

Reporting on Sustainable Investments

Understanding and automating the reporting requirements under the EU Sustainable Finance
Disclosure and Taxonomy Regulations in DNB Asset Management AS



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Abstract

This thesis aims to map the reporting requirements under the SFDR and Taxonomy regulations that went into force starting 10.3.2021. A thorough analysis of the different reporting requirements that arose from the classification under the SFDR and Taxonomy regulations was conducted. Two reports were designed, one to fulfil the pre-contractual reporting requirements and one to fulfil the periodic reporting requirements. An extensive study of different data sets needed for reporting and how to best implement them in the existing system was also conducted.

The goal of the study was to get an understanding of the reporting requirements under the SFDR and Taxonomy regulations and to map the required data sets. Once the data sets were structured, the work on designing reports that are regulatory compliant and in line with the sustainability strategy of DNB Group was started. Extensive work on analysing the best database design and how to calculate the sustainability related metrics was conducted. Much of the previously done work was undocumented, all ESG-related metrics were therefore thoroughly documented in a methodology document.

The implementation of the sustainability-related data sets is still underway. This study presents a plan for further implementation of taxonomy alignment, principal adverse impacts, exclusions, voting and dialogue data. During the implementation of data sets needed for reporting under the SFDR level 1, it was concluded that the calculation methodology needs to be thoroughly documented for all sustainability-related metrics.

Keywords: *SFDR, Taxonomy, database, sustainability reporting, Python*

Referat

Denna avhandling strävar efter att kartlägga rapporteringskraven under SFDR och Taxonomiförordningarna som trädde i kraft med start 10.3.2021. En grundlig analys av de olika rapporteringskraven som uppstod till följd av klassificering under SFDR och Taxonomi förordningarna utfördes. Två rapporter designades, en som uppfyller pre-kontraktuella rapporteringskrav och en som uppfyller rapporteringskraven för periodisk rapportering. En omfattande studie av de olika dataset som krävs för rapportering och hur dataseten bäst kan implementeras i det existerande systemet utfördes också.

Målet med studien var att få en förståelse för rapporteringskraven under SFDR och Taxonomiförordningarna och att kartlägga de dataset som krävs. När dataseten var strukturerade, påbörjades arbetet med att designa rapporter som är i linje med både regulatoriska krav och DNBs strategi för hållbarhet. Ett omfattande jobb med att analysera den bästa databasdesignen samt fastställa en beräkningsmetodologi för de olika hållbarhetsmetrikerna gjordes under våren 2022. Mycket av det jobb som tidigare hade gjorts kring hållbarhetsrapportering var odokumenterat, alla ESG-relaterade metriker dokumenterades därför grundligt och tydligt i ett metodologi dokument.

Implementationen av hållbarhetsrelaterade dataset pågår ännu. I denna studie presenteras en plan för ytterligare implementation av data för taxonomigodkända aktiviteter, Principal Adverse Impact indikatorer, exklusioner, röstning och dialoger. Under implementeringen av dataseten som krävdes för rapportering under SFDR nivå 1, konkluderades det att beräkningsmetodologin behöver vara tydligt dokumenterad för alla hållbarhetsrelaterade metriker.

Nyckelord: SFDR, Taxonomi, ESG, databas, hållbarhetsrapportering, Python

Acronyms

API - Application programming interface

CAPEX - Capital expenditure

DNSH - Do not significantly harm any of the other environmental objectives (Taxonomy)

ESG – Environmental, social and governance aspects

FSB – Financial Stability Board

HLEG – High level expert group

GHG emissions – Greenhouse gas emissions

SFDR - Sustainable Finance Disclosure Regulation

DNBAM – DNB Asset Management

DNSH – Do Not Significantly Harm

ESMA - European Securities and Markets Authority

EBA - European Banking Authority

EIOPA - European Insurance and Occupational Pensions Authority

IDE - Integrated Development Environment

IPA - Insight Platform for Analytics

ISIN – International Securities Identification Number

ISO - International Organization for Standardization

LEI – Legal Entity Identifier

MiFID II - Markets in Financial Instruments Directive II

NAV – Net Asset Value

NFRD - Non-Financial Reporting Directive

OPEX - Operational expenditure

PAI indicators - Principal adverse impact indicators

TCFD – Task Force on Climate-related Financial Disclosures

TEG - Technical expert group

TOAD - Tool for Oracle Application Developers

VBA – Visual Basic for Applications

SBTi – Science Based Target Initiative

SCD – SimCorp Dimension

1 Introduction

In 2015, the Swedish government set a new goal for the fiscal politics: The financial system should contribute to a sustainable development. All actors within the financial markets should consider environmental, social and governance aspects in their operations. Sustainability considerations have a natural connection to factors financial corporations need to consider, to be able to assess the risks in their business relationships – this is the case regardless of if it is about lending, insurance or investment operations. [1] The EU followed suit by launching a 10-point action plan consisting of a new regulation about sustainable disclosures in March 2018. The plan aims to use financial markets to address sustainability challenges with a more specific focus on climate change challenges. [2]

1.1 Problem description

The new regulation mentioned in the previous section has been put in place in a short period of time with a high level of ambition. According to the financial supervisory authority in Sweden, global issues require global solutions and, therefore, it is important that the European Union, with one sixth of the world economic and the global emissions, lies at the forefront. The new regulation is complex, and the implementation will lead to challenges for the financial actors in scope. The main responsibility to apply the disclosure regulation and the taxonomy is on the financial actors. [1]

ESG factors have been regarded as a key component for investments among institutional investors in the Nordic region. The Nordic countries have been in the forefront of sustainability for some time now according to, among others, Global Markets Media. The Nordic countries have committed to creating a more sustainable future and have nurtured the market with many years of experience, a high level of accountability and transparency, as well as consistent efforts of innovation. [3]

Even though the Nordic countries have a strong ESG heritage, ESG issues are often complex and philosophical. An example may be a company engaging in a corrupted country and the financial actors' engagements with the company. It is more and more common for financial actors to try to influence their investee companies to act in a more ethically sustainable way. Recording these engagements is not always black and white and easy to quantify. Financial actors have an extensive job to try and quantify the ethical measures they are taking. The new

regulation will require financial actors to report on their actions, but depending on the nature of the case, it might require many explanations in addition to the raw data about the actions taken to make sustainable investments.

The regulation under the Taxonomy and Sustainable Finance Disclosure Regulation (hereafter SFDR) requires financial actors to disclose more in detail how sustainable their investments are. Currently, there are no specific guidelines to whether the data used for reporting on sustainable investments should be provided by an external data provider or whether internally derived and developed data can be used. The juridical department prefers to use data provided by an external data provider, since the asset manager then can refer to the methodology used and developed by the external provider. That leads to purchases and implementations of new datasets relating to sustainable investments. These datasets are complex and since the regulation is still being developed, the availability of data is limited at the moment. The current proposed regulation is not yet adopted, and it leaves much open for interpretation. Different firms have interpreted the regulation differently. This gives considerable power to data providers to develop and influence the data and the reporting. Thus, one question that should be asked is whether we can be certain that the methodology used by the data providers is correct.

DNB Asset Management has had an ESG team working with ESG-related issues since 1989. Much engagement and voting in annual meetings has been recorded and reported since then, but the data has to a lesser extent been maintained in a structured database environment. Since the data has mostly been used internally by the ESG department, it was previously not an issue that the data was stored locally through e.g. Excel spreadsheets. Due to the new SFDR and Taxonomy regulations and new reporting requirements, several other departments at DNB Asset Management need to have access to the data in the future.

DNB Asset Management has several ESG-related initiatives ongoing simultaneously. There is a need to consolidate data in order not to store the same data points in several databases and to ensure that the data is correct and of good quality.

1.2 Purpose

The purpose of this study is to structure new and existing data sets to be able to produce a new set of reports that is regulatory compliant and in line with the sustainability strategy of the DNB Group. The first step is to give an overview of the ESG data already stored in the databases and the existing infrastructure. The second step is to consolidate the data to prevent double storing

of the same datapoints and to ensure that the data is correct and of a high enough quality to be used in regulatory reporting. New data sets needed for the new regulatory requirement need to be purchased and implemented. This study aims to organize and structure the different data sets mentioned. Once the data is structured, a new set of sustainability reports will be designed and produced using Python.

1.3 Structure of the thesis

The thesis is divided into chapters that range from theory to practical work. The second chapter gives the background to the subject, from a regulatory perspective. The currently used software and the current infrastructure is thoroughly presented in chapter three. The design and implementation of the new data sets is described in the fifth and sixth chapters. The seventh chapter evaluates the current solution and the database infrastructure, and the eighth and last chapter presents a short summary and outlines the needs for further development and implementation.

2 Background

In this chapter, the background to the problem will be presented. First, the regulatory background and the reporting requirements arising from the new regulation will be presented. In section 2.2, the sustainability strategy of DNB will be presented and in section 2.3, the plans for marketing sustainability and being regulatory compliant will be discussed.

2.1 Regulatory background

In this section, the focus will be on the regulatory background and the emergence of sustainable investing in finance. Sustainable investments have gained considerable popularity in recent years and the European Commission is creating a framework to promote sustainable investments. More emphasis will be put on product-specific regulation and the reporting requirements in section 2.2 and 2.3.

2.1.1 EU 10-point action plan

In March 2018, the European Commission published a 10-point action plan on sustainable growth [4]. The plan was a recommendation from a group of high-level experts in sustainable finance, called High level expert group (HLEG). The European Commission has divided the ten key points into three subcategories:

- 1) Reorienting capital flows towards a more sustainable economy,
- 2) Mainstreaming sustainability into risk management and
- 3) Fostering transparency and long-termism.

The first subcategory is very extensive and the first key point in the subcategory is to (1) establish a clear and detailed classification system for sustainable activities, called the EU Taxonomy. The European Commission has identified six different Taxonomy themes. The first two themes went into force 1.1.2022, while the implementation and reporting of the four other themes is expected to go into force 1.1.2023. [5] The Taxonomy is described more in detail in section 2.1.3.

The second key point in the first subcategory is to (2) create an EU Green Bond Standard and labels for green financial products. A technical expert group (TEG) proposed a voluntary green bond standard for issuers that wish to align with best practises in the market [6]. The third key point is to (3) foster investment in sustainable projects. The European Commission will connect sustainable finance initiatives such as Sustainable Europe Investment Plan, InvestEU and other

EU funds that could be of relevance to promote initiatives in sustainable investments. The fourth key point in the subcategory is to (4) incorporate sustainability in financial advice. Investment advisors and insurance distributors need to disclose how they take sustainable aspects into account when providing investment advice. The fifth key point is to (5) develop sustainability benchmarks. A new category of benchmarks with low-carbon and positive carbon impact benchmarks was published in December 2019 and was adopted in 2020. [4]

The second subcategory to mainstream sustainability into risk management consists of (6) better integration of sustainability in ratings and market research. The European Securities and Markets Authority (ESMA) published updated guidelines on disclosure requirements for credit ratings in 2019. A study about sustainability ratings and research that will explore the types of products that are provided for ratings and market research, the main players, data sourcing, transparency of methodologies and potential shortcomings in the market was also published in 2020. Another key point in this subcategory is (7) clarifying asset managers' and institutional investors' duties regarding sustainability. A set of sustainability-related disclosures was published in 2019 to clarify this. Morningstar [2] lists, among other factors, that the investment firms should list how sustainable risks are considered and explain how sustainability risks might impact returns. Investment management firms should also report how remuneration policy is consistent with integrating sustainability risks. Section 2.1.2 goes into detail about the sustainability-related disclosures both at firm level and at product level. The last key point in this subcategory is (8) to introduce a 'green supporting factor' in the EU prudential rules for banks and insurance companies. The European Parliament and Council mandated the European Banking Authority (EBA) to identify principles and methodologies to include ESG risks in the review and evaluation performed by supervisors and to explore the possibilities to introduce a more risk sensitive treatment of "green asset"; this is called the 'green supporting factor'. These mandates were introduced as risk reduction measures. [4]

The third subcategory to foster transparency and long-termism consists of (9) strengthening sustainability disclosures and accounting rulemaking by reporting on non-financial data and by financial product disclosures of ESG objectives and measures. These product-specific disclosures are more thoroughly described in section 2.1.2. The last key point in this subcategory, and in the 10-point action plan, is (10) fostering sustainable corporate governance and attenuating short-termism in capital markets. The European Commission requested advice from the ESMA, EBA and European Insurance and Occupational Pensions Authority (EIOPA) on how to mitigate short-term pressure on corporations deriving from the financial sector. The

recommendation from these bodies was to strengthen disclosure of ESG factors to facilitate institutional investor engagement. [4]

2.1.2 Sustainable Finance Disclosure Regulation

The Sustainable Finance Disclosure Regulation (SFDR) works as a supplement to the current rulebooks that govern manufacturers of, and advisors for financial products. Under the SFDR managers must disclose how they have taken sustainability risks into account in their investment process, how they assess ESG factors, and how investment decisions that might negatively affect sustainability factors are considered. According to Morningstar [7] the SFDR will make funds that promote ESG credentials and funds that have ESG objectives more easily accessible, by setting minimum disclosure standards to prevent greenwashing. [7]

The SFDR has three levels. The first disclosure requirements were implemented 10.3.2021. The next level of requirements will be implemented 1.1.2023 and the third level of disclosures will take force 30.6.2023. In Table 1 below, Morningstar has listed the most important disclosure requirements and the proposed timeline from ESMA.

Table 1: SFDR implementation timeline

Date	10 March 2021	1 January 2023	30 June 2023
Website	PAI Policy & Impact Statement: Sustainability Risk Policy Remuneration Policy Engagement Policy International Code Standards	Present SFDR level 2 pre-contractual information on website	Present PAIs for the period 2022
Pre-contractual information	Disclose fund type: – Article 8: Light Green – Article 9: Dark Green How Sustainability Risks are considered Potential impact on returns	Article 8/9 Funds: SFDR Level II template: How E/S objectives will be met	
Annual report	Disclose performance of sustainability indicators in reference period	When Published: More info on E/S results - Regulatory template for annual report disclosures	Present PAIs for the period 2022

This is the first regulation within sustainable finance, and there is still much in the regulation that needs clarification. As late as the 6th of April 2022, the European Commission adopted the Final Report on draft Regulatory Technical Standards. The document was published on 22nd October 2021 by the Joint Committee of the European Supervisory Authorities. [8]

Level one of the SFDR was already implemented 10.3.2021. Level one consisted of classifying whether an investment product does not consider environmental or social characteristics in its investment strategy (article 6), if it promotes environmental or social characteristics (article 8), or if the investment strategy has sustainable investments as its objective (article 9). All asset managers in the European Union must disclose which article their fund is classified as. The classification as article 8, to promote E/S characteristics, is quite wide and there is not any defined minimum threshold of the amount of the invested portfolio that should be invested in sustainable investments. The classification needs to be disclosed in the pre-contractual information, i.e., in the fund prospectus. [9]

Greenwashing is defined as when companies seem very transparent and reveal large quantities of ESG data but perform poorly in ESG aspects [10]. The main point with the SFDR is to prevent greenwashing and to increase transparency [7]. In practise this has led to distributors sorting funds based on which article the fund is classified as. For example, the Scandinavian bank and broker Nordnet has started to sort funds based on which SFDR article the fund is classified as. Regulation that was introduced to increase transparency has evolved into a marketing tool instead.

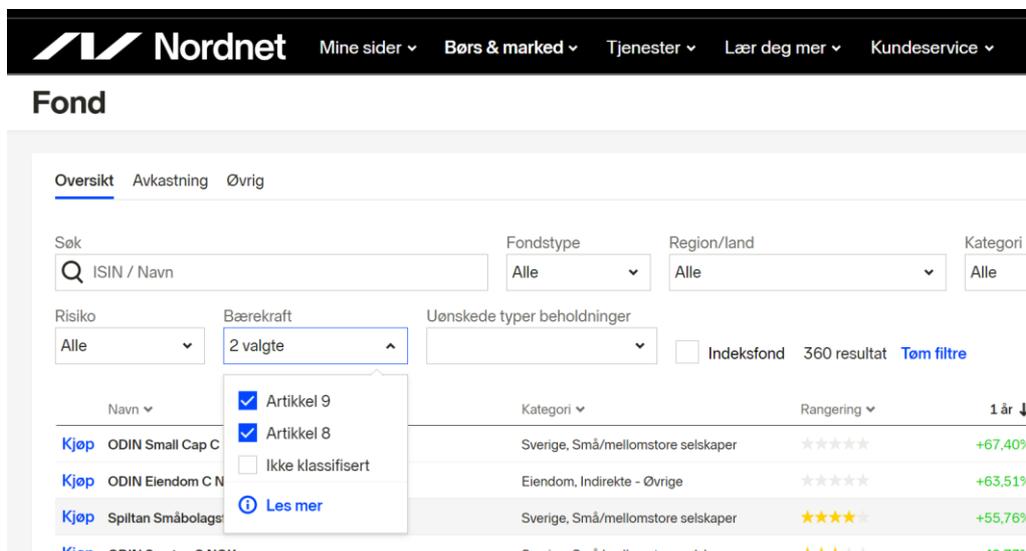


Figure 1: Snapshot of Nordnet fund selecting tool [11].

Under the SFDR, financial firms need to disclose their Sustainability Risk Policy, Remuneration Policy, Engagement Policy and International Code Standards. According to the draft RTS, this can be published on a companywide level. DNB Asset Management has published a set of policies and standards that are available on

<https://dnbam.com/en/responsible-investments/guidelines-and-exclusions> to be SFDR compliant on a companywide level.

The second level of the SFDR requires the asset manager to disclose how E/S objectives will be met in the pre-contractual information. Questions like “What is the asset allocation planned for this financial product?”, “What are the binding elements of the investment strategy used to select the investments to attain each of the environmental or social characteristics promoted by this financial product?” needs to be disclosed according to the RTS. There is little specifications and minimum requirements for a fund to be classified as article 8. The same set of questions are then presented in the report for the reference period. The asset managers need to prove how the statements made in the pre-contractual information has been practised. The reference period is one year, which means asset managers need to make the required disclosures at least in the annual report.

The information that needs to be disclosed under the SFDR level 2 in the pre-contractual information is mostly prose and questions about the planned investment strategy. The information to be disclosed under the SFDR level 2 in the periodic report is more quantitative and gives a better view about the historical performance and digs deeper into sustainability risks. Table 2 below outlines all questions that need to be addressed in the periodic report for article 8 and 9 funds.

Table 2: Information to be disclosed in the periodic report under the SFDR level 2

Periodic report	Article 8: Environmental and/or social characteristics	Article 9: Sustainable investment objective	Data point/ descriptive text
1	<i>Did this financial product have a sustainable investment objective?</i>	<i>Did this financial product have a sustainable investment objective?</i>	<i>Definition of sustainable investment</i>
1.1	<i>It made sustainable investments with an environmental objective: %</i>	<i>It made sustainable investments with an environmental objective: %</i>	<i>Allocation</i>
1.2	<i>It made sustainable investments with a social objective: %</i>	<i>It made sustainable investments with a social objective: %</i>	<i>Allocation</i>
2	<i>To what extent were the environmental and/or social characteristics promoted by this financial product met?</i>	<i>To what extent was the sustainable investment objective of this financial product met?</i>	<i>Descriptive text</i>
2.1	<i>How did the sustainability indicators perform?</i>	<i>How did the sustainability indicators perform?</i>	<i>ESG score, carbon intensity</i>
2.2	<i>...and compared to previous periods?</i>	<i>...and compared to previous periods?</i>	<i>ESG score, carbon intensity</i>
2.3	<i>What were the objectives of the sustainable investments that the financial product partially made and how did the sustainable investment contribute to such objectives?</i>	<i>What were the objectives of the sustainable investments that the financial product partially made and how did the sustainable investment contribute to such objectives?</i>	<i>Descriptive text</i>
2.4	<i>How did the sustainable investments that the financial product partially made not cause significant harm to any environmental or social sustainable investment objective?</i>	<i>How did the sustainable investments that the financial product partially made not cause significant harm to any environmental or social sustainable investment objective?</i>	<i>SFDR data; principal adverse impacts</i>

2.4.1	<i>How were the indicators for adverse impacts on sustainability factors taken into account?</i>	<i>How were the indicators for adverse impacts on sustainability factors taken into account?</i>	<i>Statement on principal adverse impacts</i>
2.4.2	<i>Were sustainable investments aligned with the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights? Details:</i>	<i>Were sustainable investments aligned with the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights? Details:</i>	<i>Guidelines</i>
3	<i>How did this financial product consider principal adverse impacts on sustainability factors?</i>	<i>How did this financial product consider principal adverse impacts on sustainability factors?</i>	<i>Descriptive text</i>
4	<i>What were the top investments of this financial product?</i>	<i>What were the top investments of this financial product?</i>	<i>Top 15 holdings with biggest weight in portfolio</i>
5	<i>What was the proportion of sustainability-related investments?</i>	<i>What was the proportion of sustainability-related investments?</i>	<i>Allocation by investment theme</i>
5.1	<i>What was the asset allocation?</i>	<i>What was the asset allocation?</i>	<i>Allocation</i>
5.2	<i>In which economic sectors were the investments made?</i>	<i>In which economic sectors were the investments made?</i>	<i>Sector allocation</i>
6	<i>To what extent were the sustainable investments with an environmental objective aligned with the EU Taxonomy?</i>	<i>To what extent were the sustainable investments with an environmental objective aligned with the EU Taxonomy?</i>	<i>Taxonomy alignment</i>
6.1	<i>What was the share of investments made in transitional and enabling activities?</i>	<i>What was the share of investments made in transitional and enabling activities?</i>	<i>Transitional activities</i>
6.2	<i>How did the percentage of investments that were aligned with the EU Taxonomy compare with previous reference periods?</i>	<i>How did the percentage of investments that were aligned with the EU Taxonomy compare with previous reference periods?</i>	<i>Historical taxonomy alignment</i>
7	<i>What was the share of sustainable investments with an environmental objective not aligned with the EU Taxonomy?</i>	<i>What was the share of sustainable investments with an environmental objective not aligned with the EU Taxonomy?</i>	<i>Taxonomy alignment</i>
8	<i>What was the share of socially sustainable investments?</i>	<i>What was the share of socially sustainable investments?</i>	<i>Allocation</i>
9	<i>What investments were included under “other”, what was their purpose and were there any minimum environmental or social safeguards?</i>	<i>What investments were included under “not sustainable”, what was their purpose and were there any minimum environmental or social safeguards?</i>	<i>Allocation + descriptive text</i>
10	<i>What actions have been taken to meet the environmental and/or social characteristics during the reference period?</i>	<i>What actions have been taken to attain the sustainable investment objective during the reference period?</i>	<i>Descriptive text</i>
11	<i>How did this financial product perform compared to the reference benchmark?</i>	<i>How did this financial product perform compared to the reference sustainable benchmark?</i>	<i>Product performance</i>
11.1	<i>How does the reference benchmark differ from a broad market index?</i>	<i>How did the reference benchmark differ from a broad market index?</i>	<i>Descriptive text</i>
11.2	<i>How did this financial product perform with regard to the sustainability indicators to determine the alignment of the reference benchmark with the environmental or social characteristics promoted?</i>	<i>How did this financial product perform with regard to the sustainability indicators to determine the alignment of the reference benchmark with the sustainable investment objective?</i>	
11.3	<i>How did this financial product perform compared with the reference benchmark?</i>	<i>How did this financial product perform compared with the reference benchmark?</i>	<i>Product performance</i>
11.4	<i>How did this financial product perform compared with the broad market index?</i>	<i>How did this financial product perform compared with the broad market index?</i>	<i>Product performance</i>

The questions that need to be addressed are rather open-ended and leave much open for interpretation. In the third column in Table 2 there is a short summary of what kind of data point the questions covers. As seen in the table, many of the questions are descriptive texts. Descriptive texts are not as easy to automate as quantitative data since the texts need to be written separately for every fund.

2.1.3 Taxonomy

Morningstar defines the EU Taxonomy as “a classification tool to determine whether an economic activity is environmentally sustainable”. Morningstar writes that the EU Taxonomy will help both investors and other policy makers to make more informed decisions, since it will be easier to identify activities that are designed to make a substantial contribution to environmental objectives and, therefore, help to finance the transition to a more sustainable economy. By having a joint definition of what “green” or “sustainable” is, it sets strict standards to prevent greenwashing. Different performance thresholds will identify what environmentally friendly activities are. The EU Taxonomy forms the foundation of other EU objectives and is also strongly aligned with the SFDR, and the amendments made to Markets in Financial Instruments Directive II (MiFiD II). [5]

The Taxonomy regulation applies to three different stakeholder groups. The first one is financial market participants that offer financial products in the EU. The second group is large companies who are already required to provide non-financial statement under the Non-Financial Reporting Directive (NFRD). The third and last group is the EU and Member states when setting public measures, standards, or labels for green financial products or green (corporate) bonds. [5]

The Taxonomy focus on six environmental objectives. These objectives are:

1. Climate change mitigation
2. Climate change adaption
3. Sustainable use and protection of water and marine resources
4. Transition to a circular economy, waste prevention and recycling
5. Pollution prevention and ion control
6. Protection of healthy ecosystems

[12]

Technical Screening Criteria are defined in which it is decided which economic activities are eligible for screening. Three main principles are used to determine if the activity is aligned with Taxonomy objectives. According to the Taxonomy, a sustainable activity needs to fulfil the three following criteria:

1. Substantially contribute to at least one of the six environmental objectives defined in the Taxonomy
2. Do not significantly harm any of the other environmental objectives (DNSH)
3. Comply with minimum safeguards created to avoid negatively impacting societal stakeholders

[12]

The Taxonomy regulation defines that those activities that are aligned to at least one of the six objectives may contribute to environmental performance of the industry directly or may act as an enabling or transitional activity. To have a direct impact on one of the objectives means that the activity is Taxonomy-aligned, while enabling activities are products or services that enable other activities to make a substantial contribution. Transitional activities are those where there is no technological and economically feasible low carbon alternative, but the activity supports the transition to a climate-neutral economy. The aim of the Taxonomy is to leave no grey area – either an activity is aligned with the Taxonomy, or it is not. There will be no room for other interpretations. [12]

Morningstar notes that what is considered eligible, and the screening criteria, will be updated frequently by the EU Platform on Sustainable Finance. This is to ensure that the Taxonomy is up to date with the most recent findings related to sustainable practises. Morningstar writes that it is highly likely that the Taxonomy framework and requirements will change over time. [5] Table 3 presents the different milestones for the rollout of the EU Taxonomy.

Table 3: Morningstar lists milestones for the rollout of the EU Taxonomy

Milestone	Date
Political agreement reached on taxonomy regulation	18.12.2018
Taxonomy Regulation written into the Official Journal	June 2020
Final Report of the Technical Expert Group	9.3.2020
Newly established 'Platform on Sustainable Finance' and 'Member State Expert Group' to provide ongoing guidance to the Commission as it manages the future development of the taxonomy	31.12.2020
Delegated Act specifying how the corporate disclosure requirements should be applied in practice, by both financial and non-financial companies Adopted	30.6.2021
Delegated Acts with technical screening criteria for climate change objectives Adopted Effective	April 2021 January 2023

Non-financial companies and financial product taxonomy eligibility disclosures	January 2022
Non-financial company alignment disclosures related to climate commence for 2022 financial year	January 2023
Financial product alignment disclosures related to climate commence	January 2024 (estimated)
Delegated Acts with technical screening criteria for the other four objectives	January 2022
Adopted	January 2023
Effective	
Commission review of verification and assurance requirements	2022
Company disclosures related to all objectives commence for 2023 financial year	January 2024
Financial product disclosures related to all objectives commence	January 2024 (estimated)

Table 4 outlines the two different data points that need to be reported under the EU Taxonomy as well as the timeline for when it is mandatory to report on these metrics.

Table 4: Data points asset managers need to report under EU taxonomy regulation

Metric	Mandatory to report	Comment
Taxonomy eligibility	01 January 2022	Asset managers need to report on the aggregated taxonomy <i>eligibility</i> of the underlying securities in the portfolio
Taxonomy alignment	01 January 2023	Asset managers need to report on the aggregated taxonomy <i>alignment</i> of the underlying securities in the portfolio

2.2 DNB's sustainability strategy

DNB Asset Management is a part of DNB Group. DNB Group is a publicly listed company in Norway. It is the largest financial services group in Norway and is also internationally active with several international branches and representative offices. DNB offers financial services such as loans, savings, advisory services, insurance and pension products for both retail and corporate customers. DNB is one of the world's leading shipping banks with a strong position in the energy sector, the fisheries and seafood industry. DNB employs around 9,000 employees. [13]

DNB Group have published a new sustainability strategy for the coming years. DNB identifies that the company has considerable influence on the sustainable transition, both in Norway, and internationally, as one of the largest financial services firms in the energy sector. One of the main points of the strategy is to be a driving force for sustainable transition. DNB's overall goal is to achieve net-zero emissions from the financing and investment activities by 2050. Net-zero emissions meaning the total calculated greenhouse gas emissions from all direct and indirect activities totalling to zero. [14]

DNB Group writes that net-zero emissions will be achieved by sub-targets such as reducing financed emissions by 2030 and financing targets for sustainable activities. Total assets under management are to be steered towards more sustainable alternatives. DNB already has a strong position in diversity and inclusion, but the importance of diversity and inclusion as well as

efforts to combat financial crime and to promote a secure digital economy will be further emphasized. [14]

DNB's sustainable strategy focuses on three priority areas where it is perceived that DNB can have the greatest impact. These three focus-areas are: (1) To finance the climate transition and be a driving force for sustainable value creation, (2) To be a driving force for diversity and inclusion and (3) To combat financial crime and contribute to a secure digital economy.

The priority area will be reached by quantifiable targets for emissions from the credit and investment activities and for the sustainable financing at portfolio level. The goal of the targets is to reduce the level of risk in DNB's credit portfolio and to steer the customers towards sustainable transition. The targets are dynamic and depend on developments in society and in the market, the data availability, and the own level of maturity in different sectors. DNB have identified three dimensions for these quantitative targets. (1) Emission intensity targets in selected industries, (2) Volume and unit targets relating to sustainable financing at portfolio level and (3) Targets for prioritised sustainability challenges.

The second dimension for the quantitative targets, volume and unit targets relating to sustainable financing at portfolio level, is particularly relevant for DNB Asset Management. DNB Group aims to provide financial products and services that promote sustainable activities, solutions, investments and innovation. The Group has identified a target of 100 billion NOK for total assets invested through DNB Asset Management's mutual funds with a sustainability profile by 2025. Another goal is that at least 50% of the net flow in 2025 will go to mutual funds with a sustainability profile. [14]

DNB Group has also identified targets for prioritised sustainability challenges, these targets are first-hand for the advisory services, but the key themes are also relevant to DNB Asset Management. The focus themes are circular economy, the natural environment and biodiversity, start-ups and growth companies, as well as innovation. [14].

In diversity and inclusion DNB Group has identified four different targets:

1. "DNB will have a good gender balance (40/60) in management positions at all levels.
2. DNB will be diverse and inclusive.
3. DNB will help promote gender equality among our customers through products, services and dialogue.
4. DNB's largest suppliers within IT services, consulting and legal services must work systematically on equality and diversity within their own organisations. " [14]

The third priority area for DNB’s sustainable strategy is to combat financial crime and contribute to a safe digital economy. This area is essential for fulfilling DNB’s social responsibility and to ensure compliance. The targets for this priority area are highly relevant to DNB Asset Management and the targets are as follows:

1. DNB reports all suspicious transactions.
2. DNB aims to be the most trusted player when it comes to delivering banking services in a modern digital economy.
3. DNB is committed to processing and using data and AI (artificial intelligence) in a way that ensures a fair, democratic and inclusive society.

[14]



Figure 2: Summary of DNB’s sustainable strategy.

An effort was made to find common aspects for all funds at DNB Asset Management to make the production of sustainability-related material easier. Since DNB Asset Management has around 80 different funds, it is of high importance that there is a common thread in the product strategy. To make marketing and reporting of the funds easier, it was decided that the funds were to be categorized in three different categories. Common factors for each fund in the three categories were then finalized. The product strategy was documented in a policy document. Three main themes were identified across all three categories. The main themes are sustainability indicator alignment, net zero alignment and active ownership. By agreeing on policies and common factors for these three themes, funds can be classified as article 8 or

article 9. The minimum requirements will be defined in the policy documents. At the point of writing (23.04.2022) the policy documents are drafts and are not publicly disclosed yet.

Table 5: Draft of DNB Asset Management's product strategy

Theme	Sustainable transition	Green transition	SDG focus
Sustainability indicator	ESG score	Taxonomy alignment	SDG alignment
Net zero	Percentage of portfolio companies with a SBTi commitment	Percentage of portfolio companies with a SBTi commitment	Percentage of portfolio companies with a SBTi commitment
Active ownership	Sustainable transition away from MSCI Laggard	Green transition away from MSCI laggard	SDG transition away from MSCI laggard

2.3 DNB's plans for marketing sustainability

When marketing the funds that DNB Asset Management manage, it is of highest importance that the fund documentation and the marketing material is regulatory compliant. It is also important that the material and the marketing strategy is aligned with the sustainable strategy of DNB Group.

DNB Asset Management is a Norwegian asset manager. Norway is not a part of the European Union, so the funds domiciled and distributed in Norway are not yet in scope for the Taxonomy or the SFDR. The regulation will be implemented in Norway as well in due time. Many of the funds has a Luxembourg domiciled equivalent and some of the Norwegian funds are distributed in countries in the European Union. Norwegian competitors face the same challenges as DNB Asset Management, and since sustainable investing is a very hot topic at the moment, DNB has decided to implement the regulatory requirements and to publish reports across all its funds regardless of where the fund is domiciled.

Sustainable investing is something that has been of high importance to DNB Asset Management since an ESG team was first introduced in 1989. DNB have had funds with an ESG focus for many years. DNB Asset Management wants to profile itself as one of the asset managers with the most focus on sustainable investing. At the same time, the DNB Bank is one of the most influential and active players in the energy and shipping sectors.

To mitigate risks of incorrect interpretations of the SFDR regulation, DNB Asset Management has taken a quite conservative stance when classifying its funds under the SFDR regulation. DNB Asset Management does not have as many article 8 and article 9 funds as many of its competitors. The company has chosen to take that conservative stance awaiting parts of the SFDR and the Taxonomy being finalized and clarified.

As can be seen in Table 6 below, DNB Asset Management is required to publish certain fund documents under the Norwegian “Securities Funds Act” (Verdipapirfondloven in Norwegian). The SFDR requires pre-contractual information in the fund prospectus and also on the webpage. A sample Sustainability profile can be found in the appendices. DNB Asset Management wants to make ESG information visible across all its marketing material since ESG is integrated across all DNB’s funds and DNB Asset Management wants to profile itself as a key player among firms providing sustainable investments.

Asset managers are required to disclose sustainable information during the reference period of one year under the SFDR. DNB Asset Management has decided to publish ESG reports on a quarterly basis to be as transparent as possible towards the clients.

Table 6: Presentation of ESG in fund documentation

Regulatory required fund documentation	Marketing	Reporting
Fund Prospectus <ul style="list-style-type: none"> • Sustainability Profile • KIID documents • Dnbam.com webpage 	<ul style="list-style-type: none"> • Factsheets with ESG section • Separate presentation of ESG funds on dnbam.com • Investor presentations 	<ul style="list-style-type: none"> • Annual reports for all funds • Quarterly ESG report for article 8 and 9 funds

3 Current infrastructure and available tools

In the third chapter the database infrastructure is presented in short. DNB Asset Management maintains several databases as well as a company data warehouse. The main sources of data that are used in reporting and fund documentation are two databases called the portfolio management database and DNB Asset Management's reporting database. These databases are Oracle relational databases.

Further in this chapter the different tools available for data processing will be presented. Unstructured data need to be imported to the databases, both external data from data providers and data produced in-house. Structured data is used in portfolio management and for reporting. Reports are sent internally within DNB Asset Management and externally to clients.

3.1 Portfolio management system

DNB Asset Management's core system is SimCorp Dimension (SCD). SCD is an integrated portfolio management system built on modules including inter alia investment decision support, order management and settlement, investment pre-trade and ex post controls, payments processing, security pricing, bookkeeping as well as portfolio and fund valuation, where all data are updated in real-time. One of the main advantages is that all functions are totally integrated for seamless straight-through processing, meaning that sources of error are reduced at the same time as the system's stability is enhanced. [15]

SCD is used by the portfolio managers, risk management and middle office functions. Other departments at DNB Asset Management, such as the product management, have read-only access to the system and use the information for reporting and data analysis. Some employees use the user interface, while other employees query information directly from the system's extensive database.

Data from the portfolio management system is in general not used for reporting, but internally for risk management purposes and portfolio management in real time. After the middle office and valuation departments have finalized the Net Asset Value (NAV) calculations the data is exported to DNB's reporting database. That way the departments that use data for reporting can be certain that the information is finalized and error checked.

3.2 DNB's reporting database

DNB Asset Management has an own data warehouse where the primary range of company data schemas are structured. It is separated from the data warehouse of the rest DNB Group since DNB Asset Management is a separate legal entity. Other branches of DNB Group prefer to use Microsoft Server SQL so it might also be challenging to share information between different data warehouses of DNB Group since some databases are Oracle and some databases are Microsoft SQL Server databases. The data warehouse is separated in different data schemas, and these are presented in sections 3.2.1 and 3.2.2.

3.2.1 Performance reporting database

The performance reporting database is one of the data schemas in DNB Asset Management's data warehouse. Daily Net Asset Value numbers and other performance and risk data are stored in this database. The data is finalized and verified and is used for client and fund reporting. All the data in the performance reporting database is historical and net of fees. Data is stored and updated daily, monthly or yearly.

Typical data in this database might be performance, volatility or tracking error aggregated on daily, monthly, year-to-date, or 1,2-,3-,5- or 10-year level. Data is stored both on fund level and each individual security included in a fund portfolio is stored here to be able to report information about which sector, region or country a security belongs to. The data is used for producing client and fund reports, such as KIID documents and factsheets presented on www.dnbam.com and in investor presentations. All the funds have a fund identifier that is equal across all databases. The fund identifier connects the fund with the portfolio in the trading and valuation database, with the fund in the performance reporting database and with all the fund specific information stored in the fund information database.

In general, the underlying data on security level is stored in tables and the aggregated data on fund-level is stored in views. Employees using the data for reporting purposes can double check the underlying data in the tables if needed, but they are receiving processed and aggregated data in views ready for reporting either from the risk management or middle office departments.

3.2.2 Fund information database

The fund information data schema is used by the Product Management department at DNB Asset Management. This database is used for storing fund specific administrative and static information. This database has information about the pre-defined risk level for each fund, identifiers such as ISIN code for each fund, start and end dates for portfolio managers and other

static information needed for reporting. The information is in general static and will not change that often. The underlying texts to fund prospectuses, investment guidelines and fund specific texts are stored in this database. Descriptive texts used in factsheets, KIID documents and monthly reports are also stored in this database. Several new descriptive fields relating to ESG, or sustainable investments have been, or will be, created in order to automatically produce sustainability profiles and sustainability reports for funds classified as article 8 and article 9 funds under the SFDR.

3.3 Other data processing tools

Several external tools or applications are available to the employees at DNB Asset Management. In the following section these six external tools will be presented in short.

3.3.1 Toad

The Tool for Oracle Application Developers (TOAD) is a full-featured development and administration tool for Oracle databases. Toad is a complete administration tool allowing the user to control every major aspect of the database, including storage manipulation, object creation and security control. [16]

Most of the users at DNB Asset Management use Toad to write queries and only a few users have writing access to the databases. New databases or adjustments to current databases in the performance reporting database and the fund information database will be implemented using Toad. Toad is a powerful tool making it easy to get a clear overview of the databases and how the data currently is structured in the databases.

3.3.2 Visual Basic for Applications

Visual Basic for Applications (VBA) has been used in DNB Asset Management for many years and most of the in-house developed tools are built using VBA. One advantage with VBA is that it is available to everybody. Every employee has access to excel and VBA and can use them without installing additional software. Disadvantages with VBA is for example the security risks the usage of macros can entail [17].

The applications are mostly used to fetch data from databases and show it to the user in some form. Types of data might for example be information about a fund such as ISIN codes, management fees or similar. Different kinds of reports that show the performance development of a fund or a client portfolio is also used. A few employees maintain these databases and applications while many employees might use the applications to access the information.

The applications can also be used to write data to the databases. There is no other user interface or back-office software providing the possibility to view information or update the databases except for Toad. Toad is not the most straightforward application to use for an employee lacking technical background, so it is easier to give some of the users access to write information to databases through the VBA macros.

The VBA applications are at times very comprehensive and has a wide range of functionalities. One of the applications called FundDashboard is used to write information to the fund information database, to show information currently in the database, and to produce a wide range of documents used for marketing purposes. Fund prospectuses, investment mandate rules and KIID and Factsheet information are generated using VBA. Working with files with much graphics and texts in excel and VBA is not optimal. DNB Asset Management has around 100 different funds with a few share classes per fund and around 200 client mandates. There is a lot of regulatory requirements such as fund prospectuses and KIID documents that need to be updated and produced for every fund. Given the large number of funds and share classes, it would be impossible for the product management team to keep track of all changes in investment mandates and make sure that the information is correct if the information were not structurally stored in a database.

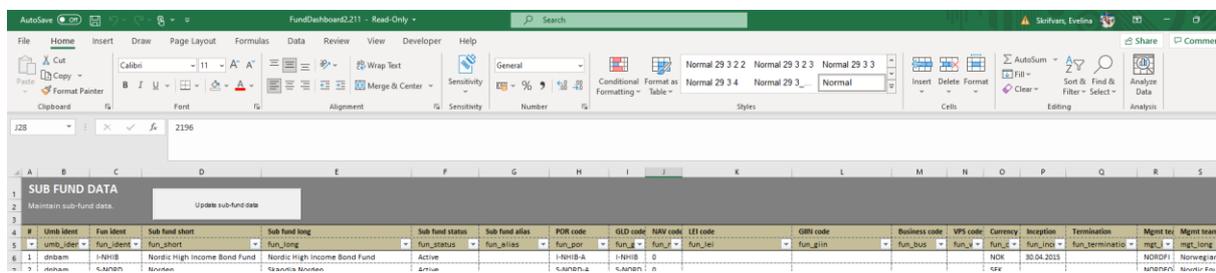


Figure 3: Snapshot from FundDashboard application.

The same application is used both for viewing data and updating data to the databases. Depending on what kind of access have been granted to users, some users use the application to update information and write to the databases, while other users might just view information in the application. All employees at DNB Asset Management have Microsoft office 365 and thereby access to Excel.

Regulatory changes, such as the SFDR, that require changes across all funds are easier to implement if the team need not manually update 100 different word or pdf documents. There is a need to automate this process more than it already is automated, and there is also a demand

for a solution that makes it easier to generate pdf documents and documents with much graphical content. VBA might not be the best tool for this purpose.

There is a need to make fund data available to the sales department and to other departments at DNB Asset Management as well. The employees might have very different backgrounds and their technical knowledge vary a lot. The product management team has identified a demand for a web-based solution where employees can access and view fund data since not all employees are that familiar with Excel. Much of the data regarding exclusions and engagements have been stored locally in excel spreadsheets up until now. Data has been reported on a companywide level, but not for every fund individually. It is an increased risk of data loss or incorrect data being entered if information is only stored in excel spreadsheets. ESG-related data will be stored in a separate schema in the future to make data available for all relevant departments within DNB Asset Management and to reduce the risk of human errors or potential data loss.

3.3.3 Python

Historically, VBA has been the most widely used programming language in DNB Asset Management. Python has developed to be one of the most widely used programming languages in the world, especially for machine learning and data analysis. During the last 5-10 years programming has been more introduced as part of university degrees in for example Economics. That means many of the younger employees at DNB Asset Management have been using Python in their courses when they studied at university. Younger employees usually do not have a background using VBA. Other departments of DNB Asset Management have started to use Python for producing reports and conducting data analysis.

Python is available and widely used among other departments of DNB Group. It was, therefore, a natural step to explore using Python for producing ESG-related reports. The ESG reporting consists of a supplementing document to the prospectus containing SFDR- and Taxonomy-related information. This report is called “sustainability profile”. In the future when level 2 of SFDR has gotten into force, a quarterly ESG report will be published. Both the pre-contractual and the periodic reports consist of much text and graphics. It would not be optimal to use VBA to create reports in PDF format with a lot of texts and graphs or pictures. Every fund classified as an article 8 or 9 fund needs to publish these two reports. Since DNB Asset Management has about 100 funds that potentially could be article 8 or 9 funds, it is desirable to automate the production of the ESG reports.

Python is an open-source, object-oriented programming language. Python is often compared to Tcl, Perl, C# or Visual Basic. Python syntaxes are clear, and Python provides modules, classes, exceptions, high level dynamic data types and dynamic typing. There are interfaces to system calls and libraries as well as to various windowing systems. It is possible to write new built-in modules in C or C++. Python can also be used as an extension language for applications written in other languages that need easy-to-use scripting or automation interfaces. [18]

3.3.4 Insight Platform for Analytics

Python can be used through a shared Insight Platform for Analytics (IPA). The IPA platform is an Amazon AWS cloud-based platform where shared code repositories can be created, and it is also possible to connect to different application programming interfaces (APIs) or create and release own APIs. The IPA Data Science platform is mostly used among Data Scientists across all departments in DNB Group. Python is accessible in the IPA platform through Visual Studio Code. Code repositories are uploaded using git.

3.3.5 Visual Studio Code

Visual Studio Code is a lightweight Integrated Development Environment (IDE) which runs on the user's desktop, and it is available for Windows, macOS and Linux. It comes with built-in support for JavaScript, TypeScript and Node.js and has a rich ecosystem of extensions for other languages (such as C++, C#, Java, Python, PHP, Go) and runtimes (such as .NET and Unity). [19] The difference between an IDE and a regular code editor is that an IDE has more tools such as for example connections to databases, project folders and other shortcuts that makes it a more powerful tool for writing and editing code. [20]

3.3.6 Git

Git is a free open-source version control system to keep track of changes made to a code repository. Git provides the possibility to track development history of source code. All users get their own copy of the complete history. Git can be seen as a tree structure with different branches for different parts of the project. Branches are separated from the project until the branch is merged with the rest of the project or with another branch. This enables the possibility to make changes to the code separately on each branch until the branch is merged with the master branch.

It is common that each developer has his, or her, own remote repository and that the administrator needs to approve changes before the master repository is updated. Updates to the master repository are called "pull requests" and means that a developer notifies the

administrator that proposed changes can be merged with the master repository. Pull requests can then be reviewed and discussed before merging them to the master repository. It is possible to tag changes such as releases or milestones using freetext. The tags enable developers to go back and look at a snapshot of the project at a specific point in time. [21]

3.4 Proprietary tools

The focus of this section is to present the different proprietary tools that exist within DNB Asset Management. The investment decision making system, presented in section 3.4.1, has been developed during many years, while ESG Lab, presented in section 3.4.2, is a newer initiative.

3.4.1 Investment decision making system

DNB Asset Management's proprietary investment decision making system is an Excel add-in developed by DNB Asset Management over a period of more than 20 years. It is a tool used primarily by portfolio managers, but also among other departments within DNB Asset Management. The investment decision making system can be used for pre-trade compliance checks, and to simulate the impact of an investment on the whole portfolio before it is made. ESG metrics such as ESG score and carbon intensity can be tracked in the investment decision making system. The long-term plan is to integrate all new sustainability indicators in the investment decision making system, so that the portfolio managers can use the indicators as a framework for investment decisions.

3.4.2 ESG LAB

ESG LAB is an initiative within DNB Asset Management that was started during the summer of 2021. ESG Lab is a web-based presentation of ESG-related data. Every employee at DNB Asset Management has access to the ESG LAB web page. The main goal with the initiative was to create DNB's own methodology for ESG scoring and to be able to record shareholder engagement activity (e.g. company dialogue). The idea is that members of the ESG team, analysts, or portfolio managers with a focus on sustainable investing, can record and track shareholder engagement activity through the ESG LAB.

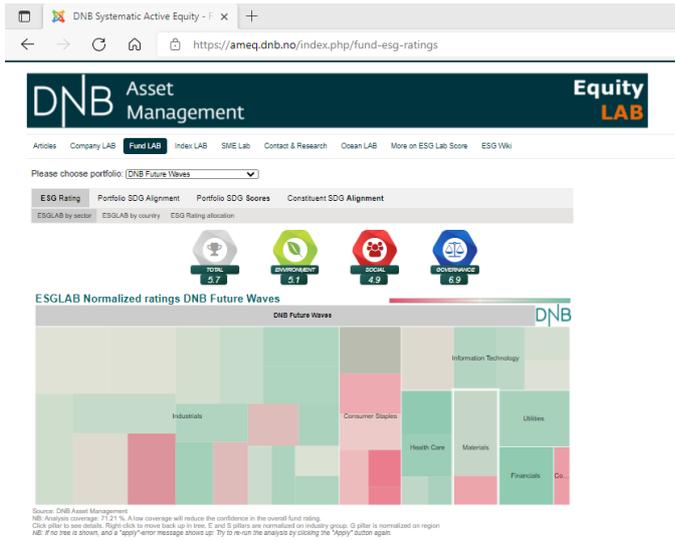


Figure 4: Visualisation of ESG-score for a company in ESG LAB.

Ferraro & Beunza (2018) define shareholder engagement as:

“...the set of practices whereby shareholders try to influence corporations by communicating directly with executives, and which often takes place by filing resolutions for proxy votes on environmental, social and governance issues. Studying shareholder engagement as a mix of public (adversarial) tactics such as shareholder resolutions and private (more

collaborative) practices such as dialogue enables us to identify the mechanisms through which communicative action emerges from strategic action”

Shareholder engagement may be conducted by representatives of DNB Asset Management who send out questionnaires to companies. The questionnaire concerns issues regarding environmental, social or governance aspects of the investee companies’ business models. For example, one of the investment funds at DNB Asset Management has blue economy, such as for example the health of oceans, as an investment theme. A questionnaire with focus on water was sent to the investee companies of this particular fund. Providing data about ESG aspects is only in the inception phase yet, there is a huge gap in data coverage among, for example, small cap companies. Portfolio managers might want to invest in small cap companies in cases where these represent more interesting risk characteristics and potentially higher rewards. Since there may be no, or low, data coverage for some of the companies, DNB Asset Management sends out questionnaires to be able to assess the risks with sustainable aspects for all the companies in the portfolio, also the ones that are not covered by external providers.

The screenshot shows a detailed questionnaire form for 'Apple Inc.' on the DNB Asset Management ESG LAB website. The form is titled 'Form and Date of Contact' and includes several sections:

- User Information:** User: AD044B, HQ Location: USA, Cupertino, ISIN: US0378333005, GICS 2: Information Technology (45).
- Universe Reference (Index):** MSCI AC World, MSCI Custom TMT, MSCI Information Technology, MSCI North America, MSCI US, MSCI World, MSCI World Ex Low Carbon, additional elements - Rtw, TME Index.
- Ownership DAM Portfolios Today: 0.02106%**
- Form and Date of Contact:** Includes radio buttons for Meeting, Call, Letter, Email, IR, Received RFI, and a date field (mm/dd/yyyy).
- Dialogue Topic:** A dropdown menu to select a category.
- Counterparty:** Radio buttons for Board, Executive Management, IR, Sustainability Team, Nomination Committee, and Other.
- Individual or Collaboration & DNB Initials:** Radio buttons for Individual and Collaboration.
- Flag to ESG team?:** Radio buttons for Yes and No.
- Key Takeaways and Comments:** A section with a 'Header:' field and a 'Write here...' text area.

 At the bottom of the form is a 'Register report' button.

Figure 5: User interface for registering engagements with companies.

Shareholder engagements could also be dialogues between DNB Asset Management and the investee companies. A portfolio manager could, for example, have a dialogue with the board of an investee company to try to influence them to act in a more sustainable direction. One example of such a dialogue is DNB Asset Management's dialogues with the Norwegian teleoperator Telenor. The objective of the meeting was to influence Telenor to cease their business in Myanmar due to the government in the country being accused of corruption. [22]

The engagement themes are usually complex and the whole truth might not be visible in the statistics. An event where an investee company did not act in the most ethically sustainable way might affect the ESG score of a company over several years depending on the data provider and their methodology for calculating the ESG score. DNB Asset Management might have had a dialogue with the investee company and have decided to invest in the company, even though the company had an incident or an event several years ago. This was previously not an issue, since a companywide annual ESG report was published, and issues like the one described above were presented in the report. Following the new Taxonomy and SFDR regulations, complex issues like this one might look peculiar in the product-specific reports, especially if the reader is not familiar with the calculation methodology and the underlying data. ESG LAB is an initiative to systematise shareholder engagements and other complex issues.

DNB Asset Management have had a sustainable investment team since 1989 and have been keeping book of voting at general meetings and dialogues with companies for a number of years. This has been presented in an annual companywide report on sustainable investments. The statistics of shareholder engagements have been stored locally in excel spreadsheets, so ESG LAB is a way of structuring data that has been logged for several years and making it more easily available to the rest of the company following the reporting requirements of SFDR.

4 Requirement specifications for sustainability indicators

In this chapter, the requirements needed for reporting on sustainability indicators are specified. Requirements are set by different stakeholders and discussed in section 4.1. The sustainability indicators that are to be reported are defined and illustrated with simple examples in section 4.3.

4.1 Stakeholder specifications

There are several stakeholders that affect the requirement specification for the SFDR or Taxonomy data and the infrastructure behind the data. The data needs to fulfil the requirements set out by regulators. According to the SFDR regulation, sustainability data must be reported on product level [9]. To be able to report on product level, the underlying ESG metrics for all securities in a portfolio must be available so that the aggregated disclosures can be reported on fund level.

DNB Asset Management has also set out its own ambitions for reporting. These ambitions goes further than the legal requirements. This means that a more comprehensive data set than legally required needs to be purchased and processed. The data needed for reporting must be stored on security or issuer level, so that it can be aggregated up to fund level.

European Fund and Asset Management Association writes in their report [23] that there is still much legal uncertainty regarding the classification of funds under the SFDR. Since the legal framework is quite new and the metrics to be disclosed are not yet clearly defined [23], DNB Asset Management needs to define a purposeful methodology for how to calculate these metrics until an official best practise methodology is available.

Other stakeholders affecting the infrastructure and the design solution are different data providers and their license agreements. DNB Asset Management is not allowed to disclose data on security level, or there might be limitations to how many securities that can be disclosed at once. Data will be imported to a pre-stage database where it will be quality proofed before exportation to the performance-reporting database. This also facilitates a means of preventing that data is exported to the performance-reporting database in conflict with data license agreements. The staff extracting data from the performance-reporting database for reporting purposes can be sure that the data is of good enough quality and that they are allowed to use the data in external reporting.

4.2 Structuring of data

The first step in structuring the data was to assess which data points that are needed to produce the reports. Several data providers were offering SFDR or Taxonomy data packages including certain metrics needed for legal reporting. The ESG team made an overview of the different data packages the data providers were offering and presented a suggestion to which data provider to choose. Factors such as the methodology behind the metrics, mapping to different industry code classifications, and overall price and data quality were considered when making the assessment.

The second step of structuring the data was to define a clear methodology for calculating the desired ESG metrics. The current data provider MSCI ESG Research was used as an example. In this stage, much inspiration was collected from their methodology documents on ESG rating and their ESG metrics calculation methodology [24]. The report “Guidance on Metrics, Targets, and Transition Plans” by the group called Task Force on Climate-related Financial Disclosures (TCFD) was also used to determine how to calculate these metrics [25]. A document defining the methodology for all ESG metrics used for reporting was written and is continuously updated. An extract of the methodology document can be found in Appendix 4: Excerpt from Methodology for ESG metrics.

4.3 Sustainability indicators

All the metrics that need to be defined and reported under the SFDR and Taxonomy are called “sustainability indicators” by DNB Asset Management. In the following sections under section 4.3, a short definition of the indicators and some illustrative examples are presented.

4.3.1 Taxonomy eligibility

The European Commission defines taxonomy eligibility in one of its Q&A sessions as follows: “all large undertakings will need to report the proportion of their activities (or the proportion of their exposures to activities) that are considered as eligible in accordance with Article 1(5) of the Disclosures Delegated Act in their turnover, capital (‘CapEx’) and operational expenditure (‘OpEx’) and total assets.” [26].

Data on taxonomy eligibility will be delivered by an external data provider. Since companies have only been obligated to report on Taxonomy eligibility starting 1.1.2022 [5], data availability is very limited. Data providers provide estimated data in cases where reported data is not yet available. Taxonomy eligibility gives an indication of the percentage of revenues that are potentially taxonomy aligned, namely the percentage of revenues that are environmentally

sustainable. The taxonomy eligibility for the investee companies in a portfolio is then aggregated on fund-level.

Taxonomy eligibility is calculated using the following formula:

$$\sum_{i=1}^n Taxonomy_eligibility_percentage_Company_i \times weight_Company_i$$

Example of taxonomy eligibility:

Suppose we have a portfolio consisting of 50% of investments in Security A, 25% of investments in Security B and 20% of investments in Security C. In this section, a sample portfolio consisting of only three securities is used. This is a very simplified example, and the fund portfolios might have short positions, bonds, derivatives, or other types of assets that might make the process for aggregating underlying data on fund level more complex. An excerpt of the methodology document is available in Appendix 4: Excerpt from Methodology for ESG metrics.

Table 7: Taxonomy eligibility for the underlying securities in the portfolio

Security	Weight	Taxonomy eligibility
Security A	50 %	100%
Security B	25%	15%
Security C	20%	20%
Cash	5%	-

The taxonomy eligibility for this portfolio would be:

$$(50\% \times 100\%) + (25\% \times 15\%) + (20\% \times 20\%) + (5\% \times 0) = 57.75\%$$

4.3.2 Taxonomy alignment

Taxonomy alignment needs to be reported on fund-level starting 1.1.2023. Asset Managers need to follow 4 steps when calculating taxonomy alignment. A clear methodology for implementing taxonomy alignment is not yet available in DNB Asset Management, but the metric will be included in the methodology document in due time.

4.3.3 ESG score

The weighted average ESG score on fund level is something that has been incorporated in the proprietary investment decision system already before the implementation of the SFDR regulation. Data on ESG score on security level is provided by an external provider. A clear

methodology for how to aggregate this metric on fund level and how to treat missing data was defined and documented internally.

$$\sum_{i=1}^n ESG_score_Company_i \times normalized_weight_Company_i$$

Using the same example portfolio, with the following underlying ESG metrics:

Table 8: ESG score for the underlying securities in the portfolio

Security	Weight	Normalized weight	ESG score
Security A	50 %	53 %	7.8
Security B	25%	26 %	5.3
Security C	20%	21 %	2.9
Cash	5%		-

We get an ESG score of:

$$(53\% \times 7.8) + (26\% \times 5.3) + (21\% \times 2.9) = 6.1$$

4.3.4 Carbon intensity

Carbon intensity has also been included in the portfolio management system for several years. Carbon intensity is also the weighted average carbon emissions on scope 1 and 2 GHG emissions in relation to revenue of the issuer aggregated on fund level. A clear methodology for how to aggregate this metric on fund level and how to treat missing data was defined and documented internally.

$$\sum_{i=1}^n Carbon\ intensity\ company_i \times weight_company_i$$

Suppose we have the same example portfolio as in the calculations above, with the carbon intensity as stated in the table below.

Table 9: Carbon intensity for the underlying securities in the portfolio

Security	Weight	Normalized weight	Carbon intensity
Security A	50 %	53 %	52
Security B	25%	26 %	10
Security C	20%	21 %	135
Cash	5%		-

We now get the following carbon intensity on fund-level:

$$(53\% \times 52) + (26\% \times 10) + (21\% \times 135) = 58$$

4.3.5 Potential Avoided Emissions

Potential Avoided Emissions is a manual assessment conducted by an external data provider. A thorough report of potential avoided emissions is published annually for the fund where the metric is relevant. The methodology is trying to estimate how much emissions that has been avoided by investing in companies with a focus on renewable energy and sustainable energy solutions. [27]

The estimated value for the underlying securities is aggregated and a weighted average is calculated for the portfolio. The formula for calculating potential avoided emissions on fund-level is:

$$\sum_{i=1}^n \text{Potential avoided emission company}_i \times \text{weight company}_i$$

Using the same sample portfolio as in the previous examples and assuming we have the estimated potential avoided emissions as in the table below:

Table 10: Potential Avoided Emissions for the underlying securities in the portfolio

Security	Weight	Normalized weight	Potential Avoided Emissions
Security A	50 %	53 %	192
Security B	25%	26 %	101
Security C	20%	21 %	57
Cash	5%		-

Gives us a portfolio value of:

$$(53\% \times 192) + (26\% \times 101) + (21\% \times 57) = 139$$

4.3.6 PAI indicators

Principal adverse impact indicators need to be reported on company level for all funds that have stated that they take principal adverse impacts into account in investment decisions. [9] DNB Asset Management have the ambition to report on PAI indicators for all its funds during

the second half of 2022. Several clients and other stakeholders are requesting this information already even though it is not mandatory to report on fund level until 1.1.2023.

There are 18 mandatory PAI indicators asset managers need to report on and then asset managers also need to choose at least one additional social indicator and one additional environmental indicator [9]. In total data providers provide between 50 and 70 indicators on security level that the asset managers need to aggregate on fund level. A complete list of all PAI indicators can be found in Appendix 3: List of PAI indicators.

Companies have not been obligated to report on the PAI indicators previously which means that the data availability is quite poor for some of these indicators. Data providers calculate estimates when reported data is not available. Since a lot of data is estimated due to lack of reported data and different data providers might have different methodologies, there are many differences in the data between different providers. DNB Asset Management has a project group working on comparing different data providers. The aim is to choose a data provider in Mid-May and then implement this data set during the summer 2022. PAI indicators will most likely not be included in the sustainability report published in the autumn 2022.

4.3.7 Exclusions

DNB Asset Management has a [Group standard for responsible investments](#) that all investments must adhere to. DNB Asset Management has identified several exclusion lists. Depending on the investment mandate and the SFDR classification different funds might exclude companies active within different industries or sectors. For example, funds with a mandate to minimize carbon emissions have a low carbon exclusion list with certain exclusion criteria relating to carbon emissions. The exclusion list is continuously updated by the ESG team. One fund might exclude a company while another fund might invest in the same company.

The exclusion topics DNB Asset Management has identified are 1) environment/human rights, 2) cluster munitions, 3) nuclear weapons, 4) environment, 5) human rights/labour rights, 6) corruption, 7) pornography, 8) tobacco, 9) coal, 10) oil sands and 11) unacceptable greenhouse gas emissions. Different minimum thresholds like for example maximum 5% of revenues is applicable to topic 2, 3, 7, 8, 9, 10. Different funds might have different thresholds. [28]

Exclusion data consists of a start date for the exclusion, possibly an end date and then it is also monitored which companies that are included in which fund's investment universe. For example, the fund DNB Norge has the reference index OSE Oslo Børs Mutual Fund TR in NOK [29]. All the stocks included in the reference index are included in the investment

universe of the fund. Exclusion lists are mapped to stocks on company level. Fixed income funds might have several bonds with the same issuer, the system needs to be updated to map the underlying bonds to the correct issuer so that the exclusion lists are correct for fixed income funds also.

4.3.8 Voting

DNB has specific voting guidelines for Norway and other global guidelines for voting. Voting is conducted through an external party that provide visualization of the voting statistics. The voting can be found on dnbam.com. It is also possible to export reports containing voting statistics directly from the portal. [30]

DNB Asset Management plans to disclose metrics such as number of meetings voted at, meetings per sector, region, and country. Another metric is if DNB Asset Management has voted against management or in line with suggestions from management. Share of capital in the fund that has been voted for is also planned to be disclosed.

4.3.9 Dialogues

Dialogues are logged in the proprietary platform ESG Lab. Portfolio managers can log dialogues they conduct with companies and if certain ESG topics have been flagged to the ESG team for follow up. Engagements with companies where the ESG team have participated are more thoroughly documented.

Progress in the ongoing engagements is measured and different milestones are defined. Several ESG topics might be discussed in the same meeting which means that one meeting might have several engagements. Different metrics such as if it was a physical meeting, phone call or letter are also documented. DNB Asset Management plans to disclose these metrics in the periodic report to be published in autumn 2022.

Table 11 presents a summary of all the sustainability indicators and the methodology for aggregating the data.

Table 11: Overview of sustainability indicators

Indicator id	Metric	Methodology	Internal/External Data provider	Legally required for reporting	DNBAM approach
1	Taxonomy eligibility	Weighted average percentage for the fund	External	If taxonomy is relevant for the fund; yes	DNB AM will not disclose this number for funds where it is not relevant
2	Taxonomy alignment	Weighted average percentage for the fund	External	If taxonomy is relevant for the fund; yes	DNB AM has ambitions to report on this during H2 2022
3	ESG score	Weighted average score for the fund	External	If sustainability indicator; yes	DNB AM has chosen to report this metric for all its funds
4	Carbon intensity	Weighted average carbon intensity (WACI) for the fund	External	If sustainability indicator; yes	DNB AM has chosen to report this metric for all its funds
5	Potential Avoided Emissions	Weighted average for the fund	External	If sustainability indicator; yes	DNB AM is reporting this metric for the funds where it is relevant and used as a sustainability indicator
6-30	Principal adverse impact indicators	Weighted average for the fund	External	Required from 1.1.2023 under SFDR level 2	DAM has ambitions to report on these metrics during H2 2022
	Exclusions	Aggregated on fund-level	Internal	Required from 1.1.2023 under SFDR level 2	DNB AM has chosen to report this metric for all its funds
	Voting	Aggregated on fund-level	External	Required from 1.1.2023 under SFDR level 2	DNB AM has chosen to report this metric for all its funds
	Dialogues	Aggregated on fund-level	Internal	Required from 1.1.2023 under SFDR level 2	DNB AM has chosen to report this metric for all its funds

5 System design

This chapter is divided in two parts. First, the system design will be presented and, secondly, the focus will be on the desired end products; the sustainability profile, fulfilling the requirements for pre-contractual information, and the sustainability report, fulfilling the reporting requirements for periodic reports under the SFDR and Taxonomy regulations.

5.1 Infrastructure design

The import feed was improved through introducing a new pre-stage database that will be presented in detail in section 5.1.1. New tables will be created in the performance-reporting database and in the fund information database to provide new fund-specific information and metrics related to the SFDR and Taxonomy disclosures. The implementation plan for these tables will be presented in section 5.1.2.

5.1.1 Pre-stage master database

A new, so called, pre-stage database was created. This database is designed to be a master database that all data will be fed through, before being exported. When data has gone through a quality check, it will be exported to other databases where it is needed.

The data steward in charge of the pre-stage database also has control of license agreements with external data providers. By feeding data through this master database, it can be secured that data is not distributed across different departments of DNB Asset Management, contrary to what is allowed in the data license agreements.

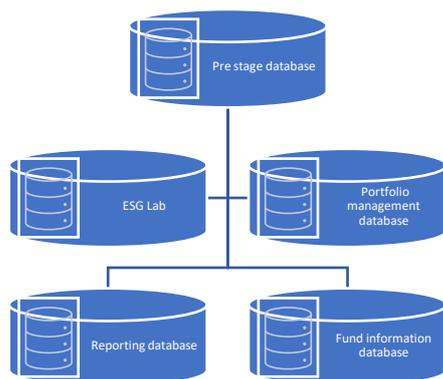


Figure 6: Database infrastructure.

ESG score and carbon intensity data on security level has already been used internally within DNB Asset management. The first step of the implementation of SFDR was to import the old data set to the pre-stage database and recreate the aggregated ESG score and carbon intensity on fund level using the new setup for data import. ESG score and carbon intensity data are

received daily from a third-party data provider. Previously, the portfolio management database and the investment decision making system both imported data directly from the source file, which led to differences between the data sets, depending on which system that was used.

Since there are many underlying securities, and different securities can be mapped to the same issuer, the data import may fail in case the mapping to the issuer is not correct. Importing the same underlying data separately to several systems increases the risk of errors and differences between different systems. By using the same master database, the risk of differences between the two systems will be mitigated. The plan is to only calculate the aggregated values once in the portfolio management system and then distribute the values from that database to all systems where the metrics are used. The methodology for aggregating the values was thoroughly documented during spring 2022. An extract of the methodology document can be found in Appendix 4: Excerpt from Methodology for ESG metrics.

5.1.2 New tables in the performance reporting database

A new “sustainability” schema will be created in the company data warehouse. The underlying data from the portfolio management database will be stored in tables while the aggregated data on fund level is stored in one view, or several views, in the database schema. The aggregated data from view(s) is primarily to be used for reporting, but the underlying data on security-level is available in tables as well if needed.

The first step of implementing the new data sets in the databases was to create a mock-up in Excel. An Excel spreadsheet is very similar to the view of the contents of a database in Toad, so it was a natural step to plot down a first draft in Excel of how the output from the portfolio management database should look. The product management department specified the desired output needed for reporting, and the IT department then came with input and potential changes to the desired setup. At the time of writing (18.04.2022) most of these datasets have not yet been implemented, and the setup presented below is only a plan for implementation and might be subject to change.

The sustainability indicators presented in chapter 4 are located in a table with underlying data on security level for that specific indicator. In the table below is an example of the table structure on security level for taxonomy eligibility. Please note that all sample data in the table below is fictive.

Table 12: Database setup for taxonomy eligibility on security level

Description	Date	ISIN	LEI	Revenue	Capex	Opex	Share of taxonomy eligible activities
Name	Date	ISIN	SECIssuerLEI	REV	CAPEX	OPEX	TAX_ELIG
Data type	Date	Char	Char	Number	Number	Number	Number, percentage
Sample data	31.12.2021	NO1239468	549300KAPJBWRKIG9Q38	2304800575.3	1234567.99	233456643.44	67.34

International Securities Identification Number (ISIN) code is a standard used to identify individual securities such as bonds, stocks, futures and options. Securities are assigned an ISIN to facilitate unambiguous clearing and settlement procedures. An ISIN code is a 12-digit alphanumeric code and unifies different ticker symbols that might vary across exchanges and currencies for the same security. [31] ISIN codes are one of many security tickers used at DNB Asset Management.

One company might have different share classes, or one issuer might issue many bonds. Since it is the same underlying issuer, a Legal Entity Identifier (LEI) code is used to identify the issuer and only store static data about the issuer once. Static data might be for example country, sector or sustainability-related metrics such as ESG score. LEI codes were originally requested in 2011 by the G20 countries and was created by the Financial Stability Board (FSB) to uniquely identify legal entities participating in financial transactions across the globe. [32]

The LEI code is a 20-character, alphanumeric code that is based on the ISO 17442 standard developed by International Organization for Standardization (ISO). The LEI code contains information about the ownership structure and answers the questions of ‘who is who’ and ‘who owns whom’. LEI codes are publicly available and works as a global directory which enhances transparency in global markets. [33]

Revenue is self-explanatory and Capex and Opex can be explained as capital expenditure and operational expenditure. Capex represents the investments that are made with a long-term view, while opex stands for short-term operational expenses. [34]

The data on security level is then aggregated using the methodology specified in in chapter 4 and in Appendix 4. The aggregated data on fund-level is available in a view that is planned to have the design shown in the table below.

Table 13: Database setup for taxonomy eligibility on fund-level

Description	Date	Fund identifier	Share of taxonomy eligible activities
Name	Date	Fun_ident	TAX_ELIG
Data type	Date	Char	Number, percentage
Sample data	31.12.2021	B-BIOT	65.39

A setup where all metrics are called indicators and every metric has an indicator id will be created. Information about which indicators that are relevant for each fund is stored in the fund information database. Below is an example of the table structure for the sustainability indicators. The data is available on aggregated level in views and the underlying data on security level is available in tables.

Table 14: Example of sustainability indicator table

Fund identifier	TAX_ELIG	ESGi	ESG	CO2
F-BIOT	65.39	7.34	8.45	120.20
F-NTEC	20.56	5.64	5.88	35.30

A similar exercise was made for the 9 data sets and a total of 9 new tables and views are planned to be added. Below is a summary of all new tables in the performance reporting database and a rough estimate of when the data will be available.

Table 15: Datasets to be implemented

Metric	View/table	Data estimated to be available
ESG score	View + table	30.04.2022
Carbon intensity	View + table	30.04.2022
Taxonomy eligibility	View + table	30.04.2022
Taxonomy alignment	View + table	31.12.2022
Potential Avoided Emissions	View + table	31.12.2022
Principal Adverse Impact indicators	View + table	31.12.2022
Exclusions	View	30.06.2022
Voting	View + table	30.06.2022
Dialogues	View + table	30.06.2022
SDG alignment	View + table	30.06.2022

5.1.3 New tables in the fund information database

Much fund specific ESG information has been reported and produced ad hoc previously. Ad hoc reports that are not documented or systematically created might be hard to recreate at a later point in time. Sometimes the personnel in the team might change. It makes it harder to keep track of what has been reported and where the data was gathered if the reports are not thoroughly documented.

In the fund information database, a whitelist with which indicators that are relevant for which fund will be stored. The indicators marked as relevant for a specific fund will then be mapped

to the corresponding indicators in the indicator view. In that way it is possible for the product management department to keep track of which indicators are to be reported for each fund. In the table below a sample of a few indicators and the connection between the indicators and the fund information database is presented. In total the number of indicators is estimated to be around 40-60 so the table will, most likely, be more comprehensive than presented below.

Table 16: Example of mapping between fund and which sustainability indicators that are relevant

Description	Date	Fund identifier	Taxonomy eligibility relevant	Taxonomy alignment relevant	ESG score relevant	Carbon intensity relevant	Potential Avoided Emissions relevant	Principal Adverse Impacts: GHG Emissions Scope 1 relevant
Name	Date	Fun_ident	TAX_ELIG	TAX_ALIG	ESGi	CO2	PAE	GHG_1
Data type	Date	Char	Binary	Binary	Binary	Binary	Binary	Binary
Sample data	31.12.2021	F-BIOT	No	No	Yes	Yes	No	Yes

To produce the pre-contractual product disclosure in the sustainability profile, a few general texts that was the same across all funds were written. The sustainability profile is documenting the sustainability aspects of the investment mandate, so a few fund-specific texts also had to be written. These were entered into the fund information database. Until now this information has not been stored in a database, the ESG team or the product management team have only been keeping track of this themselves and only reported this information on an ad hoc basis. Table 17 presents examples of the static fund information that was entered into the fund information database.

Table 17: Example of fund specific texts entered in the fund information database

Description	Fund identifier	Fund Longname	SFDR article	Measurement date	Benchmark	Intro_text
Name	Fun_ident	Longname	Article	Date	BM_text	Intro_text
Data type	char	char	integer	Date	char	char
Sample data	F-BIOT	DNB Bioteknologi	8	31.12.2021	Fondets referanseindeks er Nasdaq Biotechnology Index.	DNB Bioteknologi er et aktivt aksjefond som hovedsakelig investerer i....

5.2 Data usage and reporting

The data sets mentioned in section 4 are needed for portfolio management and for reporting. The sustainability metrics are to be used in investment decisions. Data, such as for example the carbon intensity of a company, might be used for positive screening, that is, as a criterion to select which companies that are included in a portfolio. The SFRD module in the portfolio management database can be seen as an API that aggregates the metrics according to the methodology defined in the methodology document. These metrics are then fed on to other systems for internal use within DNB Asset Management or for external reporting.

Two fund-specific reports have been developed to fulfil the reporting requirements under the SFDR and Taxonomy regulations. The pre-contractual report is called “sustainability profile” and is an appendix to the fund prospectus. The sustainability profile is presented more in detail in section 5.2.1. The other report is a periodic report called “sustainability report” with sustainability disclosures for the reporting period. The sustainability profile is to be updated whenever material changes are made to the investment mandate. The information is static except for a snapshot of the current ESG score and carbon intensity for the fund. These numbers are updated at least annually or whenever the sustainability profile is updated.

The periodic report (hereafter called sustainability report) contains performance information for the sustainability indicators mentioned in section 4. DNB Asset Management has chosen to publish these reports quarterly. These two reports are publicly available to clients. The datasets presented in chapter 4 are needed to produce these reports and especially the sustainability report. The sustainability reports are reoccurring and one of the priorities in the product management team is to create a report template that will work with all types of funds and that can be automated as far as possible. This is achieved by making sure that the same fund-specific texts can be reused in several fund documents such as the KIIDs, factsheets and sustainability reports.

5.2.1 Sustainability profiles

Asset managers need to disclose sustainability related information in the pre-contractual information. The pre-contractual information is the fund prospectus. DNB Asset Management decided to publish an appendix called “Sustainability profile” in connection to the Norwegian prospectuses. A sample Sustainability profile can be found in Appendix 1: Sustainability Profile – example DNB Future Waves.

A sustainability profile has been published for all Norwegian domiciled funds classified as article 8 or article 9 under SFDR. Data needed for the Sustainability profile is the ESG score and Carbon intensity of the funds. The Sustainability report disclose information about the investment mandate and how the asset manager is taking environmental or social characteristics into consideration when making investment decisions. Level 2 of the SFDR will also require the asset managers to disclose projected shares of the sustainable investments and how principal adverse impacts is taken into consideration.

The first draft of the report was created in Microsoft Office Word and the layout of the document was produced manually. The different sections of the document were studied, and it was decided that some text sections were general and did not change between the different funds. Certain information such as for example the benchmark index and the description of the investment mandate is fund specific and may differ from fund to fund. New tables were created in the fund information database for the fund specific ESG information and for the general texts.

Traditionally DNB Asset Management has used an external provider to produce material with graphs and texts. VBA has also been used when DNB Asset Management has produced fund documents in-house. Other departments at DNB Group are or have started to use Python for data analysis. It was decided that VS Code will be used for creating the Sustainability profiles. The sustainability profiles are not as detailed and do not contain as much data as the periodic report, so it was a project of suitable scope to start with when implementing Python in the reporting flow.

5.2.2 Sustainability reports

Under the SFDR level 2 asset managers need to report on the performance of the sustainability indicators and how the investment strategy promised in the pre-contractual information have been conducted in practise. The questions to be included in the periodic report under SFDR level 2 can be found in Table 2 in section 2.1.2. Sustainability reports will be produced for funds classified as article 8 or article 9 under the SFDR.

At the time of writing (18.04.2022) the data sets needed for the quarterly sustainability reports have not been finalized yet. A first mock-up has been made in Microsoft Word to get a first draft of the layout. The mock-up was recreated in Python using VS Code. The output from Python is available in Appendix 2: Quarterly Sustainability Report – example DNB .

The product management department has started a project of mapping which data points are to be included in the sustainability reports. Since the SFDR level 2 got pushed to 1.1.2023, the first sustainability reports produced during autumn 2022 do not have to fulfil all requirements under the SFDR level 2. An extensive comparison of what other competitors are reporting was conducted, and based on that, and the resources available, a priority list of which data points to include in the report was created. Data points that will not be available at the time of production for the first report is planned to be included in later versions of the report. Below in Table 18 is a list of all sections that will be included in the first sustainability report.

Table 18: Planned contents of the sustainability reports

Section	Description	Data type/ visualisation	Page number
Title page	Title, fund name and report name	Pictures and static text	1
Key figures	ISIN code, AUM, fund name	Text, fund statistics	2
Investment strategy	Text about investment strategy	Static text	2
Exclusion list	Themes for exclusions such as for example tobacco or gambling	Static texts/ icons	2
ESG overview	ESG score, ESG rating distribution	Static texts and graphs	3
Carbon intensity	Carbon intensity, carbon footprint	Static texts and graphs	4
Taxonomy eligibility	Taxonomy eligibility	Static texts and graphs	4
SDG alignment	SDG alignment	Static texts and graphs	5
Top 15 holdings	Company name, portfolio weight, sector, sub-industry, country	Table	6
Actions taken: exclusions	Exclusions by sector and theme, total number of exclusions	Static texts and table	7
Actions taken: voting	Voted in line with management, voting by country/region and industry, share of AUM voted for, share of company voted for	Static texts and graphs	8
Actions taken: Manager dialogues	Total number of dialogues portfolio manager have had	Static texts and graphs	9
Actions taken: engagements	ESG engagements where the ESG team have participated and milestones have been registered, milestone status and milestone progression	Static texts, tables and graphs	10
Glossary	Glossary	Static texts	11
Disclaimer	Mandatory disclaimer	Static text	11
Last page	Coloured page with logo	Logo	12

The type of data or visualisation can be seen in the third column in Table 18. Naturally almost all sections contain static text about the investment strategy or the metric to be presented. These texts are texts such as which data provider has been used to produce the metric, what is disclosed in the graphs and similar. There are some tables and many graphs to be included in the report. The graphs may prove to be challenging to implement in the code for the reports,

but since the graphs are rather similar, it should be straightforward to reuse some of the code to generate the same kind of graphs with different numbers.

One challenge with the production of the report may be that the data might vary a lot across funds. One example is excluded companies; one fund might have many exclusions, while other funds might have zero or only a few exclusions. A table with 50 exclusions across different topics looks nicer than a table with one exclusion for one topic. It is also not desirable to show a table with 0 excluded companies with revenue from nuclear energy when the relevant investment universe is technology stocks. It is unnecessary to lead the attention of the customer to exclusions that are not relevant for that specific fund. Challenges like these can most likely be solved by creating logic that will include the exclusion section if the number of exclusions is above a certain threshold and just print an explanatory text if the number of exclusions is below a certain threshold.

6 Implementation

In this section the planned use case will be presented and then the implementation of the two reports designed to fulfil the reporting requirements under the SFDR and the Taxonomy will be presented more in detail in sections 6.2 and 6.3.

6.1 Usage of sustainability indicators

The implementation of the data sets mentioned in section 4 is still in process or in the planning phase for some of these data sets. The data will be used as a framework for decision making. Data will be exported to the proprietary investment decision making system, in order for the portfolio managers and analysts to use the metrics for investment decisions. An example of a criterion where sustainability metrics can be used for investment decisions is in cases of positive screening. Companies with carbon intensity below a certain threshold might be chosen into the portfolio based on their carbon intensity values.

Since some of these metrics are mentioned in the pre-contractual report, the sustainability profile, the risk department also need to follow up on these metrics. If it for example, is promised in the sustainability profile that the ESG score of a fund will be higher than the ESG score for the benchmark, the risk department need to follow up on this investment restriction and make sure that the portfolio managers are acting within their investment mandate.

This is all connected in DNB Asset Management's product strategy for sustainable investments. Funds are categorized based on their investment strategy, and whatever is promised and mentioned in the sustainability profile to fulfil the pre-contractual requirements under SFDR level 2 and Taxonomy should be available data to the portfolio managers when they make investment decisions. The statements made in the sustainability profile are then followed up continuously in the sustainability report that is planned to be published quarterly.

The following sections in chapter 6 gives two practical examples of how the data sets presented in section 4 and 5 are used. Based on the background work of defining the methodology and implementing the metrics in the portfolio management database and later in the performance-reporting database the processed data is used to produce sustainability profiles and sustainability reports. The layout for the two reports will be very similar to increase recognition and to minimize manual work. The same methods for creating the reports will be used as far as possible.

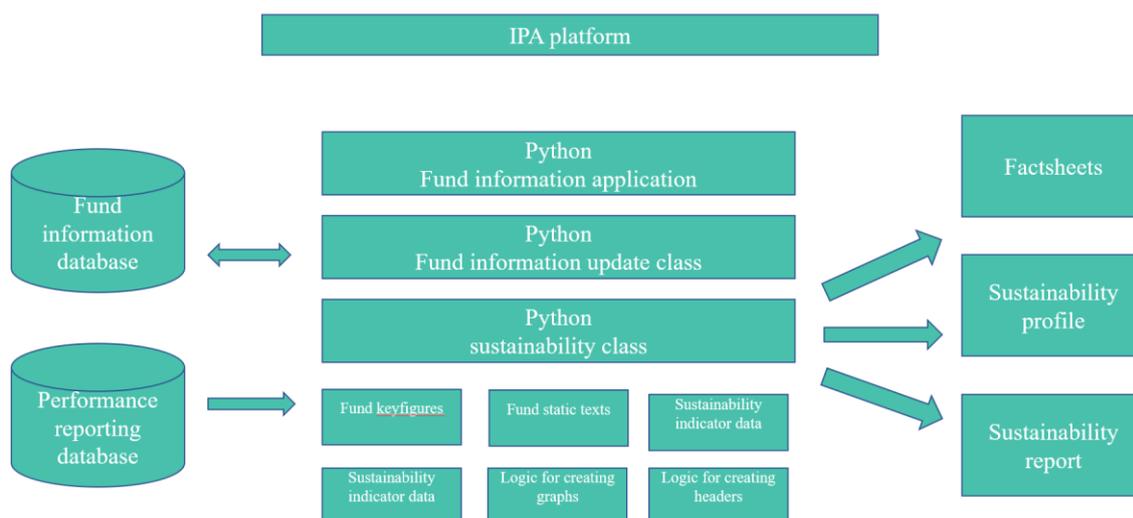


Figure 7: Overview of data model for sustainability reporting.

Figure 7 shows an overview of the planned data model for sustainability reporting. The idea is to build an application that can be used to update static fund texts in the fund information database. Currently the texts are updated using VBA. A web-based user interface where the user can view, and update texts is more user-friendly compared to processing long text strings in VBA.

A first version of a python class with building blocks has been created. The different building blocks can be used to produce sustainability reports and sustainability profiles. An external provider is currently producing factsheets. The idea is to use the sustainability indicator data to produce factsheets and other fund documents such as KIID or prospectuses. Over time the idea is to use the sustainability class for all sustainability reporting.

6.2 Sustainability profile

The first versions of the sustainability profiles were produced in MS Office Word. Only a small number of funds were classified as article 8 or 9 and needed a sustainability profile so it was decided to produce the reports as regular Word documents that was saved as pdf documents and uploaded on www.dnbam.com. To be able to automate the production of these reports it was decided to use Python. Python has not been used at DNB Asset Management before, so this was a good project to start with. There were only two ESG metrics included in the report and the reports could be produced in MS Office Word if needed as a backup solution.

6.2.1 Data collection and production

Sustainability profiles has already been produced once during the summer 2021. The natural first step in automating this report was to look at the current setup and perform a mapping of fund specific information and general information. The fund specific information was stored in a table in the fund information database and the general information was stored in another table in the same database.

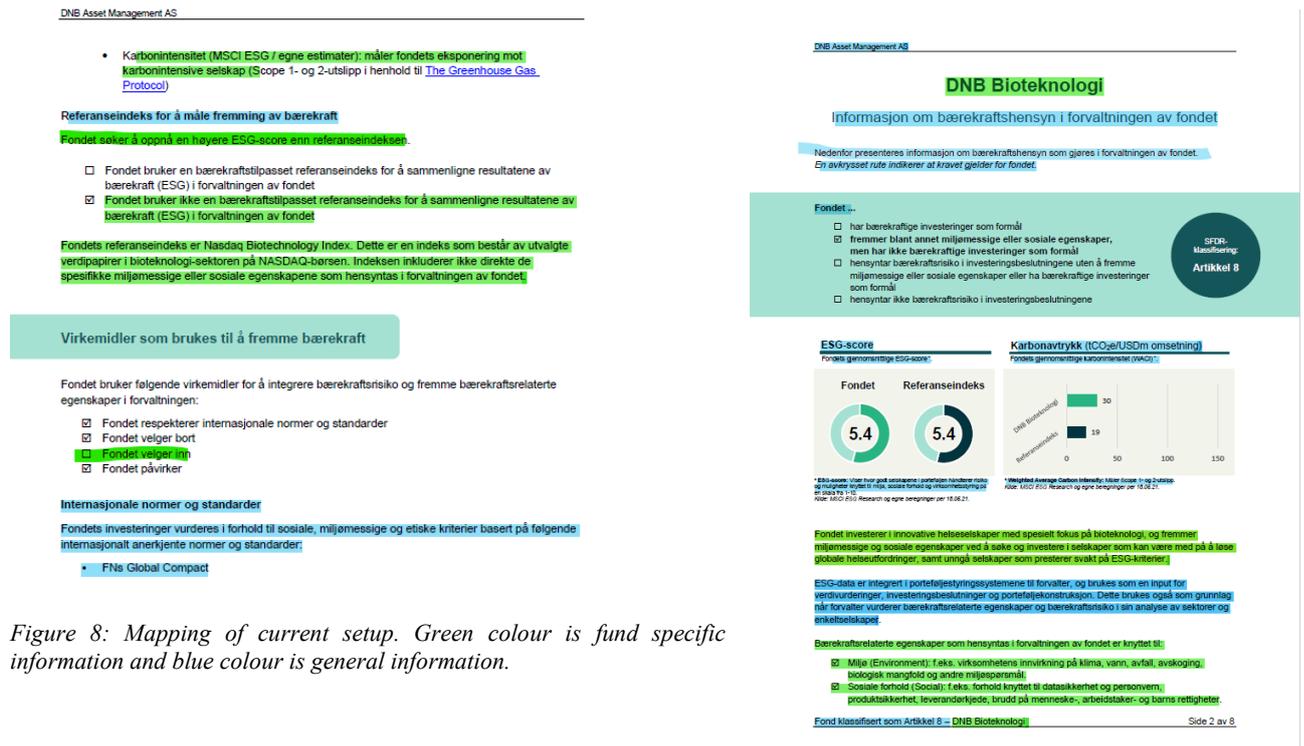


Figure 8: Mapping of current setup. Green colour is fund specific information and blue colour is general information.

6.2.2 Production of reports using Python

First a mapping of good packages to be used for generating pdf reports in Python was conducted. It was decided that FPDF2 was going to be used for this purpose. FPDF2 is a package originally written in php but converted to Python. It contains many functions for importing own fonts, defining font sizes and drawing circles and graphs that can be exported as a pdf document. FPDF2 also provide a quick and easy way to insert pictures to the document.

Other packages needed for the purpose were packages to import and structure data and packages to produce plots and bar charts. The packages used were Numpy, Matplotlib and Image PIL. At this stage of implementation there is still a technical issue with accessing the databases of DNB Asset Management. To produce the sustainability profiles, the output from the database was saved as a csv file and imported into Python. This was a backup solution that worked well for this report since there was mostly sections with texts and only two metrics. Uploading a csv file is not a suitable solution for producing reports of larger scale.

```

self.set_font(textfont, '', 10)
self.cell(0,5,'Fondet ekskluderer selskaper involvert i:',0,1,'L')
self.ln(2)

x1y1='4'
x2y1='Klasevåpen og antipersonellminer'
x1y2='4'
x2y2='Kjemiske og biologiske våpen'
x1y3='4'
x2y3='Atomvåpen'
x1y4='4'
x2y4='Tobakk (produksjon)'
x1y5='4'
x2y5='Pornografi (produksjon)'
x1y6='4'
x2y6='Kullbasert kraftproduksjon og gruvedrift¹'
x1y7='4'
x2y7='Utvinning fra oljesand²'
if str(fund_data.Exclusion_type[i])=="Extended" or str(fund_data.Exclusion_type[i])=="Low carbon":
    x1y8='4'
else:
    x1y8=''
x2y8='Konvensjonelle våpen'
if str(fund_data.Exclusion_type[i])=="Extended" or str(fund_data.Exclusion_type[i])=="Low carbon":
    x1y9='4'
else:
    x1y9=''
x2y9='Kommersiell pengespillvirksomhet'
if str(fund_data.Exclusion_type[i])=="Extended" or str(fund_data.Exclusion_type[i])=="Low carbon":
    x1y10='4'
else:
    x1y10=''
x2y10='Alkohol (produksjon)'
if str(fund_data.Exclusion_type[i])=="Low carbon":
    x1y11='4'
else:
    x1y11=''
x2y11='Fossile drivstoff (olje, gass, kull)¹'

data=np.array([[x1y1,x2y1],
               [x1y2,x2y2],
               [x1y3,x2y3],
               [x1y4,x2y4],
               [x1y5,x2y5],
               [x1y6,x2y6],
               [x1y7,x2y7],
               [x1y8,x2y8],
               [x1y9,x2y9],
               [x1y10,x2y10],
               [x1y11,x2y11]])
for row in data:
    #self.set_auto_page_break(auto= 'false', margin = 15)
    self.set_x(incline_position-5)
    self.set_font('ZapfDingbats', '', Zapfsize)
    self.cell(3, 3,row[0],1)
    self.set_auto_page_break('false')
    self.set_font(textfont, '', 10)
    self.set_x(incline_position)
    self.write(5,row[1],0)
    ypos=self.get_y()
    if ypos>270:
        self.add_page()

```

Figure 9: Snapshot of logic for exclusions.

The most straightforward way to add graphics to the document seemed to be to create charts in Python using matplotlib and then saving the chart as a picture in jpg or png format. The picture was then placed in the desired place in the document.

Since some of the information was fund specific, logic to cater for different kinds of fund specific factors was needed. An example of fund specific information is exclusions. DNB Asset Management has three different exclusion platforms. Standard exclusion criteria are the base line for all funds. Some funds have extended ESG exclusion criteria or low carbon exclusion criteria based on the investment mandate of the fund. Figure 9 above is a snapshot from the

exclusion criteria in the code. Figure 11Figure 10 below presents a snapshot of the end result of the code for the exclusions published in the sustainability profile.

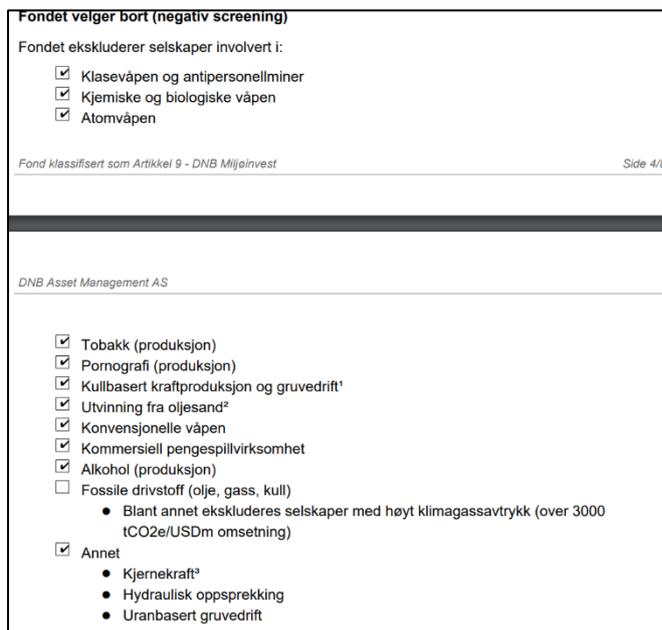


Figure 10: Snapshot from the exclusions end result.

The idea was to create a report function that could be reused for the sustainability report at a later stage. A class module extending the FPDF class was created and named “create_pdf_class”. That module was then used to create a collection of different functions that corresponded to each section in the sustainability profile and the

sustainability report. A report containing the desired building blocks could then be generated using FPDF and then saved in a desired folder.

Another module called “importdata” was created to import the fund specific texts and the general texts. When the functions import_fund_data() and import_general_data() are run the most recent version of the csv files containing the texts and the values for ESG score and carbon intensity were imported as pandas dataframes. In the future these functions will be switched out to functions that query the information from the fund information database and the performance reporting database.

Once the fund specific information was imported functions that generate the graphs and donut charts were called. Since each fund appears on one row in the fund specific csv file, the row number was used to keep track of which fund the report was generated for. The horizontal bar chart and the donut charts are generated based on the values for each fund and saved as pictures that are then imported when generating the pdf document. The pictures are overwritten whenever the report is run for a new fund. A way of improving the efficiency of the report and to save space would be to delete the pictures after the pdf report has been generated.

The row number in the csv file is hardcoded at this stage, this means that the user has to manually keep track of which fund has which row and choose which fund to run the report for. A way to make the code more efficient would be to loop through all rows instead. Another way of improving the solution would be to build a small user interface where the user could choose which fund the report should be run for, or if the report should be run for all funds at once. It is also a long-term plan to build a user interface that is connected to the database, so that users could view and update fund specific texts from the user interface. The current solution with uploading a csv file to the Amazon S3 bitbucket space is very prone to errors.

```
def run_report():

    fund_data=import_fund_data() #import fundspecific data
    general_data=import_general_data() #import general texts
    sf=set_fund()
    i=sf.get_fund()
    create_esg_fund(i)
    create_esg_bm(i)
    create_co2bar(i)

    pdf = PDF()

    os.chdir('/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/')

    pdf.add_font('DNB', 'B', r'/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/DNB-Medium.ttf', uni=True)
    pdf.add_font('DNB', '', r'/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/DNB-Regular.ttf', uni=True)
    pdf.add_font('Segoe UI', 'B', r'/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/segoeuib.ttf', uni=True)
    pdf.add_font('Segoe UI', 'I', r'/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/segoeuii.ttf', uni=True)
    pdf.add_font('Segoe UI', '', r'/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/segoeui.ttf', uni=True)
    pdf.add_font('DNB Mono', '', r'/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/code/Preprocessing/DNBMono-Regular.ttf', uni=True)

    pdf.add_page()
    pdf.alias_nb_pages()
    pdf.titles()
    pdf.articlepage()
    pdf.esg_boxes()
    pdf.body()
    pdf.add_page()
    pdf.glossary()
    pdf.disclaimer()
    pdf.add_page()
    pdf.last_page()

    path='/mnt/efs/home/opensvcde-server/pipeline-dampm-funddata/productmanagement/data/model/'

    filename=path+'Bærekraftsprofil'+str(fund)+'.pdf'

    pdf.output(filename, 'F')

run_report()
```

Figure 11: Snapshot of code for generating report.

6.3 Sustainability reports

Asset managers need to disclose, among other things, the performance of the sustainability indicators during the reference period under the SFDR level 2. DNB Asset Management have decided to publish the periodic reports quarterly, with the first report due in the autumn 2022. The implementation of this report has only just started and a plan for implementation will be presented in this chapter.

6.3.1 Data collection and production

A project to decide which data points to report on have been ongoing in DNB Asset Management for over 12 months already. It is yet to be decided which data provider that will deliver Principal Adverse Impact data. An extensive job with collecting information about what other participants are reporting on has been conducted. Based on that information, it was decided which data points were to be included in the first version of the periodic report.

Based on the timeline for implementation and the current workload for the IT department, the desired data points were divided into three categories: “need to have”, “nice to have” and “not urgent”. The points under “need to have” were the metrics it was mandatory to report on under the SFDR level 1. Those metrics are shown in Table 19 below. These data points were implemented with the highest priority since it was mandatory to report them in the annual report for 2021 for DNB Asset Management.

Table 19: "Need to have" data points

Metric	Deadline	Mandatory
ESG score	30.04.2022	yes
Carbon intensity	30.04.2022	yes
Taxonomy Eligibility	30.04.2022	yes

The data points categorized as “nice to have” are to be included in the first version of the quarterly ESG report. Some of these points are mandatory to report under the SFDR level 2, and some data points are included from a commercial point of view. Competitors are reporting ESG rating and ESG pillars and including those metrics increase the transparency for the client. DNB Asset Management would therefore like to report on these metrics as soon as possible.

Table 20: "Nice to have" data points

Metric	Deadline	Mandatory
Exclusions	30.06.2022	Yes, but from 30.04.2023
Voting	30.06.2022	Yes, but from 30.04.2023
Dialogues	30.06.2022	Yes, but from 30.04.2023
ESG rating	30.06.2022	No
ESG pillars	30.06.2022	No
Taxonomy alignment	30.06.2022	Yes, but from 30.04.2023
PAI indicators	30.06.2022	Yes, but from 30.04.2023

The metrics in Table 21 below were identified as “Not urgent” metrics and will be implemented during the year but are not high priority metrics.

Table 21: "Not urgent" data points

Metric	Deadline	Mandatory
SDG-alignment	01.01.2023	No

A new SFDR-module for the portfolio management database was purchased during autumn 2021. Many of the metrics mandatory to report under the SFDR are already included in the module. The methodology that had been defined and documented was, or will be, used when implementing the aggregation on fund-level for all the metrics.

6.3.2 Production of reports using Python

A draft version of the sustainability report was created in Microsoft Office Word to finalize the layout. At first sample data was used and then the report was recreated in Python using the same sample data. The sustainability report will be created with Python using VS Code.

Much of the work done for the sustainability profiles could be reused when creating the first draft of the periodic report. It is desirable that the layout looks similar for both the sustainability profiles and the sustainability reports, so it makes sense to reuse the same code and to synchronize changes between the two reports in the future.

A joint initiative for the product management department was created during the spring 2022. An initiative is a joint workspace where it is possible for several people to access the code of

a project. Collaboration on code is done through uploading and downloading code using git.

```
def run_report():
    fund_data=import_fund_data() #import fundspecific data
    general_data=import_general_data() #import general texts
    i=set_fund(i)
    create_esg_fund(i)
    create_esg_bm(i)
    create_co2bar(i)
    pdf = PDF()

    pdf.add_page()
    pdf.alias_nb_pages()
    pdf.titles()
    pdf.articlepage_en()
    pdf.keyfigures()
    pdf.exclusions()
    pdf.add_page()
    pdf.esg_overview()
    pdf.add_page()
    pdf.carbon()
    pdf.add_page()
    pdf.top_holdings()
    pdf.add_page()
    pdf.sdg() #nånting med latin som failar här
    pdf.taxonomy() #nånting med latin som failar här
    pdf.add_page()
    pdf.active_ownership()
    pdf.add_page()
    pdf.dialogues() #nånting med latin som failar här
    pdf.add_page()
    pdf.exclusions_extended()
    pdf.add_page()
    pdf.glossary()
    pdf disclaimer()
    pdf.add_page()
    pdf.appendix()
    pdf.add_page()
    pdf.last_page()
    path='/mnt/efs/home/openscode-server/pipeline-dampm-funddata/productmanagement/data/model/'
    filename=path+'Sustainability_report_'+str(fund)+'.pdf'
    pdf.output(filename,'F')

run_report()
```

Figure 12 shows the main code for generating the sustainability report. This is just a mock-up, and the final layout might change before the report is published. The mock-up can be found in full in Appendix 2.

```

def run_report():
    fund_data=import_fund_data() #import fundspecific data
    general_data=import_general_data() #import general texts
    i=set_fund(i)
    create_esg_fund(i)
    create_esg_bm(i)
    create_co2bar(i)
    pdf = PDF()

    pdf.add_page()
    pdf.alias_nb_pages()
    pdf.titles()
    pdf.articlepage_en()
    pdf.keyfigures()
    pdf.exclusions()
    pdf.add_page()
    pdf.esg_overview()
    pdf.add_page()
    pdf.carbon()
    pdf.add_page()
    pdf.top_holdings()
    pdf.add_page()
    pdf.sdg() #nånting med latin som failar här
    pdf.taxonomy() #nånting med latin som failar här
    pdf.add_page()
    pdf.active_ownership()
    pdf.add_page()
    pdf.dialogues() #nånting med latin som failar här
    pdf.add_page()
    pdf.exclusions_extended()
    pdf.add_page()
    pdf.glossary()
    pdf.disclaimer()
    pdf.add_page()
    pdf.appendix()
    pdf.add_page()
    pdf.last_page()
    path='/mnt/efs/home/openvscode-server/pipeline-dampm-funddata/productmanagement/data/model/'
    filename=path+'Sustainability_report_'+str(fund)+'.pdf'
    pdf.output(filename,'F')

run_report()

```

Figure 12: Snapshot of the code for generating the sustainability report.

The python modules used in the sustainability profiles were also used in the production of the sustainability reports. FPDF2 and matplotlib were used in the production of the sustainability profiles. The logic for generating the sustainability report is constructed in a similar manner as for the sustainability profile. The same class module named “create_pdf_class” was expanded with several “building blocks”, or sections, containing more data and graphs showing how sustainability risks have been considered. That module was then used to create a collection of different functions that corresponded to each section in the sustainability report. A report containing the desired building blocks could then be generated using FPDF and saved in a desired folder.

The same module called “importdata” was used to import information. At this stage all the data was uploaded using csv files, when the actual report is created, this information will be queried directly from the fund information database and the performance reporting database.

Once the fund specific information was imported, functions that generate graphs and donut charts were called. Since each fund appears on one row in the fund specific csv file, the row number was used to keep track of which fund the report was generated for. The horizontal bar chart and the donut charts are generated based on the values for each fund and saved as pictures that are then imported to when generating the pdf document. The pictures are overwritten

whenever the report is run for a new fund. A way of improving the efficiency of the report and to save space would be to delete the pictures after the pdf report has been generated.

7 Discussion

At the time of writing (18.04.2022), the most parts of the implementation of the datasets presented are yet to be finalized. Much work has been done to pave the way for implementing a wide range of sustainability-related data points. Most of the work done is just the planning phase and the actual implementation is yet to take place. It is, therefore, difficult to draw conclusions about the implementation.

A fair number of points can be put forward and many lessons can be learned from the implementation this far into the project. The first point to note is that it is of utmost importance to document all calculations clearly in a methodology document. If several departments will calculate the same metrics, and a regulatory or clearly defined market convention is unavailable, the methodology used needs to be documented. This increases transparency towards clients and saves time for other departments that might need to familiarize themselves with the same calculations.

Another very important aspect to note is the need for a master or pre-stage database in cases where the same data points will be used in several systems. This is to prevent errors in the data feed or differences between the same data points in several systems. Having a master database with quality checks and control over where data is distributed minimizes the risk of errors further down in other systems. It is also a part of the requirement specification that data is not distributed externally at security level. Some data providers limit the number of individual securities that can be reported through their licensing agreements.

The SFDR and Taxonomy regulations makes asset managers actively take a stance to whether their investment products are considering sustainability risks in investment decisions by categorizing funds to article 6, 8 or 9. Risks have been an area of discussion and the focus of research in finance for many years. Sustainability risks are a new type of risks that have not been the focus of asset managers before, and the new disclosures will lead to more transparency in the investment industry. A correct and thorough implementation is of great significance for the asset manager to avoid fines or sanctions, but also to the investors and the market since it will disclose sustainability risks and effects in a much more transparent way than before.

The SFDR and Taxonomy regulations are still very premature regulations. Many of the metrics and disclosures in the regulation leaves room for subjective interpretation. It will be very interesting to see how the sustainability reporting will evolve within the asset management industry during the coming 2-3 years. It is yet to be decided what is going to be considered

market convention when reporting on sustainability metrics. The situation can be compared to the implementation of the financial regulation MiFiD II at the beginning of 2018. MiFiD II was designed among other things to increase investor protection, diminish the risks of disorderly markets, reduce systemic risk and increase the efficiency of financial markets, as well as lowering of unnecessary costs for market participants. MiFiD II led to a huge and complicated set of rules that the IT departments of financial firms did not have the capacity to implement. [32] The implementation of the SFDR and Taxonomy regulations is similar; it can be argued that ESMA rushes to implement the regulation without providing clear instructions to market participants.

One very important aspect of the implementation of SFDR and Taxonomy data and production of sustainability profiles and sustainability reports is the commercial aspect. Competitors such as Nordea, Storebrand and KLP are already reporting on a wide range of sustainability metrics. By implementing ESG score, carbon intensity and taxonomy eligibility, much work on the methodology and the implementation for other sustainability metrics has been done. Questions such as how to treat fund-of-fund holdings, how to treat short positions and similar have already been implemented for these metrics and the methodology can be reused when implementing other metrics.

Python was used for production of sustainability profiles and will be used for production of sustainability reports. The infrastructure for the IPA platform and git is still quite unfamiliar for several employees in the product management department. Only a small number of all funds at DNB Asset Management are classified as article 8 or article 9, which makes the implementation less complex. For example, Long/Short funds need not be reported, at least not yet. It also makes the implementation in Python less complex, since only a small sample of funds can be used as a pilot project.

At the time of writing (19.04.2022), access to DNB Asset Management's databases through the IPA platforms has not been granted. All data needed for the sustainability profile was recreated in exploration environment. That was done as an alternative solution while waiting for access to the database. Not having access to the database in real time is prone to errors and it is of highest priority to gain access to the database. The mock-up sustainability report was created using sample data, but since the metrics needed for the report are quite comprehensive, it is suggested that the production of the sustainability report is only conducted in Python, if access is granted to the database.

8 Summary

In this chapter a short summary of this project is presented. Section 8.1 focuses on the scope of the project and which role the writer of this thesis has had in the project. Section 8.2 summarizes the findings and the implementation this far in the project. Suggestions for further implementation and research are presented in section 8.3.

8.1 Scope

This project has been a collaboration between several departments at DNB Asset Management. A project group with members from different departments was formed to oversee the implementation of the SFDR and Taxonomy regulations. The writer is a Product Manager. The product management team is responsible for fund reporting and for the product strategy. It is essential that the product managers understand the investment strategy of all funds, but also the whole value chain of how portfolio management, sales and risk management are connected.

The writer has overseen the technical implementation of the SFDR and Taxonomy regulations. Two product managers have been involved in the implementation. One Product Manager has been focusing more on the layout of marketing material and the report that will be produced, while the writer has been focusing more on data and infrastructure needed for the reports. It is essential to have a thorough understanding of the SFDR and Taxonomy regulations to determine how to construct the reports.

The writer has been in charge of the design of the new tables that have, or will be, implemented. The writer has also been in charge of writing the methodology document where the calculation methodology is presented and the process for importing data is documented. All these efforts have been a collaboration between several departments. The writer has written the Python code for producing the Sustainability profile and the Sustainability report and the layout was developed in collaboration with the other Product Managers in the product management department.

The ESG department at DNB Asset Management has also been strongly involved in the implementation. They have expertise in the methodology behind the ESG metrics and have been a central part of assessing different data providers. The portfolio managers have also been involved. The funds classified as article 8 or 9, i.e. funds that promotes sustainability characteristics, need to be managed in accordance with what has been written in the Sustainability profile. It is of utmost importance that the portfolio managers understand the

reporting requirements that the classification as article 8 or 9 leads to, and that all their efforts regarding sustainability in the portfolio management procedures are thoroughly documented.

Other departments that have been involved in the implementation is the IT department. DNB Asset Management has its own IT department that keeps in touch with the IT department of DNB Group. The IT department has created the new pre-stage database, created new tables, and made sure that data is imported to the new database. The Risk department has also been working on the implementation of the SFDR and Taxonomy regulations. They need to understand the new data sets and follow up in cases where certain thresholds or metrics are included in the fund prospectus. One fund might have a goal to have ESG score higher than the ESG score for the benchmark. The risk department needs to continuously follow up on such mandate requirements.

8.2 Summary of implementation

As always when starting a project of larger scale – there are delays along the way and the scope of the project might change during the course of the project. The writer started to work at DNB Asset Management in August 2021 and the SFDR and Taxonomy implementations were well underway already then. Progress has been made with regards to the robustness of the system, but most parts of the implementation of the data sets mentioned in previous sections are yet to be implemented.

Sometimes delays occur due to external parties – such as for example the European commission delaying the adoption of a law by six months. At the time of writing (18.04.2022) the Regulatory technical standards have been approved so the level of uncertainty in the implementation of the SFDR level 2 has decreased significantly.

Much emphasis has been put on understanding the regulation and the reporting requirements. The regulatory technical standards (RTS) were approved in April 2022, now it is certain which data sets that need to be purchased and what is to be reported on. An extensive overview of exactly which data points or data sets that are needed at which point in time has also been undertaken. Those data sets are presented more in detail in section 4.3. Much work has also been done on assessing different data providers. As one of the biggest corporates in the financial sector in Norway, it is of high importance to have a data provider with a robust methodology and data of high quality.

The three datapoints ESG score, carbon intensity and taxonomy eligibility has been implemented. This was not as easy and straightforward to implement as anticipated. This was mostly due to mapping issues where the underlying securities were mapped to incorrect issuer. Data was imported and mapped to incorrect issuer which led to the underlying data being incorrect.

The issue with incorrect mapping changed the scope of the project since it was discovered that the mapping between security ISIN codes and issuer LEI was needed to be able to implement some of the data sets for bond funds. That side project turned out to be a large-scale project that was unexpected, but necessary, to be able to implement some of the data sets mentioned in previous sections.

Sustainability profiles have been generated using Python and published as an appendix to the prospectus for Norwegian funds. Luxembourg domiciled funds still have the SFDR level 1 and Taxonomy disclosures incorporated in the regular prospectus. Updating prospectuses is a more complex and length worthy process in Luxembourg compared to Norway. In due time the sustainability profiles will be implemented in Luxembourg as well.

The data sets for exclusions and dialogues are internal data sets not depending on an external data provider and will be imported in the reporting database during the summer 2022. Voting data is delivered by a third-party data vendor. A daily file delivery has been set up and the design of the table is finalized, the data will be imported in the reporting database starting summer 2022.

Mock-up reports of the sustainability reports have been created during April and May 2022. It was decided in May 2022 that commercial reports will be published on a quarterly basis while a more comprehensive report will be published yearly. The reporting requirements under the SFDR level 2, specified in the RTS, are very detailed and comprehensive. It is not clear if a retail customer without extensive knowledge of sustainability reporting will understand the reported data specified in the RTS. A shorter more commercial report published on a quarterly basis will increase transparency into the sustainability aspect of the portfolio management and be more easily understandable for a retail client. A more extensive report compliant with the SFDR level 2 will fulfil the reporting requirements and be published only on a yearly basis.

DNB Asset Management is on pace for implementing the SFDR and Taxonomy related data sets in due time before the SFDR level 2 takes force 01.01.2023, even though the

implementation is not yet at the phase anticipated in August 2021 when the writing of this thesis was started.

8.3 Further implementation and research

The implementation is still in process but plans for further development is to clearly document where all data deliveries from third parties are being delivered and with what frequency. A clear overview of the data feed is needed.

The implementation of SFDR also led to the need for a further development of data governance at DNB Asset Management. A lot of these sustainability related metrics are not clearly defined under the data sets that other departments, such as middle office or risk, oversees. A clear division of responsibilities need to be identified and documented. Which department is responsible for the production of the SFDR and Taxonomy data now? Which department is responsible for the import of these data sets in the future?

Other possible paths for further development are to include the reports for Social Taxonomy and Transitional Taxonomy published during spring 2022. The report for transitional taxonomy is an extension of the current green taxonomy. [35], [36] The current Taxonomy regulation is quite strict and only focuses on what is considered environmentally sustainable as of now. Much work also needs to be done with regards to activities that can be considered transitional activities now and that will move towards being environmentally sustainable in the future. The current Taxonomy regulation focus only on the environmental aspect of sustainability. Socially sustainable activities will be more in focus in the future.

Since there is a growing demand for funds with a sustainability theme, there is a need for risk management to look more closely into the different metrics and the follow up on new investment restrictions that are defined in the pre-contractual information. Whenever a fund is marketed as a fund with a sustainability focus, it is important that all such promises and statements are constantly held and monitored.

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Appendices

Appendix 1: Sustainability Profile – example DNB Future Waves

DNB Asset Management AS

DNB Future Waves

Informasjon om bærekraftshensyn i forvaltningen av fondet

Nedenfor presenteres informasjon om hvordan bærekraft hensyntas i forvaltningen av fondet
En avkrysset rute indikerer at kravet gjelder for fondet.

Fondet...

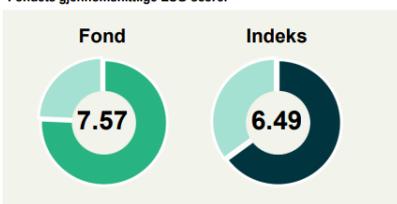
- har bærekraftige investeringer som formål
- fremmer blant annet miljømessige eller sosiale egenskaper, men har ikke bærekraftige investeringer som formål
- hensyntar bærekraftsrisiko i investeringsbeslutningene uten å fremme miljømessige eller sosiale egenskaper eller ha bærekraftige investeringer som formål
- hensyntar ikke bærekraftsrisiko i investeringsbeslutningene

SFDR-
klassifisering:

Artikkel 8

ESG-score

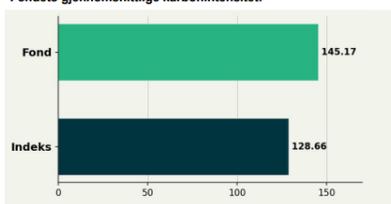
Fondets gjennomsnittlige ESG-score:



ESG-score: Viser hvor godt selskapene i porteføljen håndterer risiko og muligheter knyttet til miljø, sosiale forhold og virksomhetsstyring på en skala fra 1-10.
Kilde: MSCI ESG Research og egne beregninger per 31.12.2021.
© 2021 MSCI ESG Research LLC. Gjengitt med tillatelse.

Karbonintensitet

Fondets gjennomsnittlige karbonintensitet:



Weighted Average Carbon Intensity: Måler Scope 1- og 2-utslipp.
Kilde: MSCI ESG Research og egne beregninger per 31.12.2021.
© 2021 MSCI ESG Research LLC. Gjengitt med tillatelse.

DNB Future Waves er et aktivt forvaltet globalt aksjefond som investerer i selskaper med blant annet fokus på blå økonomi (havet) og livskvalitet. Fondet har FNs bærekraftsmål som rammeverk for investeringene sine. Fondets referanseindeks er MSCI World Index Net.

Fondet følger DNBs Standard for Ansvarlige Investeringer og ivaretar at investeringene er i samsvar med internasjonale normer og standarder. DNBs Standard definerer hvilke produkter og tjenester vi ikke har toleranse for. Den skal også sikre at risiko og muligheter knyttet til bærekraft integreres og hensyntas i forvaltningen. I tillegg søker vi å påvirke selskaper i en mer bærekraftig retning gjennom aktivt eierskap.

ESG-data er integrert i porteføljestyringssystemene til forvalter, og brukes som en input i verddivurderinger, investeringsbeslutninger og porteføljekonstruksjon. ESG-data ligger til grunn når forvalter vurderer bærekraftsrisiko i sektorer og enkeltelskaper.

Fond klassifisert som Artikkel 8 - DNB Future Waves

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The whole document is available at: https://documents.anevis-solutions.com/dnb/SUSTAINABILITY_PROFILE-NO-NO-LU2250441479.pdf

Appendix 2: Quarterly Sustainability Report – example DNB Finans

DNB Asset Management AS

DNB Finans

Q3 2022

This fund...

- has sustainable investments as its objective
- Promotes environmental or social characteristics, but does not have as its objective a sustainable investment**
- Considers sustainability risks in investment decisions, without promoting environmental or social characteristics or have sustainable investments as its objective
- Does not consider sustainability risks in investment decisions

SFDR-
classification:

Article 8

Key figures

ISIN: LU0099375739

AUM (EUR M): 58.06

Benchmark: MSCI World Index

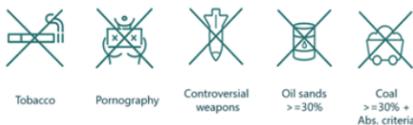
Number of holdings: 123

Investment strategy

DNB Finans er et aktivt forvaltet aksjefond som hovedsakelig investerer i aksjer innenfor finanssektoren, notert på børser og regulerte markeder over hele verden.

ESG characteristics

The fund follows the DNB Group Standard for Responsible Investments.



Fund classified as article 8 - DNB Finans

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The whole document is available at:

https://www.dropbox.com/s/bqrbw49egpdymcc/Sustainability_report_DNB%20Finans.pdf?dl=0

Appendix 3: List of PAI indicators

Number	Indicator	Mandatory/Optional
1	GHG emissions	Mandatory
2	Carbon footprint	Mandatory
3	GHG Intensity Investee Companies	Mandatory
4	Exposure to companies in fossil fuel sector	Mandatory
5	Share of non-renewable energy	Mandatory
6	Energy consumption intensity per high impact climate sector	Mandatory
7	Activities negatively affecting biodiversity-sensitive areas	Mandatory
8	Emissions to water	Mandatory
9	Hazardous waste ratio	Mandatory
10	Violations of UN Global Compact Principles and OECD Guidelines for Multinational Enterprises	Mandatory
11	Lack of processes and compliance mechanisms to monitor compliance with UN Global Compact Principles and OECD Guidelines for Multinational Enterprises	Mandatory
12	Unadjusted Gender Pay Gap	Mandatory
13	Board Gender Diversity	Mandatory
14	Exposure to controversial weapons	Mandatory
15	GHG intensity for sovereigns and supranationals	Mandatory
16	Investee countries subject to social violations	Mandatory
17	Exposure to fossil fuel through real estate assets	Mandatory
18	Exposure to energy-inefficient real estate assets	Mandatory

Appendix 4: Excerpt from Methodology for ESG metrics

1. ESG score

The ESG score on fund level is the weighted average ESG Score for all securities in the portfolio. The ESG Score indicates how well the index constituents manage their most material ESG risks relative to sector peers. Scores range from 10 (best) to 0 (worst).

1.1 ESG score on security level

The ESG score is calculated by normalizing the Weighted Average Key Issue Score to the Industry peer set.

MSCI field name: `INDUSTRY_ADJUSTED_SCORE`

1.2 ESG score on fund level

Methodology for ESG score:

ESG Score

$$ESG\ score = \frac{\sum_{i=1}^n (Weight_i \times INDUSTRY_ADJUSTED_SCORE_i)}{\sum_{i=1}^n (weight_i)}$$

Where:

- i = security with ESG score available
- $weight_i$ = closing weight for security i

This methodology is used both for internal reporting and external reporting.

Internal scoring:

- Industry adjusted ESG scores are used in the calculation of weighted average ESG score
- Internal ESG scoring is only used in the calculation of weighted average ESG score if it is industry adjusted
- Internal ESG scoring that is not industry adjusted shall be used when calculating ESG score coverage on fund level, see section 2.4

Special cases:

- Cash positions are not relevant for ESG score calculations, and any cash position is normalized across all other securities in the portfolio
If a security lacks ESG score, the weighted average calculation will be based on securities with an industry adjusted ESG score and the weights of the covered securities will be normalized to 100%
- Short positions are treated as uncovered for ESG data

- This approach is in line with MSCI’s methodology and considered current market convention
- Fund-of-funds calculate the weighted average ESG score for the underlying funds
 - A fund is treated as an instrument in scd and is included in the calculations if an industry adjusted ESG score is available for the fund
- Derivatives are not included in the calculation of weighted average ESG score
- All positions are normalized to 100 % and leverage is not included in the calculations.
- Unlisted securities are included in the weighted average calculations if an industry adjusted ESG score is available for the security
 - Municipalities and sovereign bonds are not included in the calculation at this time due to lack of standardized data
- If MSCI stops covering a security, internal scoring is used if available

1.3 Priority order of data sources

DAM might conduct internal scoring if a security lacks coverage for ESG score. Data sources are prioritized in the following order if we have several sources.

1. Override data
2. MSCI data
3. Internal scoring

1.4 Coverage for ESG score

The coverage metric for ESG score is derived by dividing the number of securities in the portfolio that has either a MSCI ESG score or an internal ESG score available by the total number of securities and their total weight in the portfolio, i.e. 100 %.

Cash positions are not included in the calculation and are normalized across the whole portfolio. Short positions are included in the coverage calculation.

There are two types of calculations for ESG score coverage:

1. Overall ESG score coverage:

$$Coverage_ESG = \frac{\sum_{i=1}^n (Security\ in\ portfolio\ with\ coverage \times weight_i)}{\sum_{i=1}^n (security_i \times weight_i)}$$

Note that ESG scores that are not industry adjusted are included when calculating the overall ESG score coverage of a portfolio.

2. Industry adjusted ESG score coverage:

$$Coverage_ESGi = \frac{\sum_{i=1}^n (Security\ in\ portfolio\ with\ coverage \times weight_i)}{\sum_{i=1}^n (security_i \times weight_i)}$$

A separate coverage number is calculated for industry adjusted ESG score. Coverage for industry adjusted ESG score is used for external reporting.