SCHOOL OF ECONOMICS AND MANAGEMENT

LUND UNIVERSITY

Bachelor Programme in *Economy and Society*

Finance for the Future– the Effectiveness of Voluntary Net-Zero Alliances for Financial Institutions

A Case Study of the Dutch Climate Commitment of the Financial Sector

By
Luka de Laat
lu8145de-s@student.lu.se

ABSTRACT: Scaling up climate finance is vital for avoiding the worst impacts of climate change and limiting global warming. In this light, multiple Voluntary Net-Zero Alliances for Financial Institutions (VNZAFIs) have been founded, directing capital flows from financial institutions towards climate action. Nonetheless, the contributions of VNZAFIs to the Paris Climate Goals can be put into question. This study determines the effectiveness of VNZAFIs in aligning the climate action plans of their members with the Paris Climate Goals. Through the development and application of a scoring framework, the climate alignment of the current action plans of financial institutions that are allied to the Dutch VNZAFI *Klimaatcommitment Financiële Sector* will be determined. The main finding of this case study is that currently, the climate action plans of financial institutions are not climate-aligned, contesting the effectiveness of VNZAFIs.

Key Terms: Climate change, Climate finance, Voluntary Net-Zero Alliances for Financial Institutions, Climate Action

EOSK12
Bachelor Thesis (15 credits ECTS)
May 2023
Supervisor: *Johanna Fink*
Examiner: *Emelie Rohne Till*
Word Count: 11443

Acknowledgements

To start with, I would like to thank my supervisor, Johanna Fink, for the time and effort she put into reading my texts and answering my questions. Her insightful feedback and our refreshing conversations certainly helped me make the most of this body of work. I would also like to thank my parents for inspiring me in my choice of topic. Their endless support and enthusiasm for my academic undertakings have enabled me to continuously follow my ambitions and complete my years at Lund University proudly and fulfilled. My eternal appreciation for the people, especially my friends, that I encountered while studying here—you have turned this studying experience into a life experience that I am forever grateful for.

To the reader: I am proud to present to you my (for now) final accomplishment at Lund University. I hope my passion for the topic is translated through these words and pages, possibly even awakening yours.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

ESG	Environmental, Social and Governance
FI	Financial Institution
GFANZ	Glasgow Financial Alliance for Net Zero
GHG	Greenhouse Gas
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
KC	Klimaatcommitment Financiële Sector
NDC	Nationally Determined Contribution
SBTi	Science-Based Target initiative
SMI	Sustainable Markets Initiative
SSP	Shared Socio-economic Pathway
UN	United Nations
UNEP	United Nations Environment Program
VNZAFI	Voluntary Net Zero Alliance for Financial Institutions

1. Introduction

From our health, food security and water supply to our cities, rural areas, natural resources and ecosystems—global warming is threatening the world as we know it (IPCC, 2014). Greenhouse gas (GHG) emissions have already caused our planet to warm by 1.1°C compared to pre-industrial levels and we are not on track to limiting global warming to 1.5°C, or even 2°C according to the IPCC (2023). Scaling up climate finance for mitigation and adaptation efforts is paramount for setting the world on a 1.5°C-track and avoiding the worst impacts of climate change (IPCC, 2023).

The significance of climate finance is increasingly recognised by the financial sector, with a growing number of financial institutions pledging to contribute to climate action. Concurrently, numerous voluntary net-zero alliances for financial institutions (VNZAFIs) have materialised in order to spur climate finance flows and assist financial institutions with their climate ambitions. Nevertheless, current climate finance flows fall short of addressing mitigation and adaptation needs. Whereas climate finance amounted to approximately USD 850 billion in 2021, it is estimated that USD 5 trillion in annual investments is needed for energy transformations alone (CPI, 2022; IRENA, 2023).

Provided the indicated climate finance gap, the efficacy of VNZAFIs in spurring climate finance can be scrutinised. To illustrate, despite the need to phase out fossil fuels, it was recently found that top asset managers in the world's biggest VNZAFI, the Glasgow Finance Alliance for Net Zero (GFANZ), held more than USD 800 billion in fossil fuel expanders (IPCC, 2023; McCully, 2023). This raises the question of whether VNZAFIs are constructively contributing to the climate goals set out by the Paris Agreement.

The contribution of VNZAFIs to the Paris Climate Goals has not been subject to extensive academic research. Studies that do focus on VNZAFIs observe a relationship between greenwashing and making net-zero commitments (Weber & Acheta, 2016; Lin, 2022). Gosling and MacNeal (2022) notice a conflict between net-zero pledges and the fiduciary duties of financial institutions. In their paper on different types of transition strategies, Dikau et al (2022) also touch upon VNZAFIs, stating that pledges and ambitions under these alliances are illegitimate and insufficient. Similarly, McGivern et al (2022) find that the increase in net-zero pledges of financial institutions is not matched with improvements in the quality of underlying net-zero strategies. While much of the current research indirectly addresses the contribution of VNZAFIs to the Paris Agreement, this has not been done directly. A possible explanation for this is the complexity and novelty of the topic. To date, no universal net-zero standard for the climate targets of financial institutions exists (SBTi, 2022).

1.1 Aim and Research Question

The aim of this study is to add to the literature on the contribution of VNZAFIs to the Paris Agreement. The effectiveness of VNZAFIs in increasing and steering climate finance will be studied. Concretely, VNZAFIs require financial institutions to set and publish targets that

address their climate ambitions, for example through climate action plans[1]. However, if the action plans of financial institutions are not constructively contributing to the climate goals, climate finance will be ineffective. To this end, this study aims to answer the following research question:

"How effective are Voluntary Net-Zero Alliances for Financial Institutions (VNZAFIs) in aligning the climate action plans of their members with the Paris Climate Goals?"

Here, "members" refers to the financial institutions that are part of the coalition. The research question will be addressed by means of a case study, studying the VNZAFI *the Dutch Klimaatcommitment Financiële Sector* (*Climate Commitment of the Financial Sector,* referred to as *KC)*. A scoring framework will be developed in order to determine the alignment of the most recent action plans with the Paris Agreement.

1.2 Relevance and Contributions

The main contribution of this research is a scoring framework from which the climate alignment of the action plans of financial institutions can be established. Considering that climate finance is a determinant of the success of climate action, understanding the relevance of current climate action plans is paramount. This is especially important given the climate finance gap. The study contributes to current economic and climate research by determining how effective VNZAFIs currently are in aligning their members' climate action plans with the Paris Agreement. This, in turn, allows for the establishment of whether the climate financing gap is (partially) caused by the functioning of VNZAFIs. Moreover, because the action plans of multiple financial institutions are studied, general trends in their ambitions and the current state of climate finance in the financial sector can be identified. Effectively, this research contributes to the enablement of policymakers, financial institutions and other stakeholders to optimise climate finance, close the financing gap and put the world on a 1.5°C-track.

1.3 Outline of the Thesis

This paper sets out by providing background on the topic of climate finance, the Paris Agreement and VNZAFIs. Literature on climate finance and science-based climate research will be discussed in section three. This literary overview will be used for developing the scoring framework. In the fourth section, the case study will be presented, after which section five introduces the framework, data and methodology. The sixth section presents the results of this paper, which will be discussed in more detail in section seven. Here, the implications and limitations of this research are touched upon as well. Section eight concludes.

[1] See, for example, *Guidelines for Climate Target Setting for Banks* (UNEP, 2021) for the UN-convened Net-Zero Banking Alliance, or Klimaatcommitment Financiële Sector (2019).

2. Background

The goal of this section is to provide readers with a deeper understanding of the meaning of climate finance, the Paris Agreement and voluntary net zero alliances for financial institutions (VNZAFIs).

2.1 Climate Finance in the Context of Sustainable Finance

Climate finance is a subcategory of green finance, which is defined as the financing of investments, both public and private, in "environmental goods and services" and the "prevention, minimisation and compensation of damages to the environment and to the climate" (Lindenberg, 2014; p.2). Climate finance, then, focuses on mitigating and adapting to climate change (Lindenberg, 2014; OECD, 2020). It can be deployed through public, private and intermediary sources (Buchner et al, 2014). Noteworthy, as can be seen from figure 1, green and climate finance are both subcategories in the taxonomy of sustainable finance. Although this research is concerned with climate finance, it is important to be aware that climate finance falls within a broader scope of financial sustainability practices.

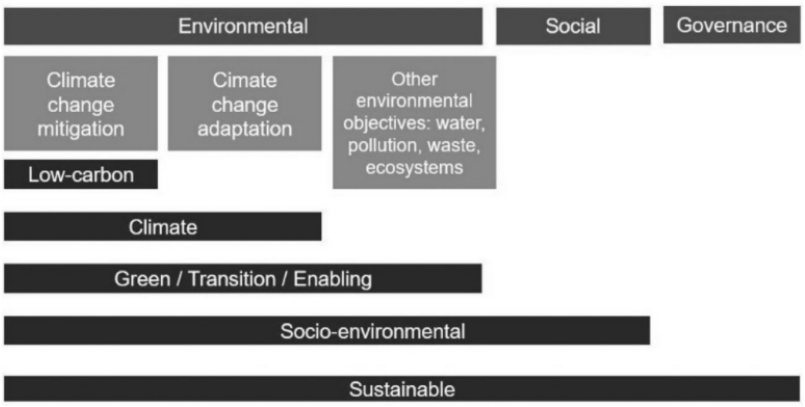

Figure 1: Different categories of sustainable finance (adapted from OECD, 2020).

Sustainable finance is not a new phenomenon. Already in 1992, the United Nations Environmental Programme (UNEP) Finance Initiative was launched in order to address environmental degradation (UNEP, 2017). This initiative initially focused on stabilising GHG concentrations in the atmosphere, later also incorporating social factors in their objectives. Although the exact extent of sustainable finance is difficult to measure, it is safe to conclude that the sustainable finance market is developing swiftly: in 2020, environmental, social and governmental ("ESG-")[2] related assets surpassed USD 35 trillion, coming from USD 22.8 trillion in 2016 (Bloomberg L.P., 2022).

Climate finance is a central objective within the broader category of ESG- and similar sustainable investment strategies (Giglio et al, 2021). For example, green bonds, referring to bonds issued for environmental-friendly purposes, represented around 60 per cent of the total

[2] ESG investing is a common sustainable investment strategy. It enables investors to incorporate non-financial factors in their decisions about capital allocation, using ESG ratings to measure the sustainability performance of their investment (de Jong & Rocco, 2022).

global sustainable bond supply in 2022 (Ray & Mylläri, 2023). This, in combination with the fact that climate finance accounted for 95 per cent of green finance in 2021, shows that the share of climate finance in sustainable finance is considerable (IDFC, 2022). From a sectoral perspective, climate finance is largely directed towards renewable energy, followed by carbon transport and energy efficiency (CPI, 2022). Spatially, green financial instruments are mostly rendered in Europe. In 2020, this region accounted for more than 50 per cent of green bond issuances, followed by North America (21.1 per cent), Asia and the Pacific (18.3 per cent) and Latin America (2.7 per cent) (IFF, 2021).

In figure 2, a longitudinal overview of the development of climate finance from 2011 is given, in addition to the necessary future climate finance flows. As can be seen from the left-hand graph, climate finance has more than doubled since 2011. Nevertheless, the right-hand graph shows a necessary sixfold and ninefold increase in climate finance flows by 2030 and 2050 respectively (CPI, 2022). The fact that credible statistics on the topic date back only a decade shows the need for more statistical and academic research on climate finance.

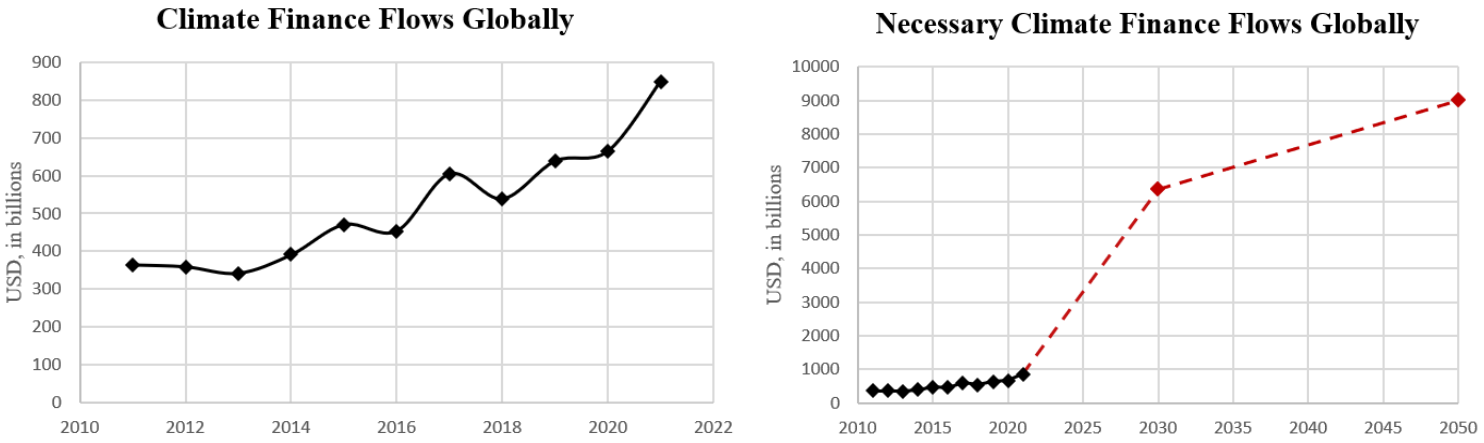

Figure 2: Annual global climate finance flows and future projections of necessary global finance flows. The data encompasses private and public primary investments (data: CPI, 2022)

2.2 Climate Finance in the Context of the Paris Agreement

The Paris Agreement is a legally binding international treaty adopted by 196 parties. The main goal of this treaty is to limit the rise of global temperatures to well under 2°C above pre-industrial levels, preferably 1.5°C (UNFCCC, 2015). Moreover, Article 2 of the Paris Agreement intends "to strengthen the global response to the threat of climate change" by "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (UNFCCC, 2015; p.3). This affirms the important role of climate finance in the fight against climate change.

Notwithstandingly, net zero CO2 emissions and significant reductions in other GHG emissions by 2050 are necessary (IPCC, 2018A). Essentially, net zero CO2 emissions refers to the global balancing of anthropogenic CO2 emissions to the atmosphere with

anthropogenic CO2 withdrawals over a specified time period (IPCC, 2018B). This is to be achieved through “mitigation”, which concerns the abatement and storage of GHG emissions. Another key aspect of the Paris Climate Goals is “adaptation”, which involves “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change” (UNFCCC, 2015; p.9). The IPCC (2023) has found that currently, a profound majority of climate financial flows is targeting mitigation, disregarding adaptation efforts. Current adaptation gaps are aggravating social, environmental and economic climate risks, especially in developing countries (IPCC, 2023).

2.3 Voluntary Net-Zero Alliances for Financial Institutions

The importance of climate finance has given rise to numerous VNZAFIs. These voluntary coalitions, often initiated by financial institutions, governments or NGOs, commit financial institutions to net zero pledges. The goal of VNZAFIs is to stimulate financial institutions to actively participate in the global effort of meeting the Paris Agreement, in addition to creating a platform that enables, coordinates and expedites this participation– such as by offering technical and strategic support for financial institutions (UNFCCC, 2021). For example, the mission of GFANZ, founded during the COP26 climate conference, is “to expand the number of net zero-committed financial institutions and to establish a forum for addressing sector-wide challenges associated with the net-zero transition” (GFANZ, n.d). The GFANZ constitutes more than 500 financial institutions, with around USD 130 trillion in assets under management (SBTi, 2022). Other examples of VNZAFI include UN-convened Net-Zero Alliances for banks, insurance companies and asset owners. The VNZAFI subject to this study is the *Klimaatcommitment Financiële Sector* (*KC*), a Dutch VNZAFI with pension funds, insurance companies, banks and asset management companies as members.

3. Literature Review

3.1 Conceptual Assessment

The goal of this section is to elaborate on the conceptual and analytical underpinnings of this research. For this reason, what follows is an introduction to neoclassical and alternative approaches to finance. Subsequently, the interaction between finance, the economy and climate change is explored. The conceptual framework on which the determinants of net-zero pathways are based is explained, which is relevant for the formulation of criteria to which net-zero policies of financial institutions should adhere. Finally, the meaning of net-zero financial institutions will be presented.

3.1.1 From Orthodox Finance to Sustainable Finance

According to Michie (2022), the climate crisis can be described as a "capital allocation problem" (p.558), referring to the necessity of creating a setting in which financial flows are steered towards global decarbonisation. Indeed, although the financial sector is large enough to tackle climate and sustainability challenges (Naidoo, 2020), figure 2 shows that an increase of almost 600 per cent in yearly climate finance is necessary to reach the interim goals for 2030. This affirms that capital allocation appears to be an obstacle to adequate climate action. The question is whether narratives in the financial world influence this.

Although traditional economic and financial theories are increasingly criticised for not reflecting the real world, it is commonly found that these neoclassical approaches still dominate economic and financial thinking and decision-making (e.g. Naidoo, 2020; Monasterolo, 2020; Raworth, 2017). In traditional finance, great emphasis is placed on the efficient market hypothesis. This theory falls within the broader sphere of the market equilibrium hypothesis, and refers to the notion that prices in the market reflect all available information (Fama, 1970). Accordingly, future asset prices are unpredictable and follow a random walk: all information is incorporated in today's prices, and tomorrow's information is not yet available (Malkiel, 2003). The theory furthermore rests on the notion that investors are rational agents who act upon all available information. Because of this, their interactions produce a stable equilibrium. The idea is that exogenous shocks such as climate change will influence the behaviour of investors and result in a new equilibrium (Lagoarde-Segot, 2015). Consequently, capital is always efficiently allocated, and there is no need for interference in the market (Malkiel, 2003). These economic narratives were widely adopted in the second half of the 20th century, among others due to the famous works of Samuelson (1965) and Fama (1970), in which they independently proved the randomness and efficiency of prices.

Nevertheless, it is found that "externalities" such as sustainability issues are not captured in asset prices (Nordhaus, 2019; Naikoo, 2020; Monasterolo, 2020). This did not change when behavioural finance and economics, which accepts that economic agents do not always act rationally, took root towards the turn of the century (de Bondt & Thaler, 1995; pp.385-387). Simultaneously, the notion of Friedman (1970), who famously stated that "the social responsibility of business is to increase its profits" is deeply embedded in financial thinking.

As a consequence, financial institutions commonly invest according to the shareholder model, which revolves around profit maximisation and pays little heed to social or environmental concerns (e.g. Soppe, 2004; Schoenmaker, 2017; p.22). Thus, because climate risks are not adequately reflected in asset prices, and profit maximisation is the main narrative in the finance world, there is a misallocation of capital, and climate finance remains insufficient.

In recent years movements away from traditional finance and economics have transpired. For example, in her influential book "Doughnut Economics", Raworth (2017) calls for the need to embed the economic system within the broader context of our society and planet. She argues that the "support of financial partners seeking to invest long-term in generating multiple kinds of value – human, social, ecological, cultural and physical – along with a fair financial return" (p.234) is crucial for the design of a sustainable economic system. For this, she states, replacing short-term investments with long-term investments is needed. Similarly, Schoenmaker (2017; p.33) finds that "short-termism" is an obstacle towards sustainable finance. He calls for the endorsement of social and environmental issues, in addition to a move from the short- to the long-term, in financial decision-making. These notions are part of the academic underpinnings of sustainable finance, showing that the concept is not only emerging in financial markets, but also subject to academic analysis. It is stressed that finance does not only have a *quantitative* [financial] but also a *qualitative* [social and environmental] role (Schoenmaker, 2017; p.8; Lagoarde-Segot, 2019; Naidoo, 2020).

It is important to emphasise that the concepts in this theoretical overview have repercussions for the results of this research. For example, if it is found that VNZAFIs are ineffective in aligning the targets of financial institutions, the orthodox narrative of finance, rather than the policies of VNZAFIs per se, could be at the root of this. This, in turn, has implications for how financial institutions can be incentivised to align their targets and financial activities with the Paris Climate Goals.

3.1.2 The Determination of Net-Zero Pathways

This analytical overview elucidates on the modelling of climate scenarios. Through these, pathways to net-zero, referring to trajectories that enable the achievement of net-zero emissions by 2050, are determined (IPCC, 2018A). Given that financial institutions ought to formulate their policies and targets on the basis of net-zero pathways, a short summary of the analytical underpinnings of climate scenario modelling and net-zero pathways is relevant.

The determination of net-zero pathways is complex due to the inherent uncertainty about the future and the interaction between climate change and socioeconomic developments (Van Vuuren et al, 2014; Giglio et al, 2021). In particular, climate scenarios depend on expectations about the development of socioeconomic trends, yet the evolution of these trends is influenced by the future effects of climate change (van Vuuren et al, 2014; Rogelj et al, 2018A). For example, there are negative feedback loops between climate change and economic growth, with economic growth affecting climate change and vice versa (Giglio et al, 2021). Exploring the existence of negative feedback channels between the financial sector and climate change, it has already been established that capital allocation affects climate

change. Simultaneously, climate change is exposing financial institutions to weather-related risks ("physical risks") and risks induced by unexpected tightening of policies ("transition risks") (e.g. Batten et al, 2016; Monasterolo, 2020). Because of these risks, there is an increased likelihood of carbon-intensive assets becoming stranded (Fanizza & Cerami, 2023).

Concerns about these negative climate feedback loops were already raised in the 20th century by Nordhaus (1977). In order to measure the extent of the negative feedback loops and determine optimal policy, he developed several Integrated Assessment Models, which construct quantitative characteristics, such as future emissions and population growth, based on various assumptions made about the future (Nordhaus, 1992; Nordhaus & Yang, 1996; O'Neill et al, 2017). Still, due to the inherent uncertainty about future socio-economic development, different future scenarios are feasible– inhibiting the modelling of net-zero pathways (van Vuuren et al, 2014; Rogelj et al 2018A; O'Neill et al, 2014; Bauer et al, 2017). To this end, Shared Socioeconomic Pathways (SSPs), which narrate different credible future worlds with varying trends in the evolution of socio-economic factors and climate change challenges, are increasingly adopted (Riahi et al, 2017; van Vuuren et al, 2014; Rogelj et al 2018A; O'Neill et al, 2014). In figure 3, a short description of the five most-used SSPs is given, in addition to a visualisation of their corresponding challenges for mitigation and adaptation (O'Neil et al, 2014; O'Neil et al, 2017; Bauer et al, 2017).

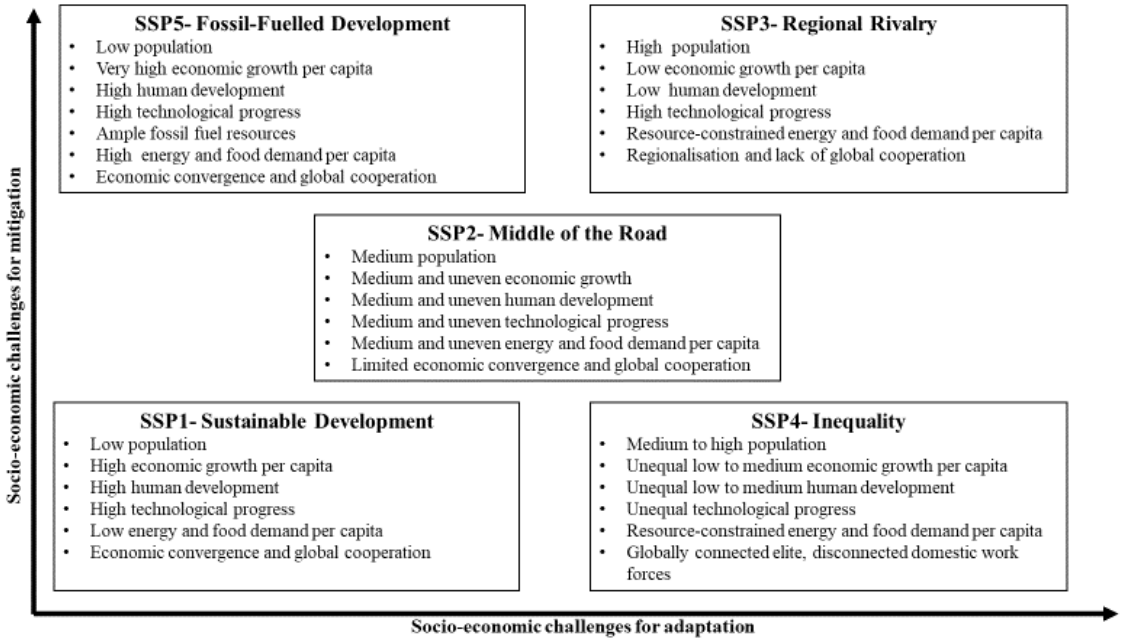

Figure 3: The five most-used SSPs and their related mitigation and adaptation challenges (edited from IPCC, 2018A & O'Neil et al, 2017)

Although a complete technical overview of the modelling of climate scenarios is beyond the scope of this research, it is important to note that net-zero scenarios are constructed using different assumptions about socio-economic development and related climate change. Based on the scenario, net-zero strategies can be formulated. This is relevant for financial institutions, as it determines their climate targets and ambitions. Importantly, DeFries et al

(2019) state that the economic risks of climate change are severely underestimated in climate assessment models. Moreover, Battiston and Monasterolo (2018) observe that these models fail to incorporate the important role of finance. Accordingly, they argue that this could affect the attainability of net zero scenarios.

3.1.3 Net-Zero Financial Institutions

It is important to understand when financial institutions are considered to be embracing their qualitative (particularly climate-related) role and set strategies according to net-zero scenarios. In other words, when are they considered to be 'net-zero' or 'climate-aligned'?

Based on the definition of net zero presented in the background of this paper, the SBTi (2022) has developed a definition of net-zero financial institutions. Fundamentally, financial institutions are climate-aligned when they "align all financing with pathways that limit warming to 1.5°C with no or limited overshoot" and "neutralise residual emissions through the financing of activities that permanently remove an equivalent amount of atmospheric carbon dioxide" (SBTi, 2022; p.32). The SBTi (2022) emphasises that *all* financing activities should be in accordance with achieving net-zero emissions at a *global* level, rather than at a *portfolio* level. This implies that financial institutions should contribute to economy-wide decarbonisation, rather than solely focusing on the decarbonisation of their portfolios.

A visual representation of how financial institutions can become climate-aligned is presented in figure 4. Essentially, LaMonaco et al (2020) explain that financial institutions can merge onto a net-zero pathway by understanding the climate impact of their current financial activities, and setting targets and strategies in order to join this pathway.

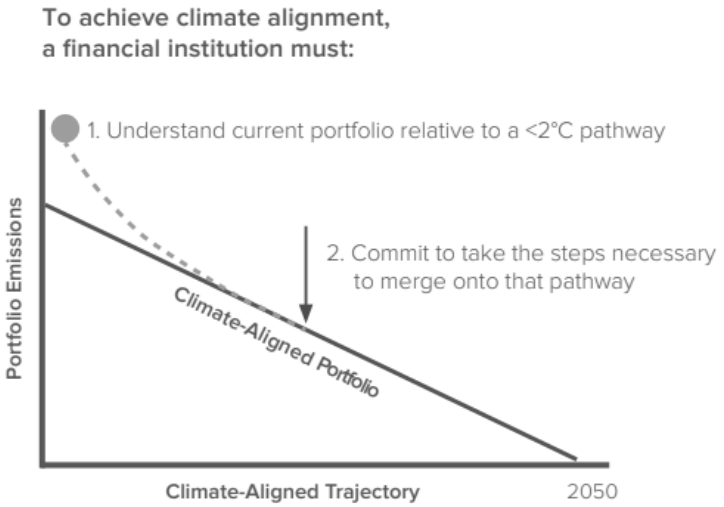

Figure 4: The meaning of climate alignment for financial institutions (adopted from LaMonaco et al, 2020)

3.2 Empirical Literature Review

This section sets out by reviewing the scientific literature on how to reach economy-wide net zero. Relevant to this study are pathways and mitigation strategies on the basis of which financial institutions can formulate their transition strategies. Thereafter, the entailments of financial institutions becoming climate-aligned will be discussed. Finally, some challenges to climate finance, including those that VNZAFIs face, are presented.

3.2.1 Reaching Net Zero

In order to limit global warming to 1.5°C, carbon neutrality needs to be reached by 2050 and significant reductions in alternative GHG emissions are required (IPCC, 2018A). With respect to fossil fuels, the IEA (2022) identified "no new coal mines or mine extensions [from 2021 onwards]" and the "phase out of unabated coal in advanced economies [by 2030]" as key milestones for reaching the Paris Agreement (p.20). Similarly, Muttitt et al (2023) observe the importance of a quick phase out of coal—however, they question the feasibility of it, especially for low- and middle-income countries. Rogelj (2018B) states that under all 1.5°C scenarios, coal needs to be phased out pre-2040 and oil before 2060. The role of natural gas, however, is ambiguous, with different SSPs depicting either an increase or decrease in its use (e.g. Rogelj et al, 2018B; IPCC, 2018A; Bauer et al, 2017).

Next, it is commonly found that four systemic transitions are needed (Rogelj, 2018A). These transitions comprise the energy sector, the industry sector, the urban and infrastructure sector and land-use. Starting with energy transitions, their associated challenges differ greatly across SSPs (Bauer et al, 2017; Rogelj, 2018A). Nevertheless, the energy sector "holds the key to averting the worst effects of climate change" (IEA, 2022, p.13). Moreover, it is widely accepted that mitigation efforts are spurred when fossil fuels are replaced with cleaner energy sources (e.g. Rogelj et al, 2018B; Luderer et al, 2018; IEA, 2022). This includes a transition towards renewable energy, with projections of its share in total electricity ranging from 70-85 (IPCC, 2018A) to 90 per cent (IEA, 2022) by 2050. Along similar lines, Luderer et al (2018) state that demand-side CO2 reductions are vital, emphasising the importance of total energy demand savings and electrification.

Electrification is not only important for the energy sector, but also for other transitions (Luderer et al, 2018; Rogelj et al, 2018A). With respect to urban and infrastructure transformations, GHG emissions of buildings can be reduced by increasing energy efficiency and insulation, in addition to electrification (Luderer et al, 2018; IEA, 2022). This, in turn, would require the utilisation of advanced retrofitting technologies (Güneralp et al, 2017). For the transport sector specifically, systemic optimisations related to routing and occupancy rate are also necessary (Rogelj et al, 2018A). Regarding industry, CO2 reductions can be achieved through the previously-mentioned electrification, the use of hydrogen and product substitutions (IPCC, 2018A).

Moving on, there is a reliance on the deployment of carbon dioxide removal (CDR) across all 1.5°C scenarios (Bui et al 2018; Riahi et al, 2017). This implies that transitions in land-use,

for example with respect to reforestation and reducing pasture land, are needed in order to reach the Paris Climate Goals (IPCC, 2018A). Finally, despite the fact that mitigation and adaptation are often framed as separate efforts, there are trade-offs, synergies and co-benefits between these approaches that need to be taken into account (e.g. Biesbroek et al, 2009; Gupta et al, 2014, p.1232; Boyd et al, 2022). Affirming the importance of decompartmentalising mitigation and adaptation, the IPCC (2018A) states that 1.5°C scenarios require a mix of mitigation and adaptation efforts. In all, it is widely agreed that the sooner transitions start taking place, the better climate change prospects (Luderer et al, 2018; IPCC, 2018A; Fankhauser et al, 2022).

3.2.2 Financial Institutions and Reaching Net Zero

Having elaborated on pathways to net zero, this part reviews the literature on a 'financing roadmap' to achieving the climate goals. Importantly, it is found that academic research on the topic is still limited (e.g. Naidoo, 2020; Ozili, 2022). According to Klaaßen and Steffen (2023), there is a gap in the understanding of the nature of investment shifts necessary for addressing global warming. Similarly, Naidoo (2020) argues that academics fail to critically examine the most optimal decarbonisation pathways, stating that this is resulting in misdirected climate finance. This is also confirmed by Buchner et al (2011; p.52), who find that "information gaps impede a better understanding of what is needed to enhance the effectiveness of climate finance".

Illustrating this ambiguity, Monasterolo (2020) states that investments in carbon-intensive sectors need to be replaced with investments in low-carbon sectors. Similarly, Giglio et al (2021, p.16) argue that financial markets "mitigate climate risk by facilitating the flow of investment capital toward green projects and away from brown industries and firms". On the other hand, Climate Finance Leadership Initiative (CFLI, 2019), states that carbon-intensive sectors should be supported in attaining their climate goals, rather than completely abandoning them. In line with this, according to Klier et al (2020), green financing initiatives have failed to address the mitigation of emissions in high-carbon sectors, observing that these investments are often considered to not be 'green'. They argue that without supporting transformations in high-emission sectors, our climate goals will not be reached. This relates to the previously-mentioned notion that financial institutions are climate-aligned when they are contributing to a net-zero economy, rather than building a net-zero portfolio (SBTi, 2022), and shows the challenges financial institutions face when aligning their activities with the climate goals.

Despite the difficulty of navigating the route towards the most effective net-zero strategies, a few much-cited directions for financial roadmaps can be identified. Moreover, it is widely accepted that financial institutions should have net-zero targets that cover all three emission scopes (see figure 5 for an explanation of the emission scopes), and that their policies should address scope three activities in their entirety (e.g. SBTi, 2022; UNEP, 2021). In the case of financial institutions, scope three emissions mainly encompass financed emissions. Furthermore, financial institutions should address the scope three emissions of their portfolio companies (SBTi, 2022; SMI, 2021).

The three emission scopes

The GHG protocol (2011) requires companies to take responsibility for and report on three identified GHG emission scopes:

Scope 1: Concerns all direct emissions from owned/controlled assets;

Scope 2: Covers all indirect emissions from the production of procured energy;

Scope 3: Encompasses all indirect emissions, up- and downstream, that occur in the value chain of the company (excluding scope 2 emissions).

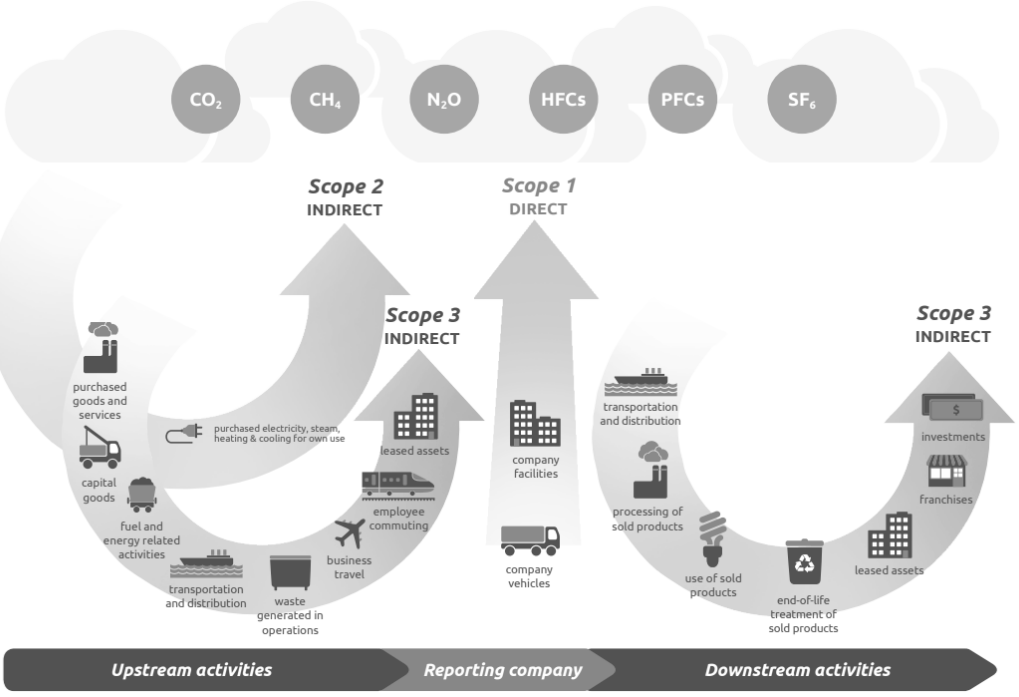

Figure 5: Information box about the three emission scopes (source: Bhatia et al, 2011)

The targets that financial institutions set should be aligned with a science-based net-zero pathway (SBTi, 2022; UNEP, 2021; SMI, 2021, pp.27-31). In addition, the identification of high priority sectors, and clear transition plans with respect to carbon-related financial activities, are called for (SBTi, 2022, pp.42-43; GFANZ, 2022, p.52). Rather than sole divestment, this involves having an engagement strategy on how to promote the transitions of their clients (GFANZ, 2022, pp.61-65; SMI, 2021, pp.63-65).

Moving on, targets and objectives should be measurable, and financial institutions ought to set an emission baseline from which they measure progress (UNEP, 2021; Laplane & van Loenen, 2021; Popescu et al, 2021; SBTi, 2022). With respect to the formulation of the emission baseline, setting out a reduction trajectory is warranted (Bolton et al, 2022). Relatedly, having interim goals is crucial for the credibility of commitments, and the overall attainability of the climate goals (UNEP, 2021; SMI, 2021; SBTi, 2022; Rogelj et al, 2018B). Next, neutralising unabated emissions is important for financial institutions in their transition phase (SBTi, 2022, p.47; SMI, 2021, pp.45-49). Finally, financial institutions should be transparent in their disclosure of emissions, strategies and progress (UNEP, 2021; SMI, 2021; SBTi, 2022).

3.2.3 Challenges to Climate Finance

As mentioned previously, a barrier to climate finance is the persistence of neoclassical narratives in the financial sector. Moreover, other barriers already touched upon are the discrepancy between the long-term investment needs for climate finance and the short-termism of investors, the failure to incorporate finance into climate assessment models, in addition to information gaps on the allocation of climate finance. Several other challenges can be identified. For example, within the financial world, climate-aligned investments have lower promised returns than non-aligned assets (Fanizza & Cerami, 2023). However, evidence suggests that climate-aligned assets generate returns comparable to, or even better than, their non-green counterparts (e.g. King & Lenox, 2001; Muñoz et al, 2014; Cortez et al, 2022). This is especially the case when taking into account physical and transition risks, in addition to risks of stranded assets.

Another much-identified challenge to climate finance is the lack of governmental engagement and inconsistency of policies (e.g. D'orazio & Popoyan, 2019; Ozili, 2022). Regarding this, Bhandary et al (2021) investigate the functioning of nine different climate policies. They find that a lack of standardisation and legislation impedes the mobilisation of climate finance (Bhandary et al, 2021). Similarly, voluntary guidelines, in addition to a lack of internationally agreed-upon standards, obstructs climate finance and can result in greenwashing (Banga, 2019; Talbot, 2017). Nevertheless, despite a lack of regulation, the previous sections have shown that there is a science-based consensus on what is needed from the financial sector. Studying different widely-acknowledged standards, this is reiterated by McGivern et al (2022). They find a strong convergence between different science-based guidelines, and identify the lack of incorporation of these guidelines in legislative frameworks and standards as an impediment to climate finance.

Correspondingly, Kemfert and Schmalz (2019), note that the lack of a clear definition of climate finance poses one of its biggest challenges, something also found by Ozili (2022). Similarly, "ambiguous definition[s] of corporate greenness" and "lack of consistency in assessing corporate greenness" inhibit climate finance (Gilchrist et al, 2021, p.9). These impediments result in ambiguous and unavailable data on the emissions of companies, especially on their scope three emissions (Gilchrist et al, 2021; Roston, 2021). As a consequence, financial institutions experience unclarity, data unavailability and challenges with double counting when measuring their portfolio footprint (van Lunteren & Linthorst, 2021). Currently, the most-used measurement tool for finance-related activities, PCAF (Partnership for Carbon Accounting Financials), is not able to account for these problems (Roston, 2021; van Lunteren & Linthorst, 2021).

Challenges for climate finance can also be identified with respect to VNZAFIs. To start with, Gosling and MacNeal (2022) find a tension between net-zero commitments and the fiduciary duties of financial institutions, alluding to the neoclassical narrative of finance. This tension could result in financial institutions adopting climate goals for reputational enhancements, rather than for the benefit of sustainability. This was also found in an analysis of the Equator

Principles[3] (Weber & Acheta, 2016). Similarly, Lin (2022) argues that net-zero commitments can be associated with an increased risk of greenwashing. Confirming this, McGivern et al (2022) observe that the increase in the number of net-zero pledges is not accompanied by improvements in the quality of underlying strategies, subsequently stating that net-zero targeting can be employed to delay real-world action. Dikau et al (2022) state that the voluntary nature of alliances limits correctionary measures and discredits net-zero pledges. Concerns have also been raised about the liberty of financial institutions to choose what financial activities they report on (Rli, 2022). These worries have been substantiated by research of the World Benchmark Alliance (2022), which discovered that an overwhelming majority of GFANZ-members does not have interim goals that cover all their financial activities. Similarly, Reclaim Finance found that these financial institutions persistently fund fossil fuel expansion projects with billions of dollars (McCully, 2023).

3.3 A Gap in the Literature

Taken together, science shows credible pathways and strategies for reaching the Paris Climate Goals, and there are multiple guidelines for financial institutions on how to become climate-aligned. The financial sector is increasingly making net-zero commitments. Nevertheless, a six-fold increase in climate finance is necessary in order to reach the climate goals, alluding to a climate financing gap. This shows that there is a discrepancy between commitments made and the amount of climate finance necessary to address climate change, something which the literature scarcely touches upon. To this end, this research looks at the effectiveness of VNZAFIs in aligning the climate action plans of their members with the Paris Agreement. Results will shed light on the current nature of climate finance, which in turn provides insights for improving it.

[3] The Equator Principles is a framework intended to provide a minimum standard for sustainable risk management in finance.

4. The Case of the KC

In this section, the case study of this research will be introduced. Given the importance of universalisation, the case study ought to be representative of VNZAFIs in general. Therefore, the focus of this research is on the effectiveness of the Dutch Climate Commitment of the Financial Sector (*Klimaatcommitment Financiële Sector*, *KC*). The KC is a Dutch VNZAFI and counts over 50 signatories, ranging from banks to insurance companies, pension funds and asset managers (Klimaatcommitment Financiële Sector, 2019). This means that the KC is an alliance of different types of financial institutions, as opposed to other VNZAFIs that only constitute one type of financial institution. Moreover, the overseeable, yet considerable, size of the KC allows for a deep and thorough assessment of all its members and activities, thereby increasing the reliability of the results. Another reason for opting for the KC is the readily accessible data. What follows is a summary of the KC and its signatories.

4.2 Klimaatcommitment Financiële Sector

The KC was founded in July 2019 with the objective of actively contributing to the realisation of the Paris Agreement and its national equivalent, the Dutch Climate Agreement. Its foundation and goals are an integral part of this climate agreement, which is in turn the Nationally Determined Contribution (commonly referred to as "NDC") of the Netherlands under the Paris Agreement (Klimaatakkoord, 2019). At its foundation, the goal was to have decreased CO2 emissions by 49 per cent in 2030 compared to 1990 (Klimaatakkoord, 2019). However, with increased ambitions from the EU, and the inauguration of a new Dutch government in 2021, this target has been increased to 55 per cent (Fetting, 2020; Coalitieakkoord 2021-2025, 2021). These reduction targets are estimated prerequisites for meeting the Paris Agreement.

The KC has formulated four efforts to which its allied financial institutions have pledged to commit (Klimaatakkoord, 2019). Member financial institutions shall:

1. **Participate in the financing of making the energy sector more sustainable**. This is aimed at enabling a cross-sector energy transition. Moreover, the goal is to significantly contribute to cross-sectoral sustainability projects.
2. **Measure and publicly report CO2 emissions** of relevant finances and investments with methods of their choosing. Consequently, financial institutions shall share their knowledge and compare their results in order to improve measuring methods;
3. **Draw up an action plan**. These should communicate clear targets and strategies for the delivery of these targets. This action plan was to be formulated at the latest in 2022;
4. **Collectively organise deliberations about their progress**. A platform has been established in order to facilitate these deliberations and the previously-mentioned exchange of knowledge and methods.

Due to the different nature of the financial activities of signatories and the difficulty of measuring the climate performance of some of these activities, financial institutions are required to report on the progress and climate impact of finances and activities that they deem

relevant, having to disclose these choices in their action plans. Ideally, climate policy and methods are externally checked. By the same token as other alliances, the KC is a voluntary commitment without an enforceable legal basis.

4.2 Members of the KC

The KC counts 53 signatories, constituting banks, insurance companies, pension funds and asset managers. Four sector associations have signed the agreement. In the following table, the participating financial institutions are listed according to their typology. Importantly, members that have delivered an action plan are presented in the grey cells. These are the signatories of which their action plans' climate alignment will be determined.

Pension Fund	Insurance	Bank	Asset Management Company	Other
ABP	Achmea B.V.	ABN-AMRO	Actiam	NN Group N.V.
APG	Aegon Nederland N.V.	ASN Bank/ASN Impact Investors	Achmea Investment Management	
BPL Pensioen	Allianz Nederland Groep N.V.	BNG bank	Aegon Asset Management Nederland	
Pensioenfonds Horeca & Catering	ASR Nederland N.V.	FMO	Anthos Fund and Asset Management	
Pensioenfonds Metaal en Techniek	Athora Netherlands N.V.	ING	Blackrock (Netherlands) N.V.	
Pensioenfonds PGB	Coöperatie Klaverblad Verzekeringen U.A	Insinger Gilissen	BNP Paribas Asset Management Nederland	
Pensioenfonds voor de bouwnijverheid	Coöperatie Univé U.A.	NIBC Bank	CBRE Global Investors	
Pensioenfonds voor de Woningcorporaties	Coöperatie VGZ U.A.	NWB Bank	MN	
Pensioenfonds voor de Zoetwarenindustrie	de Goudse N.V.	Rabobank	Robeco	
Pensioenfonds voor het Bakkersbedrijf	de Vereende N.V.	Triodos Bank	UBP Asset Management	
Pensioenfonds voor het Schilders-, afwerkings en glaszetbedrijf	MS Amlin Insurance SE-Nederland	de Volksbank N.V.	van Lanschot Kempen	
Pensioenfonds werk en (re-)integratie	O.W.M MediRisk B.A.			
Pensioenfonds Zorg en Welzijn	Scildon N.V.			
PME Pensioenfonds	VvAA Schadeverzekeringen N.V.			
Unilever APF				

Table 1: Signatories of the KC excluding sector associations. Grey cells represent those who have delivered an action plan. White cells represent those who do not have an action plan/whose action plan cannot be acquired. ASN Bank and ASN Impact Investors are presented in the same cell.

5. Methodology & Data

5.1 Research Approach

In order to answer the research question and assess the effectiveness of VNZAFIs, a framework will be developed based on which the climate alignment of the most recent climate action plans of financial institutions can be checked. The reason for developing a framework is the current absence of a universal net-zero standard or guideline for financial institutions. This qualitative study utilises secondary sources in order to develop the scoring framework.

After having developed the framework, it will be applied to the financial institutions part of the case study. The rationale for opting for a case study is the complexity of the topic. Essentially, the literature review has revealed that climate finance is multifaceted in nature and difficult to navigate. Moreover, there are many VNZAFIs, and still more financial institutions that have made net zero commitments. A case study allows for a detailed examination of a specific VNZAFI, narrowing the extensive world of climate finance and VNZAFIs down to manageable research. Providing contextual and concrete insights, results from the case study can be used to say something about the functioning of VNZAFIs in general.

5.2 Assessment: the Framework

The developed framework builds on science-based net-zero pathways, mitigation strategies and guidelines for financial institutions. This includes the mitigation strategies and net-zero pathways introduced by the IPCC (2018A) and related authors, and suggested guidelines for financial institutions by UNEP (2021), SMI (2021), GFANZ (2022) and SBTi (2022). In this part, the scoring framework will be introduced.

As shown in figure 6, the scoring criteria of the framework are divided into four categories: *boundaries*, *time frame*, *credibility* and *transformation efforts*. Here, *boundaries* refers to the variety of activities and emissions that are covered by the action plans and the types of efforts financial institutions engage in. *Time frame* refers to the establishment of a timeline for targets and objectives, in addition to setting interim goals. Moreover, *credibility* refers to the credibility of the action plan delivering on the climate goals as well as the credibility of the financial institution committing to the action plan. Finally, the category *transformation efforts* has been chosen to gain insights into the engagement of financial institutions in specific sectoral transformations.

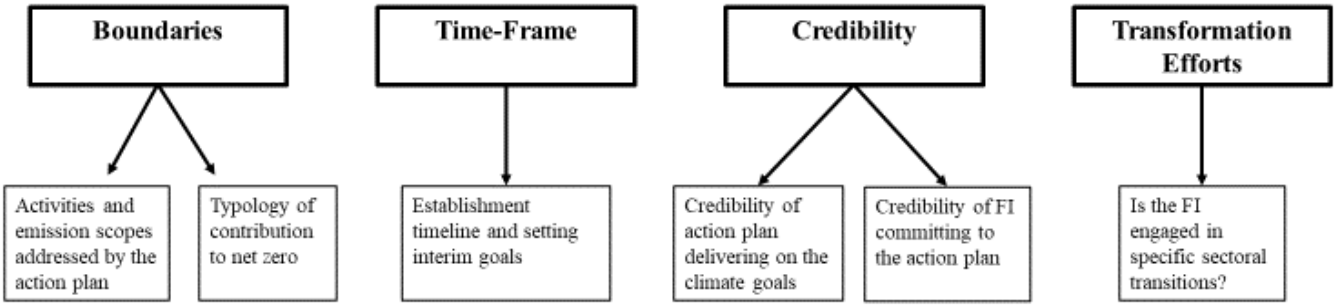

Figure 6: The four categories of the scoring framework (in this figure, financial institution *is abbreviated as* FI*)*

The categories *boundaries* and *time frame* are two out of the three key target formulation dimensions for financial institutions identified by SBTi (2022). Although formulated differently, many other guidelines, for example UNEP (2021) and GFANZ (2022), reiterate similar criteria and emphasise the importance of setting interim targets and addressing emission scopes. The category *credibility* is also based on guidelines and academic findings, which underscore the importance of reporting, utilising adequate measuring methods and making net zero commitments a core component of financial operations. The transformation efforts are categorised into the four sectoral transformations identified by the IPCC (2018A). Although all categories focus on the contribution of financial institutions to a net-zero society, this category specifically addresses the transitions in which financial institutions are engaged.

In table 1, the scoring framework, including scoring criteria and their motivation, is presented. The number of points attributed depends on the criteria, with the attainable score varying between 0-1 points and 0-2 points. Importantly, the number of points attainable per criteria does not give weight to its importance. Rather, when two points are obtainable this means that there are multiple dimensions to the criteria, or that the criteria and its answer are more complex.

Table 2: Scoring framework to which the climate alignment of action plans of financial institutions can be tested. Criteria in this framework build on the literature presented in section three of this paper (in the table, financial institution *is abbreviated as* FI*).*

Criteria	Scoring Criteria	Motivation
	BOUNDARY	
Does the action plan address all three emission scopes in their entirety?	0: The action plan only addresses emission scopes 1 and 2 / The action plan does not articulate what emission scopes are addressed 1: The action plan encompasses scope 1,2 and 3. However, scope 3 is only partially addressed. 2: The action plan encompasses all three emission scopes in their entirety.	Scope 3 emissions are the financed emissions of FIs: those are the emissions that matter if FIs are to fulfil an enabling role in an economy-wide transition. In order to become climate-aligned it is important to address all scope 3 emissions.
Does the action plan address the scope 1, 2 and 3 emissions of portfolio companies?	0: The FI does not clarify what scope emissions of its portfolio companies are covered by its action plan/ only scope 1 and 2 of its portfolio companies are targeted. 1: Scope 1 and 2 of its portfolio companies' emissions are covered by the action plan– the FI has a target and strategy on covering scope 3. 2: Scope 1, 2 and 3 emissions of the portfolio companies are targeted.	Targets commonly address solely scope 1 and 2 emissions of portfolio companies. However, in order to be climate aligned, FIs should address all three emission scopes of their clients.
Does the action plan address both mitigation and adaptation?	0: The action plan addresses solely mitigation (or adaptation). 1: The action plan addresses both mitigation and adaptation/ the action plan justifies its choice of focusing on either one.	Keeping global warming below 1.5°C requires a mix of mitigation and adaptation efforts.
Does the FI neutralise its unabated emissions? *E.g. through the usage of carbon credits or investments in CDR?*	0: The FI does not neutralise its unabated emissions. 1: The FI neutralises its unabated emissions.	FIs should neutralise all unabated emissions.
	TIME FRAME	
Has the FI set an emission baseline and defined a strategic timeline on how to meet its objectives? *E.g. by means of a reduction trajectory?*	0: The FI has not set an emission baseline. 1: The FI has set an emission baseline but has not staged a reduction trajectory over annual or bi-annual timeframes. 2: The FI has set an emission baseline and has staged a reduction trajectory over annual or bi-annual timeframes.	Emission baselines should be set in order to measure the progress of GHG emission reductions. Action plans should articulate reduction trajectories in order to realise net-zero targets.
Does the FI have interim targets, for example for 2030?	0: The FI has not clearly defined interim targets. 1: The FI has clearly defined interim targets.	Setting interim targets is crucial for the realisation of the Paris Agreement.
	CREDIBILITY	
Has the FI selected science-based net-zero pathways to which they align their targets?	0: The FI has not disclosed and/or selected science-based pathways to which they align their targets and strategies. 1: The FI has disclosed science-based pathways on which they base the formulation of their targets and strategies.	Targets and strategies are only credible if they are science-based, including based on a science-based net-zero pathway to net-zero, (*e.g. SSP 1 or 2*).
Did the FI have its action plan verified by a third party?	0: The FI did not have its action plan verified by a credible third party. 1: The FI has not had its action plan verified by a credible third party, however it is planning on doing so. 2: The FI had its action plan verified by a credible third party.	Climate-aligned action plans are to be verified by a credible third party.

Is the progress on targets and objectives measurable? Does the FI define its methods in measuring progress?	0: Targets and objectives are not measurable. The FI does not define its methods in measuring progress. 1: Progress on targets and objectives is measurable, however clear/adequate measuring methods are not defined/ not all targets and objectives are measurable. 2: Targets are measurable and methods are clearly defined.	In order to track progress and deliver on action plans, targets and objectives should be measurable. Adequate measuring methods should be used in order to track progress.
Has the FI identified priority sectors (e.g. high emitting sectors, such as coal, oil and gas)? Has the FI established and applied policy conditions and transition plans for these sectors?	0: The FI has not identified priority sectors. 1: The FI has identified priority sectors, however policy conditions and transition plans for these sectors are limited. 2: The FI has identified and motivated priority sectors. The FI has formulated adequate policy conditions for these sectors.	High-emitting sectors such as coal, gas and oil should be prioritised in terms of financing these transitions and the phase-out of harmful activities.
Does the FI have an engagement strategy on how to encourage net zero transitions for their clients?	0: The FI does not formulate an engagement strategy. 1: The FI has formulated an engagement strategy, however it is unclear/incomplete. 2: The FI has formulated an efficacious engagement strategy.	In order to proactively contribute to the climate goals, FIs should encourage portfolio companies to become climate-aligned.
Does the FI have a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero?	0: The FI does not formulate a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero. 1: The FI formulates a policy/plan that addresses the instance when clients are unwilling to shoulder efforts to become net zero. However, efforts are insufficient. 2: The FI formulates a clear and targeted policy/plan that addresses the instance when clients are unwilling to shoulder efforts to become net zero.	If clients are unwilling to shoulder efforts to become net zero, they should be excluded from the portfolio. Policy examples include reallocation, divestment and exclusion policies.
Has the FI included its net-zero commitment in its decision-making tools and governance?	0: The ambition to become climate-aligned is not well-integrated into the core activities of the FI. 1: The FI has stated that becoming climate-aligned is part of its governance 2: The FI has formulated how becoming climate-aligned is part of its core decision-making tools, activities and governance.	In order for action plans to be successful, net-zero targets and strategies should become part of the operational strategic plans of FIs and are to be approved of by the highest executives.
TRANSFORMATION EFFORTS		
Is the FI engaged in energy transformations?	0: No engagement. 1: Limited/ineffective engagement. 2: Effective engagement.	*Examples include:* Lower energy demand; Upscaling of renewables; Electrification energy sector; R&D in the energy sector;
Is the FI engaged in industry transformations?	0: No engagement. 1: Limited/ineffective engagement. 2: Effective engagement.	*Examples include:* Enabling industry to transform; Product substitutions; Divestment, reallocation; R&D in the industry sector;
Is the FI engaged in land-use transformations	0: No engagement. 1: Limited/ineffective engagement. 2: Effective engagement.	*Examples include:* Sustainable food production; Carbon Dioxide Removal; R&D with respect to land-use.
Urban- and infrastructure transformations	0: No engagement. 1: Limited/ineffective engagement. 2: Effective engagement.	*Examples include:* Electrification transportation; Energy efficiency in buildings; R&D in the urban- and infrastructure sector

In total, 30 points can be obtained, 22 of which in the first three categories. Because the category *transformation efforts* is aimed at gaining an understanding of what transition strategies are currently employed, and because financial institutions do not need to engage in all transformation strategies, this category will be treated separately in the analysis. Importantly, full points (22) on the categories *boundary*, *time frame* and *credibility,* plus effective engagement in at least one transition effort (i.e. 2 points for one sectoral transformation), is considered to represent climate alignment. This means that scoring below 22 points in the first three categories per definition means that plans are not climate aligned, no matter the score for transformation efforts. Due to the separate treatment of *transformation efforts,* these scores will not be added to those of the other categories.

Total (sectoral) scores are calculated by summing the scores of financial institutions (per sector) and dividing this by the total number of financial institutions (in this sector). The total score says something about how climate-aligned members of the KC are on average. This, in turn, indicates how effective the KC is in aligning the climate action plans of its members with the Paris Agreement. Total sectoral scores are used to determine differences per sector.

In the instance that the KC is not effective in aligning action plans with 1.5°C pathways, establishing what criteria are not met is important for improving the efficacy of the VNZAFI. Therefore, formula 1 will be used in order to identify average scores per criteria. Scores per criteria will be calculated per sector and for all financial institutions taken together.

$$(1)\ (sectoral)\ score\ per\ criteria\ = \frac{total\ number\ of\ points\ per\ criteria\ (per\ sector)}{total\ number\ of\ financial\ institutions\ (per\ sector)}$$

5.3 Data

The data of this study constitutes the action plans that members of the KC have had to provide during the time period 2019-2022. These are obtained from the official website of the KC (Klimaatcommitment Financiële Sector, 2019). Effectively, all the financial institutions presented in table 1, with the exception of *Pensioenfonds werk en (re-)integratie* and *Aegon Asset Management Nederland*, which have not provided an action plan, will be studied. Furthermore, *ASN Bank* has not delivered an action plan, yet *ASN impact investors*, which manages the investment funds of the bank, has. This will be analysed instead. *Achmea Bank*, part of *Achmea B.V.*, has delivered on an action plan but has not signed the agreement independently. *Achmea Bank* is therefore not represented in the table but its action plan will be studied. This brings the total number of financial institutions subject to analysis to 51. It is important to mention that *Pensioenfonds voor de Zoetwarenindustrie* and *Pensioenfonds voor het Bakkersbedrijf* have the same action plans. Being separate organisations, they will be treated independently.

Finally, the four sector associations, *Verbond van Verzekeraars* (insurance sector), *Pensioenfederatie* (pension sector), *Nederlandse Vereniging van Banken* (banking sector) and *DUFAS* (asset management sector) have not delivered on an action plan, and will therefore not be studied.

6. Results

6.1 General Overview of the Results

To start with, analysing the action plans reveals that an overwhelming majority of financial institutions are not only signatories to the KC, but also to other VNZAFIs, such as the Net Zero Asset-, -Banking-, or -Insurance Owner Alliance. This, in turn, has positive repercussions for the representativeness of this case study.

In table 3 the climate alignment of each financial institution is presented, with scores for categories 1, 2 and 3 depicted jointly and category 4 scores presented separately (see the Appendix for a detailed overview of the scores). As the table shows, none of the action plans of the financial institutions are climate-aligned according to this framework. On average members of the KC score 10,9 out of 22 points for the categories *boundaries*, *time frame* and *credibility*. This is less than half of what is necessary to constructively contribute to the Paris Alignment. By sector, the action plans of banks are the most climate-aligned, followed by asset management companies, pension funds and insurance companies. Financial institutions score three out of eight points on average for *transformation efforts*. Moreover, 24 out of 51 action plans effectively engage in at least one sectoral transformation. Here, sectoral differences are clearly visible: whereas 83 per cent of the banks efficiently engage in at least one transformation strategy, this is only 14 per cent for insurance companies.

The highest score is 17,5 (out of 22), obtained by *ASN Impact Investors*, a bank established for the purpose of contributing to sustainability. This also goes for *Triodos,* scoring second-highest (16,5). With 3,5 points in the first three categories, the insurance company *VvAA Schadeverzekeringen N.V.* is the least climate-aligned. Moreover, this financial institution does not address the scope three emissions of its clients, does not have an engagement strategy and has not identified a priority sector (see the table *insurance companies* in the appendix). On the whole, the least climate-aligned action plans score low on these categories, in addition to the criteria *adaptation*, *governance* and *carbon removal*.

Pension Fund	Score cat. 1,2 & 3	Score cat. 4	Insurance Company	Score cat. 1,2 & 3	Score cat. 4	Bank	Score cat. 1,2 & 3	Score cat. 4	Asset Management Company	Score cat. 1,2 & 3	Score cat. 4	Other	Score cat. 1,2 & 3	Score cat. 4
ABP	12	**4**	Achmea B.V.	15	**4**	ABN-AMRO	14	**5**	Actiam	15,5	**6**	NN Group N.V.	14,5	**6**
APG	10	3	Aegon Nederland N.V.	9,5	2	Achmea Bank	7	**4**	Achmea Investment Management	12	3			
BPL Pensioen	12,5	**3**	Allianz Nederland Groep N.V.	8	3	ASN Impact Investors	17,5	**5**	Anthos Fund and Asset Management	13	**3**			
Pensioenfonds Horeca & Catering	10,5	**3**	ASR Nederland N.V.	11	**5**	BNG bank	11,5	4	Blackrock (Netherlands) N.V.	8,5	2			
Pensioenfonds Metaal en Techniek	13,5	**5**	Athora Netherlands N.V.	9,5	2	FMO	14,5	**6**	BNP Paribas Asset Management Nederland	13	4			
Pensioenfonds PGB	10,5	3	Coöperatie Klaverblad Verzekeringen U.A	11,5	1	ING	13,5	**6**	CBRE Global Investors	6,5	**3**			
Pensioenfonds voor de bouwnijverheid	11,5	**3**	Coöperatie Univé U.A.	9,5	2	Insinger Gilissen	5	1	MN	12	**4**			
Pensioenfonds voor de Woningcorporaties	11,5	2	Coöperatie VGZ U.A.	11,5	1	NIBC Bank	10	3	Robeco	13,5	1			
Pensioenfonds voor de Zoetwarenindustrie	9	**3**	de Goudse N.V.	10,5	1	NWB Bank	13	**6**	UBP Asset Management	9	1			
Pensioenfonds voor het Bakkersbedrijf	9	**3**	de Vereende N.V.	8	0	Rabobank	13,5	**6**	van Lanschot Kempen	8,5	1			
Pensioenfonds voor het Schilders-, afwerkings en glaszetbedrijf	5	2	MS Amlin Insurance SE-Nederland	6	0	Triodos Bank	16,5	**6**	*Average Total*	*11*	*3*			
Pensioenfonds Zorg en Welzijn	10	2	O.W.M MediRisk B.A.	8,5	2	de Volksbank N.V.	12,5	**5**						
PME Pensioenfonds	13	2	Scildon N.V.	7	1	*Average Total*	*12*	*5*						
Unilever APF	5	0	VvAA Schadeverzekeringen N.V.	3,5	1									
Average Total	*10*	*3*	*Average Total*	*9*	*2*									
Average total KC													10,9	3

Table 3: Climate alignment of FIs.
Scores are presented separately for categories 1,2 and 3 and category 4. The total amount of points for categories 1,2 and 3 is 22. For category 4, a maximum of 8 points can be obtained. Here, scores are presented in bold when the FI engages effectively in a transformation strategy. The table depicts scores of individual FIs, sectoral averages and the total average score.

6.2 Results per Criteria

Table 4 shows criteria-specific scores in more detail. Given that the matrix has shown that the KC is ineffective in aligning the climate ambitions of financial institutions with the 1.5°C target, the importance of these results is reflected in their ability to show room for improvement. Strikingly, most financial institutions do not address all three emission scopes in their entirety: only five action plans target the entire financial portfolio of the financial institution (see Appendix). This, as stressed in many action plans, is either due to (i) the low emissions associated with certain financial instruments, or (ii) the lack of tools in measuring and influencing emissions associated with some financial instruments.

Only one action plan (*ASN Impact Investors*) addresses all three emission scopes of its portfolio clients, and almost half of the financial institutions (24) fail to partially address these emissions or communicate future ambitions on doing so. In addition, no financial institution had its action plan verified by a third party, and solely the *Volksbank* had its targets approved by SBTi. Although most financial institutions have stated that their targets are aligned to science-based net zero pathways, close to zero define which pathway, with only *Robeco* having specified a SSP.

Encouragingly, almost all financial institutions have set interim targets, and most have a clear engagement strategy. Specific policies addressing the instance when engagement is not effective, however, are less clearly defined. Here, Asset Management Companies score significantly lower (on average 0.5 out of 2 points) than their counterparts. Given that their funds are often managed externally, many asset managers express the difficulty of engaging with clients. Regarding specific financial instruments, numerous financial institutions state that engagement is complicated with respect to bonds. Measuring the emissions of hedge funds, and setting targets for those is also discerned as difficult. Problems with engagement and measuring emissions link back to the incomplete proportion of scope three emissions covered by action plans. With respect to measurement, an overwhelming majority of financial institutions use PCAF as a tool for measuring the GHG emissions of their financial activities.

Out of priority sectors, most financial institutions identified and excluded fossil fuel-intensive companies to a certain degree. Nevertheless, despite the importance of phasing out coal as soon as possible, 16 per cent of the KC-aligned financial institutions have not set a specific target on this. In terms of mitigation and adaptation efforts, all action plans address mitigation, however only 30 per cent refers to adaptation. With a 0,2 score out of 1 on average, most financial institutions do not neutralise their unabated emissions. When they do so, they target their operational (scope 1 and 2) emissions. These, in turn, constitute only one per cent of their total (scope 1, 2 and 3) emissions as stated by de *Volksbank N.V.*

In terms of governance, most financial institutions state that climate ambitions are supervised by the board, however few (4) state that these are part of their core activities and decision-making. Furthermore, many action plans call for policymakers to increase (legislative) efforts and guidance to support a net-zero economy. For example, *ING*

emphasises the importance of governments providing timelines for energy transitions and calls for increased cooperation between regulators and the financial sector. Most financial institutions recognise the transition and physical risks associated with unexpected policy changes, using this as an important justification for undertaking climate action.

Total Points	Criteria	Pension Funds	Insurance Companies	Bank	Asset Management Company	*All FIs*
	BOUNDARY					
2	Does the action plan address the three emission scopes in their entirety?	1,1	1	1,2	1,1	***1,1***
2	Does the action plan cover scope 1, 2 and 3 emissions of the portfolio companies?	0,6	0,5	0,8	0,2	***0,5***
1	Does the action plan address both mitigation and adaptation?	0,2	0,2	0,4	0,3	***0,3***
1	Does the FI neutralise its unabated emissions? E.g. through the usage of carbon credits or investments in CDR?	0	0,1	0,5	0,2	***0,2***
	TIME FRAME					
2	Has the FI set an emission baseline and defined a strategic timeline on how to meet its objectives? For example, by means of a reduction trajectory?	1,2	1,3	1,5	1,3	***1,3***
1	Does the FI have interim targets, for example for 2030?	1	0,9	1	1	***1***
	CREDIBILITY					
1	Has the FI selected science-based net-zero pathways to which they align their targets?	0,5	0,6	0,9	0,9	***0,7***
1	Did the FI have its action plan verified by a third party?	0	0	0	0	***0***
2	Is the progress on targets and objectives measurable? Does the FI define its methods in measuring progress?	1,4	1,1	1,4	1,5	***1,4***
2	Has the FI identified priority sectors (e.g. high emitting sectors, such as coal, oil and gas, forestry)? Has the FI established and applied policy conditions and transition plans for these sectors?	1	0,6	1,3	1,1	***1***
2	Does the FI have an engagement strategy on how to encourage net zero transitions for their clients?	1,8	1,3	1,8	1,7	***1,7***
2	Does the FI have a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero?	1	0,8	0,5	1	***0,8***
2	Has the FI included its net-zero commitment in its decision-making tools and governance?	0,6	0,6	1,2	1	***0,9***
	TRANSFORMATION EFFORT					
2	Is the FI engaged in energy transformations?	1	0,9	1,7	1	***1,2***
2	Is the FI engaged in industry transformations?	0,5	0,1	0,8	0,5	***0,5***
2	Is the FI engaged in land-use transformations	0,2	0,3	0,9	0,5	***0,5***
2	Urban- and infrastructure transformations	1,1	0,5	1,3	0,8	***0,9***

Table 4: Criteria-specific average scores for each sector and all financial institutions (abbreviated as FI in the table) taken together. The maximum amount of points obtainable for each criteria is presented in the left column.

Finally, with respect to transformation efforts, financial institutions are mostly engaged in energy transformations, with land-use and industry transformation efforts being the least popular. In terms of energy transformations, investing in renewables is widespread. Urban- and infrastructure transformations are largely addressed by increasing the energy-efficiency of buildings, especially when mortgages and insurance companies are involved. The maintenance of biodiversity is an important driver for land-use transformations. Finally, divestment and exclusion are the main strategies used in industry transformations. As table 4 shows, banks are on average the most engaged in sectoral transformations.

On the whole, the analysis of the action plans allows for the discernment of three different strategies. The first concerns a focus on the decarbonisation of financial institutions' own operations, namely scope 1 and 2 emissions. The second is a strategy of developing a green portfolio and divesting in fossil fuel-intensive sectors. This does not require transformation strategies, as financial institutions invest in already-green companies. The final strategy concerns the support of economy-wide transitions. This strategy involves intensive engagement with (carbon-intensive) clients and applying a variety of engagement strategies. Strategies can be, and are to an extent, employed conjunctly.

7. Discussion

In the following discussion, results from the case study will be generalised and put in the context of the broader scope of climate finance and voluntary net-zero alliances for financial institutions.

From the analysis, it appears that the action plans of financial institutions are insufficiently climate-aligned, meaning that currently, financial institutions are not effectively contributing to reaching the Paris Agreement. This is visually represented in figure 6, which shows that with current ambitions, financial institutions are not adhering to a climate-aligned trajectory. To answer the research question, *VNZAFIs are ineffective in aligning the action plans of their members with the Paris Climate Goals.*

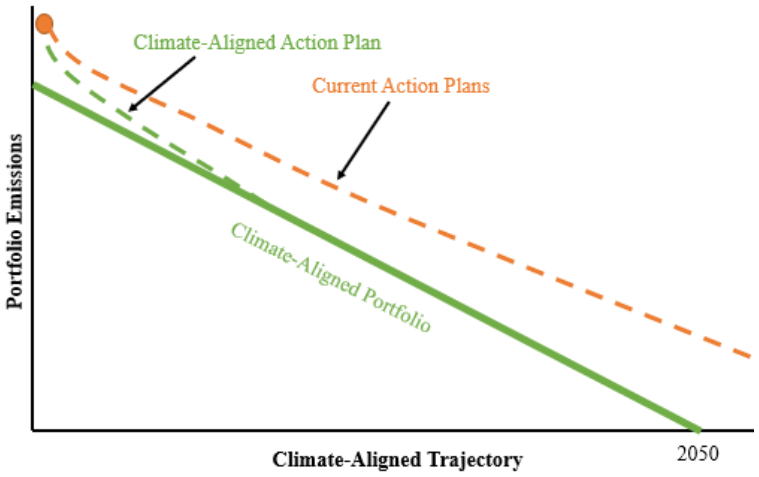

Figure 7: The trajectories of climate-aligned action plans and current action plans. (the figure is edited from figure 4, adopted from LaMonaco et al, 2020)

The results of this study seem to confirm the notion of McGivern et al (2022) that increases in the number of net-zero commitments are not accompanied by enhancements in the quality of underlying strategies. Moreover, the findings reiterate concerns raised about the credibility of VNZFIs by Lin (2022) and Weber and Acheta (2016) about greenwashing. They also substantiate observations by World Benchmark Alliance (2022) and RLi (2022) about the limited scope of financial activities targeted by action plans.

7.1 Identified Impediments to Climate Finance

The question is why VNZAFIs are ineffective in aligning the action plans of their signatories with the Paris Agreement. The remainder of the discussion divides impediments to climate finance into four categories, in the light of which obtained results will be discussed. The categories are discerned from the literature review in addition to the research itself and concern *the narrative of the financial sector*; *the current state of science*; t*he landscape of regulation and policies* and *the functioning of VNZAFIs*.

7.1.1 The Narrative of the Financial Sector

There are indications that orthodox finance views are persistent in the financial sector. Despite the fact that financial institutions recognise the transition and physical risks of climate change, this study finds that they fail to fully embed global warming considerations into their core financial decision-making strategies. This means that the results of this study are in line with the ideas of Naidoo (2020), Monasterolo (2020) and Raworth (2017), who argue that neoclassical narratives continue to dominate financial decision-making.

Moreover, the failure of financial institutions to completely incorporate climate into their financial choices shows that (i) financial institutions still largely invest according to the shareholder model. This, in combination with the capital misallocation problem of the climate crisis also reveals that (ii) asset prices do not fully reflect the risks climate change poses. The finding that climate-aligned investments have lower promised returns than non-aligned assets (e.g. Fanizza & Cerami, 2023), and the tension between net-zero commitments and the fiduciary duties of financial institutions as identified by Gosling and MacNeal (2022) is confirmed by the lacking incorporation of climate policies in governance structures, and the misalignment of the action plans in general.

Altogether, results from this study indicate that the financial sector is neither narrated by an entirely neoclassical view, nor fully embracing its qualitative role (described by Schoenmaker, 2017, p.8; Lagoarde-Segot, 2019; Naidoo, 2020). Moreover, the findings confirm that there is still a long way to go before systemic change, after which financial institutions prioritise not only the generation of monetary but also social and environmental value, has transpired (e.g. Raworth, 2017; Schoenmaker, 2017, p.33).

7.1.2 Current State of Science

To start with science-based net-zero pathways, this study finds that financial institutions often state that they have based their action plans on net-zero pathways, yet fail to define these. This makes their action plans more ambiguous and complicates the verification of their climate alignment. It shows the need for financial institutions to specify their action plans and targets. It also alludes to a disconnect between science and the financial sector. For example, if the importance of the financial sector in climate action was better understood and incorporated in SSPs (as argued for by Battiston and Monasterolo, 2018), this would expedite the choice of science-based net-zero pathways for financial institutions. Moreover, better modelling of the economic and financial risks associated with climate change, as stressed by DeFries et al (2019), could improve the reflection of climate risks in asset prices. This can result in a deeper integration of climate action into the financial decision-making of financial institutions.

Relatedly, most financial institutions engage in increasing renewable energy supply, decreasing the energy demand of buildings and electrifying (mostly scopes 1 and 2) infrastructure and transportation. Engagement in other much-cited strategies such as product substitution (industry transitions), systemic optimisation (transportation) and reducing

pasture-land (land-use) is limited—confirming the disconnect between science and financial institutions. Furthermore, financial institutions state to encounter problems in the measurement of GHG emissions related to certain financial instruments, as well as the scope three emissions of their clients. This confirms the findings of Gilchrist et al (2021), Roston (2021) and van Lunteren and Linthorst (2021) about the limited availability of GHG emissions-related data. It presents a limit to the science-based measurement tools currently available.

Moving on, this study identifies three strategies commonly employed by financial institutions. In addition, it finds that the degree of climate alignment differs greatly per sector. These, in combination with the failure of financial institutions to construct climate-aligned action plans in general, confirm the views of Buchner et al (2011) and Klaaßen and Steffen (2023) that information gaps impede an enhanced understanding of what is needed to improve the effectiveness of climate finance. The results show that information gaps extend to for example the question of whether transformational strategies (CLFI, 2019; Klier et al, 2020) or green strategies (Monasterolo, 2020; Giglio et al, 2021, p.16) should be implemented, and what sector-specific actions are the most effective.

At the same time, principal organisations on climate change research, such as the IPCC (2018A) and the IEA (2022) have repeatedly emphasised the importance of phasing out coal as quickly as possible, and also highlight setting interim targets. The findings show that the majority of financial institutions have set those interim targets, and most of these targets concern the phase out of coal. Thus, despite a disconnect, there is also communication between the science community and the financial sector.

7.1.3 Governmental Regulation and Policies

In their action plans financial institutions stress that increased government regulation and guidance are needed for a successful transition to a climate-aligned economy. Here, it is important to acknowledge the context of the case study: the call for upscaled efforts is likely directed at the Dutch government. Nevertheless, the targets and ambitions of the Netherlands are aligned with the EUs joint NDC, showing that they are comparable to those of other EU members. Concerning NDCs and policy implementations in general, IPCC (2023) identifies an emission gap *and* implementation gap: with current ambitions and real-world actions, they express high confidence that global warming will exceed the 1.5°C target. Moreover, GFANZ has recently faced a backlash from conservative politicians in the United States, who argue that the coalition is a violation of antitrust laws (Temple-West, 2023). These observations show that the need for increased policymaker efforts and engagement extends beyond the scope of this case study. It confirms the findings of D'orazio and Popoyan (2019) and Ozili (2022), who state that a lack of governmental engagement and legislation impedes climate finance.

Next, as long as there are no clear regulations on the reporting of the scope three emissions of companies (Gilchrist et al, 2021), these would remain difficult to obtain for financial institutions. Thus, a lack of regulation and standardisation can influence the limited scope of

financial activities covered by financial institutions, in addition to their ability to effectively engage with their clients. Similarly, the low average score of financial institutions on transformation efforts could be influenced by the limited guidance of policymakers, but also academics. In line with the previously-mentioned statement of *ING* (see results), *ABN AMRO* states that the decarbonisation of the mortgage market is not possible without strong regulation and incentives from governments. Hypothesising, efforts of governments that show which transition- (and sectoral-) strategies are prioritised are insufficient for effectively steering the transformation attempts of financial institutions.

7.1.4 The Functioning of Voluntary Net-Zero Alliances

As the previous sections have shown, multiple factors influence the misalignment of the action plans of financial institutions with the Paris Agreement, thereby affecting the functioning of VNZAFIs. Nevertheless, the organisational structures of VNZAFIs also influence this misalignment.

To start with, the voluntary nature of VNZAFIs is most likely influencing the climate alignment of the action plans of their members. It should not be overlooked that the two highest-scoring financial institutions in this case study were founded on the principles of environmental sustainability. Given that these perform considerably better than the mean, this could imply that it is intrinsic ambitions steering the degree of climate alignment of action plans rather than the incentives provided by VNZAFIs. The notion that the voluntary nature of VNZAFIs is not providing the right incentives can also be found elsewhere, for example in the previously-mentioned continuation of GFANZ-members funding fossil fuel expansion projects (McCully, 2023)

Concrete examples of the lack of stimulus provided by VNZAFIs are also observed in this case study. For instance, the KC urges its members to have their action plan approved by third parties. Nevertheless, none of the financial institutions refers to an external assessment of their targets and policies in their action plans. Similarly, one of the core objectives of the KC is for members to measure and publicly report CO2 emissions. Yet the analysis shows that the definition of measuring methods, and the measurability of targets and objectives, are not climate-aligned on average. Furthermore, despite organisations such as SBTi (2022) emphasising the importance of action plans targeting the three emission scopes of financial institutions to their fullest, the fact that member-FIs are free to choose what financial activities are targeted is contributing to the misalignment of their action plans. GFANZ (2022) states that scope three emissions should be incorporated based on relevance and data availability, showing that the lack of effective incentives can be applied to other VNZAFIs as well.

On the whole, if VNZAFIs' sole requirements for financial institutions are to deliver an action plan on how they intend to climate-align self-selected financial activities and measure and report CO2 emissions, greenwashing and inaction are likely unavoidable. This conclusion is in line with concerns raised by Weber and Acheta (2016), Lin (2022) and RLi (2022).

7.2 Implications and Recommendations

This research has shown that VNZAFIs are ineffective in aligning the climate policies and ambitions of their members with the Paris Climate Goals. The implications of this are manyfold. Ultimately, the effectiveness of VNZAFIs ought to be improved. Below, channels through which this can transpire are presented.

Firstly, incorporating financial and economic risks, in addition to the importance of the financial sector to climate action, in SSPs is warranted. This requires a deeper engagement of the academic world with climate finance. Furthermore, clear guidelines for financial institutions with respect to choosing net-zero pathways and transformation strategies are needed to optimise climate finance and align the intentions of policymakers, scientists and financial institutions. This requires increased cooperation between the academic world, policymakers and financial institutions. Here, VNZAFIs could extend their role as platform provisioners. This cooperation should address among others the development of better measuring methods for GHG emissions and the establishment of clear standards for climate alignment. Moreover, given the sectoral differences between financial institutions, and the varying challenges and tasks these differences present, guidelines, tools and methods ought to be sector specific.

At the same time, it should be acknowledged that VNZAFIs already provide platforms that bring together stakeholders—these are positive developments, yet the unsatisfying progress shows that further actions are needed. Actions could involve stricter (inter)governmental regulations and standardisation, not only with respect to financial institutions, but also concerning the GHG emission measurement tools used by companies. Continuous developments, such as the implementation of the EU taxonomy[4] are promising. Nonetheless, despite these encouraging developments, this research has shown that governmental regulations, in addition to cooperation and communication between governments and financial institutions, should surpass current ambitions. Importantly, governments and policies should not inhibit the functioning of VNZAFIs.

VNZAFIs could also implement stricter requirements for their signatories. For example, they could enforce the verification of action plans of their members by third parties. When measuring methods are sufficiently advanced, VNZAFIs could oblige financial institutions to cover all three emissions scopes in their action plans.

In sum, increased regulation and accountability, increased academic research and deeper cooperation between financial institutions, policymakers and academics could make VNZAFIs more efficient. These are also emphasised by Batten et al (2016), D'Orazio and Popoyan (2019) and Monasterolo (2020). In addition, Schoenmaker (2017) and Raworth (2017) emphasise the importance of changing the traditional narrative and moving to a definition of finance that is sustainable by default. The aforementioned measures are

[4] The EU taxonomy is unified classification system designed to establish which activities can be labelled as sustainable and environmentally friendly (EU, 2020)

important steps in this direction and provide grounds for future research. Another topic for future research is how aligned the real-world financial activities of financial institutions are with their respective climate ambitions. Ultimately, VNZAFIs should align the climate policies *and* real-world financial activities of their signatories with the Paris Agreement.

7.3 Limitations

On a final, important note, the limitations of this study imply that results and conclusions should be interpreted with caution. To start with, the results are drawn from a single case study. It ought to be noted that results can never fully be generalised. For example, the KC is a national alliance, whereas many other coalitions are international. Moreover, the KC is an alliance of financial institutions from multiple sectors. Although studying different types of financial institutions makes the study more representative of the financial sector as a whole, many financial institutions are members of voluntary net-zero alliances within their specific sector. In addition, different financial institutions encounter different problems, so the results of this study might not reflect the case of a VNZAFI operating in one sector only. Relatedly, the nature of climate alignment could differ per sector. Hence, developing sector-specific frameworks might make the study more credible. This research moderates these complications by presenting results in their sectoral context.

Concerning the design of the framework, criteria have been drawn from different, widely-acknowledged scientific guidelines. Nevertheless, given the novelty of the research and the complexity of the topic in general, the framework might not be complete. For example, science shows that the timing of intermediate targets, for example with respect to the phase-out of coal, is crucial. This research only focuses on *whether* financial institutions have set intermediate targets, rather than the *timing* of these targets. This does not discredit the results of this paper, namely that financial institutions are not climate-aligned. Rather, it shows how a framework can be more detailed and provide fruitful results as to *how* financial institutions are not climate-aligned. In the future, nuance could also be added to the framework by assigning different degrees of climate alignment to specific scoring intervals.

Next, the methodologies for determining the climate alignment of financial institutions expose the study to subjectivity. In future research, this can be solved by scoring financial institutions blindly, or by having multiple impartial parties execute the same research. Finally, action plans are studied in isolation, meaning that this is a static analysis. Given the constant evolvement of knowledge on the topic, action plans and progress reports are continuously subject to improvement. This means that a longitudinal study could be beneficial. Due to the novelty of research and data on this topic, this is difficult.

Overall, many limitations of this study reflect the limited scope of the research, the novelty of climate finance and the need for an enhanced understanding of this field. Despite the limitations, this static analysis provides a good and credible overview of the situation today and contributes to the understanding of climate finance and its impediments as a whole.

8. Conclusion

Despite numerous financial institutions having made net-zero commitments, current climate finance flows are too small to keep global warming below 1.5°C. By means of a case study on the Dutch VNZAFI *klimaatcommitment Financiële Sector (KC),* this research set out to discover how effective VNZAFIs are in aligning the action plans of their members with the Paris Climate Goals. The goal was to provide insights into the climate finance gap.

In sum, this study finds that VNZAFIs are ineffective in aligning the climate action plans of their members with the Paris Agreement. Regardless of the sector, none of the 51 action plans studied are climate-aligned. Importantly, the most climate-aligned action plans are those of financial institutions founded on the principles of sustainable development. This shows that VNZAFIs do not provide adequate incentives for financial institutions to fully commit to net-zero ambitions. Considering the importance of the financial sector in addressing the climate crisis, this could mean that, with current ambitions, global warming will exceed 1.5°C.

However, it is not the functioning of VNZAFIs per se that is inhibiting the credibility of action plans. The continuation of a neoclassical narrative, lacking governmental engagement, regulations and standardisation in addition to the infancy of scientific research and measuring methodologies all prevent financial institutions from drawing up effective action plans. Simultaneously, the voluntary nature and lack of sufficient guidelines of VNZAFIs is also impeding purposeful action plans. These findings indicate both opportunities for improvement and topics for future research.

This research contributes to economic and climate literature in several ways. First, the study adds to research on the current status of climate finance. Relatedly, it has shed light on the origins of, and solutions to, the climate finance gap. Moreover, the developed framework can be used to determine the effectiveness of other VNZAFIs. The findings of this research allow policymakers, VNZAFIs and other stakeholders to improve climate finance flows. Ultimately, climate finance has the potential to enable keeping global warming below 1.5°C and creating a more sustainable, equitable and livable future. Continuous exploration of the topic and close cooperation between VNZAFIs, financial institutions, governments and scientists is necessary in order to safeguard our planet and future generations.

Bibliography

Banga, J. (2019). The Green Bond Market: A Potential Source of Climate Finance for Developing Countries, *Journal of Sustainable Finance & Investment*, vol. 9, no. 1, pp.17–32

Batten, S., Sowerbutts, R. & Tanaka, M. (2016). Let's Talk about the Weather: The Implications of Climate Change on Central Banks, Staff Working Paper, 603, Bank of England

Battiston, S. & Monasterolo, I. (2018). The Climate Target Gap Is Widening. Can We Close It by Including Climate Finance in SSPs?, SSRN Scholarly Paper, 3266041, Available Online: https://papers.ssrn.com/abstract=3266041 [Accessed 14 April 2023]

Bauer, N., Calvin, K., Emmerling, J., Fricko, O., Fujimori, S., Hilaire, J., Eom, J., Krey, V., Kriegler, E., Mouratiadou, I., Sytze de Boer, H., van den Berg, M., Carrara, S., Daioglou, V., Drouet, L., Edmonds, J. E., Gernaat, D., Havlik, P., Johnson, N., Klein, D., Kyle, P., Marangoni, G., Masui, T., Pietzcker, R. C., Strubegger, M., Wise, M., Riahi, K. & van Vuuren, D. P. (2017). Shared Socio-Economic Pathways of the Energy Sector – Quantifying the Narratives, *Global Environmental Change*, vol. 42, pp.316–330

Bhandary, R. R., Gallagher, K. S. & Zhang, F. (2021). Climate Finance Policy in Practice: A Review of the Evidence, *Climate Policy*, vol. 21, no. 4, pp.529–545

Bhatia, P., Cummis, C., Rich, D., Draucker, L., Lahd, H. & Brown (WBCSD), A. (2011). Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, [e-journal], Available Online: https://www.wri.org/research/greenhouse-gas-protocol-corporate-value-chain-scope-3-accounting-and-reporting-standard [Accessed 15 May 2023]

Biesbroek, G. R., Swart, R. J. & van der Knaap, W. G. M. (2009). The Mitigation–Adaptation Dichotomy and the Role of Spatial Planning, *Habitat International*, vol. 33, no. 3, pp.230–237

Bloomberg L.P. (2022). ESG May Surpass $41 Trillion Assets in 2022, But Not Without Challenges, Finds Bloomberg Intelligence | Press | Bloomberg LP, *Bloomberg L.P.*, Available Online: https://www.bloomberg.com/company/press/esg-may-surpass-41-trillion-assets-in-2022-but-not-without-challenges-finds-bloomberg-intelligence/ [Accessed 2 May 2023]

Bolton, P., Kacperczyk, M. & Samama, F. (2022). Net-Zero Carbon Portfolio Alignment, *Financial Analysts Journal*, vol. 78, no. 2, pp.19–33

Boyd, D., Pathak, M., van Diemen, R. & Skea, J. (2022). Mitigation Co-Benefits of Climate Change Adaptation: A Case-Study Analysis of Eight Cities, *Sustainable Cities and Society*, vol. 77, p.103563

Buchner, B., Falconer, A., Hervé-Mignucci, M., Trabacchi, C. & Brinkman, M. (2011). The Landscape of Climate Finance, CPI

Buchner, B., Stadelmann, M., Wilkinson, J., Mazza, F., Rosenberg, A. & Abramskiehn, D. (2014). The Global Landscape of Climate Finance 2014, Climate Policy Initiative, Available Online: https://www.climatepolicyinitiative.org/wp-content/uploads/2014/11/The-Global-Landscape-of-Climate-Finance-2014.pdf

Bui, M., S. Adjiman, C., Bardow, A., J. Anthony, E., Boston, A., Brown, S., S. Fennell, P., Fuss, S., Galindo, A., A. Hackett, L., P. Hallett, J., J. Herzog, H., Jackson, G., Kemper, J., Krevor, S., C. Maitland, G., Matuszewski, M., S. Metcalfe, I., Petit, C., Puxty, G., Reimer, J., M. Reiner, D., S. Rubin, E., A. Scott, S., Shah, N., Smit, B., Martin Trusler, J. P., Webley, P., Wilcox, J. & Dowell, N. M. (2018). Carbon Capture and Storage (CCS): The Way Forward, *Energy & Environmental Science*, vol. 11, no. 5, pp.1062–1176

Fanizza, D. & Cerami, L. (2023). A Market for Brown Assets To Make Finance Green, *IMF Working Papers*, [e-journal] vol. 2023, no. 011, Available Online: https://www.elibrary.imf.org/view/journals/001/2023/011/article-A001-en.xml [Accessed 23 May 2023]

CFLI. (2019). Financing the Low-Carbon Future A Private-Sector View on Mobilizing Climate Finance, Available Online: https://data.bloomberglp.com/company/sites/55/2019/09/Financing-the-Low-Carbon-Future_CFLI-Full-Report_September-2019.pdf [Accessed 10 February 2023]

Coalitieakkoord 2021-2025. (2021). Omzien Naar Elkaar, Vooruitkijken Naar de Toekomst, Available Online: https://open.overheid.nl/documenten/ronl-f3cb0d9c-878b-4608-9f6a-8a2f6e24a410/pdf

Cortez, M. C., Andrade, N. & Silva, F. (2022). The Environmental and Financial Performance of Green Energy Investments: European Evidence, *Ecological Economics*, vol. 197, p.107427

CPI. (2022). Global Landscape of Climate Finance: A Decade of Data: 2011-2021, Climate Policy Initiative, Available Online: https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-a-decade-of-data/ [Accessed 23 February 2023]

De Bondt, W. F. M. & Thaler, R. H. (1995). Chapter 13 Financial Decision-Making in Markets and Firms: A Behavioral Perspective, in *Handbooks in Operations Research and Management Science*, Vol. 9, [e-book] Elsevier, pp.385–410, Available Online: https://www.sciencedirect.com/science/article/pii/S092705070580057X [Accessed 14 April 2023]

de Jong, M. & Rocco, S. (2022). ESG and Impact Investing, *Journal of Asset Management*, vol. 23, no. 7, pp.547–549

DeFries, R., Edenhofer, O., Halliday, A., Heal, G., Lenton, T., Puma, M., Rising, J., Rockström, J., Ruane, A. C., Schellnhuber, H. J., Stainforth, D., Stern, N., Tedesco, M. & Ward, B. (2019). The Missing Economic Risks in Assessments of Climate Change Impacts, Grantham Research Institute on Climate Change and the Environment

Dikau, S., Robin, N., Smoleńska, A., van 't Klooster, J. & Volz, U. (2022). Net Zero Transition Plans - A Supervisory Playbook for Prudential Authorities, *Grantham Research Institute on Climate Change and the Environment*, [e-journal], Available Online: https://policycommons.net/artifacts/3183263/net-zero-transition-plans/3981870/ [Accessed 15 March 2023]

D'Orazio, P. & Popoyan, L. (2019). Fostering Green Investments and Tackling Climate-Related Financial Risks: Which Role for Macroprudential Policies?, *Ecological Economics*, vol. 160, pp.25–37

EU. (2020). Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the Establishment of a Framework to Facilitate Sustainable Investment, and Amending Regulation, Available Online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32020R0852

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work, *The Journal of Finance*, vol. 25, no. 2, pp.383–417

Fankhauser, S., Smith, S. M., Allen, M., Axelsson, K., Hale, T., Hepburn, C., Kendall, J. M., Khosla, R., Lezaun, J., Mitchell-Larson, E., Obersteiner, M., Rajamani, L., Rickaby, R., Seddon, N. & Wetzer, T. (2022). The Meaning of Net Zero and How to Get It Right, 1, *Nature Climate Change*, vol. 12, no. 1, pp.15–21

Fetting, C. (2020). The European Green Deal, ESDN Office, Available Online: https://www.esdn.eu/fileadmin/ESDN_Reports/ESDN_Report_2_2020.pdf

Friedman, M. (1970). A Friedman Doctrine‐- The Social Responsibility Of Business Is to Increase Its Profits, *The New York Times*, 13 September, Available Online: https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html [Accessed 14 April 2023]

GFANZ. (2022). Financial Institution Net-Zero Transition Plans- Fundamentals, Recommendations, and Guidance, GFANZ, p.99

GFANZ. (n.d.). About Us, *Glasgow Financial Alliance for Net Zero*, Available Online: https://www.gfanzero.com/about/ [Accessed 11 April 2023]

Giglio, S., Kelly, B. & Stroebel, J. (2021). Climate Finance, *Annual Review of Financial Economics*, vol. 13, no. 1, pp.15–36

Gilchrist, D., Yu, J. & Zhong, R. (2021). The Limits of Green Finance: A Survey of Literature in the Context of Green Bonds and Green Loans, 2, *Sustainability*, vol. 13, no. 2, p.478

Gosling, T. & MacNeil, I. (2022). Can Investors Save the Planet? - NZAMI and Fiduciary Duty, SSRN Scholarly Paper, 4277960, Available Online: https://papers.ssrn.com/abstract=4277960 [Accessed 15 March 2023]

Güneralp, B., Zhou, Y., Ürge-Vorsatz, D., Gupta, M., Yu, S., Patel, P. L., Fragkias, M., Li, X. & Seto, K. C. (2017). Global Scenarios of Urban Density and Its Impacts on Building Energy Use through 2050, *Proceedings of the National Academy of Sciences*, vol. 114, no. 34, pp.8945–8950

Gupta, S., Harnisch, J., Barua, D. C., Chingambo, L., Frankel, P., Garrido Vázquez, R. J., Gómez-Echeverri, L., Haites, E., Huang, Y., Kopp, R., Lefèvre, B., Machado-Filho, H. & Massetti, E. (2014). Cross-Cutting Investments and Finance Issues, in *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Inter-Governmental Panel on Climate Change*, New York: Cambridge University Press, pp.1207–1246

IDFC. (2022). IDFC Green Finance Mapping Report 2022, International Development Finance Club, Available Online: https://www.climatepolicyinitiative.org/publication/idfc-green-finance-mapping-2022/#:~:text=Finance%20for%20green%20energy%20and,representing%2088%25%20of%20climate%20finance.

IEA. (2022). World Energy Outlook 2022, IEA, Available Online: https://iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf

IFF. (2021). Global Finance and Development Report, International Finance Fund, Available Online: https://iigf-china.com/wp-content/uploads/2021/12/GFAD-report20211208_IFF.pdf

IPCC. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC

IPCC. (2018A). Summary for Policymakers, in *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, Cambridge University Press, pp.3–26

IPCC. (2018B). Annex I: Glossary, in *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, Cambridge University Press, pp.541–562

IPCC. (2023). Synthesis Report of the IPCC Sixth Assessment Report (AR6), Available Online: https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf

IRENA. (2023). World Energy Transitions Outlook 2023: 1.5° C Pathways., International Renewable Energy Agency, Available Online: https://mc-cd8320d4-36a1-40ac-83cc-3389-cdn-endpoint.azureedge.net/-/media/Files/IRENA/Agency/Publication/2023/Mar/IRENA_WETO_Preview_2023.pdf?rev=c4c2398e169a4243ad37cf67dc441f

Kemfert, C. & Schmalz, S. (2019). Sustainable Finance: Political Challenges of Development and Implementation of Framework Conditions, *Green Finance*, vol. 1, no. 3, pp.237–248

King, A. A. & Lenox, M. J. (2001). Does It Really Pay to Be Green? An Empirical Study of Firm Environmental and Financial Performance: An Empirical Study of Firm Environmental and Financial Performance, *Journal of Industrial Ecology*, vol. 5, no. 1, pp.105–116

Klaaßen, L. & Steffen, B. (2023). Meta-Analysis on Necessary Investment Shifts to Reach Net Zero Pathways in Europe, 1, *Nature Climate Change*, vol. 13, no. 1, pp.58–66

Klier, D., Knight, Z., Bidgoli, F., Mo, C. & Bou, A. (2020). Heavy Lifting: Why Transition Finance Is Vital to Combat Climate Change

Klimaatakkoord. (2019). , Available Online: https://www.klimaatakkoord.nl/binaries/klimaatakkoord/documenten/publicaties/2019/06/28/klimaatakkoord/klimaatakkoord.pdf

Lagoarde-Segot, T. (2015). Diversifying Finance Research: From Financialization to Sustainability, *International Review of Financial Analysis*, vol. 39, pp.1–6

Lagoarde-Segot, T. (2019). Sustainable Finance. A Critical Realist Perspective, *Research in International Business and Finance*, vol. 47, pp.1–9

LaMonaco, S., Matsuo, T., Mitchell, J., O'Hanlon, B. & Kessier, L. (2020). Charting the Course to Climate-Aligned Finance: Five Barriers to Alignment and How a Sectoral Approach Can Help, Available Online: https://rmi.org/insight/navigating-five-barriers-to-climate-aligned-finance/ [Accessed 20 February 2023]

Laplane, J. & van Loenen, L. (2021). Fair Finance Guide International Methodology 20210 a Methodology for the Assessment of Responsible Investment and Finance Policies of Financial Institutions, Amsterdam: Profundo

Lin, A. C. (2022). Making Net Zero Matter, *Washington and Lee Law Review*, [e-journal] vol. 79, p.679, Available Online: https://heinonline.org/HOL/Page?handle=hein.journals/waslee79&id=672&div=&collection=

Lindenberg, N. (2014). Definition of Green Finance, Available Online: https://web.archive.org/web/20180721183829id_/https://www.die-gdi.de/uploads/media/Lindenberg_Definition_green_finance.pdf

Luderer, G., Vrontisi, Z., Bertram, C., Edelenbosch, O. Y., Pietzcker, R. C., Rogelj, J., De Boer, H. S., Drouet, L., Emmerling, J., Fricko, O., Fujimori, S., Havlík, P., Iyer, G., Keramidas, K., Kitous, A.,

Pehl, M., Krey, V., Riahi, K., Saveyn, B., Tavoni, M., Van Vuuren, D. P. & Kriegler, E. (2018). Residual Fossil CO2 Emissions in 1.5–2 °C Pathways, 7, *Nature Climate Change*, vol. 8, no. 7, pp.626–633

Malkiel, B. G. (2003). The Efficient Market Hypothesis and Its Critics, *Journal of Economic Perspectives*, vol. 17, no. 1, pp.59–82

McCully, P. (2023). Throwing Fuel on the Fire: GFANZ Financing of Fossil Fuel Expansion, Reclaim Finance, Available Online: https://reclaimfinance.org/site/wp-content/uploads/2023/01/Throwing-fuel-on-the-fire-GFANZ-financing-of-fossil-fuel-expansion.pdf [Accessed 15 March 2023]

McGivern, A., Axelsson, K., Straub, S., Craig, S. & Steen, B. (2022). Defining Net Zero for Organisations: How Do Climate Criteria Align across Standards and Voluntary Initiatives?, Available Online: https://netzeroclimate.org/wp-content/uploads/2022/12/Summary-Report_Oxford-Net-Zero_October-2022.pdf

Michie, A. (2022). The Role of the Global Financial System in Financing the Transition to Net Zero, *Global Policy*, vol. 13, no. 4, pp.557–562

Monasterolo, I. (2020). Climate Change and the Financial System, *Annual Review of Resource Economics*, vol. 12, no. 1, pp.299–320

Muñoz, F., Vargas, M. & Marco, I. (2014). Environmental Mutual Funds: Financial Performance and Managerial Abilities, *Journal of Business Ethics*, vol. 124, no. 4, pp.551–569

Muttitt, G., Price, J., Pye, S. & Welsby, D. (2023). Socio-Political Feasibility of Coal Power Phase-out and Its Role in Mitigation Pathways, 2, *Nature Climate Change*, vol. 13, no. 2, pp.140–147

Naidoo, C. P. (2020). Relating Financial Systems to Sustainability Transitions: Challenges, Demands and Design Features, *Environmental Innovation and Societal Transitions*, vol. 36, pp.270–290

Nordhaus, W. D. (1977). Economic Growth and Climate: The Carbon Dioxide Problem, *The American Economic Review*, vol. 67, no. 1, pp.341–346

Nordhaus, W. D. (1992). An Optimal Transition Path for Controlling Greenhouse Gases, *Science*, vol. 258, no. 5086, pp.1315–1319

Nordhaus, W. (2019). Climate Change: The Ultimate Challenge for Economics, *The American Economic Review*, vol. 109, no. 6, pp.1991–2014

Nordhaus, W. D. & Yang, Z. (1996). A Regional Dynamic General-Equilibrium Model of Alternative Climate-Change Strategies, *The American Economic Review*, vol. 86, no. 4, pp.741–765

OECD. (2020). Developing Sustainable Finance Definitions and Taxonomies, Available Online: https://www.oecd.org/environment/cc/developing-sustainable-finance-definitions-and-taxonomies-brief-for-policy-makers.pdf [Accessed 20 February 2023]

O'Neill, B. C., Kriegler, E., Ebi, K. L., Kemp-Benedict, E., Riahi, K., Rothman, D. S., van Ruijven, B. J., van Vuuren, D. P., Birkmann, J., Kok, K., Levy, M. & Solecki, W. (2017). The Roads Ahead: Narratives for Shared Socioeconomic Pathways Describing World Futures in the 21st Century, *Global Environmental Change*, vol. 42, pp.169–180

O'Neill, B. C., Kriegler, E., Riahi, K., Ebi, K. L., Hallegatte, S., Carter, T. R., Mathur, R. & van Vuuren, D. P. (2014). A New Scenario Framework for Climate Change Research: The Concept of Shared Socioeconomic Pathways, *Climatic Change*, vol. 122, no. 3, pp.387–400

Ozili, P. K. (2022). Green Finance Research around the World: A Review of Literature, *International Journal of Green Economics*, vol. 16, no. 1, pp.56–75

Popescu, I.-S., Hitaj, C. & Benetto, E. (2021). Measuring the Sustainability of Investment Funds: A Critical Review of Methods and Frameworks in Sustainable Finance, *Journal of Cleaner Production*, vol. 314, p.128016

Raworth, K. (2017). Doughnut Economics- Seven Ways to Think Like a 21st-Century Economist, Penguin Random House

Ray, D. & Mylläri, S. (2023). Sustainable Finance Markets: 2022, a Year in Charts, *Nordea*, Available Online: https://www.nordea.com/en/news/sustainable-finance-markets-2022-a-year-in-charts [Accessed 6 April 2023]

Riahi, K., van Vuuren, D. P., Kriegler, E., Edmonds, J., O'Neill, B. C., Fujimori, S., Bauer, N., Calvin, K., Dellink, R., Fricko, O., Lutz, W., Popp, A., Cuaresma, J. C., Kc, S., Leimbach, M., Jiang, L., Kram, T., Rao, S., Emmerling, J., Ebi, K., Hasegawa, T., Havlik, P., Humpenöder, F., Da Silva, L. A., Smith, S., Stehfest, E., Bosetti, V., Eom, J., Gernaat, D., Masui, T., Rogelj, J., Strefler, J., Drouet, L., Krey, V., Luderer, G., Harmsen, M., Takahashi, K., Baumstark, L., Doelman, J. C., Kainuma, M., Klimont, Z., Marangoni, G., Lotze-Campen, H., Obersteiner, M., Tabeau, A. & Tavoni, M. (2017). The Shared Socioeconomic Pathways and Their Energy, Land Use, and Greenhouse Gas Emissions Implications: An Overview, *Global Environmental Change*, vol. 42, pp.153–168

Rli. (2022). Financiering in Transitie: Naar Een Actieve Rol van de Financiele Sector in Een Duurzame Economie

Rogelj, J., Shindell, D., Jiang, K., Fifita, S., Forster, P., Ginzburg, V., Handa, C., Kheshgi, H., Kobayashi, S., Kriegler, E., Mundaca, L., Séférian, R. & Vilariño, M. V. (2018A). Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development, in *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, In Press, pp.93–174

Rogelj, J., Popp, A., Calvin, K. V., Luderer, G., Emmerling, J., Gernaat, D., Fujimori, S., Strefler, J., Hasegawa, T., Marangoni, G., Krey, V., Kriegler, E., Riahi, K., van Vuuren, D. P., Doelman, J., Drouet, L., Edmonds, J., Fricko, O., Harmsen, M., Havlík, P., Humpenöder, F., Stehfest, E. & Tavoni, M. (2018B). Scenarios towards Limiting Global Mean Temperature Increase below 1.5 °C, 4, *Nature Climate Change*, vol. 8, no. 4, pp.325–332

Roston, M. (2021). The Road from Scope 3 to Net Zero, in T. Heller & A. Seiger (eds), *Settling Climate Accounts: Navigating the Road to Net Zero*, [e-book] Cham: Springer International Publishing, pp.59–70, Available Online: https://doi.org/10.1007/978-3-030-83650-4_4 [Accessed 1 May 2023]

Samuelson, P. A. (1965). Proof That Properly Anticipated Prices Fluctuate Randomly, *Industrial Mangement Review*, pp.41–49

SBTi. (2022). Foundations for Science-Based Net-Zero Target Setting in the Financial Sector, Science Based Targets initiative

Schoenmaker, D. (2017). From Risk to Opportunity: A Framework for Sustainable Finance, Rotterdam School of Mangement, Erasmus University

SMI. (2021). A Practitioner's Guide for Banks- Considerations for Banks in Setting a Net Zero Strategy

Soppe, A. (2004). Sustainable Corporate Finance, *Journal of Business Ethics*, vol. 53, no. 1, pp.213–224

Talbot, K. M. (2017). What Does Green Really Mean: How Increased Transparency and Standardization Can Grow the Green Bond Market, *Villanova Environmental Law Journal*, vol. 28, p.127

Temple-West, P. (2023). Mark Carney's Green Alliance Rides out Stormy Waters, *Financial Times*, 27 February, Available Online: https://www.ft.com/content/f5ca94f5-2fab-451c-981c-e6e0e54fc3ba [Accessed 10 May 2023]

UNEP. (2017). The Evolution of Sustainable Finance – United Nations Environment – Finance Initiative, Available Online: https://www.unepfi.org/news/timeline/ [Accessed 2 May 2023]

UNEP. (2021). Guidelines for Climate Target Setting for Banks, United Nations Environment Programme

UNFCCC. (2015). The Paris Agreement | UNFCCC, Available Online: https://unfccc.int/process-and-meetings/the-paris-agreement?gclid=Cj0KCQjwuLShBhC_ARIsAFod4fKmKnDYP4eMkD0HmtlLdPEYm46qRTChAT-q9zVOlcGvdZJxugoG4w4aAtPiEALw_wcB [Accessed 5 April 2023]

UNFCCC. (2021). COP26 and the Glasgow Financial Alliance for Net Zero (GFANZ), Available Online: https://climatechampions.unfccc.int/wp-content/uploads/2021/04/GFANZ.pdf

van Lunteren, B. & Linthorst, G. (2021). Updates from Implementing GHG Accounting for the Financial Sector in the Netherlands, PCAF Netherlands, Available Online: https://carbonaccountingfinancials.com/files/2021-10/pcaf-nl-2021-update-report-002-.pdf?e1ce53bc11

van Vuuren, D. P., Kriegler, E., O'Neill, B. C., Ebi, K. L., Riahi, K., Carter, T. R., Edmonds, J., Hallegatte, S., Kram, T., Mathur, R. & Winkler, H. (2014). A New Scenario Framework for Climate Change Research: Scenario Matrix Architecture, *Climatic Change*, vol. 122, no. 3, pp.373–386

Weber, O. & Acheta, E. (2016). The Equator Principles: Do They Make Banks More Sustainable?, UNEP, Available Online: https://wedocs.unep.org/bitstream/handle/20.500.11822/7482/-The_equator_principles_Do_they_make_banks_more_sustainable_-2016The_Equator_Principles_Do_They_Make_Banks_More_Sustainable.pdf.pdf?sequence=3&amp%3BisAllowed=

World Benchmark Alliance. (2022). Financial System Benchmark, *World Benchmarking Alliance*, Available Online: https://www.worldbenchmarkingalliance.org/publication/financial-system/ [Accessed 15 March 2023]

Appendix

On the following pages, the scores of financial institutions subject to study are presented. Scoring criteria and maximum scores are described in table 2.

PENSION FUNDS

Criteria	ABP	APG	BPL	PHC	PMT	PGB	PB	PW	PZ / PBB	PSAG	PZW	PME	Unilever
BOUNDARY													
Does the action plan address the three emission scopes in their entirety?	1	1	1	1	1	2	1	1	1	1	1	1	1
Does the action plan cover scope 1, 2 and 3 emissions of the portfolio companies?	1	1	1	0	1	0	0	1	1	0	1	1	0
Does the action plan address both mitigation and adaptation?	1	0	0	0	0	1	1	0	0	0	0	0	0
Does the FI neutralise its unabated emissions? E.g. through the usage of carbon credits or investments in CDR?	0	0	0	0	0	0	0	0	0	0	0	0	0
TIME FRAME													
Has the FI set an emission baseline and defined a strategic timeline on how to meet its objectives? For example, by means of a reduction trajectory?	1	1	1 ½	1 ½	1 ½	1 ½	1	1	1	1	1	2	1
Does the FI have interim targets, for example for 2030?	1	1	1	1	1	1	1	1	1	0	1	1	1
CREDIBILITY													
Has the FI selected science-based net-zero pathways to which they align their targets?	0	1	1	1	1	0	½	½	0	0	0	1	0
Did the FI have its action plan verified by a third party?	0	0	0	0	0	0	0	0	0	0	0	0	0
Is the progress on targets and													

Scores of pension funds. Pension funds are abbreviated in the table: *BPL = BPL Pensioenfonds; PHC = Pensioenfonds Horeca & Catering; PGB = Pensioenfonds PGB; PB = Pensioenfonds voor de bouwnijverheid; PW = Pensioenfonds voor de Woningcorporaties; PBB =Pensioenfonds voor het Bakkersbedrijf ; PZ =Pensioenfonds voor de Zoetwarenindustrie; PSAG = Pensioenfonds voor het Schilders-, afwerkings en glaszetbedrijf; PZW= Pensioenfonds Zorg en Welzijn; PME = PME Pensioenfonds; Unilever = Unilever APF.*

PENSION FUNDS CONTINUATION

Criteria	ABP	APG	BPL	PHC	PMT	PGB	PB	PW	PZ / PBB	PSAG	PZW	PME	Unilever
Is the progress on targets and objectives measurable? Does the FI define its methods in measuring progress?	1	1	2	1	2	1	2	2	2	0	1	2	1
Has the FI identified priority sectors (e.g. high emitting sectors, such as coal, oil and gas, forestry)? Has the FI established and applied policy conditions and transition plans for these sectors?	2	1	1	2	2	0	1	1	0	1	1	1	0
Does the FI have an engagement strategy on how to encourage net zero transitions for their clients?	2	1	2	2	2	1	2	2	2	2	2	2	1
Does the FI have a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero?	1	2	1	0	2	2	1	1	0	0	1	2	0
Has the FI included its net-zero commitment in its decision-making tools and governance?	1	0	1	1	0	1	1	1	1	0	1	0	0
TRANSFORMATION EFFORT													
Is the FI engaged in energy transformations?	2	1	1	1	1	1	1	1	1	1	1	1	0
Is the FI engaged in industry transformations?	1	1	0	2	2	1	0	0	0	0	0	0	0
Is the FI engaged in land-use transformations	0	0	0	0	0	0	0	0	2	0	0	0	0
Urban- and infrastructure transformations	1	1	2	1	2	1	2	1	0	1	1	1	0

Scores of pension funds. Pension funds are abbreviated in the table: *BPL = BPL Pensioenfonds; PHC = Pensioenfonds Horeca & Catering; PGB = Pensioenfonds PGB; PB = Pensioenfonds voor de bouwnijverheid; PW = Pensioenfonds voor de Woningcorporaties; PBB =Pensioenfonds voor het Bakkersbedrijf ; PZ =Pensioenfonds voor de Zoetwarenindustrie; PSAG = Pensioenfonds voor het Schilders-, afwerkings en glaszetbedrijf; PZW= Pensioenfonds Zorg en Welzijn; PME = PME Pensioenfonds; Unilever = Unilever APF.*

INSURANCE COMPANIES

Criteria	ACHMEA	AEGON	ALLIANZ	ASR	ATHORA	CKV	CU	VGZ	GOUDSE	VEREENDE	MSAI	MEDIRISK	SCILDON	VvAA
BOUNDARY														
Does the action plan address all three emission scopes in their entirety?	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Does the action plan cover scope 1, 2 and 3 emissions of the portfolio companies?	1	0	0	0	1	1	0	½	1	0	0	1	1	0
Does the action plan address both mitigation and adaptation?	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Does the FI neutralise its unabated emissions? E.g. through the usage of carbon credits or investments in CDR?	½	0	0	½	½	0	0	0	0	0	0	0	0	0
TIME FRAME														
HAs the FI set an emission baseline and defined a strategic timeline on how to meet its objectives? For example, by means of a reduction trajectory?	1 ½	1	1	1 ½	0	2	1	2	2	2	1	1	1	1
Does the FI have interim targets, for example for 2030?	1	½	1	1	1	1	1	1	1	1	1	1	1	½
CREDIBILITY														
Has the FI selected science-based net-zero pathways to which they align their targets?	1	1	1	1	0	1	1	1	1	0	0	½	1	0
Did the FI have its action plan verified by a third party?	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Scores of insurance companies. Insurance companies are abbreviated: *Achmea = Achmea B.V.; Aegon Nederland N.V.; Allianz = Allianz Nederland Groep N.V.; ASR = ASR Nederland N.V.; Athora = Athora Netherlands N.V.; CKV = Coöperatie Klaverblad Verzekeringen U.A; CU = Coöperatie Univé U.A.; VGZ = Coöperatie VGZ U.A.; Goudse = de Goudse N.V.; Vereende = de Vereende N.V.; MSAI = MS Amlin Insurance SE- Nederland; Medirisk = O.W.M MediRisk B.A.; Scildon = Scildon N.V.; VvAA = VvAA Schadeverzekeringen N.V.*

INSURANCE COMPANIES CONTINUATION

Criteria	ACHMEA	AEGON	ALLIANZ	ASR	ATHORA	CKV	CU	VGZ	GOUDSE	VEREENDE	MSAI	MEDIRISK	SCILDON	VvAA
Is the progress on targets and objectives measurable? Does the FI define its methods in measuring progress?	2	1	0	1	2	1	1	1	1	2	1	1	0	1
Has the FI identified priority sectors (e.g. high emitting sectors, such as coal, oil and gas, forestry)? Has the FI established and applied policy conditions and transition plans for these sectors?	1	1	1	1	1	½	½	1	½	0	1	1	1	0
Does the FI have an engagement strategy on how to encourage net zero transitions for their clients?	2	1	2	1	1	2	2	2	1	1	1	1	1	0
Does the FI have a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero?	2	2	0	1	1	1	1	1	1	1	0	0	0	0
Has the FI included its net-zero commitment in its decision-making tools and governance?	1	0	1	1	1	1	1	1	1	0	0	1	0	0
TRANSFORMATION EFFORT														
Is the FI engaged in energy transformations?	2	1	1	2	1	1	1	1	1	0	0	1	1	0
Is the FI engaged in industry transformations?	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Is the FI engaged in land-use transformations	0	0	0	2	1	0	1	0	0	0	0	0	0	0
Urban- and infrastructure transformations	2	1	1	1	0	0	0	0	0	0	0	1	0	1

Scores of insurance companies. Insurance companies are abbreviated: *Achmea = Achmea B.V.; Aegon Nederland N.V.; Allianz = Allianz Nederland Groep N.V.; ASR = ASR Nederland N.V.; Athora = Athora Netherlands N.V.; CKV = Coöperatie Klaverblad Verzekeringen U.A; CU = Coöperatie Univé U.A.; VGZ = Coöperatie VGZ U.A.; Goudse = de Goudse N.V.; Vereende = de Vereende N.V.; MSAI = MS Amlin Insurance SE- Nederland; Medirisk = O.W.M MediRisk B.A.; Scildon = Scildon N.V.; VvAA = VvAA Schadeverzekeringen N.V.*

BANKS

Criteria	ABN	ACHMEA	ASN BANK	BNG BANK	FMO	ING	INSINGER G	NIBC BANK	NWB BANK	RABOBANK	TRIODOS	DE VOLKSBANK
BOUNDARY												
Does the action plan address all three emission scopes in their entirety?	1	½	2	1	2	1	1	1	1	1	2	1
Does the action plan cover scope 1, 2 and 3 emissions of the portfolio companies?	1	0	2	0	1	1	0	1	1	1	1	0
Does the action plan address both mitigation and adaptation?	0	0	1	0	1	1	0	1	0	0	0	1
Does the FI neutralise its unabated emissions? E.g. through the usage of carbon credits or investments in CDR?	½	0	½	½	½	½	0	½	½	½	½	1
TIME FRAME												
HAs the FI set an emission baseline and defined a strategic timeline on how to meet its objectives? For example, by means of a reduction trajectory?	2	1	2	2	1	1	1	1	2	2	2	1
Does the FI have interim targets, for example for 2030?	1	1	1	1	1	1	1	1	1	1	1	1
CREDIBILITY												
Has the FI selected science-based net-zero pathways to which they align their targets?	1	1	0	1	1	1	0	1	1	2	1	1
Did the FI have its action plan verified by a third party?	0	0	0	0	0	0	0	0	0	0	0	½

Scores of banks. Banks are abbreviated: *ABN = ABN-AMRO; Achmea = Achmea Bank; Insinger G = Insinger Gilissen; Triodos = Triodos Bank*

BANKS CONTINUATION

Criteria	ABN	ACHMEA	ASN BANK	BNG BANK	FMO	ING	INSINGER G	NIBC BANK	NWB BANK	RABOBANK	TRIODOS	DE VOLKSBANK
Is the progress on targets and objectives measurable? Does the FI define its methods in measuring progress?	2	1	2	1	1	2	½	1	2	1	2	1
Has the FI identified priority sectors (e.g. high emitting sectors, such as coal, oil and gas, forestry)? Has the FI established and applied policy conditions and transition plans for these sectors?	2	½	2	1	2	2	0	1	1	2	1	1
Does the FI have an engagement strategy on how to encourage net zero transitions for their clients?	2	1	2	2	2	2	1	1	2	2	2	2
Does the FI have a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero?	0	0	1	0	1	0	0	0	1	0	2	1
Has the FI included its net-zero commitment in its decision-making tools and governance?	1 ½	1	2	2	1	1	½	1	½	1	2	1
TRANSFORMATION EFFORT												
Is the FI engaged in energy transformations?	2	2	2	2	2	1	1	1	2	2	2	1
Is the FI engaged in industry transformations?	1	0	1	0	1	2	0	1	1	1	1	1
Is the FI engaged in land-use transformations	0	0	2	0	2	1	0	0	1	2	2	1
Is the FI engaged in urban- and infrastructure transformations?	2	2	0	2	1	2	0	1	2	1	1	2

Scores of banks. Banks are abbreviated: *ABN = ABN-AMRO; Achmea = Achmea Bank; Insinger G = Insinger Gilissen; Triodos = Triodos Bank*

ASSET MANAGEMENT COMPANIES & OTHER

Criteria	ACTIAM	ACHMEA	ANTHOS	BLACKROCK	BNP	CBRE	MN	ROBECO	LANSCHOT KEMPEN	UBP	NN GROUP
BOUNDARY											
Does the action plan address all three emission scopes in their entirety?	2	1	1	1	1	1	1	1	1	1	1
Does the action plan cover scope 1, 2 and 3 emissions of the portfolio companies?	1	0	0	0	0	0	0	1	0	0	1
Does the action plan address both mitigation and adaptation?	½	0	0	0	1	½	0	0	0	1	1
Does the FI neutralise its unabated emissions? E.g. through the usage of carbon credits or investments in CDR?	0	0	0	0	½	0	0	½	½	0	½
TIME FRAME											
Has the FI set an emission baseline and defined a strategic timeline on how to meet its objectives? For example, by means of a reduction trajectory?	2	1	1	½	1	1	2	2	1	1	1
Does the FI have interim targets, for example for 2030?	1	1	1	1	1	1	1	1	1	1	1
CREDIBILITY											
Has the FI selected science-based net-zero pathways to which they align their targets?	1	1	1	1	1	0	1	1	1	1	1
Did the FI have its action plan verified by a third party?	0	0	0	0	0	0	0	0	0	0	0

Scores of Asset Management Companies. Asset Management Companies are Abbreviated: *Achmea = Achmea Investment Management; Aegon = Aegon Asset Management Nederland; Anthos = Anthos Fund and Asset Management; Blackrock = Blackrock (Netherlands) N.V.; BNP = BNP Paribas Asset Management Nederland; CBRE= CBRE Global Investors; Lanschot Kempen = van Lanschot Kempen ; UBP = UBP Asset Management;*
Scores *NN Group N.V. ("NN Group").*

ASSET MANAGEMENT COMPANIES & OTHER CONTINUATION

Criteria	ACTIAM	ACHMEA	ANTHOS	BLACKROCK	BNP	CBRE	MN	ROBECO	LANSCHOT KEMPEN	UBP	NN GROUP
Is the progress on targets and objectives measurable? Does the FI define its methods in measuring progress?	2	1	2	2	2	1	2	1	1	1	2
Has the FI identified priority sectors (e.g. high emitting sectors, such as coal, oil and gas, forestry)? Has the FI established and applied policy conditions and transition plans for these sectors?	2	2	1	0	2	0	1	1	1	1	1
Does the FI have an engagement strategy on how to encourage net zero transitions for their clients?	2	2	2	2	2	1	2	2	1	1	2
Does the FI have a clear policy that addresses the instance when clients are unwilling to shoulder efforts to become net zero?	2	2	2	0	1	0	1	2	0	0	2
Has the FI included its net-zero commitment in its decision-making tools and governance?	0	1	2	1	½	1	1	1	1	1	1
TRANSFORMATION EFFORT											
Is the FI engaged in energy transformations?	2	1	0	1	1	1	1	1	1	1	2
Is the FI engaged in industry transformations?	1	1	1	0	1	0	1	0	0	0	1
Is the FI engaged in land-use transformations	2	0	2	0	1	0	0	0	0	0	1
Urban- and infrastructure transformations	1	1	0	1	1	2	2	0	0	0	2

Scores of Asset Management Companies. Asset Management Companies are Abbreviated: *Achmea = Achmea Investment Management; Aegon = Aegon Asset Management Nederland; Anthos = Anthos Fund and Asset Management; Blackrock = Blackrock (Netherlands) N.V.; BNP = BNP Paribas Asset Management Nederland; CBRE= CBRE Global Investors; Lanschot Kempen = van Lanschot Kempen ; UBP = UBP Asset Management;*
Scores *NN Group N.V. ("NN Group").*