

Dipartimento di Impresa e Management

Corso di Laurea Magistrale in Corporate Finance

Cattedra di Risk Management

The inclusion and assessment of climate-related and environmental-related risks in the Banking industry: the UniCredit case.

prof. Daniele PENZA

RELATORE

prof. Francesco CERRI

CORRELATORE

Giovanni Luigi GIOIA
Matr. 715221

CANDIDATO

*A Giulia, mia nipote,
affinché le nostre azioni oggi
non si ripercuotano
sul suo futuro domani.*

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Introduction

Climate change is probably one of the few topics of discussion that silences almost everyone. It is a complicated matter and, what little is known comes from apocalyptic movies or TV series, fake news, environmental organizations struggles, or pop culture.

It is not possible to discuss the subject because very few know the dynamics and the dramatic consequences that an increase of one or two Celsius degrees after twenty, thirty, or fifty years involve not only on nature, already scarred by centuries of wild exploitation, but on the very nature of the human being.

Al Gore, the former U.S. Vice President under the Clinton Administration, in the documentary "*An Unconvenient Truth*" used the "*boiling frog*" situation to understand the relationship between humankind and climate change.

In the 19th century, scientists believed that if a frog dives into a pot of boiling water, it immediately jumps out because it feel danger. However, if it plunges into a warm water pot, brought slowly to boil, it does not move at all. It remains there even if the temperature continues to rise. The analogy is brilliant, even though not true from a scientific point of view.

The human being does not realize the emergency that planet Earth is facing because society use the five senses to identify, describe, annd analyze something. Climate change has consequences over a time horizon (from 10 to 100 years) too long to appreciate the different conditions. In a situation where humankind cannot touch the phenomenon it is experiencing, it tends to place its trust in its Head of State. When heads of state - as in Russia, Brazil, USA - spread false news to their citizens, they are offending the office they occupy.

Leaving aside the political debate around electoral consesus, the real problem is the consistent lack of data society faces when analysing climate change. Very often free-access data are old, confusing, non-comparable. The residual class of high quality data are proprietary. Data gives users the possibility to analyze, compare, and direct investments decisions. Moreover, considering how

important the concept of “ESG-driven company” is to the majority of consumers at this time in history, the subject is even more relevant. Particularly:

- the 80% of the customers make preferences based on environmental- and social-related topics;
- the 70% of Millennials expect a job with societal impact in a purpose-driven company;
- the 63% of the organizations feel under pressure from stakeholders about sustainability improvements;

New consumer preferences and market sentiment impose to the companies among all industries to review - in some cases even revolutionize - their business models in order to survive.

During the last quarter of the twentieth century, the financial sector was incredibly blind to society's weaknesses. Capitalism of the time identified the vulnerable parts of the society's value chain and turned them into profit until the link was broken, the community shattered, but financial sector “*too big to fail.*”

During his speech at Llyod's in 2015, Mark Carney defined climate change as the “*Tragedy of the horizon*”, in the sense that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors (corporations, politics, banks) imposing a cost on future generations that the current one has no direct incentive to fix.

The Banking sector has extraordinary importance as a transition player towards a sustainable, net-emissions economy. However, little attention has been dedicated to understand and cover financial risks that could arise from the climate crisis and environmental degradation. Moreover, the COVID-19 outbreak exposes - probably for the first time in history - that climate- and environmental- risks as exogenous shocks could become systemic and affect the whole economy: the so-called *Green Swans*.

The banking sector is fundamental to help companies and households moving forward in a more sustainable paradigm. It is taking action on climate change, with the purpose to become a catalyst for everyone to do more on the “*Tragedy at the Horizon*”.

Banks needs to rebuild a new risk management framework, setting an appropriate time horizon and including transition risks, whose effects occur in the long term. The struggle against climate change requires the best efforts of governments, policymakers, financial institutions, and civil society.

Climate is the theme that defines the Present: future generations will not change present actions.

The whole of humanity is about to cross the line of no return.

Chapter 1. The nexus between climate-related risks and financial risk

Climate change is the most crucial threat world has ever faced. It is a slow phenomenon that has deep roots in the past. As an example, the ancient Romans released into the atmosphere a percentage of lead only eight times lower than today¹. A quantity even imaginable for the pre-industrial era, but which has left a concrete trace inside the French Alps glaciers. Since the early centuries A.D., the world population has polluted, disfigured, disrupted the entire biosphere, bringing planet Earth to the critical conditions in which it finds itself in the most recent times. The same people who, through their ancestors, abused the place where they lived today suffer the consequences in terms of:

- temperature change (the years between 1983 and 2012 were the warmest over the last 1400 years), which leads to glaciers melting and
- global sea level rising, then warmer and more acid water (since the 19th century, there has been a 26% increase in ocean water pH), that cause massive losses of marine species².

Humankind activities deal with the consequences briefly reported above, no matters the latitude. Until a few years ago, the worst was the marginal awareness that human actions, even daily ones, left their mark on the environment.

¹ Makra, Brimblecombe, 2004, Selections from the history of environmental pollution, with particular attention to air pollution, *Int. J. Environment and Pollution*, Vol. 22, No. 6, pp. 641–656.

² IPCC, 2014, *Climate Change 2014: Synthesis Report*.

From “nuclear” to climate apocalypse

In the late 1970s, few scientists denounced the dramatic rise in global temperature and calling for action by policymakers that fiercely discussed the costs of regulating GreenHouse Gases (from now on GHGs). That news spread beyond the small minority who regularly followed scientific issues: to an ordinary citizen, a rise of a few degrees might sound trivial even in a moment of chaos among industrial pollution, nuclear tests, and consequences on space exploration. Corporations spent time and money to sow uncertainty and denial of any danger from global warming. Although the public opinion ignored climate arguments, they had left a residue in the public mind. The idea that nuclear war might bring global environmental disaster had been familiar for decades as a science-fiction scenario³. For many people, the feelings connected with nuclear war became nearly associated with feelings about climate change. In 1985, Joe Farnan, Brian Gardiner, and Jonathan Shanklin - a group of British scientists - discovered a “hole” in the ozone layer over the South Pole, and the images and attitudes from Sci-Fi movies and political paranoia just materialized in the public opinion’s mind. The guilty party was founded in the ChloroFluoroCarbon gases (CFCs) produced worldwide for many functions, but mainly in spray cans. In the U.S., at the time, President Reagan strongly rejected the responses to the environmentalist community. The international political Agreement was reached in 1987 in Montreal with the outcome to nullify the production and the consequences of CFCs. The Montreal Agreement had not the desired effects mainly because the conditions were not strict enough. For this reason and because of intense media attention about the theme, the 1985 Agreement was improved and even extended during the Kyoto Climate Conference in 1997. The responses were massive: the Clinton Administration and the Global Climate Coalition - in which prominent corporations business leaders joined by 2000 - brought the climate crisis to the general mass public.

³ Niels Bohr Library, The Public and Climate, cont. Accessed May 9, 2021. <https://history.aip.org/history/exhibits/climate/public2.htm>.

The turning point: The Paris Agreement and the UN 2030 Agenda for Sustainable Development

2015 represented the golden year of climate crisis policies since, in the same year, the Paris Agreement and the Sustainable Development Goals (SDGs) were adopted by the major part of the developed and developing countries.

The Paris Agreement was formally adopted in December 2015 by 184 countries. It resulted from the United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty that aims to limit GHGs after adopting the Kyoto Protocol. The goal is to maintain the Earth's temperature well below 2°C, preferably below 1.5°C above the pre-industrial level. The Agreement is set up on a 5-year time horizon. It provides that countries involved create their plans for climate actions, known as National Determined Contributions (NDC), to reduce GHGs. However, the Paris Agreement is only partially legally binding. The so-called Long Term Low Greenhouse Gas Emission Development Strategies (LT-LEDS) provides the long-term perspective of the NDCs, as a vision for future development. There is not any supervisory body entitled to oversee the progress of the Parties. The Paris Agreement also supports developing countries in establishing a framework for financial, technical, and capacity-building help.

In line with a solidarity principle, developed countries shall provide financial assistance to developing ones, encouraging voluntary contributions. It is necessary to redirect capital flows to significantly mitigate the emissions and adapt the unlikely effects of climate change. Research & Development (R&D) should be the first and more extensive recipient of these flows: technology plays a crucial role in the fight against climate change in the sense that global efforts are needed to improve existing production inputs making them more sustainable and creating new ones openly sharing knowledge. To reach the ambitious plans stated above, capital flows and R&D need material - railways, renewable energy plans - and immaterial - a more inclusive, extensive, and free internet connection - infrastructures. Moreover, the Parties agree to set up, from 2024, a proper

accountable report system to track their progress in climate mitigation, adaptation, and support: the Enhanced Transparency Framework (ETF).

Although ambitious and well-conceived, the Paris Agreement's main goal - keeping global warming below 1.5°C above pre-industrial levels - requires a halving of GHGs emissions by 2030. An analysis made by the Universal Ecological Fund FEU-US and the Acting on Climate Together Foundation shows that almost 75% of the climate commitments set up by countries are partially insufficient or insufficient to reach the goal⁴. Focusing on the top four global GHG emitters - China, the United States, the European Union, and India - only the E.U. and its Member States are on track to cut GHG emissions by 58% by 2030. The former U.S. President Donald Trump announced the withdrawal from the Paris Agreement in 2017, and only in January 2021, the United States came back.

In China and India, despite the pledges, analysts project a constant increase in GHG emission by 2030 due to the economic growth rate.

To conclude, even though imperfect, the Paris Agreement represents the first signal of awareness by the nations to recognize that climate change is not a lonely struggle, pooling up a framework of resources, know-how, and commitment.

The concrete changeover that leads to a growing awareness of the civil society for sustainability issues the most is the United Nations 2030 Agenda for Sustainable Development, launched and adopted by the U.N.'s General Assembly in September 2015. There are "*integrated and indivisible*" 17 Sustainable Development Goals and 169 targets that form the core of the 2030 Agenda.

As the report said, the Agenda is a "*plan of action for people, planet, and prosperity.*" SDGs identify the priorities of humankind to reach a sustainable and fairer society. Targets are aspirational and global, leaving each Government the freedom to decline them in policies and plans that

⁴ 2019, Universal Ecological Fund, The Truth Behind the Climate Pledges. Available at: <https://drive.google.com/file/d/1nFx8UKTyjEteYO87-x06mVEkTs6RSPBi/view>

contextualize the nations' economic, social, and environmental dynamics. At the same time, the goals reflect the three dimensions of sustainable development: economic, social, and ecological.

Every year, the United Nations publishes the Sustainable Development Goals Report to provide an overview of the efforts made worldwide, highlighting the weakness and the opportunities to reach the SDGs. As the 2020 Report stated: *“improving maternal and child health, expanding access to electricity and increasing women’s representation in Government had made progress. Yet even these advances were offset elsewhere by growing food insecurity, deterioration of the natural environment, and persistent and pervasive inequalities.”*⁵

Even before the COVID-19 pandemics, nations were not on track to meet the SDGs by 2030: despite the efforts, the number of people suffering from food insecurity was increasing, the environmental deterioration grew at an alarming rate, inequalities spread all over the world. COVID-19 outbreak is making the goals achievement more challenging: collapsing healthcare systems almost worldwide, 1.6 billion students out of school, millions and millions of new people in extreme poverty are some of the consequences of the global pandemics.

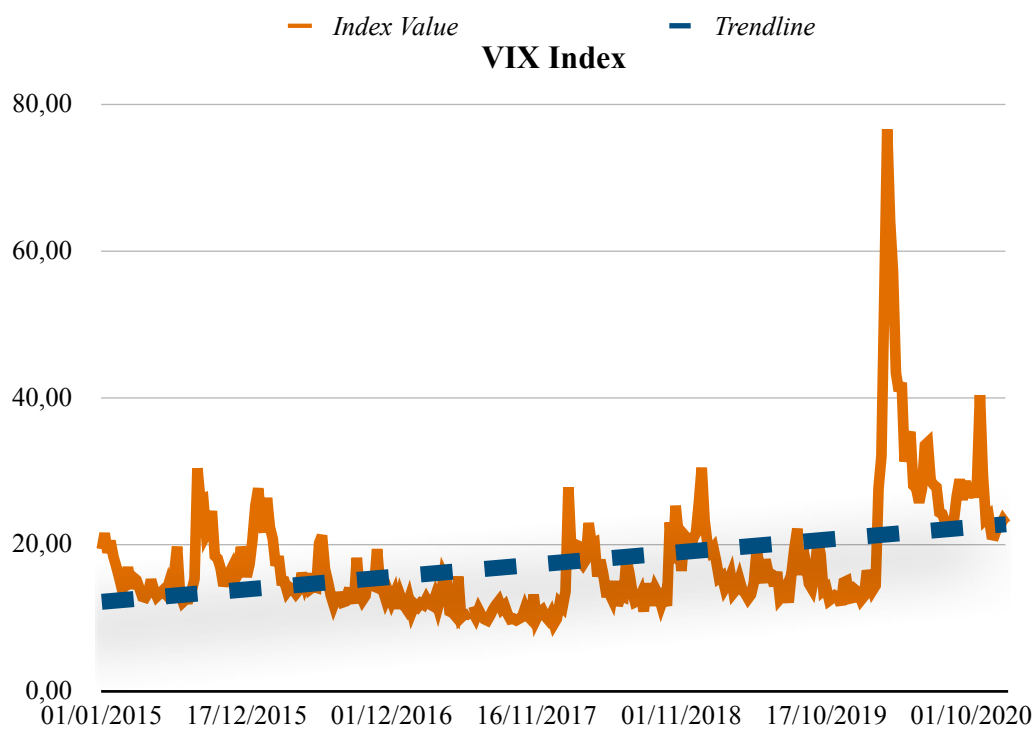
Although slowly, superficially, and - to some extent - in bad faith, global public opinion today sees climate change as a crucial issue for the survival of the human species and, with it, of the apparatuses that have made the progress of the species faster and more evolved. The rise in awareness of the severe impact of climate change on people's life occurs during the first twenty years of the twenty-first century, marked by terrorist attacks, financial crisis, economic depression, Trade Wars, racial hatred, and pandemics. These phenomena have in common their intensity and the worldwide dimension of the consequences: in such a globalized world, there is no country and no productive sector that could be justified for the faults of the others.

⁵ 2020, United Nations, The Sustainable Development Goals Report 2020. Available at: <https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf>

The VUCA world

Academics define this context as VUCA (Volatile, Uncertain, Complex, and Ambiguous). The acronym was first used in the late 1980s to describe the perception of the world's chaos after the end of the Cold War. Particularly during the last two years, highlighted by the COVID 19 pandemics and the whole set of the consequences brought through, the concept is gaining new relevance for characterizing the current environment and the goals to face to navigate it successfully.

Volatility regards the unexpected or unstable phenomenon of unknown duration, but it is not necessarily hard to understand. A popular measure of volatility in the financial market is the VIX Index, representing the 30-day expectation of volatility given by a weighted portfolio of out-of-the-money European options on the S&P 500.



Data retrieved from Yahoo! Finance

In 2015-20, the VIX index showed a constant rate of almost 1%, with a maximum of 53.54 in March 2020 in the middle of the pandemic outbreak. Even before the COVID-19 pandemic, the financial markets reported an average VIX rate of 16.94 in 2018, 53.4% higher than the previous year.

Uncertainty refers to the inability to predict the future. Part of that is perceived with the inability to understand what is happening. Uncertain environments are those that don't allow any prediction on a statistical basis. The more uncertain the world is, the harder it is to predict. Uncertainty is itself a hallmark characteristic of complexity.

Complexity refers to the number of factors to consider, their variety, and the relationships between them. The more elements, the greater their type, and the more interconnected, the more complex an environment is. Under high complexity, it is impossible to analyze the environment and come to rational conclusions comprehensively. The more complex the world is, the harder it is to study.

The unclarity of the causal relationships represents Ambiguity. More generally, it refers to fuzziness and vagueness in ideas and terminology. The more ambiguous the world is, the harder it is to interpret. In the 21st century world, the four terms are related. They represent distinct elements that make the globalized society harder to grasp and control.

In a Volatile, Uncertain, Complex, and Ambiguous world, people are becoming more aware of the increasing frequency and intensity of climate events. Corporations are slowly responding to this increased awareness, while regulatory measures and evolving consumer attitudes force the issue.

One of the most severe consequences of living in a hyper-globalized, over-polluted, VUCA world is the cracking of the so-called "*social capital*," i.e., the dense network of the relationships and cooperation that, despite the savage capitalism of the recent decades, slowed down the hemorrhaging of wealth and equality between people. Inequality is growing for more than 70% of the global population⁶, exacerbating the risks of divisions and hampering economic and social development⁷. The World Social Report, published by the U.N. Department of Economic and Social Affairs (DESA), shows that the wealthiest one percent of the population, increasing their share of income between 1990 and 2015, while the bottom 40 percent earned less than a quarter of the

⁶ 2020, UN Department of Economic and Social Affairs (DESA), World Social Report. Available at <https://www.un.org/development/desa/dspd/world-social-report/2020-2.html>

⁷ Ibidem

income in all countries surveyed. In unequal societies, people are more likely to remain trapped in poverty across generations.

Four trends has an impact on inequality around the world:

- Technological innovation: new technologies have the potential to eliminate categories of jobs out, equally, may generate entirely new jobs and innovations.
- Climate change: as stated above, it makes the poorest countries even more impoverished and could reverse progress made in reducing inequality among them.⁸
- Urbanization: more people live in urban areas than rural areas, which is expected to continue over the coming years. Cities are unequal, with the highly wealthy living alongside the very poor. The scale of inequality varies widely from city to city, even within a single country.
- International migration: described as both a “powerful symbol of global inequality” and “a force for equality under the right conditions”⁹, in some cases, where migrants compete for low-skilled work, wages may be pushed down, increasing inequality but, if they offer skills that are in short supply or take on work that others are not willing to do, they can have a positive effect on unemployment.

Although the megatrends can continue divisions in society, a more equitable and sustainable world can harness them.

During the last quarter of the twentieth century, the financial sector was incredibly brazen and blind to society's weaknesses. Capitalism of the time, because of the heavy deregulation carried out by the Reagan Administration in the U.S. and other states with a markedly neoliberal policy, identified the vulnerable parts of the society's value chain and turned them into profit until the link was broken, the community shattered, but financial sector “*too big to fail.*”

⁸ 2020, UN Department of Economic and Social Affairs (DESA), World Social Report. Available at <https://www.un.org/development/desa/dspd/world-social-report/2020-2.html>

⁹ Ibidem

During his speech at Lloyd's in 2015, Mark Carney - at the time Governor of the Bank of England and Chairman of the Financial Stability Board - defined climate change as the "*Tragedy of the horizon*," in the sense that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors – the business cycle, the political cycle, and the credit cycle – imposing a cost on future generations that the current one has no direct incentive to fix. In Carney's words, "*once climate change becomes a defining issue for financial stability, it may already be too late.*"¹⁰.

In this context, the financial sector's primary purpose shifted from a wealth-producing machine *per se* to a critical enabling factor to reach the most ambitious policy objectives, attempting to mainstream such a new way of doing finance: sustainable finance, above all.

The European Commission¹¹ defines "*sustainable finance*" as the process of taking environmental, social, and governance (from now on ESG) dimensions into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects.

The environmental dimension refers to the actions taken to mitigate and adapt consequences from climate change, preserve biodiversity, fight pollution, and promote new sustainable business models (such as the circular economy). The social dimension focuses on inequality, inclusiveness, human capital, stakeholders engagement, human rights. The governance dimension relates to both public and private companies' management structure and organization, prioritizing the human component - e.g. employee relations - and the financial one - as executive compensation. A proper legislative framework aims to foster transparency in the case of ESG-related risks in the financial sector. It

¹⁰ Speech by Mr Mark Carney, Governor of the Bank of England and Chairman of the Financial Stability Board, at Lloyd's of London, London, 29 September 2015.

¹¹ Available at European Commission's website: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_en

mitigates these risks through appropriate governance of financial and corporate actors, too. The following paragraph intends to analyze the European Union legislative framework in the ESG area.

The European Union as pioneer of ESG revolution

In recent years, the European Union has been the frontrunner in imposing a *green* political, cultural, and social Agenda compared to other countries.

In December 2019, the European Commission launched the European Green New Deal, aiming to make the European Union the first climate-neutral continent by 2050, boost the use of resources by moving towards a circular economy, and restore biodiversity cut pollution. The Green New Deal encompasses all sectors in a broad range of policy areas: clean energy, sustainable industry, building and renovations, sustainable mobility, biodiversity, sustainable farming, pollution fighting, and climate action. To raise the ambitions, the Commission - in January 2020 - planned to reduce GHG emissions by 55% compared to 1990 figures. Achieving the objectives requires €260 billion of additional annual investment in 10 years, about 1.5% of 2018 EU GDP.

The European Green Deal Investment Plan (EGDIP) is the investment pillar of the Green Deal. The Plan will mobilize at least €1 trillion to support the next ten years through the:

- E.U. budget (€503 billion), as a 25% target for climate mainstreaming across all E.U. programs and two revenue streams (non-recycled plastic packaging waste and the 20% of the revenue from the auctioning of E.U. Emissions Trading System to the E.U. budget, equal to €25 billion) through Own Resources, and
- associated instruments, particularly InvestEU for about €279 billion.

The InvestEU Programme provides long-term funding to companies, supporting the Union policies across the Member States. The Programme consists of:

- the InvestEU fund that aims to mobilize more than €372 billion of private and public investments through an E.U. guarantee of €26.2 billion in partnership with European Investment Bank (EIB) and other financial institutions;
- the InvestEU Advisory Hub that provides technical support and assistance on investment projects;
- the InvestEU Portal, a platform that connects investors and projects across Europe.

The Plan will also create a framework to facilitate private-public partnerships on sustainable investing. Lastly, it will support public administrations in identifying, structuring, and executing sustainable projects.

As part of the EGDIP, the Just Transition Mechanism and the Just Transition Fund - with €143 billion over ten years - shall help the regions and the sector most affected by the transition to a zero-carbon economy. The Green New Deal shall look at the private sector to reorient capital flows towards long-term, sustainable growth. The Commission announced a Renewed Sustainable Finance strategy to provide the tools to ensure a sustainable transition of business during the COVID-19 outbreak. Currently, the strategy is a work in progress. It will be built on the Action Plan on Financing Sustainable Growth adopted by March 2018.

The Action Plan set a strategy to link finance and sustainability.

It comprises three categories¹²:

- I. Reorient capital flows towards a more sustainable economy:
 - A. establishing a classification system for sustainable activities;
 - B. creating standards for financial products;
 - C. stimulating investment in sustainable projects;
 - D. encompassing sustainability factors when providing financial advice;
 - E. developing sustainability benchmarks;
- II. Mainstream sustainability into risk management:
 - A. integrating sustainability in ratings and market research;
 - B. clarifying asset managers' and investors' duties regarding sustainability;
 - C. introducing a “green supporting factor” in the E.U. prudential rules for banking and insurance sectors;

¹² “Renewed Sustainable Finance Strategy and Implementation of the Action Plan on Financing Sustainable Growth.” European Commission - European Commission, August 5, 2020. https://ec.europa.eu/info/publications/sustainable-finance-renewed-strategy_en

III. Foster transparency and long-termism:

A. enhancing sustainability disclosure;

B. strengthening sustainable corporate governance and mitigating short-termism in capital market;

In order to set up a common classification system for sustainable economic activities, the European Union adopted Regulation 2020/852 on the establishment of a European Taxonomy framework. Defining a “*common language*” is expected to keep investors safe, particularly from the greenwashing phenomenon, to support companies in the transition, uniform the market, and eventually move investments where they are needed.

As stated in Article 3 of the Regulation, an economic activity shall qualify as environmentally sustainable where:

I. it contributes substantially to climate change mitigation and adaptation through: sustainable use and protection of water and marine resource, the transition to a circular economy, pollution prevention and control, the safety and the restoration of biodiversity and ecosystems.

II. It does not harm any of the objectives stated above.

III. It ensures applying the principles set out in the Declaration of the International Labour Organization on Fundamental Principles and Rights at Work and the International Bill of Human Rights.

IV. It complies with technical screening criteria established by the Commission through delegated acts to verify the substantial contribution as stated in point A.

The first E.U. Taxonomy Climate Delegated Act was published in April 2021. It delivered the first set of technical criteria for defining those activities that contribute substantially to climate change mitigation and adaptation, the first two of six environmental objectives in the E.U. Taxonomy¹³.

¹³ COM(2021) 188 final 2021/188, EU Taxonomy, Corporate Sustainability Reporting, Sustainability Preferences and Fiduciary Duties: Directing finance towards the European Green Deal. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0188>

The Platform on Sustainable Finance - a permanent Commission expert group established under the Taxonomy Regulation - provides advice on how to acknowledge the role of the E.U. Taxonomy in contributing to the green transition. The E.U. Platform will substitute the Technical Experts Group (TEG) established in 2018.

In June 2019, the TEG published a Report on E.U. Green Bond Standard, recommending the Commission to create a voluntary, non-legislative E.U. Green Bond Standard (GBS) to enhance the effectiveness, transparency, comparability, and credibility of the green bond market and to encourage the market participants to issue and invest in E.U. green bonds¹⁴. The report defines the E.U. Green Bond as any listed or unlisted bond or Capital Markets debt instrument aligned with the EU GBS. The proceeds from the bond must finance projects compliant with Article 3 of the E.U. Taxonomy Regulation, drawing up a mandatory allocation report verified by an external reviewer. The bond issuer should set out a strategy according to environmental objectives, subject to a mandatory impact report. The process is currently at the targeted consultation phase.

The E.U. Taxonomy Regulation led to several new legislative products on sustainable disclosure. Regulation 2019/2088 on sustainability-related disclosures in the financial services sector (from now on SFDR) applied by March 2021. According to the SFDR, the financial producers and advisers shall publish on their website information about their policies on integrating sustainability risks in their investment decision-making process. Financial market participants and financial advisers shall include in their remuneration policies¹⁵ details on how those policies are consistent with integrating sustainability risks and shall publish that information on their websites. Moreover, financial market participants and financial advisers shall include the integration of sustainability risks in pre-contractual disclosures.

¹⁴ 2019, EU Technical Expert Group on Sustainable Finance, Report on EU Green Bond Standards.

¹⁵ “Lex Access to European Union Law.” EUR. Accessed May 9, 2021. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02019R2088-20200712>

The European Union is acting as the frontrunner in the fight against the climate crisis, placing a comprehensive and composite strategy, producing a series of important legislative acts, emphasizing disclosure and correct information of citizens, companies, and investors. These efforts explain why the European Union is the only area on track to reach the SDGs by 2030, as stated above.

Chapter 2. Climate-related risks in the Banking Sector

Academics divide environmental-related and climate-related risks in:

- I. Transition risk, resulting from the adjustment processes towards a low-carbon economy, caused by technology innovation, (e.g. fall in renewable energy costs and reduced pricing power and market share for fossil fuels), policy changes, as the E.U. Green New Deal, and shift in consumer preference.
- II. Physical risk, defined as the impacts today on the value of financial assets that arise from climate and environmental-related events - including more frequent extreme weather events and gradual changes in climate as well as of environmental degradation - that may damage property or disrupt trade. Physical risk is therefore categorized as “acute” when it arises from extreme events and “chronic” when it occurs from progressive shifts, such as increasing temperatures, sea-level rises, water stress, biodiversity loss, and resource scarcity¹⁶.
- III. Liability risk - could arise if parties suffered losses or damages from the effects of climate change seek compensation from those responsible - particularly in the insurance industry.

The United Nations Environmental Programme Finance Initiative (UNEP FI) provides a methodology for assessing physical risk. It recommends considering both changes in average weather conditions and the more frequent occurrence of extreme events. To implement these exercises, it would be necessary to improve the available data, in particular on the geographical location of borrowers, improve macroeconomic models that integrate the impact of climate change and anticipate difficulties that the insurance sector could experience.

Physical and transition risks are drivers of prudential risk, particularly credit risk, operational risk, market risk, and liquidity risk. These risks also affect the sustainability of the institution’s business

¹⁶ 2020, European Central Bank, Guide on climate-related and environmental risks Supervisory expectations relating to risk management and disclosure. Available at: https://www.bankingsupervision.europa.eu/legalframework/publiccons/pdf/climate-related_risks/ssm.202005_draft_guide_on_climate-related_and_environmental_risks.en.pdf

model in the medium-to-long term, particularly business models that relies on sectors and markets vulnerable to climate-related and environmental risks.

The magnitude and distribution of climate-related and environmental risks depend on the level and timing of mitigation measures and whether the transition occurs in an orderly or disorderly fashion¹⁷. Potential losses stemming from climate- and environmental-related risks rely significantly on the future adoption of policies, technological developments, and changes in consumer preferences and market sentiment. Irrespective of this, any combination of physical and transition risks will, in all probability, materialize on the balance sheets of euro area institutions. Existing estimates of adverse long-term macroeconomic effects resulting from climate change points to significant and lasting losses in wealth. These may be due to slowing investment and lower factor productivity in many sectors of the economy, and reduced potential GDP growth.¹⁸

The limitation to climate change and a substantial lack of data to properly assess the impact of these risks improve only marginally the understanding of the relationship between sustainability-related risks and financial risks¹⁹.

In the first place, banks need to develop a clear climate strategy as a tool for integrating ESG risks across the company. Keeping in mind the long-term growth, first banks shall define their current and future market positioning and define the target in which they want to operate. Then, an appropriate governance framework shall write down, incentivate, and be sure that the new set of policies is fully understood and integrated into all decision-making processes. A sound internal governance framework shall create new roles in the management body (Chief Sustainability Officer, Chief Value Officer, Chief Diversity Officer), revisionate the reporting lines and the communication

¹⁷ 2020, European Central Bank, Guide on climate-related and environmental risks Supervisory expectations relating to risk management and disclosure. Available at: https://www.bankingsupervision.europa.eu/legalframework/publiccons/pdf/climate-related_risks/ssm.202005_draft_guide_on_climate-related_and_environmental_risks.en.pdf

¹⁸ Ibidem

¹⁹ Migliorelli et al., 2020, Sustainability and Financial Risks: The Impact of Climate Change, Environmental Degradation and Social Inequality on Financial Markets, Palgrave Studies in Impact Finance

flows. A particular focus shall be set over the profit centers and the cost centers, where new first risks arise. It is appropriate to identify these new risks, take them into account, and include new controls to ensure the effectiveness of the new risk management framework.

The ESG risks analysis and management should involve four steps:

- I. Identification: a strategic assessment of the environmental, social, and governance factors that may cause financial risks and, in the long run, loss of reputation. As stated before, ESG risks are not new types of risks: they materialize in financial (credit, market, and liquidity risks) and non-financial risks (operational, business/strategic, and reputational risks).
- II. Exposure: measurement of the sizes of a firm's exposures to ESG risks.
- III. Assessment: estimation of probabilities and magnitudes of financial losses arising from ESG risks. The EBA proposes three assessment methods:
 - A. Portfolio Alignment Method, in which banks define targets to align portfolios towards climate change goals. KPMG²⁰ suggests a best practice method used by some banks to assess the alignment of their loan portfolios in the decarbonization process of the loan book.

The approach involves two step:

1. The Measurement of the carbon impact of the banks' products, and then the adequate allocation of the financial flows to projects which are in alignment with climate ambitions.
 2. Ensure that carbon emissions per unit of money invested are aligned with climate (using transition risk assessment, emissions reduction targets, operational strategies).
- B. Risk Assessment Method, in which banks use scenario analysis to assess their exposures to different climate scenarios. Climate scenarios are temperature-based or event-based scenarios using underlying models, such as sector-specific models, macroeconomic models,

²⁰ April 2021, KPMG International, Integrating ESG into banks' risk, Integrating ESG into banks' risk management frameworks: Sound practice and current challenges for financial institutions.

or Integrated Assessment Models (IAM). These changes in corporate financial statements are then integrated into risk models to assess financial risks both on a portfolio and an individual basis.

- C. Exposure Method uses metrics to obtain the concentration of banks to different sectors, activities, or industries, and then clarify which areas among the bank are at risk in case of adverse ESG-impact. The method is useful in studying the outside-in (such as a repentine change in the political agenda) and the inside-out effects about of the investment portfolios.

IV. Mitigation: Introduction of internal policies and processes that discourage exposures to environmentally risky assets, e.g., reducing exposures to carbon-intensive infrastructure assets to avoid the risks of holding stranded assets in the longer term, and an active shareholder engagement to assist the green transition of other companies, requesting better information disclosure and providing risk management products.

Banks' risk management framework needs revision to include sustainability risks, in terms of policies and procedures but also about methodologies and infrastructure. Climate change is a challenging issue, not yet deeply analyzed: banking sector needs to create an *in-itinere* approach, where solution shall be prioritized, adopted, and reiterated fo further development and refinement. Focusing on the Risk Appetite - the amount of value the bank is willing to bear to reach long term goals - banking sector shall develop appropriate ESG risk indicators and limits for ESG risks in line with the regulation and potential red-flags.

As the studies conducted by the British and French Prudential Regulation Authorities showed, for banks, there are a misalignment between climate- and environmental-related risk impacts and planning horizons. For this reason, banks are beginning to treat these risks like other financial risks rather than a corporate social responsibility issue. Such banks start to oversee the financial risks from climate change and assign the overall responsibilities to set the strategy, targets, and risk appetite relating to these risks (also at the Board level). Plus, banks have begun considering the

most immediate physical threats to their business models and have started to assess exposures to transition risks where government policy is already pulling forward the adjustment.

The Banking sector has extraordinary importance as a transition player towards a sustainable, net-emissions economy. However, little attention has been dedicated to understand and cover financial risks that could arise from the climate crisis and environmental degradation. Moreover, the COVID-19 outbreak exposes - probably for the first time in history - that climate- and environmental- risks as exogenous shocks could become systemic and affect the whole economy.

The EBA Framework of ESG-risk for Financial Institutions

The European Banking Authority²¹ (EBA) regulation aims to set a monitoring system to assess material²² ESG risks, considering ESG factors in the authority work, having the mandate to oversee the whole ESG European legislative framework. The Authority focuses on three different areas: strategy and risk management, disclosures, and scenario analysis. The mandates to the EBA cover ESG related factors and risks.

The revised CRR 2/CRD 5 package includes three mandates for the EBA in the area of sustainable finance. Article 988 of CRD 5 calls on the EBA to assess the potential inclusion of ESG risks in the supervisory review and evaluation process performed by competent authorities.

The EBA's assessment includes developing a uniform definition of ESG risks (including physical and transition risks), criteria for understanding the impact of ESG risks in the short, medium, and long term. The assessment involves the processes, mechanisms, and strategies to be implemented by the institutions to identify, assess and manage these risks and the methods as well as the tools to determine the impact of ESG risks on lending and the financial intermediation activities of institutions.

Article 449a of CRR 2 requires large institutions with publicly listed issuances to disclose ESG risks, physical risks, and transition risks.

According to Article 501c of CRR 2, the EBA must assess the methodologies to evaluate the effective riskiness of exposures related to environmental and social objectives compared with the riskiness of other exposures. Also, the Authority shall determine the development of appropriate criteria for the assessment of physical risks and transition risks. Eventually, the EBA will assess the potential effects of a dedicated prudential treatment of exposures associated substantially with

²¹2019, European Banking Authority, EBA Action Plan on Sustainable Finance

²² An information is material where its omission or misstatement could change or influence the assessment or decision of a user relying on that information for the purpose of making economic decisions

environmental and social objectives and activities on financial stability and bank lending in the Union.

Similar goals are attributable to the IFR/IFD package. Article 35 of the IFD must report the introduction of criteria related to exposures associated with ESG objectives for the supervisory review and evaluation process of risks to assess the possible sources and effects of such risks on investment firms. The IFR (Article 32a) has to scrutiny whether a prudential treatment, in the form of adjusted K-factors or adjusted K-factor coefficients, would be justified from a prudential perspective. K-factors are the quantitative indicators provided by the IFR that reflect the risks the investment firm can pose to customers, the market, and the firm itself.

The Risk to Client (RtC) covers the risks about: assets under management (K-AUM), clients' funds (K-CMH), balanced capital (K-ASA), clients' orders (K-COH).

The Risk to Market (RtM) comprehends the risks based on the Capital Requirement Regulation's (CRR) market risk framework (K-NPR) and the amount of risk counterparties are allowed to bear (K-CMG). The Risk to Firm (RtF) includes the risks associated with the volume of transaction in the trading book (K-DTF), the exposure to the default of the company's counterparties in trading (K-TCD), and the single exposures with respect to each counterparty.

The objectives of the EBA work on sustainable finance are linked with the overall goals of contributing to the short-, medium- and long-term stability and effectiveness of the financial system and include:

- The improvement of the current regulatory framework for institutions to foster their operations in a sustainable manner (contributing to sustainable development objectives and managing ESG risks);
- The introduction of sustainability considerations in institutions' strategy and risk management;
- Providing supervisors with adequate tools to understand, monitor, and assess ESG risks in their supervisory practices.

The Equator Principles

The Equator Principles provide a baseline framework to determine, assess, and manage environmental and social related risks²³.

The Framework - valid for all sectors, globally - comprises 10 Principles, valid for projects that involve the following five categories of financial products: Project Finance Advisory Services, Project Finance, Project-Related Corporate Loans, Bridge Loans and Project-Related Refinance, and Project-Related Acquisition Finance.

The Equator Principles were launched in 2003, starting from the International Finance Corporation (IFC) ESG policy frameworks. Currently, 116 financial institutions already adopted the Equator Principles in 37 countries.

The International Finance Corporation Performance Standards on Social and Environmental Sustainability and the World Bank Group Environmental, Health, and Safety Guidelines are entitled to periodically update and revise the framework²⁴. The last revision was the fourth, published in July 2020.

According to the Equator Principles, projects shall be categorized in:

- A. projects with potential adverse environmental and social risks and diverse, irreversible or unprecedented impacts;
- B. projects with potential limited environmental and social risks and few, circumstantial, and largely reversible impacts;
- C. projects with no environmental and social risks or impacts, according to the severity of the potential environmental and social risks and the severity of these risks.

²³ 2020, The Equator Principles, fourth revision. Available at: <https://equator-principles.com/wp-content/uploads/2021/02/The-Equator-Principles-July-2020.pdf>

²⁴ 2015, Equator Principles History and Context. Available at: <https://web.archive.org/web/20151123034432/http://equator-principles.com/resources/Frequently%20Asked%20Questions.pdf>

After be categorized, projects shall be assessed about the relevant environmental and social risks and the magnitude of impacts. Then, assessment documentation shall set up an adequate, accurate, and objective proposal for risk management measurements.

Category A and B projects shall include an Environmental and Social Impact Assessment (ESIA), including a Human Rights evaluation and climate-related risks assessment.

As regards the latter, Category A and B projects require consideration of relevant physical risks as described by the TCFD. Furthermore, an analysis of climate transition risks is expected if the projects has more than 100,000 tonnes of CO₂ annually. The assessment document should include a due diligence process compliant with all applicable laws, regulation, and applicable standards.

Projects need a strong governance component to ensure effective implementation of environmental and social applicable standards. To this extent, Principles 4 and 5 requires implementing an Environmental and Social Management System (ESMS), drafting an Environmental and Social Management Plan (ESMP), complying to an Equator Principles Action Plan (EPAP), and demonstrating effective Stakeholder Engagement with communities, employees, and others. ESMS, ESMP, and EPAP shall carry an independent review to assist in determining the Equator Principles compliance. As part of the ESMS, Category A and B projects shall include effective grievance mechanisms designed for stakeholders to receive and facilitate concerns about the environmental and social performance.

An important strength of the Equator Principles is the inclusion of compliance covenants. In case of not compliant projects, the financial institution will work with the client to bring the Project compliant. Otherwise, remedies and penalties will be appropriate. Eventually, projects need to be fully monitored and progresses accurately reported by Independent Committees.

Although the undeniable impact the Equator Principles brought to the global society, the framework applies only to a small part of the products financial intermediaries offer to customers. Furthermore,

the application of the Principles is not mandatory for the parties, weakening the complex balance of forces that characterizes the framework.

The Principles for Responsible Banking

The Principles for Responsible Banking provide a framework with the goal of ensuring the alignment of strategy and practice with the UN Sustainable Development Goals and the Paris Climate Agreement²⁵.

Currently, 227 banks - more than one third of the global banking industry - adopt the Principles, embracing the vision of banking as positive contributor to people and the planet.

The Principles provide the framework for a sustainable banking system, making an impactful commitment to the society. After more than 10 years since the last major financial crisis, the banking sector needs to define and affirm its role and responsibilities in shaping and financing a sustainable future.

Principles of Responsible Banking intends to transform the banking industry to enable it to play a leading role in achieving society's goals. A responsible banking industry that is an integral part of the society of the 21st century because it serves and contributes to an inclusive society that uses its natural resources sustainably.

The framework comprises of 6 principles:

- I. Aligning banks' business strategy consistently with individuals' needs and society's goals, as expressed in the Sustainable Development Goals, the Paris Climate Agreement, and relevant national and regional frameworks.
- II. Setting impacts, managing the risks to people and environment resulting from human activities, products and services. To do so, banks shall set targets to improve the positive impacts.
- III. Cooperating responsibly with clients and customers to encourage sustainable practices and enable impactful economic activities.
- IV. Engaging stakeholders to achieve society's goals.
- V. Implementing commitment through effective governance and a culture of responsible banking.

²⁵ 2019, UNEP FI, Principles for Responsible Banking. Available at: <https://www.unepfi.org/banking/bankingprinciples/>

VI. Reviewing individual and collective implementation of the Principles and fostering transparency for positive and negative impacts and contribution to society's goals.

Contrary to the Equator Principles, the Principles for Responsible Banking represent a comprehensive framework addressing the whole strategic, portfolio and transaction level across all of the bank's business lines. Moreover, the process for a bank to step in the network is hard, takes almost 4 years and it is challenging to pursue and implement.

Environmental-related risk assessment

Physical risks could potentially impact the financial sector because severe weather events could translate into financial risks and damage the stability and resilience of the financial system. Literature^{26,27} shows that climate- and environmental-related risks potentially manifest as risks financial institutions already knew: credit risk, market risk, operational risk, and liquidity risk. Severe weather events may deteriorate banks' credit books since borrowers' income capacity decrease. In turn, banks' loan books may suffer an increase in the probability of default (PD) and loss given default (LGD). In the case of guaranteed loans or mortgages, severe weather events may halve the value of the collaterals and provoke a write-off of assets in the financial statements. Transition risks may affect the assets' value in switching towards a low-carbon economy, impairing the value of banks' loan portfolio: the case of the so-called "*stranded assets*." Finally, liability risks may appear in the situation when, since climate- and environmental-related losses occur, an increase in default rates increase the insurance premia, and so the potential losses.

Climate change is becoming an important aspect with respect to the customers banks lend to. The major part of the commercial banking sector have already included in their policies mandatory requirements as part of the credit policy to consider climate risk for new lending, estimations of financed emissions and intensities for climate-sensitive lending exposures.

Physical risks - e.g., a natural disaster damaging national infrastructure - could potentially impact economic growth. In turn, it brings an increase in sovereign debt to cover the losses and reconstruction costs. It might cause an increase in sovereign risk, deteriorating the country's trustworthiness rating score. Eventually, the increase in return rate could lower the value of the banks' securities. Transition policies may provoke a repricing in Equity Capital Markets (ECM) and

²⁶ 2019, Aubert et al, French banking groups facing climate change-related risks, Banque de France Analyses et Synthèses, 101.

²⁷ 2018, Bank of England, Transition in thinking: The impact of climate change on the UK banking sector. Available at: <https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/report/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector.pdf>

Debt Capital Markets (DCM) instruments related to the policies' outcomes (such as commodity sectors). The repricing could make complex the short-term refinancing, inducing liquidity shortages. Dafermos' study²⁸ shows that climate change may increase the corporate loans' default rate and undermine the banking system and, in turn, the entire economic paradigm.

Operational risk realizes from inadequate internal processes, people and systems, or external events. Severe weather events may impact banks' IT infrastructure and diminish employees' productivity. Transition internal policies might provoke difficulties in the daily operativity and misorientation about what to do. The risks discussed so far have in common the material impact that might generate banks' losses or damages.

²⁸ 2018, Dafermos et al, A stock-flow-fund ecological macroeconomic model, *Ecological Economics*, 131, 191–207

The mispricing of the environmental-related risks

The quantification of the material impacts on environmental-related risks in the banking sector is challenging for several reasons. First, the amount of available data on the relationship between climate change and credit risk is insufficient to draw a trendline correctly, and for this reason, the models of the risk quantification rely on stress tests and climate scenarios. Campiglio's analysis²⁹ shows that material costs related to climate events may negatively affect ECM and DCM, inducing lower payoffs and higher Non Performing Loans (NPLs).

In 2017, Professor Battiston established a pioneering climate-related stress test using the top 50 listed European bank-level data. The study³⁰ concluded that banks would not run into default because exposures towards carbon sensitive industries, although this may cause volatility of banks' securities concerning their capital. As an example³¹, Dutch banks might potentially lose 3% of assets in a disorderly energy transition. In a technology shock scenario, the regulatory capital ratio might fall by 4%. A 2019 study³² on the Mexican financial system shows that the worst-case scenario may provoke a systemic loss between 2.5% and 4%.

The lack of data discussed so far brings another consequence, a potential underestimation or mispricing of the environmental-related risks. As the Bank of Canada stated: "*limited understanding and mispricing of climate-related risks could potentially increase the cost of transitioning to allow carbon economy.*"³³

²⁹ 2019, Campiglio et al, *Climate risks in financial assets*, CEP Discussion Notes,.

³⁰ 2017, Battiston et al, A climate stress-test of the financial system. *Nature Climate Change*, 7(4), 283–290.

³¹ 2017, Regelink, Waterproof? An exploration of climate-related risks for the Dutch financial sector. Available at https://www.dnb.nl/en/binaries/waterproof_tcm47-363%20851.pdf

³² Roncoroni, A., Battiston, S., Farfán, L. O. L. E., & Jaramillo, S. M. (2020). *Climate risk and financial stability in the network of banks and investment funds*. Available at: https://siecon3-607788.c.cdn77.org/sites/siecon.org/files/media_wysiwyg/roncoroni2019climate.pdf

³³ 2019, Bank of Canada, *Financial system review - 2019*. Available at: <https://www.bankofcanada.ca/wp-content/uploads/2019/05/Financial-System-Review%E2%80%942019-Bank-of-Canada.pdf>

The underestimation of those risks may over-allocate riskier activities, undermining the efficient allocation of capital. Moreover, an inefficient allocation of capital might result from a lack of information on climate risk at customer level.

In other words, when incomplete information occurs, it means that the efficient market hypothesis might not hold.

As the Task Force on Climate-related Financial Disclosure (from now on TCFD) summarized:

“inadequate information about risks can lead to a mispricing of assets and misallocation of capital and can potentially give rise to concerns about financial stability since markets can be vulnerable to abrupt corrections.”³⁴

Literature suggests that banks and other financial institutions should mitigate the effects of credit reduction raising deposit rates to increase credit in more climate-affected areas with respect to the others.

As the Network for Greening the Financial System (NGFS) declared: *“there is a strong risk that climate-related financial risks are not fully reflected in asset valuations.”³⁵* One of the reasons might be inappropriate models to consider climate-related risks that could cause mispricing and potentially provoke systemic failure.

An analysis³⁶ by the ECB demonstrates that climate risks potentially become systemic for the Euro Area, particularly in a situation where financial institutions might not price the risks correctly. A worst-case scenario - chaotic transition policies - presents several implications for the overall stability of the society. At first, there would be a lower energy supply and a rise in energy costs,

³⁴ 2017, Task Force on Climate-related Financial Disclosures (TCFD), *Final report: Recommendations of the task force on Climate-related financial disclosures*. Available at: <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>

³⁵ 2019, Network for Greening the Financial System (NGFS), *A call for action: Climate change as a source of financial risk*. Available at: https://www.ngfs.net/sites/default/files/medias/documents/synthese_ngfs-2019_-_17042019_0.pdf

³⁶ 2019, Giuzio et al, Climate change and financial stability, European Central Bank Financial Stability Review, pp. 120–133

which could cause an increase in fixed costs that could take down the GDP. Moreover, financial institutions might suffer the cut-off of stranded assets.

Climate risks as market failure: the Green Swan

As discussed so far, there is evidence that climate and environmental-related risks impact the entire planet, so they must be considered exogenous, non-diversifiable risks. Moreover, Bolton's study³⁷ shows that there is the possibility that, since climate disasters increase at a dramatic rate, these risks could cause a significant financial crisis.

To properly build a framework that might monitor and mitigate the environmental-related risks, there is a need to describe and analyze these risks. Environmental-related risks are disruptive, i.e., their impact is on all economic agents, sectors, and geographic areas. Also, they are non-diversifiable, nonlinear, correlated, and potentially irreversible. As stated in the Bolton study, climate change should represent the evolution of the black Swans:

“a new type of systemic risk that involves interacting, nonlinear and fundamentally unpredictable, environmental, social, economic, and geopolitical dynamics, which are irreversibly transformed by the growing concentration of greenhouse gases in the atmosphere.”³⁸

The study calls these risks “*Green Swan*.”

Literature³⁹ shows that climate disasters are correlated to liquidity shortages in the commercial banking sector. Severe weather events induce significantly lower Z-scores, larger probabilities of default (PDs), and more non-performing loans (NPLs).

Transition risk could impact the banking sector stability. As an example, a study⁴⁰ suggests that banks would not invest in the renewable energy sector because quick transition to a net-zero economy might offset the profitability of the investment since there would be an increase in setting out the renewable power plants and substituting the fossil fuels and gas stations. In other words,

³⁷ 2020, Bolton et al, The green swan: Central banking and financial stability in the age of climate change. Available at: <https://www.bis.org/publ/othp31.pdf>

³⁸ Ibidem

³⁹ 2018, Noth et al, Natural disaster and bank stability: Evidence from the U.S. financial system, SAFE Working Paper Series, 167.

⁴⁰ 2017, Safarzyn'ska & van den Bergh, Financial stability at risk due to investing rapidly in renewable energy, *Energy Policy*, 108, 12–20.

studies show that climate change is a market failure and could potentially open the door to several new market failures.

About the lending sector, literature shows that severe weather events - as physical risks - may be seen as a market failure, too.

In 2009, Garmaise and Moskowitz⁴¹ analyzed the 1990s data on loans granted in geographic areas affected by hurricanes. Their study demonstrated that borrowers affected by hurricanes were not likely to grant another loan in the same geographic area. The research results could be linked to the liability risk banks faced when they deal with uninsured loans.

Studying the consequences of the periodic floods of El-Nino in Perù, Collier⁴² in 2013 found that in case of floods, borrowers - to repay their debt - needed new loans: it took to an overindebtedness and a slower economic recovery of the area.

The consequences of flooding in Pakistan in 2010 provide another example⁴³ of flood risk. Banks did not grant loans to new and less educated borrowers. This phenomenon, called “adverse selection”, represents a situation where two parties have different information, so that in a trade a participant might select which benefit the most, at the expense of the other party.

In 2019, Duan and Li⁴⁴ found out that when local temperature rose, the mortgage approval rate and loan fell by 6.7%.

Focusing on Italy⁴⁵, there is evidence that in regions at risk of flooding, corporate lending decrease towards firms with higher exposures to flooding risk. Faiella and Natoli investigated the relationship between bank lending and catastrophe risk by analyzing the exposure of banks of

⁴¹ 2009, Garmaise & Moskowitz, Catastrophic risk and credit markets, *The Journal of Finance*, 64(2), 657–707

⁴² 2013, Collier et al, Natural disasters and credit supply shocks in developing and emerging economies (Working Papers, 3). Wharton Risk Management and Decision Processes Center.

⁴³ 2017, Choudhary & Anil, Finance and inequality: The distributional impacts of bank credit rationing, *International Finance Discussion Papers*, 1211.

⁴⁴ 2019, Duan & Li, Climate change concerns and mortgage lending.

⁴⁵ 2019, Faiella & Natoli, Climate change and bank lending: The case of flood risk in Italy

italian firms located in area at risk of flooding. Damages from natural events may affect the ability of borrowers to repay back loans, eventually forcing banks to sale assets and tighten credit policies. Flood risk represents one of the most relevant sources of natural risk in Italy - as the public opinion sadly knows - and, at the same time, almost widespread over the Italian territory. The study followed two paths:

- I. match data on flood risk with data on bank loans – from the Italian Central Credit Register – by geographic location of credit;
- II. using municipal-level aggregations, correlate the level of flood risk with the amount of credit granted to firms by the banking sector.

Results showed that credit activity is negatively influenced by flood risk. The analysis suggest that banks are likely to discriminate borrowers by their natural risk exposure. Eventually, the study provides insights on the *ex-ante* perception of risk.

The environmental-related disclosure as a risk mitigation tool

A proper environmental-related disclosure should smooth the transition policies towards a more sustainable economy. The TCFD plays an essential role in improving the quality of the information disclosed by all sectors, particularly banks and financial institutions. As the TCFD stated: *“one of the essential functions of financial markets is to price risk to support informed, efficient capital allocation decisions. Accurate and timely disclosure of current and past operating and financial results is fundamental to this function⁴⁶”*. Although all the efforts to improve the disclosure, there is still scarce and inadequate data and information, as already said before. Besides disclosure, there is a growing awareness in addressing climate risks at the group strategy level.

The Banking sector is making climate change a urgent governance issue, such that BoD in banks are overseeing climate strategies, metrics and targets to look at when evaluating progresses and goals, and the climate risk management, including massive reviews of key financial risk management documents, such as the Risk Appetite Statement. As regards metrics and targets, banks focalizes in sustainable financing i.e., funding committed to projects, businesses, and products that provide environmental benefits, operational emission (related to carbon banks’ own emissions and energy consumption), and financed emissions - GHG emissions banks finance through their lending and investment activity. However, since there is no universal framework for managing environmental-related metrics and targets, then banks differ in the definition of sustainable financing, and in the estimation of operational and financed emissions. As a matter of governance, BoDs put in place Risk Committees, overseeing and monitoring the consequences related to environmental risks. Also, banks tend to start assessing opportunities, new products, and customer support towards a low carbon economy: green bonds, green deposits, green loans, and sustainable funds are just a small fraction of the new financial products over the banks’ catalogue. The

⁴⁶ 2017, Task Force on Climate-related Financial Disclosures (TCFD), *Final report: Recommendations of the task force on Climate-related financial disclosures*. Available at: <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>

proceeds of these products fund green, sustainable, and impact projects with the ultimate goal of provide material goodwill to the whole society. Internally, banks' senior management remuneration policies are taking into account climate-related targets, either in the long run and in the annual bonuses. It is worthnoting that the IFRS Foundation Trustee have recently outlined their strategic direction for a new international sustainability standards board, taking the sustainability reporting as rigourous as the financial reporting.

The banking sector is fundamental to help companies and households moving forward in a more sustainable paradigm. Banks are exposed to environmental risks through the lending activity, which represents their core business. Banking sector is taking action on climate change, with the purpose to become a catalyst for everyone to do more on the "*Tragedy at the Horizon*". European Banking Sector is shaping its strategy towards an ambitious "*net zero bank*" goal (i.e. make their net emission zero by 2050) putting in place vigorous actions to reduce financed and own operational emissions, to provide green and sustainable products, and to increase investments in climate solutions, innovation and technology.

Banks must include a sound risk management framework to capture the climate outcomes. There is a strong and encouraging support in favor of recognize climate risk as a financial and material risk. "Climate risk" is the frame in which financial and non-financial risks take place. As analysed before, the Banking Sector know the potential threats of climate risk on the financial system if not properly managed. In particular, as in the case of flood risk in Italy, climate-related risks may impact the ability of borrowers to repay their loans and, in turn, it is likely to see a deterioration of the creditworthiness and a rise in the default rates.

Banks may fail to manage climate risks through appropriate internal policies and may affect assets and operations. Scenario analysis might be a useful tool for understanding consequences of environmental risks and opportunities. Eventually, the banking sector must either guarantee access

to credit - particularly towards customers in geographic areas at risk- and monitor and mitigating the physical and transition risks.

The banking sector needs to rebuild a new risk management framework, setting an appropriate time horizon and including transition risks, whose effects occur in the long term. The struggle against climate change requires the best efforts of governments, policymakers, financial institutions, and civil society.

Chapter 3. How do UniCredit assess, monitor and mitigate climate-related risks

UniCredit is one of the biggest in market capitalization commercial banks in Europe and worldwide. It is a pioneer in managing and monitoring climate-related risks and bringing risk management into its strategy and culture. UniCredit is the only Italian Bank with the EE+ rating from Standard Ethics, the first sustainability-linked loans lender according to Bloomberg, and nominated the Best Social Impact Bank in Europe by Capital Finance International⁴⁷.

Be the leader in the sustainable finance sector means guiding capital reallocation towards economic activities generating positive externalities.

UniCredit act as an ESG-driven bank in two ways:

- I. in the transition towards a low-carbon economy, supporting and financing people and organizations at risk of financial and social exclusion
- II. through the Social Impact Banking activities

In December 2019, the Top Management launched the Team 23 Strategy Plan. It aimed to capture commercial opportunities proactively and enhance human capital, basing its activities on ethics and respectfulness.

Team 23 Strategy plan comprises four pillars:

- grow and strengthen client franchise
- transform and maximize productivity
- disciplined risk management and controls
- capital and balance sheet management

Team 23 strategy plan set up also ambitious targets, most of them already achieved.

⁴⁷ 2020 UniCredit Integrated Report. Available at: https://www.unicreditgroup.eu/content/dam/unicreditgroup-eu/documents/en/sustainability/sustainability-reports/2020/UC_INTEGRATO_2020_ENG.pdf

In line with the scope of the research, it is worth noting to describe UniCredit ESG strategy. It aims to integrate all ESG factors in the Bank's core businesses and processes, considering both risk and market opportunities and a straightforward multi-stakeholder approach.

First, UniCredit draft an ambitious new Coal Policy declaring zero financings in all cases of expansion of coal operations by 2028. Moreover, UniCredit commits to increase the exposure to the renewable energy sector, the new energy efficiency loans, the use of renewable energy in the workplace, and the project with positive externalities. About the governance, UniCredit commits to increase the number of women in senior management. The Bank also set up ESG linked indicators in the long-term incentive plan for the top management (LTIP), evaluating the ESG rating by a third-party agency, the people engagement index, and the customer satisfaction index. The LTIP consists of 10% of the variable compensation.

Focusing on the long run, UniCredit establishes a framework based on the TCFD recommendations. it consists of five steps:

- I. mapping practices to take a picture of the Group on ESG topics
- II. understanding the positioning of UniCredit in the ESG areas
- III. prioritizing improvement initiatives using a multi-step framework based on a bottom-up approach and a top-down approach
- IV. defining a detailed roadmap, synthesized in the ESG monitoring framework, composed by a tableau with a set of key performance indicators (KPIs) and a suite of dashboards and reports
- V. setting out ESG internal and external communication plans, focused on KPIs and disclosure according to TCFD recommendations

COVID-19 pandemics acted as a catalyst on the sustainability momentum, exacerbating the sustainability materiality and the ESG factors. Besides the pandemics, banks' business model is challenging. Interest rates are negative and lowest since records. Limited macroeconomic growth and regulatory constraints make it urgent for banks to improve their business models. To avoid

dramatic impacts on the economic system after the pandemics, the European Union set up the EU recovery strategy, focusing on the green and digital transition, employment, and climate neutrality.

Parallel to the macro-economic context, customers are changing their behavior and their priorities:

- the 80% of the customers make preferences based on environmental- and social-related topics⁴⁸
- the 70% of Millennials expect a job with societal impact in a purpose-driven company⁴⁹
- the 63% of the organizations feel under pressure from stakeholders about sustainability improvements⁵⁰

Investors are getting more and more engaged in ESG issues, promoting shareholders activities on:

- capabilities, diversity, independence, and compensation of the BoD
- disclosure on talent pipeline and pay gap and TCFD-related
- climate risk management at a portfolio level
- ESG Risk Management framework

In line with the market trends described above, UniCredit provides financial products and services to households, companies, and wealth management advice. Besides the core business, the Bank promotes philanthropy through the UniCredit Foundation – promoting social and humanitarian initiatives and supporting studying and research - and corporate citizenship through the Social Impact Bank.

⁴⁸ Consumer Products and Retail: How sustainability is fundamentally changing consumer preferences, by Capgemini Research Institute

⁴⁹ Embracing the New Age of Materiality: Harnessing the Pace of Change in ESG, by World Economic Forum.

⁵⁰ Circular Economy Global Survey 2020 Report, by Bureau Veritas

UniCredit's Financial Risk Management Framework

UniCredit puts an extensive risk management framework throughout all the business lines and geographies, based on a solid risk culture properly communicated both inside and outside the Bank.

UniCredit's risk management process begins by identifying the risks the Bank is potentially exposed to before measuring those risks. With this in mind, our Group decides how much risk it is willing to assume, establishing its Risk Appetite Framework (RAF).

UniCredit's businesses pursue sales targets within these defined risk limits, identifying and measuring risk with a set of rules, methods, and policies that are also used to support the Group's strategic planning processes.

As a commercial bank with solid presence in Western and Eastern European countries, the risk exposures reflect on the Risk Weighted Assets, that comprises:

- 88.3% of credit risk, spread throughout geographic areas and asset classes
- 3% of market risk, equal to €11.5 billion
- 8.7% of operational risk, that corresponds to €33 billion

Focusing on the liquidity risk, the Group has a sufficient level of liquidity to honor its payment obligations not only on an ongoing basis but also under stressed conditions. Liquidity plan establishes a balanced funding gap evolution, bringing funds from CEE countries and use them to support growth in West Europe. The plan will generate a proper buffer over the minimum total loss absorption capacity (TLAC) and the minimum requirements for own funds and eligible liabilities (MREL).

As regards credit risk, the main goal is to properly identify, assess, manage, and monitor expected losses, focusing on Non-Performing Exposures (NPEs). The Team 23 Strategy Plan sets a Group Gross NPEs as below €20 billion and the Gross NPE ratio at 3,8% in 2023.

About Compliance and Operational risk, UniCredit is further enhancing controls, processes, and overall risk culture, sponsoring the rotation of people between business and control functions. The

Bank is also continuing to boost oversight through strengthened centralized compliance requirements. The central part of prudential supervisory pillar is the financial strategy, allocating capital based on countries, industries, and individual client level, related to their financial performance. The governance bodies entitled to oversee the risk strategies are the Group Risk Management (GRM) and the Group Lending Office (GLO). GRM manages risk strategies such as the Risk Appetite Framework (RAF) definition, the Internal Capital Adequacy Assessment Process (ICAAP), and the Non-Performing Exposures (NPEs). Meanwhile, in Compliance with risk management strategies, GLO oversees credit activities, including developing policies and guidelines. Risks constantly evolve and must be monitored so they can be managed appropriately. Whenever the Group updates its RAF, the Risk Management function incorporates it into a set of operational Key Performance Indicators (KPIs) to closely monitor UniCredit's activities and the risks it has assumed. These KPIs can then be applied to various management techniques to either tolerate, mitigate, transfer or even eliminate risk. Effective risk mitigation practices adhere to a Risk Appetite Framework (RAF) – the level of risk UniCredit is willing to bear in pursuing its strategic objectives and business plan - which balances sustainability objectives with the healthy long-term growth of UniCredit businesses, fully integrating the sustainability goals into the RAF.

Non-financial risk inclusion in UniCredit's Risk Management Framework

Climate change exposes UniCredit to several types of risks – physical, transition, liability – that translate into credit, market, operational, liquidity, and reputational risks. UniCredit considers short-term the risks that occur in 18 months, medium-term up to 5 years, and long-term all the risks that occur beyond. Risk assessment relates to the transition of companies' business models to a low-carbon economy. In credit risk, the RAF reinforces the risk discipline about the origination, underwriting, and monitoring of new loans. The RAF includes⁵¹ new Key Performance Indicators (KPIs):

- to better steer these targets across the Group legal entity and divisional level;
- to better define the long-term strategy, ensuring an adequate buffer of assets over the new strategic plan horizon to be used as collateral for secured funding and steering the level of intra-group exposure.

The RAF also comprises:

- thresholds embedding the stress test analysis;
- ICT & Cyber risk, Anti-Money Laundering, and Financial Sanctions;
- Climate- and environmental-related risks.

The Bank defines climate- and environmental-related risks as medium to long-term risks.

To this extent, the Bank set up a bank-wide climate risk management framework to manage and supervise processes related to climate- and environmental-related risks that comprises:

- Physical risk assessment
- Transition Risk Model
- EBA Sensitivity Pilot Exercise
- Paris Agreement Capital Transition Assessment (PACTA)

⁵¹ 2019 UniCredit Integrated Report. Available at: https://www.unicreditgroup.eu/content/dam/unicreditgroup-eu/documents/en/sustainability/sustainability-reports/2019/IR_ENG2019_LINK.pdf

- Sector Policies

The Physical risk assessment is a one-off assessment that considers the most critical impacts connected to climate change. The assessment, conducted in 2020, shows impairment in the value of collateral located in high climate-risk zones subject to chronic risk (e.g., rise in sea level) and acute risk (e.g., flooding and landslides). Focusing on the chronic risks, UniCredit estimated the potential impacts of the rise in sea level on the value of individual mortgage collaterals located at Italian seacoast sites. About the acute risks, the Bank monitors these risks over time and integrates new information into the lending granting process.

The Transition Risk Model is a sector-level transition risk heat map. The model consists of the map and a dedicated assessment of climate and environmental transition risks at the counterparty level – in 2020, UniCredit analyses 400 counterparties - focused on UniCredit corporate lending portfolio. The assessment results in a scoring scale that complements and enhances the ESG information already available at the counterparty level and relevant for the credit decision-making process.

The model aims to measure the credit transition risk exposure and the vulnerability of the Bank's credit counterparts. UniCredit internally develops climate and environmental scoring, assessing each client against a set of qualitative and quantitative, current, and forward-looking indicators gathered directly from completing a dedicated questionnaire. The assessment results are considered during the credit granting decision-making process.

The model can be represented using a risk matrix where the horizontal axis represents the climate and environmental risk vulnerability (based on the forward-looking indicators) while the vertical axis provides the current climate and environmental risk exposures.

A company with a higher vulnerability needs to develop a dedicated and more restricted climate strategy, while with a higher current exposure, the Bank must accompany the clients throughout the transition pathway.

As announced in the Action Plan on Sustainable Finance, in May 2020, EBA launched a pilot sensitivity exercise⁵² on climate risk with a sample of 29 volunteer banks from 10 countries. Since climate-risk stress test frameworks are still developing, the pilot sensitivity analysis was designed as a learning exercise for both the EBA and participating banks.

The exercise focuses only on transition risk, and its main objectives are:

- to explore data and methodological challenges related to climate risk assessment;
- to test banks' readiness to apply the EU green taxonomy for classifying their exposures;
- to provide a preliminary comparable assessment on banks' exposures regarding climate risk, based on different data classifications.

Overall, this exercise will represent the starting point for a more comprehensive discussion of how to embed climate risk in a stress test framework in the coming years. The data analyzed in the pilot exercise covers non-SME corporate exposures to non-financial obligors domiciled in EU countries under both the internal ratings-based (IRB) approach and the standardized approach. These data were provided at the obligor level as of December 2019. Participating banks were asked to provide the original exposure value, risk parameters, risk-weighted assets, and information on the sector for each obligor in the scope. The total original exposure submitted by banks amounts to €2.4 trillion, the 42% of total corporate exposure (€5.7 trillion) and 78% of non-SME corporate exposures to obligors domiciled in EU countries (€3.0 trillion), as reported by participating banks in standard reporting (prudential supervisory reporting, COREP).

The Paris Agreement Capital Transition Assessment (PACTA) methodology⁵³ enables banks to measure the alignment of their corporate lending portfolios with climate scenarios. Within each sector, the methodology focuses only on the value chain segment primarily responsible for climate

⁵² 2020, EBA, Risk Assessment of the European Banking System. Available at: https://www.eba.europa.eu/sites/default/documents/files/document_library/Risk%20Analysis%20and%20Data/Risk%20Assessment%20Reports/2020/December%202020/961060/Risk%20Assessment_Report_December_2020.pdf

⁵³ 2020, 2investing initiative, PACTA for Banks Methodology Document. Available at: <https://www.transitionmonitor.com/wp-content/uploads/2020/09/PACTA-for-Banks-Methodology-Document.pdf>

change. This methodology is a crucial first step for banks that wish to understand their contributions to climate change and begin defining climate strategies that have a meaningful impact, first linking a bank's financial exposure to physical assets in the real economy. Then, the economic units of output coming from the physical assets financed by the Bank are compared to different climate change scenarios, informing the Bank of the current climate pathway its loan book and clients are on. By basing the analysis on economic units of output, it is possible, using business intelligence data, to make forward-looking projections. It follows that the Bank can assess its portfolio and clients against business-as-usual and Paris-aligned scenarios. Then, it can make informed decisions around steering capital towards a Paris-aligned world and communicate on its climate scenario alignment to stakeholders and civil society.

The PACTA output metrics look to oversee two key climate issues:

- I. the absolute production limits of high carbon technologies.
- II. the required shift from high- to low-carbon technologies.

For Power, Fossil Fuels, and Automotive, there are precise low- or zero-carbon technologies available. For example, in the Power sector, power generation has to transition from fossil fuels to renewables.

Results are calculated using different accounting principles at the loan book level and client level. At the loan book level, a weighted portfolio approach is used, whereby the production of a client is allocated to the portfolio based on the size of the exposure to that client. At the client level, an unweighted approach is used, given the client's production level. The interpretation of the results is, therefore, different between the two. For sectors where technology decarbonization pathways are not so well defined, such as Steel and Cement, a different approach is needed. For these sectors, climate change scenarios do not currently prescribe production to specific technologies producing the economic units of output, although trials for some solutions may already exist.

UniCredit assesses the environmental, social, operational, and reputational risks through the Global Policy on Group Credit Operations and the particular policies and practices, setting out a model in which traditional and non-financial risk management coexists. Focusing on the non-financial risk management, UniCredit:

- follows Equator Principles, if applicable
- provides particular policies about sectors with significant environmental and social risks, monitoring portfolio exposures accordingly
- sets up a robust inner risk management culture, prioritizing environmental and social issues

As described in Chapter 2, Equator Principles is a framework of standards for determining, assessing, and managing environmental and social risks for large projects, based on the International Financial Corporation Performance Standard on Environmental and Social Sustainability and the World Bank Group Environmental, Health, and Safety Guidelines. UniCredit adopted the Equator Principles in 2003, and by October 2020, committed to adopting the fourth review of the Equator Principles, published in July 2020.

The sector policies represent a framework of sector-specific (i.e., coal, mining, non-conventional oil and gas industry, defense/armaments, nuclear energy, water infrastructures) standards guidelines to identify, assess and mitigate environmental, social, and reputational risks on an ongoing basis with customers. In 2020, UniCredit screened more than 1130 transactions for environmental and social risk issues. Besides the sector policies, UniCredit analyses specific high-risk cases/transactions not covered under the defined policies. Analyses are conducted leveraging the data available and the essential internal functions of external ESG rating providers. In 2020, the Bank screened almost 230 transactions in environmental, social, human rights, and reputational risk issues.

The Group Reputational Risk Committee (GRRC) is responsible for assessing the reputational risks involved in initiatives, transaction banking, projects, customers, and other business activities. The GRRC is entitled to provide assessment and knowledge of potential reputational risks across the

Group. The Committee also supports the Group Chief Risk Officer (CRO) on governance guidelines for managing the reputational risk on sensitive sectors and customer relationships, the related mitigation actions, and all the other relevant topics submitted by the Reputational Risk function. In 2020, the GRRC analyzed 90 transactions, provided the analysis to the Group Operational and Reputational Risk Committee quarterly, and engaged all ESG activities covering 110 ESG topics.

UniCredit represents a model in how banks should include and integrate climate risks in their risk management frameworks. Among its competitors, UniCredit provides a consistent amount of information to the public about ESG risk management.

However, a sound risk management system is influenced and related to other important aspects of how a bank concretely works.

The next section try to take a closer view of this topic.

Comparison with KPMG Benchmark

The section proposes a comparison between UniCredit public information disclosed and the benchmark provided by the KPMG Report “*Climate disclosures within the Annual Financial Reports of Banks: Benchmarking on how banks reported on climate change in the 2020 reporting season*”⁵⁴ issued in April 2021.

The report outlined the trends on climate change risks disclosure in 2020 Annual Financial Reports of some of the major banks around the world. The benchmark retrieved data from the annual financial reports of 25 major banks worldwide (5 in the United Kingdom, 5 in Europe, 4 in Australia, 5 in Canada, and 6 in the United States). The paragraph proposes a comparison between UniCredit public information and the benchmark about the following topics:

- Front End Reporting
- Governance
- Climate Strategy
- Risk Management
- Metrics and Targets

⁵⁴ 2021, Climate disclosures within the Annual Financial Reports of Banks - Benchmarking on how banks reported on climate change in the 2020 reporting season, KPMG

Front-end Reporting

As “front end” reporting, practitioners refer to the directors’ report and the areas of the Annual Financial Report other than the financial statements and notes. Conversely, “back end” refers to the financial statements and notes of the annual report.

As explained in the previous chapters, climate disclosure has been boosted over the last few years and, with the increasing engagement of the public opinion, it is becoming crucial in consumer decision and market sentiment.

A first empirical analysis is the climate change buzzwords count in a bank’s Annual Financial Report, as an indication of the growing importance of climate change.

The Report stated that, on average, the word “climate” appears 99 times on average in the 2020 Annual Report, 62 in 2019, and 36 in 2018.

Buzzwords	2020	2019	2018
Climate	99	62	36
Green	27	20	17
Net Zero	8	1	0

The table below shows how many times the buzzword appears in the UniCredit Annual Reports, compared with the Benchmark.

Buzzwords	2020	Benchmark	2019	Benchmark	2018	Benchmark
Climate	22	99	16	62	0	36
Green	11	27	0	20	0	17
Net Zero	0	8	0	1	0	0

Results show that UniCredit is well below the 2020 benchmark: 79% less for the word “climate”, 59% times less for “green”. Taking into consideration UniCredit reports drafted between 2018 and 2020, there is no mention to “net zero” policy. Although results are not encouraging, it should be specified that Unicredit launched the above mentioned Team 23 Strategic Plan at the end of 2018

including a series of targets and policies to mitigate adverse climate events as well as measures to be taken to risk management in order to include climate and environmental risks in the Bank's Risk Management Framework.

Since 2018, the word "climate" doubled in two years, while the word "green" becomes part of the vocabulary used to draft the Annual Report only in 2020. Although more and more "climate-related" words are included in the Annual Report, from this first - albeit superficial and "dumb" analysis - it denotes how Unicredit is not interested in set net-zero policy in the near future, as it will be described later on.

Focusing only on the 2020 Annual Report, UniCredit disclose the climate-related information in the "*For the environment*" section on a siloed-basis approach, illustrating the policies and strategy put in place against climate change, dedicating a section of the front end of the Annual Financial Report and limited disclosure in the Notes referred only to the Risk Management.

In the Part E "*Information on risks and hedging policies*" of the Notes, it is clear that UniCredit treats climate- and environmental-related risks as emerging and non-quantifiable risks. As emerging and still non-quantifiable risks, the bank manages and monitors emerging risks following a dynamic approach: Risk Management identifies and estimates emerging risks and submits them regularly to senior/top management and Board of Directors which take the appropriate actions.

In the Annual Report there is no mention in the financial statement about climate risks.

Furthermore, even adopting TCFD recommendations, UniCredit will disclose recommended information in a separate document in June 2021.

UniCredit provides detailed climate disclosures in a separate document - the Integrated Report - analysed in the previous sections. As a result, the final users of these disclosures - investors, practitioners, academics - often need to go through multiple reports in order to fully comprehend a bank's climate-related information, and this situation may generate confusion.

Governance

As stated in the KPMG Report, in 2020 the 88% of the banks disclose details of their governance around climate-related risks and opportunities within their annual financial reports, making climate change a board-level issue, with clear responsibility for the Board of Directors. The 72% of the banks in the benchmark disclose climate change as a matter overseen by the Board, the 52% of them assign climate risk responsibilities to the Risk Committee while only the 12% delegate to the Audit Committee.

UniCredit, as stated above, delegates the responsibilities to the Group Risk Management (GRM), responsible for the supervision and management of issues related to climate change and environmental risks as well as for the Bank's approach to sensitive sectors. The non-executive directors should be appropriately skilled and experienced in the area of climate change. UniCredit's Board of Directors boasts leading figures in Finance and the Economics, starting with Pier Carlo Padoan, former Italian Minister of Economy and Finance as well as former Chief Economist of the OECD.

The table below summarizes new appointed Directors' *curricula* and, from the information provided, highlight whether they have previous studies or experiences related to climate change topics. From the table are excluded the CEO Andrea Orcel, the Chairman Pier Carlo Padoan, and the Deputy Chairman Lamberto Andreotti.

Director	Education	Profession	Experiences/ studies related to climate change topics	UniCredit seats held
Vincenzo CARIELLO	<ul style="list-style-type: none"> • Degree in Law - Università Cattolica del Sacro Cuore, Milano • PhD in Commercial Law - Università Commerciale Bocconi, Milano 	<ul style="list-style-type: none"> • Full tenure Professor of Commercial Law - Università Cattolica del Sacro Cuore, Milano • Attorney at law 	Member of the Board of Directors of A2A S.p.A. (Sustainability and Territory Committee)	Member of the Related Parties Committee
Elena CARLETTI	<ul style="list-style-type: none"> • Habilitation in Economics, University of Mannheim • Ph.D in Economics, London School of Economics • Doctorate in Economics, University of Bologna • Master in Economics, Bocconi University • Laurea in Economics, Bocconi University 	Director of Unit "Banking, Finance and Regulation", Bocconi University, Baffi Carefin Center for Applied Research	None retrieved	<ul style="list-style-type: none"> • Chairwoman of the Internal Controls & Risks Committee • Member of the Related Parties Committee
Jeffrey Alan HEDBERG	<ul style="list-style-type: none"> • University of Denver, MA in International Management with a focus on International Policy and International Law • Northeastern University, BS in Business Administration 	CEO, Wind Tre S.p.A.	None retrieved	Member of the ESG Committee

Director	Education	Profession	Experiences/ studies related to climate change topics	UniCredit seats held
Beatriz Lara BARTOLOMÉ	<ul style="list-style-type: none"> • Master's Degree, Physics Science, Universidad Complutense de Madrid • Bachelor's Degree, Physics, Universidad Autonoma de Madrid 	<ul style="list-style-type: none"> • Non-Executive Director Development Program, IESE Business School • Innovation & Change Programs at MIT Sloan School of Management • Corporate Governance Program, ICA, Spanish Institute of Directors • PDG, MBA for Senior Executives, IESE Business School • Strategic in-company Programs, Harvard Business School for AT&T 	None retrieved	Member of the ESG Committee
Luca MOLINARI	M.S. in Economics and Business Administration, Bocconi University, Milan	Head of Financial Services at Mubadala Investment Company, Abu Dhabi (UAE)	None retrieved	Member of the Remuneration Committee

Director	Education	Profession	Experiences/ studies related to climate change topics	UniCredit seats held
Jayne-Anne GADHIA	<ul style="list-style-type: none"> • Honorary Doctor of Civil Law - University of East Anglia • Honorary Doctor of the University - University of Glasgow • Honorary Doctor of Science (Economics) - Royal Holloway, University of London • Honorary Doctor of Civil Law - Northumbria University • Chartered Accountant - ICAEW • Bachelor of Arts (Honours), University of London 	Founder and Executive Chair of Snoop	None retrieved	<ul style="list-style-type: none"> • Chairwoman of the Remuneration Committee • Member of the Corporate Governance & Nomination
Maria PIERDICCHI	<ul style="list-style-type: none"> • Economics (Laurea in Economia Politica), Università Commerciale Bocconi, Milano • MBA Finance, New York University, Stern Graduate School of Business Administration 	Experienced Board Member	None retrieved	<ul style="list-style-type: none"> • Chairwoman of the Related-Parties Committee • Member of the Internal Controls & Risks Committee
Alexander WOLFRING	Degree in Economics and Business Administration - Vienna University of Economic and Business	<ul style="list-style-type: none"> • Various publications, e.g. "Risikomanagement für Finanz- und Kapitalmärkte", Wien 2008 • Consultant • Various lectures in the field of risk management 	None retrieved	<ul style="list-style-type: none"> • Member of the Internal Controls & Risks Committee • Member of the Corporate Governance & Nomination Committee

Director	Education	Profession	Experiences/ studies related to climate change topics	UniCredit seats held
Francesca TONDI	<ul style="list-style-type: none"> • Summa cum Laude Degree, Business and Economics, Bocconi University, Milan • Qualified Chartered Accountant, Italy • Certified Fintech Course, ESCP Business School, London 	<ul style="list-style-type: none"> • Founding Member of the Women Supporting Women circle for the Princes Trust, mentor; contributor to the Enterprise Course • Angel Investor 	None retrieved	<ul style="list-style-type: none"> • Chairwoman of the ESG Committee • Member of the Internal Controls & Risks Committee
Renate WAGNER	<ul style="list-style-type: none"> • Master of Business Administration, Heriot-Watt University, Edinburgh, United Kingdom • Master in Mathematics, University of Paderborn, Germany 	<ul style="list-style-type: none"> • Member of the Board of Management Allianz SE, Germany • Member of the Board of Management Allianz Deutschland AG, Germany 	None retrieved	Member of the Remuneration Committee

The information contained in the BOD members' *curricula* as well as research carried out on academic databases (Google Scholar, Summon Search) does not indicate qualifications or research produced relating to climate change, climate risk, or ESG for any of the members. Moreover, from a professional point of view, following the same methodology, only one member of the BoD - Dr. Cariello - has ongoing experience as a member of the Sustainability and Territory Committee at A2A, an Italian listed company operating in the energy sector. However, although Dr. Cariello is the only expert in this field (according to public information), he does not sit on the ESG Committee.

The 80% of the banks of the benchmark have assigned climate-related roles and responsibilities to their management: in the 32% of them, the CEO has the responsibility about climate change, while in the 28% of the benchmark is the Chief Risk Officer (CRO) the senior manager responsible for the climate-related issues.

With regard to Unicredit, it is important to highlight the new organisational structure at the top of the Group. In May 2021, the new appointed Group CEO Andrea Orcel streamlined the organizational structure, removing a layer in the organisational structure – Western Europe and Finance & Controls – and reducing the leadership team from twenty seven under the old Executive Management Committee (EMC) to a streamlined fifteen, who will make up the new Group Executive Committee (GEC).

Before May 2021, as to climate change - broader included in the sustainability topic - there was not a single executive figure responsible for. A group of the Executive Management Committee members formed a dedicated Taskforce on ESG strategy, coordinated by the Group ESG Strategy and Impact Banking, headed by Roberta Marracino (also part of the old EMC). Furthermore, through the Group Sustainability function, the Group ESG Strategy and Impact Banking supported the old Corporate Governance, Nomination and Sustainability Committee (CGN&S) in its activities and assisted senior management in strategies that integrate sustainability considerations into the value creation process and generate long-term benefits for all stakeholders.

Although no further details on the structure and possible new appointments have been published yet, it is possible to outline how the ESG theme is residual in the new organisation of the Bank's executive management.

From the announcement published in May 2021 it appears that Fiona Melrose - Head of Strategy and Optimization - will have to deal with all critical initiatives for the CEO, such as Strategy and M&A, Group Transformation Office, and *“the further integration of ESG into the bank's businesses”*. It follows that the ESG theme is no longer a matter of primary importance in the new CEO opinion, who is instead pushing massively towards digitalization and innovation within the Group. It is therefore hoped that this issue will become more relevant in further announcements.

36% of the banks have already linked their remuneration to climate-related targets.

UniCredit set up ESG linked indicators in the long-term incentive plan for the top management (LTIP), evaluating the ESG rating by a third-party agency, the people engagement index, and the customer satisfaction index. The LTIP consists of 10% of the variable compensation. In this case, UniCredit does better than more of the half of the banks in the benchmark.

Climate Strategy

More than the half of the banks in the benchmark disclose the ambition to make their net emissions zero by 2050. UniCredit, reasonably, set in the Team 2023 Strategic Plan the goal of reducing GHG emissions by 60% by 2020 - achieved - and 80% by 2030 (compared to 2008 values).

Setting ambitious targets cannot be realistically achieved could cause strong reputational damage to banks: both investors and public opinion reward the strong commitment to the ESG theme, but it is expressed in concrete, achievable goals in a defined time horizon.

Moreover, UniCredit put in place a new Coal Policy declaring zero financings in all cases of expansion of coal operations by 2028. Furthermore, the Bank set zero exposures to thermal coal mining and coal-fired power plant by 2023.

Eventually, UniCredit commits to increase the exposure to the renewable energy sector, the issuance of new energy efficiency loans, the consumption of renewable energy in their buildings, and the promotion of projects with positive externalities.

UniCredit summarizes the Group Climate Strategy in the Annual Report, deepening the topic in the Integrated Report.

In these disclosures, the Bank provides details of potential climate-related opportunities and how these opportunities have been integrated into their climate strategy.

As an example, during 2020 Unicredit issued new products such as €120 billion of sustainable bonds and loans in 97 deals, €750 million green bond for real estate firm CPI Property Group to fund new green projects, €750 million for Eurogrid to fund offshore wind farm projects, and €500 million for Swisscom to finance energy efficiency projects.

About the climate strategy, Unicredit is in line with the benchmark, reaching levels of excellence in the issuance of green financial products.

Risk Management

According to KPMG benchmark, the 84% of the banks discloses climate-related risk management. As already mentioned, Unicredit in the Annual Report refers to climate risks mainly in the Notes' section dedicated to Risk Management, in which the Bank describes the structure of its Risk Appetite Framework. Climate- and environmental-related risks are included in the RAF in order to ensure prevention and immediate intervention in the case should they occur. Moreover, from a quantitative point of view, Unicredit measures the performance objectives of climate and environmental risks through the Managerial KPIs i.e., indicators that provide metrics about the Bank's Strategy and Risk Appetite in relation with all key risks.

The bank, however, by defining climate-related risks as "emerging" and "non-quantifiable", denies the materiality characteristic of these risks and practically separates them from financial risks, a category they should be part as explained in the literature - see Chapter 2 - and as competitors worldwide are already doing so (the 72% of the banks included in the benchmark disclose climate risk as a financial risk to their business).

There is no mention in the Annual Report of the impact of climate risks on other risks. Nevertheless the Integrated Report states that climate change exposes UniCredit to several types of risks – physical, transition, liability – that translate into credit, market, operational, liquidity, and reputational risk. This means that, like a small fraction of the banks in the benchmark, UniCredit is starting to see climate risk as on par with the other “traditional” risks, but not in the same category. Being climate- and environmental-related risks not quantifiable due to - as already explained in the previous chapters - lack of data and misalignment of the time horizons, scenario analysis is an important and useful tool for understanding and measuring strategic implications of climate-related risks and opportunities.

In line with the major part of the banks in the benchmark, UniCredit developed a dedicated internal methodology aimed at assessing Climate and Environmental exposure and vulnerability of the lending portfolio.

With reference to physical risk, the Bank presented a preliminary estimation at Group level of potential impact of some chronic and acute hazards on the value of mortgage collaterals related to properties located on the most exposed areas.

As regards to transition risk, the Integrated Report defines the proprietary Transition Risk Matrix, developed for the Corporate segment, including the methodology adopted. The outcomes of the two assessment models are not publicly disclosed.

While deepening in detail the inclusion of climate risk within the Risk Management Framework, Unicredit should improve the communication of the results achieved and go into detail on the quantitative aspects of the topic.

Metrics and Targets

Climate change is a source of both opportunities and risks for banks. In order to keep opportunities seized and risks managed, banks should set up a proper framework of metrics and targets.

80% of the banks identified and disclosed metrics and targets which are directly linked to achieving their climate strategy. As mentioned above, metrics and targets disclosed by banks relate to three common areas: sustainable financing, operational emissions and financed emissions.

Sustainable financing refers to funding committed to projects, businesses and products that provide environmental benefits. UniCredit funds sustainable activities for almost €122 billion (see the Climate Strategy section).

The bank discloses a vast amount of quantitative data on operational emissions - both carbon emissions and energy consumption - and financed emissions, positioning itself in line with the benchmark (7 out of 10 banks involved do the same).

However, UniCredit discloses only raw data. The bank does not provide the metrics used in the risk management assessment as well as those included in the above mentioned managerial KPIs.

The presence of these data gives users of the Reports the possibility to analyze, compare, and direct investments decisions. Moreover, considering how important the concept of “ESG-driven company” is to the majority of consumers at this time in history, the subject is even more relevant.

However, there is currently no universally accepted framework or methodology for identifying and calculating climate-related metrics and targets neither UniCredit provides details about its methodology.

Considerations

Averaging between topics, Unicredit ranks in line with the banks included in the KPMG Benchmark.

The KPMG Report includes the Auditor's Report theme. The writer chose to exclude it from the analysis because in Europe the External Audit does not include the risks related to climate change in its report to dedicate space for climate change risks at audit level. In the near future it is hoped for a greater awareness as well as for the description of the audit impacts and the specific audit procedures performed.

It is important to recall that Unicredit's strategy plan against climate change was only defined in 2019 and came into operation the following year. However, the governance revolution and the apparent overshadowing of the ESG theme within the new Group Executive Committee are puzzling.

The governance point appears the area on which Unicredit needs to improve. It is useful to remember that among all non-executive directors, only one - from what can be seen from public information - has the professional skills to deal with the ESG theme and climate change. Paradoxically, he is not on the ESG Committee.

Another problem that can be extended to the entire banking sector is the almost total lack of data in financial statements in the Annual Reports. This gap can be attributed to the lack of legislation and accounting policy on the subject. It is hoped that the relevant bodies will speed up the integration process.

It is finally possible to define Unicredit at its current state in line with its competitors on the topic of climate change. The bank has an excellent climate strategy that is well thought out and managed dynamically. Problems within the brand-new top organizational structure could result in bottlenecks in the chain of command and reporting, exposing the Group to dramatic long-term consequences.

Conclusions

Climate change is the most crucial threat world has ever faced. Until a few years ago, the worst was the marginal awareness that human actions, even daily ones, left their mark on the environment.

2015 represented the golden year of climate crisis policies since, in the same year, the Paris Agreement and the Sustainable Development Goals (SDGs) were adopted by the major part of the developed and developing countries. Although ambitious and well-conceived, the Paris Agreement's main goal - keeping global warming below 1.5°C above pre-industrial levels - requires a halving of GHGs emissions by 2030. Even though imperfect, the Paris Agreement represents the first signal of awareness by the nations to recognize that climate change is not a lonely struggle, pooling up a framework of resources, know-how, and commitment. The concrete changeover that leads to a growing awareness of the civil society for sustainability issues the most is the United Nations 2030 Agenda for Sustainable Development.

Although slowly, superficially, and - to some extent - in bad faith, global public opinion today sees climate change as a crucial issue for the survival of the human species and, with it, of the apparatuses that have made the progress of the species faster and more evolved.

One of the most severe consequences of living in a hyper-globalized, over-polluted, VUCA world is the cracking of the so-called "*social capital*," i.e., the dense network of the relationships and cooperation that, despite the savage capitalism of the recent decades, slowed down the hemorrhaging of wealth and equality between people.

During the last quarter of the twentieth century, the financial sector was incredibly brazen and blind to society's weaknesses. Capitalism of the time identified the vulnerable parts of the society's value chain and turned them into profit until the link was broken, the community shattered, but financial sector "*too big to fail*."

In this context, the financial sector's primary purpose shifted from a wealth-producing machine *per se* to a critical enabling factor to reach the most ambitious policy objectives, attempting to mainstream such a new way of doing finance.

The European Union is acting as the frontrunner in the fight against the climate crisis, placing a comprehensive and composite strategy, producing a series of important legislative acts, emphasizing disclosure and correct information of citizens, companies, and investors.

Academics divide environmental-related and climate-related risks in transition risk, resulting from the adjustment processes towards a low-carbon economy, and physical risk, defined as the impacts today on the value of financial assets that arise from climate and environmental-related events that may damage property or disrupt trade.

Physical and transition risks are drivers of prudential risk, particularly credit risk, operational risk, market risk, and liquidity risk.

Banks need to develop a clear climate strategy as a tool for integrating ESG risks across the company. Then, an appropriate governance framework shall write down, incentivate, and be sure that the new set of policies is fully understood and integrated into all decision-making processes.

Banks' risk management framework needs revision to include sustainability risks, in terms of policies and procedures but also about methodologies and infrastructure. Climate change is a challenging issue, not yet deeply analyzed: banking sector needs to create an *in-itinere* approach, where solution shall be prioritized, adopted, and reiterated for further development and refinement.

The Banking sector has extraordinary importance as a transition player towards a sustainable, net-emissions economy. However, little attention has been dedicated to understand and cover financial risks that could arise from the climate crisis and environmental degradation. Moreover, the COVID-19 outbreak exposes - probably for the first time in history - that climate- and environmental- risks as exogenous shocks could become systemic and affect the whole economy.

The European Banking Authority (EBA) regulation aims to set a monitoring system to assess material ESG risks, considering ESG factors in the authority work, having the mandate to oversee the whole ESG European legislative framework. The objectives of the EBA work on sustainable finance are linked with the overall goals of contributing to the short-, medium- and long-term stability and effectiveness of the financial system and include the improvement of the current regulatory framework for institutions to foster their operations in a sustainable manner, the introduction of sustainability considerations in institutions' strategy and risk management as well as providing supervisors with adequate tools to understand, monitor, and assess ESG risks in their supervisory practices.

Literature shows that climate- and environmental-related risks potentially manifest as risks financial institutions already knew: credit risk, market risk, operational risk, and liquidity risk.

The quantification of the material impacts on environmental-related risks in the banking sector is challenging for several reasons. First, the amount of available data on the relationship between climate change and credit risk is insufficient to draw a trendline correctly, and for this reason, the models of the risk quantification rely on stress tests and climate scenarios. The underestimation of climate-related risks may over-allocate riskier activities, undermining the efficient allocation of capital. Moreover, an inefficient allocation of capital might result from a lack of information on climate risk at customer level. In other words, when incomplete information occurs, it means that the efficient market hypothesis might not hold.

To properly build a framework that might monitor and mitigate the environmental-related risks, there is a need to describe and analyze these risks. Environmental-related risks are disruptive, non-diversifiable, nonlinear, correlated, and potentially irreversible: the so-called *Green Swans*.

About the lending sector, literature shows that severe weather events - as physical risks - may be seen as a market failure, too. Focusing on Italy, there is evidence that in regions at risk of flooding, corporate lending decrease towards firms with higher exposures to flooding risk. Results showed

that credit activity is negatively influenced by flood risk. The analysis suggest that banks are likely to discriminate borrowers by their natural risk exposure. Eventually, the study provides insights on the *ex-ante* perception of risk.

A proper environmental-related disclosure should smooth the transition policies towards a more sustainable economy. Although all the efforts to improve the disclosure, there is still scarce and inadequate data and information, as already said before. Besides disclosure, there is a growing awareness in addressing climate risks at the group strategy level.

The Banking sector is making climate change a urgent governance issue, such that BoD in banks are overseeing climate strategies, metrics and targets to look at when evaluating progresses and goals, and the climate risk management, including massive rievews of key financial risk management documents, such as the Risk Appetite Statement. As regards metrics and targets, banks focalizes in sustainable financing, operational emission, and financed emissions.

The banking sector needs to rebuild a new risk management framework, setting an appropriate time horizon and including transition risks, whose effects occur in the long term. The struggle against climate change requires the best efforts of governments, policymakers, financial institutions, and civil society.

UniCredit is one of the biggest in market capitalization commercial banks in Europe and worldwide. In December 2019, the Top Management launched the Team 23 Strategy Plan. It aimed to capture commercial opportunities proactively and enhance human capital, basing its activities on ethics and respectfulness.

UniCredit sustainability strategy aims to integrate all ESG factors in the Bank's core businesses and processes, considering both risk and market opportunities and a straightforward multi-stakeholder approach.

COVID-19 pandemics acted as a catalyst on the sustainability momentum, exacerbating the sustainability materiality and the ESG factors. Besides the pandemics, the bank's business model is

challenging: UniCredit provides financial products and services to households, companies, and wealth management advice. Besides the core business, the Bank promotes philanthropy through the UniCredit Foundation – promoting social and humanitarian initiatives and supporting studying and research - and corporate citizenship through the Social Impact Bank.

UniCredit puts an extensive risk management framework throughout all the business lines and geographies, based on a solid risk culture properly communicated both inside and outside the Bank.

Climate change exposes UniCredit to several types of risks – physical, transition, liability – that translate into credit, market, operational, liquidity, and reputational risks. To this extent, the Bank set up a bank-wide climate risk management framework to manage and supervise processes related to climate- and environmental-related risks that comprises:

- The Physical risk assessment is a one-off assessment that considers the most critical impacts connected to climate change. The assessment shows impairment in the value of collateral located in high climate-risk zones subject to chronic risk and acute risk.
- The Transition Risk Model is a sector-level transition risk heat map. The model consists of the map and a dedicated assessment of climate and environmental transition risks at the counterparty level focused on UniCredit corporate lending portfolio.
- As announced in the Action Plan on Sustainable Finance, in May 2020, EBA launched a pilot sensitivity exercise on climate risk. Since climate-risk stress test frameworks are still developing, the pilot sensitivity analysis was designed as a learning exercise for both the EBA and participating banks. This exercise will represent the starting point for a more comprehensive discussion of how to embed climate risk in a stress test framework in the coming years.
- The Paris Agreement Capital Transition Assessment (PACTA) methodology enables banks to measure the alignment of their corporate lending portfolios with climate scenarios. This methodology is a crucial first step for banks that wish to understand their contributions to climate

change and begin defining climate strategies that have a meaningful impact, first linking a bank's financial exposure to physical assets in the real economy.

- The sector policies represent a framework of sector-specific (i.e., coal, mining, non-conventional oil and gas industry, defense/armaments, nuclear energy, water infrastructures) standards guidelines to identify, assess and mitigate environmental, social, and reputational risks on an ongoing basis with customers.

UniCredit represents a model in how banks should include and integrate climate risks in their risk management frameworks. However, a sound risk management system is influenced and related to other important aspects of how a bank concretely works.

In the end of the research is proposed an analysis of UniCredit publicly disclosed documents using as benchmark the KPMG Report *“Climate disclosures within the Annual Financial Reports of Banks: Benchmarking on how banks reported on climate change in the 2020 reporting season”* issued in April 2021.

A first empirical analysis is the climate change buzzwords count in a bank's Annual Financial Report, as an indication of the growing importance of climate change. Results show that UniCredit is well below the 2020 benchmark: 79% less for the word “climate”, 59% times less for “green”. Taking into consideration UniCredit reports drafted between 2018 and 2020, there is no mention to “net zero” policy.

Focusing only on the 2020 Annual Report, UniCredit disclose the climate-related information in the *“For the environment”* section on a siloed-basis approach. UniCredit provides detailed climate disclosures in a separate document: the Integrated Report. As a result, the final users of these disclosures - investors, practitioners, academics - often need to go through multiple reports in order to fully comprehend a bank's climate-related information, and this situation may generate confusion.

About governance, the non-executive directors should be appropriately skilled and experienced in the area of climate change. The information contained in the BoD members' *curricula* as well as research carried out on academic databases does not indicate qualifications or research produced relating to climate change, climate risk, or ESG for any of the members. Moreover, from a professional point of view, following the same methodology, only one member of the BoD - Dr. Cariello - has ongoing experience as a member of the Sustainability and Territory Committee at A2A, an Italian listed company operating in the energy sector. However, although Dr. Cariello is the only expert in this field (according to public information), he does not sit on the ESG Committee. Although no further details on the structure and possible new appointments have been published yet, it is possible to outline how the ESG theme is residual in the new organisation of the Bank's executive management.

From the announcement published in May 2021 it appears that Fiona Melrose - Head of Strategy and Optimization - will have to deal with all critical initiatives for the CEO, such as Strategy and M&A, Group Transformation Office, and "*the further integration of ESG into the bank's businesses*". It follows that the ESG theme is no longer a matter of primary importance in the new CEO opinion, who is instead pushing massively towards digitalization and innovation within the Group. It is therefore hoped that this issue will become more relevant in further announcements.

More than the half of the banks in the benchmark disclose the ambition to make their net emissions zero by 2050. UniCredit, reasonably, set in the Team 2023 Strategic Plan the goal of reducing GHG emissions by 80% by 2030 (compared to 2008 values). Setting ambitious targets cannot be realistically achieved could cause strong reputational damage to banks: both investors and public opinion reward the strong commitment to the ESG theme, but it is expressed in concrete, achievable goals in a defined time horizon.

According to KPMG benchmark, the 84% of the banks discloses climate-related risk management. While deepening in detail the inclusion of climate risk within the Risk Management Framework,

Unicredit should improve the communication of the results achieved and go into detail on the quantitative aspects of the topic.

In order to keep opportunities seized and risks managed, banks should set up a proper framework of metrics and targets. The bank discloses a vast amount of quantitative data on operational emissions and financed emissions, positioning itself in line with the benchmark. However, UniCredit does not provide the metrics used in the risk management assessment as well as those included in the above mentioned managerial KPIs. The presence of these data gives users of the Reports the possibility to analyze, compare, and direct investments decisions. Moreover, considering how important the concept of “ESG-driven company” is to the majority of consumers at this time in history, the subject is even more relevant.

Averaging between topics, Unicredit ranks in line with the banks included in the Benchmark. However, the governance revolution and the apparent overshadowing of the ESG theme within the new Group Executive Committee are puzzling. It is finally possible to define Unicredit at its current state in line with its competitors on the topic of climate change.

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Abstract

The nexus between climate-related risks and financial risk

Since the early centuries A.D., the world population has polluted, disfigured, disrupted the entire biosphere, bringing planet Earth to the critical conditions in which it finds itself in the most recent times. The same people who, through their ancestors, abused the place where they lived today suffer the consequences in terms of temperature change (the years between 1983 and 2012 were the warmest over the last 1400 years), which leads to glaciers melting, and global sea level rising, then warmer and more acid water (since the 19th century, there has been a 26% increase in ocean water pH), causing massive losses of marine species.

Until a few years ago, the worst was the marginal awareness that human actions, even daily ones, left their mark on the environment.

In the late 1970s, few scientists denounced the dramatic rise in global temperature and calling for action by policymakers that fiercely discussed the costs of regulating GreenHouse Gases (from now on GHGs). That news spread beyond the small minority who regularly followed scientific issues: to an ordinary citizen, a rise of a few degrees might sound trivial even in a moment of chaos among industrial pollution, nuclear tests, and consequences on space exploration.

In 1985, Joe Farnan, Brian Gardiner, and Jonathan Shanklin - a group of British scientists - discovered a “hole” in the ozone layer over the South Pole, and the images and attitudes from Sci-Fi movies and political paranoia just materialized in the public opinion’s mind. The guilty party was founded in the ChloroFluoroCarbon gases (CFCs) produced worldwide for many functions, but mainly in spray cans. The international political Agreement was reached in 1987 in Montreal with the outcome to nullify the production and the consequences of CFCs. The Montreal Agreement had not the desired effects mainly because the conditions were not strict enough. For this reason and because of intense media attention about the theme, the 1985 Agreement was improved and even extended during the Kyoto Climate Conference in 1997.

2015 represented the golden year of climate crisis policies since, in the same year, the Paris Agreement and the Sustainable Development Goals (SDGs) were adopted by the major part of the developed and developing countries.

The Paris Agreement was formally adopted in December 2015 by 184 countries. It resulted from the United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty that aims to limit GHGs after adopting the Kyoto Protocol. The goal is to maintain the Earth's temperature well below 2°C, preferably below 1.5°C above the pre-industrial level.

In line with a solidarity principle, developed countries shall provide financial assistance to developing ones, encouraging voluntary contributions. It is necessary to redirect capital flows to significantly mitigate the emissions and adapt the unlikely effects of climate change. Although ambitious and well-conceived, the Paris Agreement's main goal - keeping global warming below 1.5°C above pre-industrial levels - requires a halving of GHGs emissions by 2030. An analysis made by the Universal Ecological Fund FEU-US and the Acting on Climate Together Foundation shows that almost 75% of the climate commitments set up by countries are partially insufficient or insufficient to reach the goal. Focusing on the top four global GHG emitters - China, the United States, the European Union, and India - only the E.U. and its Member States are on track to cut GHG emissions by 58% by 2030.

Even though imperfect, the Paris Agreement represents the first signal of awareness by the nations to recognize that climate change is not a lonely struggle, pooling up a framework of resources, know-how, and commitment.

The concrete changeover that leads to a growing awareness of the civil society for sustainability issues the most is the United Nations 2030 Agenda for Sustainable Development, launched and adopted by the U.N.'s General Assembly in September 2015.

Even before the COVID-19 pandemics, nations were not on track to meet the SDGs by 2030: despite the efforts, the number of people suffering from food insecurity was increasing, the environmental deterioration grew at an alarming rate, inequalities spread all over the world. COVID-19 outbreak is making the goals achievement more challenging: collapsing healthcare systems almost worldwide, 1.6 billion students out of school, millions and millions of new people in extreme poverty are some of the consequences of the global pandemics.

Although slowly, superficially, and - to some extent - in bad faith, global public opinion today sees climate change as a crucial issue for the survival of the human species and, with it, of the apparatuses that have made the progress of the species faster and more evolved. The rise in awareness of the severe impact of climate change on people's life occurs during the first twenty years of the twenty-first century, marked by terrorist attacks, financial crisis, economic depression, Trade Wars, racial hatred, and pandemics. These phenomena have in common their intensity and the worldwide dimension of the consequences: in such a globalized world, there is no country and no productive sector that could be justified for the faults of the others.

Academics define this context as VUCA (Volatile, Uncertain, Complex, and Ambiguous). Particularly during the last two years, highlighted by the COVID 19 pandemics and the whole set of the consequences brought through, the concept is gaining new relevance for characterizing the current environment and the goals to face to navigate it successfully. Volatility regards the unexpected or unstable phenomenon of unknown duration, but it is not necessarily hard to understand. Uncertainty refers to the inability to predict the future. Part of that is perceived with the inability to understand what is happening. Complexity refers to the number of factors to consider, their variety, and the relationships between them. The more elements, the greater their type, and the more interconnected, the more complex an environment is. Ambiguity refers to fuzziness and vagueness in ideas and terminology.

In a Volatile, Uncertain, Complex, and Ambiguous world, people are becoming more aware of the increasing frequency and intensity of climate events. Corporations are slowly responding to this increased awareness, while regulatory measures and evolving consumer attitudes force the issue.

One of the most severe consequences of living in a hyper-globalized, over-polluted, VUCA world is the cracking of the so-called "*social capital*," i.e., the dense network of the relationships and cooperation that, despite the savage capitalism of the recent decades, slowed down the hemorrhaging of wealth and equality between people. During the last quarter of the twentieth century, the financial sector was incredibly brazen and blind to society's weaknesses. Capitalism of the time, because of the heavy deregulation carried out by the Reagan Administration in the U.S. and other states with a markedly neoliberal policy, identified the vulnerable parts of the society's value chain and turned them into profit until the link was broken, the community shattered, but financial sector "*too big to fail*."

During his speech at Llyod's in 2015, Mark Carney - at the time Governor of the Bank of England and Chairman of the Financial Stability Board - defined climate change as the "*Tragedy of the horizon*," in the sense that the catastrophic impacts of climate change will be felt beyond the traditional horizons of most actors – the business cycle, the political cycle, and the credit cycle – imposing a cost on future generations that the current one has no direct incentive to fix. In Carney's words, "*once climate change becomes a defining issue for financial stability, it may already be too late*".

In this context, the financial sector's primary purpose shifted from a wealth-producing machine *per se* to a critical enabling factor to reach the most ambitious policy objectives, attempting to mainstream such a new way of doing finance: sustainable finance, above all.

The European Commission defines "*sustainable finance*" as the process of taking environmental, social, and governance (from now on ESG) dimensions into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic

activities and projects. A proper legislative framework aims to foster transparency in the case of ESG-related risks in the financial sector. It mitigates these risks through appropriate governance of financial and corporate actors, too.

In recent years, the European Union has been the frontrunner in imposing a *green* political, cultural, and social Agenda compared to other countries.

In December 2019, the European Commission launched the European Green New Deal, aiming to make the European Union the first climate-neutral continent by 2050, boost the use of resources by moving towards a circular economy, and restore biodiversity cut pollution. The Green New Deal encompasses all sectors in a broad range of policy areas: clean energy, sustainable industry, building and renovations, sustainable mobility, biodiversity, sustainable farming, pollution fighting, and climate action.

The European Green Deal Investment Plan (EGDIP) is the investment pillar of the Green Deal, while the InvestEU Programme provides long-term funding to companies, supporting the Union policies across the Member States.

As part of the EGDIP, the Just Transition Mechanism and the Just Transition Fund - with €143 billion over ten years - shall help the regions and the sector most affected by the transition to a zero-carbon economy. The Green New Deal shall look at the private sector to reorient capital flows towards long-term, sustainable growth. The Commission announced a Renewed Sustainable Finance strategy to provide the tools to ensure a sustainable transition of business during the COVID-19 outbreak. Currently, the strategy is a work in progress.

In order to set up a common classification system for sustainable economic activities, the European Union adopted Regulation 2020/852 on the establishment of a European Taxonomy framework. Defining a “*common language*” is expected to keep investors safe, particularly from the greenwashing phenomenon, to support companies in the transition, uniform the market, and eventually move investments where they are needed. The European Union is acting as the

frontrunner in the fight against the climate crisis, placing a comprehensive and composite strategy, producing a series of important legislative acts, emphasizing disclosure and correct information of citizens, companies, and investors. These efforts explain why the European Union is the only area on track to reach the SDGs by 2030, as stated above.

Climate-related risks in the Banking Sector

Academics divide environmental-related and climate-related risks in transition risk, resulting from the adjustment processes towards a low-carbon economy, and physical risk, defined as the impacts today on the value of financial assets that arise from climate and environmental-related events that may damage property or disrupt trade.

Physical and transition risks are drivers of prudential risk, particularly credit risk, operational risk, market risk, and liquidity risk.

The magnitude and distribution of climate-related and environmental risks depend on the level and timing of mitigation measures and whether the transition occurs in an orderly or disorderly fashion.

Potential losses stemming from climate- and environmental-related risks rely significantly on the future adoption of policies, technological developments, and changes in consumer preferences and market sentiment. Irrespective of this, any combination of physical and transition risks will, in all probability, materialize on the balance sheets of euro area institutions. Existing estimates of adverse long-term macroeconomic effects resulting from climate change points to significant and lasting losses in wealth. These may be due to slowing investment and lower factor productivity in many sectors of the economy, and reduced potential GDP growth.

The limitation to climate change and a substantial lack of data to properly assess the impact of these risks improve only marginally the understanding of the relationship between sustainability-related risks and financial risks.

In the first place, banks need to develop a clear climate strategy as a tool for integrating ESG risks across the company. Keeping in mind the long-term growth, first banks shall define their current

and future market positioning and define the target in which they want to operate. Then, an appropriate governance framework shall write down, incentivate, and be sure that the new set of policies is fully understood and integrated into all decision-making processes. A sound internal governance framework shall create new roles in the management body (Chief Sustainability Officer, Chief Value Officer, Chief Diversity Officer), revisionate the reporting lines and the communication flows. A particular focus shall be set over the profit centers and the cost centers, where new first risks arise. It is appropriate to identify these new risks, take them into account, and include new controls to ensure the effectiveness of the new risk management framework.

The ESG risks analysis and management should involve four steps:

- I. Identification: a strategic assessment of the environmental, social, and governance factors that may cause financial risks and, in the long run, loss of reputation.
- II. Exposure: measurement of the sizes of a firm's exposures to ESG risks.
- III. Assessment: estimation of probabilities and magnitudes of financial losses arising from ESG risks. The EBA proposes three assessment methods:
 - A. Portfolio Alignment Method, in which banks define targets to align portfolios towards climate change goals. The approach involves two step:
 1. The Measurement of the carbon impact of the banks' products, and then the adequate allocation of the financial flows to projects which are in alignment with climate ambitions.
 2. Ensure that carbon emissions per unit of money invested are aligned with climate (using transition risk assessment, emissions reduction targets, operational strategies).
 - B. Risk Assessment Method, in which banks use scenario analysis to assess their exposures to different climate scenarios.

C. Exposure Method uses metrics to obtain the concentration of banks to different sectors, activities, or industries, and then clarify which areas among the bank are at risk in case of adverse ESG-impact.

IV. Mitigation: Introduction of internal policies and processes that discourage exposures to environmentally risky assets.

Banks' risk management framework needs revision to include sustainability risks, in terms of policies and procedures but also about methodologies and infrastructure. Climate change is a challenging issue, not yet deeply analyzed: banking sector needs to create an *in-itinere* approach, where solution shall be prioritized, adopted, and reiterated fo further development and refinement.

Focusing on the Risk Appetite - the amount of value the bank is willing to bear to reach long term goals - banking sector shall develop appropriate ESG risk indicators and limits for ESG risks in line with the regulation and potential red-flags.

The Banking sector has extraordinary importance as a transition player towards a sustainable, net-emissions economy. However, little attention has been dedicated to understand and cover financial risks that could arise from the climate crisis and environmental degradation. Moreover, the COVID-19 outbreak exposes - probably for the first time in history - that climate- and environmental- risks as exogenous shocks could become systemic and affect the whole economy.

The European Banking Authority (EBA) regulation aims to set a monitoring system to assess material ESG risks, considering ESG factors in the authority work, having the mandate to oversee the whole ESG European legislative framework. The objectives of the EBA work on sustainable finance are linked with the overall goals of contributing to the short-, medium- and long-term stability and effectiveness of the financial system and include the improvement of the current regulatory framework for institutions to foster their operations in a sustainable manner, the introduction of sustainability considerations in institutions' strategy and risk management as well as providing supervisors with adequate tools to understand, monitor, and assess ESG risks in their

supervisory practices. Literature shows that climate- and environmental-related risks potentially manifest as risks financial institutions already knew: credit risk, market risk, operational risk, and liquidity risk.

The quantification of the material impacts on environmental-related risks in the banking sector is challenging for several reasons. First, the amount of available data on the relationship between climate change and credit risk is insufficient to draw a trendline correctly, and for this reason, the models of the risk quantification rely on stress tests and climate scenarios. The underestimation of climate-related risks may over-allocate riskier activities, undermining the efficient allocation of capital. Moreover, an inefficient allocation of capital might result from a lack of information on climate risk at customer level. In other words, when incomplete information occurs, it means that the efficient market hypothesis might not hold. To properly build a framework that might monitor and mitigate the environmental-related risks, there is a need to describe and analyze these risks. Environmental-related risks are disruptive, non-diversifiable, nonlinear, correlated, and potentially irreversible: the so-called *Green Swans*.

About the lending sector, literature shows that severe weather events - as physical risks - may be seen as a market failure, too. Focusing on Italy, there is evidence that in regions at risk of flooding, corporate lending decrease towards firms with higher exposures to flooding risk. Results showed that credit activity is negatively influenced by flood risk. The analysis suggests that banks are likely to discriminate borrowers by their natural risk exposure. Eventually, the study provides insights on the *ex-ante* perception of risk. A proper environmental-related disclosure should smooth the transition policies towards a more sustainable economy. Although all the efforts to improve the disclosure, there is still scarce and inadequate data and information, as already said before. Besides disclosure, there is a growing awareness in addressing climate risks at the group strategy level.

The Banking sector is making climate change a urgent governance issue, such that BoD in banks are overseeing climate strategies, metrics and targets to look at when evaluating progresses and

goals, and the climate risk management, including massive reviews of key financial risk management documents, such as the Risk Appetite Statement. As regards metrics and targets, banks focalizes in sustainable financing, operational emission, and financed emissions.

The banking sector needs to rebuild a new risk management framework, setting an appropriate time horizon and including transition risks, whose effects occur in the long term. The struggle against climate change requires the best efforts of governments, policymakers, financial institutions, and civil society.

How do UniCredit assess, monitor and mitigate climate-related risks

UniCredit is one of the biggest in market capitalization commercial banks in Europe and worldwide. It is a pioneer in managing and monitoring climate-related risks and bringing risk management into its strategy and culture. In December 2019, the Top Management launched the Team 23 Strategy Plan. It aimed to capture commercial opportunities proactively and enhance human capital, basing its activities on ethics and respectfulness. UniCredit sustainability strategy aims to integrate all ESG factors in the Bank's core businesses and processes, considering both risk and market opportunities and a straightforward multi-stakeholder approach.

COVID-19 pandemics acted as a catalyst on the sustainability momentum, exacerbating the sustainability materiality and the ESG factors. Besides the pandemics, the bank's business model is challenging: UniCredit provides financial products and services to households, companies, and wealth management advice. Besides the core business, the Bank promotes philanthropy through the UniCredit Foundation – promoting social and humanitarian initiatives and supporting studying and research - and corporate citizenship through the Social Impact Bank.

UniCredit puts an extensive risk management framework throughout all the business lines and geographies, based on a solid risk culture properly communicated both inside and outside the Bank.

Climate change exposes UniCredit to several types of risks – physical, transition, liability – that translate into credit, market, operational, liquidity, and reputational risks. To this extent, the Bank

set up a bank-wide climate risk management framework to manage and supervise processes related to climate- and environmental-related risks that comprises:

- The Physical risk assessment is a one-off assessment that considers the most critical impacts connected to climate change. The assessment shows impairment in the value of collateral located in high climate-risk zones subject to chronic risk and acute risk.
- The Transition Risk Model is a sector-level transition risk heat map. The model consists of the map and a dedicated assessment of climate and environmental transition risks at the counterparty level focused on UniCredit corporate lending portfolio.
- As announced in the Action Plan on Sustainable Finance, in May 2020, EBA launched a pilot sensitivity exercise on climate risk. Since climate-risk stress test frameworks are still developing, the pilot sensitivity analysis was designed as a learning exercise for both the EBA and participating banks. This exercise will represent the starting point for a more comprehensive discussion of how to embed climate risk in a stress test framework in the coming years.
- The Paris Agreement Capital Transition Assessment (PACTA) methodology enables banks to measure the alignment of their corporate lending portfolios with climate scenarios. This methodology is a crucial first step for banks that wish to understand their contributions to climate change and begin defining climate strategies that have a meaningful impact, first linking a bank's financial exposure to physical assets in the real economy.
- The sector policies represent a framework of sector-specific (i.e., coal, mining, non-conventional oil and gas industry, defense/armaments, nuclear energy, water infrastructures) standards guidelines to identify, assess and mitigate environmental, social, and reputational risks on an ongoing basis with customers.

UniCredit represents a model in how banks should include and integrate climate risks in their risk management frameworks. However, a sound risk management system is influenced and related to other important aspects of how a bank concretely works.

In the end of the research is proposed an analysis of UniCredit publicly disclosed documents using as benchmark the KPMG Report “*Climate disclosures within the Annual Financial Reports of Banks: Benchmarking on how banks reported on climate change in the 2020 reporting season*” issued in April 2021.

A first empirical analysis is the climate change buzzwords count in a bank’s Annual Financial Report, as an indication of the growing importance of climate change. Results show that UniCredit is well below the 2020 benchmark: 79% less for the word “climate”, 59% times less for “green”. Taking into consideration UniCredit reports drafted between 2018 and 2020, there is no mention to “net zero” policy.

Focusing only on the 2020 Annual Report, UniCredit disclose the climate-related information in the “*For the environment*” section on a siloed-basis approach. UniCredit provides detailed climate disclosures in a separate document: the Integrated Report. As a result, the final users of these disclosures - investors, practitioners, academics - often need to go through multiple reports in order to fully comprehend a bank’s climate-related information, and this situation may generate confusion.

About governance, the non-executive directors should be appropriately skilled and experienced in the area of climate change. The information contained in the BoD members' *curricula* as well as research carried out on academic databases does not indicate qualifications or research produced relating to climate change, climate risk, or ESG for any of the members. Moreover, from a professional point of view, following the same methodology, only one member of the BoD - Dr. Cariello - has ongoing experience as a member of the Sustainability and Territory Committee at A2A, an Italian listed company operating in the energy sector. However, although Dr. Cariello is the only expert in this field (according to public information), he does not sit on the ESG Committee.

Although no further details on the structure and possible new appointments have been published yet, it is possible to outline how the ESG theme is residual in the new organisation of the Bank's executive management.

From the announcement published in May 2021 it appears that Fiona Melrose - Head of Strategy and Optimization - will have to deal with all critical initiatives for the CEO, such as Strategy and M&A, Group Transformation Office, and "*the further integration of ESG into the bank's businesses*". It follows that the ESG theme is no longer a matter of primary importance in the new CEO opinion, who is instead pushing massively towards digitalization and innovation within the Group. It is therefore hoped that this issue will become more relevant in further announcements.

More than the half of the banks in the benchmark disclose the ambition to make their net emissions zero by 2050. UniCredit, reasonably, set in the Team 2023 Strategic Plan the goal of reducing GHG emissions by 80% by 2030 (compared to 2008 values). Setting ambitious targets cannot be realistically achieved could cause strong reputational damage to banks: both investors and public opinion reward the strong commitment to the ESG theme, but it is expressed in concrete, achievable goals in a defined time horizon.

According to KPMG benchmark, the 84% of the banks discloses climate-related risk management. While deepening in detail the inclusion of climate risk within the Risk Management Framework, Unicredit should improve the communication of the results achieved and go into detail on the quantitative aspects of the topic.

In order to keep opportunities seized and risks managed, banks should set up a proper framework of metrics and targets. The bank discloses a vast amount of quantitative data on operational emissions and financed emissions, positioning itself in line with the benchmark. However, UniCredit does not provide the metrics used in the risk management assessment as well as those included in the above mentioned managerial KPIs. The presence of these data gives users of the Reports the possibility to analyze, compare, and direct investments decisions. Moreover, considering how important the

concept of “ESG-driven company” is to the majority of consumers at this time in history, the subject is even more relevant.

Averaging between topics, Unicredit ranks in line with the banks included in the Benchmark. However, the governance revolution and the apparent overshadowing of the ESG theme within the new Group Executive Committee are puzzling. It is finally possible to define Unicredit at its current state in line with its competitors on the topic of climate change.