRS in Europe, *Journal of International Financial Management & Accounting*, 21(2), pp. 85-119.

Edgley C. (2014), A genealogy of accounting materiality, *Critical Perspectives on Accounting*, 25(3), pp. 255-271.

Gibassier D., Michelon G., Cartel M. (2020), The future of carbon accounting research: "we've pissed mother nature off, big time", *Sustainability Accounting, Management and Policy Journal*, 11(3), pp. 477-485.

Hair J.F.Jr, Celsi W., Money A.H., Samouel P., Page M.J. (2003), *Essentials of Business Research Methods*, Wiley, Hoboken, USA.

Hall M., Mikes A., Millo Y. (2015), How do risk managers become influential? A field study of toolmaking in two financial institutions, *Management Accounting Research*, 26, pp. 3-22.

Haque S., Islam A. (2015), Stakeholder pressures on corporate climate change-related accountability and disclosures: Australian evidence, *Bus Politics*, 17, pp. 355-390.

IMF (2018), İnci Ötker and Krishna Srinivasan. Bracing for the Storm. For the Caribbean, building resilience is a matter of survival. *Finance & Development*, March, 55(1).

IPCC, Report 2018, -- available at https://www.ipcc.ch/sr15/.

King M., Atkins J. (2016), *Chief value officer: Accountants can save the planet*. Greenleaf Publishing, UK.
KPMG (2021), -- https://home.kpmg/uk/en/blogs/home/posts/2021/02/how-does-your-esg-data-and-reporting-compare.html, Access on November 2021.
Krippendorf K. (2013), *Content Analysis: An Introduction to its Methodology*, 3 ed., Sage Publications, Thousand Oaks, USA.
Kvaal E., Nobes C. (2010), International differences in IFRS policy choice: a research note, *Accounting and Business Research*, 40(2), pp. 173-187.
Lombardi R., Schimperna F., Paoloni P., Galeotti M. (2021), The climate-related information in the changing EU directive on non-financial reporting and disclosure: first evidence by Italian large companies, *Journal of Applied Accounting Research*, 23(1), pp. 250-273.
Meek G.K., Saudagaran S. M. (1990), A survey of research on financial reporting in a transnational context, *Journal of Accounting Literature*, 9(145), pp. 145-182.
Milne M.J., Grubnic S., Solomon J.F., Solomon A., Norton S.D., Joseph N.L. (2011), Private climate change reporting: An emerging discourse of risk and opportunity, *Accounting, Auditing & Accountability Journal*, 24(8), pp. 1119-1148.
NGFS, First Progress Report (2018), -- available at https://www.ngfs.net/en
Nobes C.W., Stadler C. (2015), The qualitative characteristics of financial information, and managers' accounting decisions: evidence from IFRS policy changes, *Accounting and Business Research*, 45(5), pp. 572-601.
O'Dwyer B. (2011), The case of sustainability assurance: Constructing a new assurance service, *Contemporary Accounting Research*, 28(4), pp. 1230-1266.
O'Dwyer B., Unerman J. (2020), Shifting the focus of sustainability accounting from impacts to risks and dependencies: researching the transformative potential of TCFD reporting. *Accounting, Auditing & Accountability Journal*, 33(5), pp. 1113-1141.
Palmeiro L., Gibassier D. (2020), Your company's next leader on climate is … the CFO, *Harvard Business Review*, January, -- available at: https://hbr.org/2020/01/your-companys-next-leader-on-climate-is-the-cfo (accessed on November 2021).
Pomponi F., Moncaster A. (2017), Circular economy for the built environment: A research framework, *Journal of Cleaner Production*, 143, pp. 710-718.
Porter M.E., Van der Linde C. (1995), Toward a new conception of the environment-competitiveness relationship, *Journal of Economic Perspectives*, 9(4), pp. 97-118.
Power M. (1997), Expertise and the construction of relevance: Accountants and environmental audit, *Accounting, Organizations and Society*, 22(2), pp. 123-146.
Rüschen T., Eckey M. (2011), *How Climate Change Impacts the Role of the CFO,* eds. *The Strategic CFO*, Springer, Berlin, Heidelberg, pp. 265-284.
Scheepens A.E., Vogtländer J.G., Brezet J.C. (2016), Two life cycle assessment (LCA) based methods to analyze and design complex (regional) circular economy systems. Case: Making water tourism more sustainable, *Journal of Cleaner Production*, 114, pp. 257-268.
TCFD, Recommendations of the Task Force on Climate-related Financial Disclosures (2017), -- available at https://www.fsb-tcfd.org/publications/
Veltri S., Ferraro, O. (2018), Does other comprehensive income matter in credit-oriented systems? Analyzing the Italian context, *Journal of International Accounting, Auditing and Taxation*, 30, pp. 18-31.
Venturelli A., Caputo F., Leopizzi R., Pizzi, S. (2019), The state of art of corporate social disclosure before the introduction of non-financial reporting directive: a cross country analysis, *Social Responsibility Journal*, 15(4), pp. 409-423.