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APPLICATION

Guidelines of the Value to Business Methodologies

Application Guidance

value balancing alliance

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About the VBA

The Value Balancing Alliance (VBA) is a coalition of around 30 multinational companies committed to driving sustainability by measuring and valuing corporate impacts on nature and society. Our world has been running through the most significant structural change in the last 250 years. We experience the environmental credit crunch: The paradigm of economic growth building on infinite resources is over. We enter the impact economy – requiring a new understanding of value creation[1]. VBA's mission as a not-for-profit alliance is to jointly create a globally applicable and comprehensive methodology together with the International Foundation for Valuing Impacts, Inc. (IFVI) for measuring sustainable value creation – impact accounting. Impact accounting has been successfully tested over the last fifteen years by leading companies across regions and industries. It gains more and more traction as a solution to translating ESG metrics into the language of business (monetization) and turning the sustainability reporting challenge into a force for value creation. The VBA is pioneering impact accounting in various collaborations, which contextualizes sustainability data and translates it into comparable monetary values, reflecting corporate impacts across the entire value chain.

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[1] UBS. (2023). *The Rise of the Impact*

1. Introduction

The integration of sustainability-related topics into financial planning, risk management, and business valuation is no longer a voluntary exercise – it has become a strategic necessity. Regulatory requirements resulting from the TCFD[2] and ESRS[3], rising expectations from investors and customers, and the growing awareness of the financial implications of climate and nature-related risks are forcing companies to fundamentally rethink their management and reporting systems.

This is not just about reporting and compliance: many companies face the concrete challenge of achieving their key climate targets by 2030. This milestone now falls within the typical 5-year planning cycle – what was once considered a distant future is now approaching rapidly and requires significantly greater attention and operational anchoring.

Against this backdrop, the Value Balancing Alliance (VBA), supported by KPMG, has developed the Value to Business Framework. The aim of this application guidance is to provide support for companies to financially quantify sustainability-related risks and opportunities and systematically integrate them into their decision-making processes – whether in financial planning and forecasting, risk management, or investment and business valuation.

In practice, missing or incomplete data and the complexity of the sustainability-related topics are often cited as obstacles to quantifying the financial effects of sustainability risks and opportunities – especially regarding long-term impacts. But practice shows that many relevant pieces of information already exist within companies but are often not centrally available or consistently prepared. Reality is indeed complex – but that is precisely why it is necessary to capture it in a structured way and to engage with it logically and quantitatively. The attempt to quantify often opens new perspectives that purely qualitative analyses do not reveal. Moreover, this process creates new dialogue formats between different stakeholders, bringing the topic of sustainability strongly into operational focus and on management attention. Additionally, necessary investments in decarbonization or other transition plans are sometimes delayed due to perceived economic unfeasibility – without adjusting the underlying and communicated climate targets. This creates an action vacuum with increasing implementation risks. Here too, a rational and well-founded analysis considering all relevant risks and opportunities helps to objectify the discussion and identify the best individual strategy.

The Value to Business concept aims to build bridges between the relevant corporate functions – particularly between sustainability, finance, and operations. Through clear definitions, methodological explanations, and practical examples, a shared understanding is created that facilitates collaboration and accelerates implementation.

This Value to Business concept is divided into two parts:

- Value to Business Framework - The methodological foundations that provide conceptual structure and general explanations. This document is intended for both experts and interested practitioners, serving as a guiding reference in cases where discretionary judgment is required.

[2] TCFD. (2017). Final Report Recommendations of the Task Force on Climate-related Financial Disclosures
[3] EFRAG. (2025). ESRS 1 – General Requirements: Technical Advice (November 2025), p. 14

- Value to Business Application Guidance – The description of a standardized implementation approach including tools, templates, and checklists. This part mainly refers to practitioners and aims to provide clear guidance-based examples.

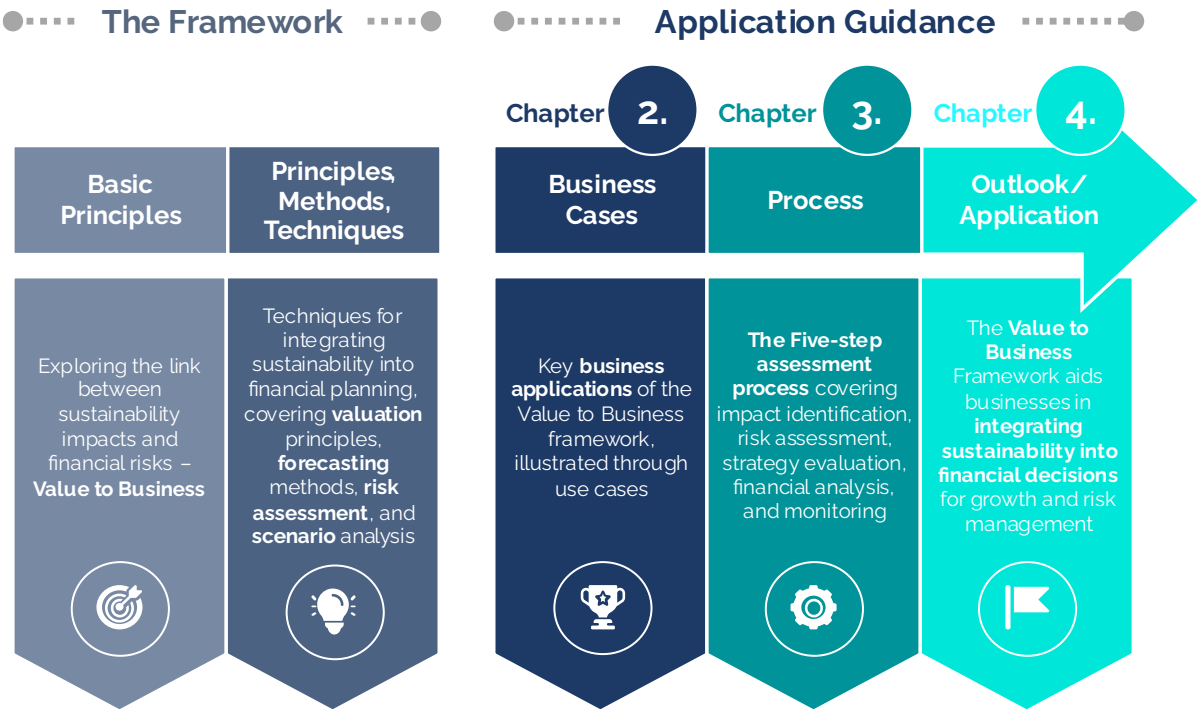


Figure 1 **Overview V2B Publications - The Framework in previous publication available**

The Application Guidance describes the process for analyzing and quantifying sustainability-related financial opportunities and risks. Chapter 2 introduces potential business cases and illustrates where the assessment of sustainability factors can create value or mitigate risks. Chapter 3 provides a detailed description of the five-step process for a Value to Business assessment: First, relevant impacts and dependencies are identified by building upon on insights e.g., from double materiality assessments or impact accounting. Second, financial risks and opportunities are derived through value driver analyses, and the underlying uncertainty is assessed using sensitivity, scenario, and simulation analyses. Third, the current and intended management strategy and responses to sustainability-related changes in the business environment are reflected upon. Fourth, financial risks and opportunities are assessed as well as potential strategic responses. Finally, the process covers the interpretation and monitoring through defined KPIs. In Chapter 4 this process is put into practice, illustrating how companies can integrate the Value to Business logic. It should be noted that this Application Guidance and the Value to Business process are intended to assist in the derivation of qualitative financial opportunities and risks and their subsequent quantification. However, this guidance does not claim to represent a holistic project management approach. It might need adjustment based on the defined scope of the Value to Business assessment.

The Application Guidance builds on existing work such as double materiality analyses, climate or nature transition and action plans, or climate risk assessments. It does not claim to explain or replace these in detail – rather, it serves as a methodological complement to financial evaluation and integration into management processes.

The Value to Business Framework aims to accelerate the transformation towards sustainable business models by establishing a common language and mindset that aligns profit, people, and planet. The Application Guidance reduces initial hurdles for companies by providing a practical, structured approach to quantify and implement sustainability measures.

Both the Framework and the Application Guidance address the complexity of financially evaluating sustainability topics, including uncertainty of long-term effects or the challenge of translating qualitative risks into quantitative models. They provide guidance and tools, such as sensitivity analyses, scenario and simulation techniques, to manage uncertainties and support robust decision-making.

Recognizing the complexity of real-world conditions and the uniqueness of company processes, the Application Guidance does not prescribe simplified, one-size-fits-all solutions. Instead, it outlines fundamental approaches, offers recommendations, and deliberately preserves flexibility for individual, company-specific applications.

The concept of Value to Business is still evolving, even though various established frameworks – such as the Natural Capital Protocol (NCP)[4], Social & Human Capital Protocol (SHP)[5], TCFD/TNFD[6], WBCSD[7], and EU Life Transparent Project[8] – already address specific aspects. However, the Value to Business work acknowledges several limitations and areas for further development:

Low degree of standardization to account for company specific circumstances

Anticipated financial effects on entities depend not only on sector-specific circumstances but also on company specific characteristics, including actions and processes in place. For example, although entities A and B operate in the same sector and geographically, dependency on water may differ due to variations in production technologies or product designs. These company-specific circumstances, which relate to risks and opportunities, need to be considered in the Value to Business concept and necessarily limit the degree of standardization in its application.

Direct mapping between sustainability risks and opportunities and affected financial line items in financial statements

While numerous publications have already attempted this, they often reflect simplified views due to the inherent complexity and company-specific nature of these relationships. It is not the intention of this Application Guide to define standardized financial linkages for every type of impact or dependency. Accordingly, the Application Guidance focuses on

[4] Capitals Coalition. (2016). Natural capital protocol
[5] Capital Coalition. (2016). Social and Human Capital Protocol
[6] Taskforce on Climate-related Financial Disclosures (TCFD), Taskforce on Nature-related Financial Disclosures (TNFD)
[7] World Business Council for Sustainable Development. (2017). Sustainability and enterprise risk management: The first step towards integration
[8] EU Life Project Transparent. (2023). Standardized Natural Capital Management Accounting

outlining a general approach rather than providing static lists, which could otherwise limit practical usefulness at the company level.

Deliberate exclusion of detailed instructions and static lists

To ensure a broad applicability of the Value to Business concept, the Application Guidance deliberately avoids overly prescriptive instructions. Users of this guide are encouraged to apply approaches and methods suited to their specific needs and organizational context. This flexibility is essential to accommodate the diversity of business models, data availability, and strategic priorities. For this reason, static lists of planning parameters are excluded, as they tend to become outdated quickly. Instead, the Application Guidance points to sources that currently provide useful reference points. It is not intended to replace specialized analyses such as double materiality assessments or transition planning with the Value to Business Assessment but rather use those as a general foundation for understanding and structuring sustainability-related financial considerations. Sector- or entity-specific guidance may be developed in future publications. The Value to Business concept is designed for application across a wide range of use cases. This chapter showcases selected use-case-examples intended to illustrate potential applications rather than provide an exhaustive list.

2. Business Use Cases

2.1. Use Case: Transition Planning

A steel manufacturer is currently evaluating how to transition from traditional coal-based production to carbon-neutral alternatives in response to tightening environmental regulations and societal demands for sustainable practices. The company is at a critical juncture, facing major strategic decisions that will shape its future. Significant investment is required for new technologies and production facilities, but the financial and operational implications of this transformation remain uncertain.

The leadership team is exploring several scenarios as part of their Value to Business assessment to guide their internal investment decision:

Scenario 1: Delayed Transition

The company has postponed its investment in green steel technologies. This approach might save upfront costs but increases their exposure to rising carbon credit prices, potential regulatory penalties, as well as market and reputational risks. In this scenario, the financial model would help assessing the extent to which regulatory fines and carbon pricing could impact profitability in the short to medium term and how the company's market share might be affected.

Scenario 2: Phased Transition with Partial Investment

The steel manufacturer gradually implements carbon-neutral technologies, starting with pilot facilities. This would spread out costs and reduce immediate disruptions to production, but it might also delay full compliance with regulations. The analysis would focus on the trade-offs between partial investments, operational productivity, and market share during the transition period.

Scenario 3: Front Runner Investment

The company commits to a complete overhaul of its production processes to fully adopt carbon-neutral technologies. This scenario examines upfront capital expenditures, potential subsidies, and long-term savings from avoiding carbon taxes and improving market competitiveness. Productivity losses during the transition and the potential for securing new "green" customers are also evaluated. To prepare for these scenarios, the company is developing a comprehensive integrated planning model. Key parameters under evaluation include carbon credit costs, government subsidies, technological timelines, and market demand.

By analyzing these variables, the company aims to make an informed decision about the timing and scale of its investments. The goal is to align financial stability with compliance and competitiveness, ensuring a smooth and profitable transition to sustainable production.

2.2. Use Case: Impact and Dependency Management

A new managing director has been appointed to revive an automotive OEM supplier and implement an ambitious strategy that combines financial profitability with strong sustainability goals. The previous management struggled to address these challenges effectively.

The new director's initial focus is on setting up a robust Impact, Risk, and Opportunity (IRO) monitoring and management system. This involves analyzing key factors affecting the business model, including macroeconomic trends, product-specific details, and sustainability-related issues like regulatory changes and technological developments. Using the Value-to-Society concept and impact accounting, the company will evaluate its environmental and social impacts on a regular basis. The Value-to-Business approach will help assess dependencies and financial effects linked to risks and opportunities providing actual and future insights. The results feed into an existing integrated steering and monitoring dashboard, and quarterly reports provide ongoing insights to guide decision-making

2.3. Use Case: Sustainable Investment Decision-Making

A medium-sized packaging company is under pressure to balance sustainability with profitability due to stricter regulations, rising costs, and growing customer demand for eco-friendly solutions. To address this challenge, the company is considering three investment options:

Option 1: Investing in R&D to develop a new packaging material using carbon captured from the atmosphere, offering innovative leadership but requiring high upfront costs.

Option 2: Improving recycling systems and creating a closed-loop production process to reduce waste and reliance on raw materials.

Option 3: Transitioning to renewable energy across operations to cut long-term energy costs and emissions.

Considering budgetary constraints, the company can only invest in one option.

Using the Value to Business and Value to Society concepts, the company will assess the financial and non-financial effects of each option, evaluating Return on Investment (ROI), net present value (NPV), as well as environmental and social impacts. Scenarios can be modelled based on an integrated planning model to analyze the effects of these investments on important non-financial KPIs like CO_2 emissions and waste. This analysis will

guide the leadership team in making a decision that ensures both long-term growth and innovation leadership in sustainable packaging.

2.4. Use Case: ESG Due Diligence for Acquisition

A mid-sized entity in the industrial machinery industry is looking to strengthen its market position by acquiring a direct competitor which has faced financial difficulties in recent years. The management of the acquiring entity views this acquisition as an opportunity to increase production capacities and gain additional market share.

To thoroughly evaluate this potential acquisition, the potential buyer will conduct an ESG due diligence assessment which highlights sustainability related risks and opportunities. Based on these results, the management performs a benchmarking analysis comparing financial and non-financial KPIs (e.g. carbon intensity) of the target with their own business as well as with peer group companies. Building on these results, the management gained a clearer view of how sustainable value drivers translate into financial performance and growth potential. The insights were integrated into the company's planning and valuation model, linking impact data with traditional financial metrics. This approach also revealed concrete synergies and value levers that could be realized during integration, supporting more informed pricing and investment decisions.

2.5. Use Case: Target Setting & Monitoring

A company specializing in plastic manufacturing seeks to address the strategic challenge of reducing the environmental footprint of its product portfolio. In response to increasing regulatory, market, and investor pressure around plastic waste and climate impact, the management has initiated a comprehensive transformation program.

The company currently reports annual CO_2 emissions of 2.5 million tons and a recycled material share of 20%, with customer satisfaction at 70%. All key performance indicators are integrated into their sustainability and enterprise value framework.

The strategic objectives are to cut CO_2 emissions by 50% within five years, increase the recycled material share to 60%, and raise customer satisfaction to 85%, aligning operational performance with long-term value creation and capital market expectations. To achieve these objectives, the entity plans to allocate an investment budget of € 2 million for research and development of sustainable materials, along with a training program for employees to enhance awareness of sustainability in production.

The financial metrics to be tracked throughout the strategic realignment include revenue growth from sustainable products, costs associated with sustainable materials, and the calculation of the ROI from this initiative. Concurrently, non-financial metrics such as regular measurement of CO_2 emissions, recycling rates, customer satisfaction surveys, and employee engagement data will be collected. This combination of financial and non-financial metrics will enable the entity to continuously review the progress and to ensure meeting the set objectives.

2.6. Use Case: ESG Reporting

An entity specializing in the development and marketing of photovoltaics is implementing the new ESRS non-financial reporting standards. In this context, the entity would like to set up quantification methods and a process for the assessment of the anticipated financial effect of material financial risks and opportunities according to ESRS 2 SBM 3.

Based on the double materiality and resilience analysis, it describes qualitatively the material risks and opportunities in a first step. In a second step the company starts a quantitative analysis of the anticipated financial effects using the logic of value drivers, external market data and estimates, as well as internal expert knowledge.

Due to the high uncertainty included in the estimation of some of the underlying sustainability matters, the entity will work with scenarios and simulation analysis to derive a well-documented value range for reporting purposes and the required assurance.

2.7. Use Case: Risk Stress Testing

A food supplier aims to strengthen its risk management procedures for sustainability related risks to capture how environmental and social developments could affect their future cash flow and operational resilience. The company is embedding climate transition risks, physical risks and market dependencies directly into its stress-testing and scenario-modelling processes. This approach enables management to simulate how shifts in environmental and social systems, such as water scarcity, carbon pricing, supply chain disruptions, or changes in stakeholder expectations, affect operational stability and financial performance.

By linking impacts and financial drivers, the stress tests provide a quantified view of double materiality under different time horizons and helps identifying vulnerabilities early. The results are now used in board discussions on strategic planning and operational risk assessment, providing a more comprehensive view of enterprise value under sustainability-related uncertainty. Altogether, the entity can now prioritize measures and take targeted actions to strengthen its governance frameworks.

2.8. Use Case: Financial Planning for Relocation

A manufacturing company is planning to relocate its headquarters. For this purpose, a new production site is being built on a greenfield site. The attractive site near the city center, where administration and production were previously located, will be used for real estate purposes and partly sold or leased. The cash flow generated by the realignment of the old site is expected to be self-sustaining and to cover the company's remaining pension obligations going forward. To ensure the short-, medium-, and long-term liquidity of the project and to secure favorable credit conditions, detailed financial planning is required. This planning also includes various social capital KPIs, such as the development of pension eligible employees and the proportion of social housing.

The analysis shows that liquidity is not guaranteed, and the company would be at risk of over-indebtedness. The management uses scenarios to examine various countermeasures, such as selling shares, selling existing properties, or adjusting the housing mix. The financial planning is updated on a regular basis to consider adjustments in the cost planning for real estate development and for changes in market conditions.

3. Value to Business Assessment Process

Analyzing and assessing financial effects from sustainability related topics is a complex and comprehensive task. The main structural challenges include:[9]

[9] World Business Council for Sustainable Development. (2017). Sustainability and enterprise risk management: The first step towards integration

1. **Limited internal knowledge** about sustainability-related opportunities and risks,
2. **Short-term thinking**, which leads to neglecting long-term effects, and
3. **Difficulties in quantifying qualitative findings.**

To overcome these challenges, the Value to Business concept follows a structured and consistent process based on the principles outlined in the Value to Business Framework. While the core components remain stable, workflows may vary depending on the specific use case. It is recommended to execute each step in the prescribed sequence, as they are inherently interconnected, laying the foundation for a comprehensive assessment and quantification.

Before starting the analysis, several essential steps should be taken:

- **Define the objective** of the assessment (e.g. investment decisions, strategic options)[10],
- **Specify the scope**, including boundaries such as region, time horizon, and supply chain stage,
- **Assign responsibilities**, including project coordination and expert contributions, and
- **Ensure proper documentation** throughout the whole exercise, including objectives, scope, assumptions, calculations, etc.

This structured setup ensures clarity, consistency, and efficiency throughout the process. Internal project participants can be specialists and managers from Risk Management, Sustainability, Finance & Controlling, Strategy & Corporate Development, and Investor Relations. Specific topic experts (e.g., for energy procurement, circularity, etc.) should be involved depending on the specific topic addressed. Other stakeholders who could be involved in the process include major equity and debt investors, employee representatives, environmental organizations, research institutions and universities, auditors, or other advisors.

Next to the collaboration with a variety of internal and external parties a certain amount of sustainability-related, as well as industry- and company-specific data will be required to derive appropriate and intersubjectively verifiable analysis results. This guide therefore repeatedly presents possible sources for a wide variety of data. However, these exemplary sources only serve as inspiration and initial starting point. The final selection and assessment of these sources is the responsibility of the organization conducting the analysis and depends on the objective and scope of the assessment (e.g., industry or region).

Although quantification is often seen as challenging due to limited data and complexity, project experience reveals that companies already hold substantial internal data and expertise to address this. Making use of this internal data can be challenging though as it is often spread across departments and individuals, which makes collecting and combining them time-consuming. In addition, complexity and uncertainty are not unique to sustainability topics. They are part of any forward-looking or strategic decision, such as investments or market planning. Established techniques exist to deal with these challenges, and they will be covered in the process description of the Value to Business assessment.

[10] See potential Business Use Cases in Chapter 2.

The following diagram provides an overview of the five main steps for the Value to Business assessment and its quantification[11]:

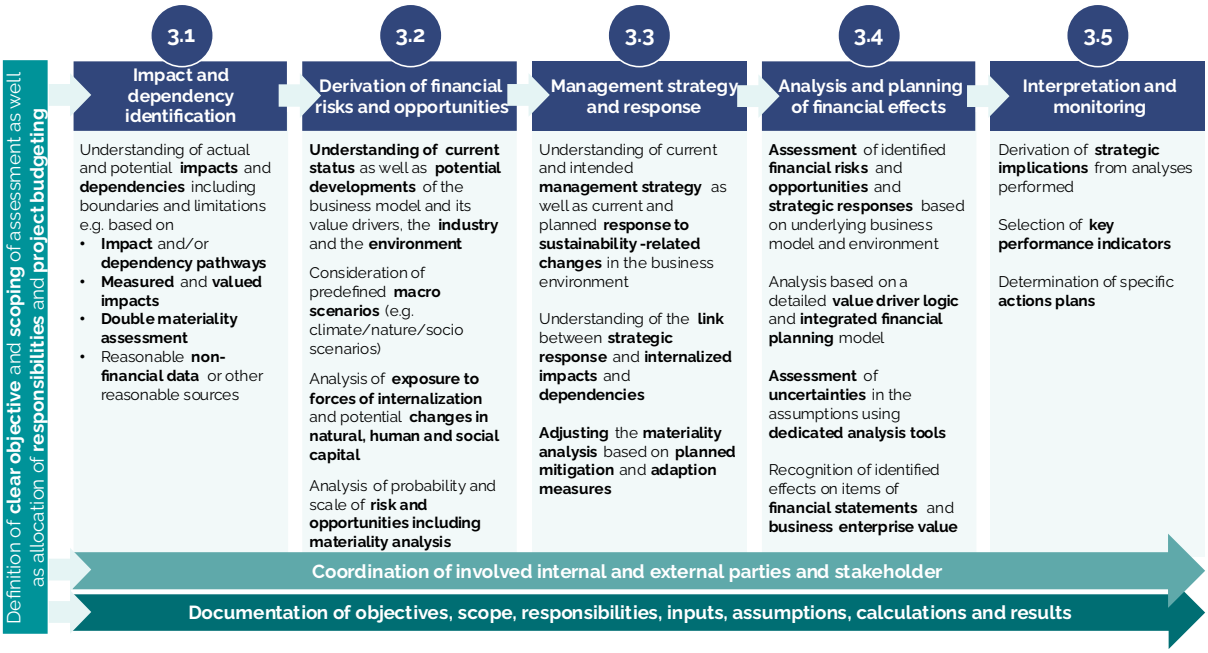


Figure 2 **Value to Business Assessment Process**

The following sub-chapters will delve into each stage of this process, providing comprehensive insight into the different steps and methods required to analyze, calculate, and interpret the Value to Business. To enhance understanding of the process and underlying concepts, a running example will be introduced and further developed throughout the following chapters. This example will be presented at the end of each relevant step.

3.1. **Step 1** – Impact and dependency identification

The first step in the analysis process is the identification and understanding of material impacts and dependencies relevant for the entity.[12] Although, the structured analysis of actual and potential impacts and dependencies, as well as their financial effects on the entity, still represents a new perspective within the business analysis, it becomes a critical aspect of the overall analysis of an entity, analogous to market and competitive analysis.

Whenever possible, this step should be based on analyses already conducted for sustainability reporting under recognized frameworks such as ESRS, ISSB, or similar standards. By using these results, organizations can leverage existing insights and data, ensuring that regulatory expectations are aligned with strategic business objectives. If those results are unavailable, the identification of impacts and dependencies can be divided into the following step-by-step approach.

[11] For an alternative approach with a dedicated focus on the perspective of equity investors, see, for example, the "Framework for sustainability in intrinsic value (SiiV)" of the World Business Council for Sustainable Development.

[12] For Value to Business consequently the financial materiality of risks and opportunities is relevant. Nevertheless, a certain materiality assessment when identifying impacts and dependencies may be suitable in practice. It should always be borne in mind that impacts and dependencies of a smaller, seemingly non-material scope can also lead to material risks and opportunities especially in future.

a. Define scope, objective and boundaries based on a Value to Business case

To ensure an effective identification of impact and dependencies, the first step is to define the scope, objectives and boundaries of the assessment, aligning them with the Value to Business use case (see examples Chapter 2). In the Value to Business context, ***impacts*** refer to a change in one or more dimensions of people's well-being directly or through a change in the natural environment[13], while ***dependencies*** describe the reliance of entities on natural, human, social, or economic capital[14].

The scope may specify focus areas such as regions, business segments, products, or legal entities. Additionally, materiality considerations may be outlined, while avoiding prematurely excluding impacts and dependencies. This avoids a skewed opportunity and risk analysis. Both actual and potential impacts and dependencies should be analyzed within a defined timeframe.

The objective of the impact and dependency analysis should align with the specific needs of the Value to Business use case, as this determines how results are presented. Key considerations include identifying potential stakeholders and selecting the most appropriate format for their needs, integration into the business, and the most effective presentation method for the opportunities and risks analysis. Possible formats include reports, lists, process maps, geographical breakdowns, and impact and dependency pathways. Lastly, a decision must be made on whether impacts and dependencies will be measured qualitatively or quantitatively.[15]

b. Create an understanding of the entity with special regards to the specified analysis unit and scope

Impacts and dependencies are company-specific, shaped by the entity's inputs, operational activities, and outputs throughout the depth of the entire value chain[16]. A thorough Value to Business analysis should examine these aspects also in relation to the specific characteristics of the locations of its operations (regulation, geographical regions and operational sites). Frameworks like Michael Porter's Value Chain Analysis[17] are useful for distinguishing between primary and supporting business activities[18]. The LEAP (Locate, Evaluate, Assess, Prepare) process introduced by the Taskforce on Nature-related Financial Disclosures (TNFD) emphasizes the need for a comprehensive business model analysis. It offers a structured methodology for understanding nature-related dependencies, impacts, risks, and opportunities. In the context of a Value to Business analysis, the LEAP approach can enhance the five-step process. Specifically, the first step of the LEAP process (L1) focuses on understanding the entity's activities by sector, value chain, and geography,

[13] International Foundation for Valuing Impacts and Value Balancing Alliance. (2024). General Methodology, p. 49

[14] See Capitals Coalition. (2019). Social and Human Capital Protocol

[15] For more information regarding the measurement of impacts and dependencies see "5. Measure impact drivers and dependencies".

[16] The CSRD / ESRS explicitly requires an analysis of the entire value chain. The focus of the analysis should be on material impacts, dependencies, opportunities and risks, irrespective of existing contractual relationships. It should be noted that the CSRD / ESRS follows the double materiality approach, whereas a Value to Business analysis focuses primarily on the financial consequences of the value chain relationships.

[17] M. Porter. (1985). Competitive Advantage: Creating and Sustaining Superior Performance

[18] In Porter's Value Chain Analysis, primary activities focus on creating and delivering products or services, including inbound logistics, operations, outbound logistics, marketing, sales, and service. Support activities, such as procurement, technology development, human resources, and firm infrastructure, enhance the efficiency of these primary functions to maximize value for customers.

including upstream and downstream participants. That ensures a comprehensive assessment of impacts and dependencies.[19]

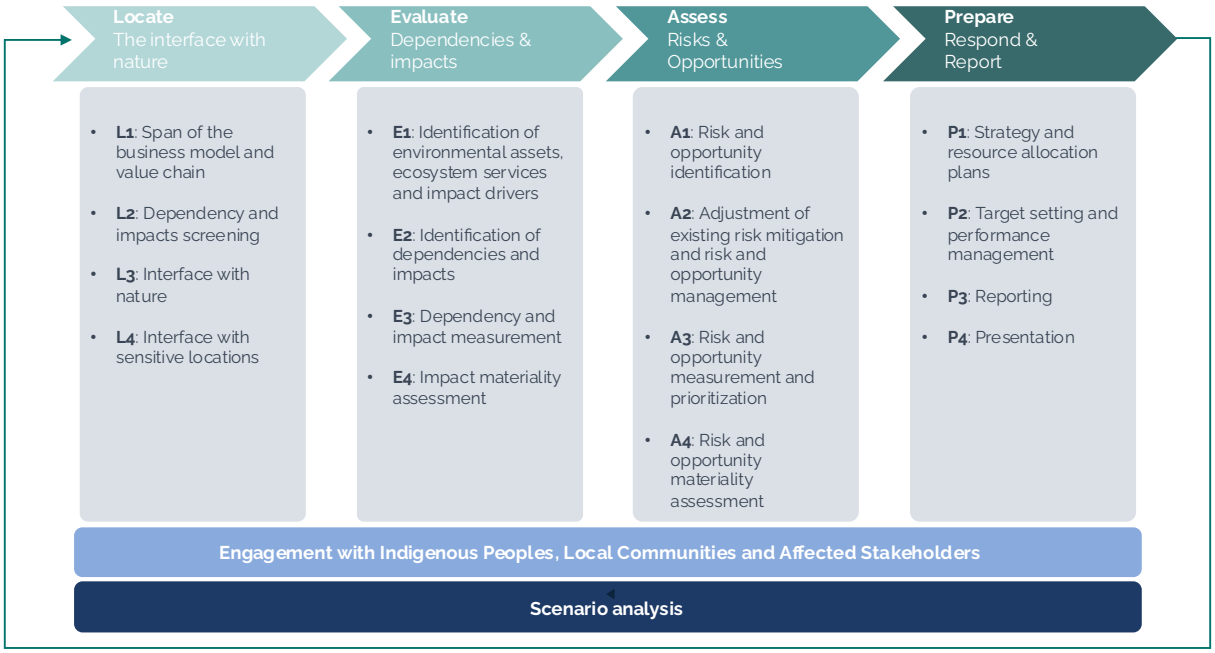


Figure 3 **The LEAP approach according to the TNFD**
(Source: Based on TNFD, 2023)

Guiding questions include:

- In which sector does the business model and value chain partners of the entity operate?
- In which value chain stage does the entity operate?
- Where are the entity's direct operations geographically located?

Additionally, the TNFD has created specific guidance on 14 different sectors covering 25 of the sectors classified by the Sustainable Industry Classification System (SICS)[20]. The current industry coverage is listed below:

Table 1: **Additional sector guidance by TNFD**

Financial institutions*	**Biotechnology and pharmaceuticals****	**Construction materials*****
Aquaculture**	**Metals and Mining****	**Engineering, construction and real estate*****
Forestry, Pulp and Paper**	**Electric utilities and power generators****	**Beverages*****
Food and Agriculture**	**Oil and gas****	**Apparel, accessories and footwear*****
Chemicals**	**Fishing*****	

Note: ** Version 2.0 June 2024; ** Version 1.0 June 2024; ***Draft open for consultation June 2024*
(Source: TNFD, 2024)

[19] TNFD. (2023). Guidance on the identification and assessment of nature-related Issues: The TNFD LEAP approach, p. 41-43, Further mapping of LEAP to V2B to be found in Appendix 2

[20] The Sustainable Industry Classification System is an industry classification system based on the categorisation of industries on the basis of comparable sustainability related risks and opportunities. The SICS are developed by the Sustainability Accounting Standards Board (SASB). See also: Find your industry - SASB (ifrs.org).

The Guidance supports the analysis of impacts and dependencies as well as risks and opportunities by offering key topics, guiding questions, and a prototypical sector-specific value chain. This helps ensure all relevant business activities are captured.[21]

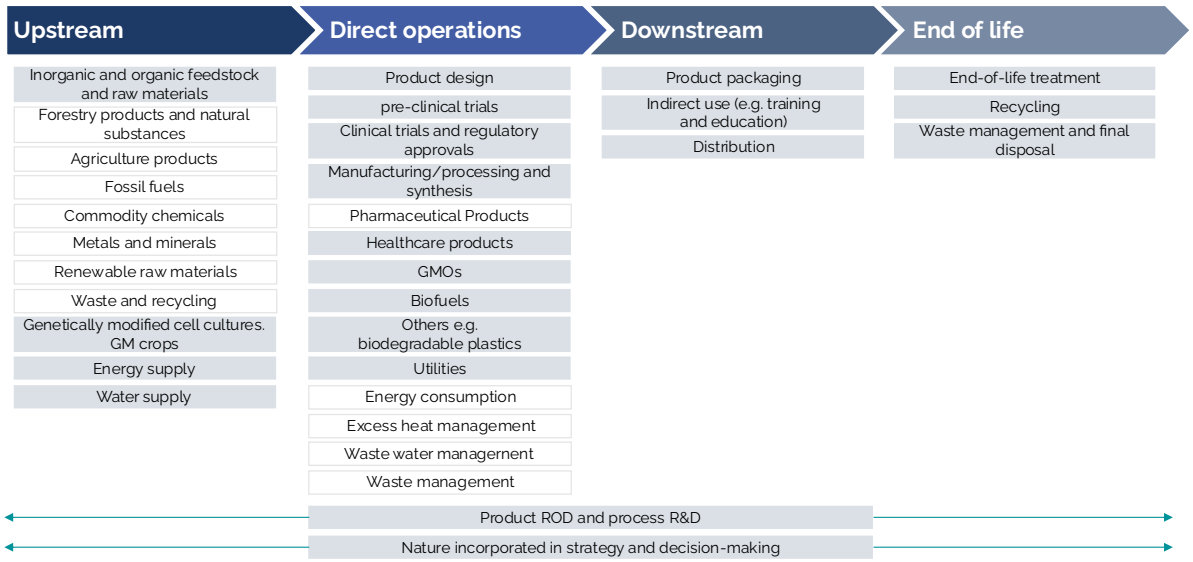


Figure 4 **Illustrative example of value chain overview within the TNFD sector guidance** (Source: TNFD, 2024)

Ideally, an entity would have full visibility of its downstream and upstream activities, enabling easy extraction from internal systems of key data like raw material use and related environmental and social impacts for informed decision-making.

However, such transparency is rarely achievable due to unavailable or incomplete data. This forces reliance on simplified (analytical) methods, assumptions, and secondary data sourced from mathematical models or third-party providers.[22] These limitations introduce measurement uncertainty into the analysis, making it challenging to fully grasp the environmental and social impacts and dependencies across the value chain.

The complexity of value chain analysis increases with factors such as multi-tiered supply chains, complex product compositions, diverse product portfolios and customer bases, or regional diversity of customer and suppliers. Given these challenges, entities may prioritize in their analysis key actors, regions, products, or materials in their value chain based on materiality.[23] This ensures resources focus on the analysis of impacts and dependencies with potentially significant effects on risks and opportunities.

An exclusive focus on Tier 1 suppliers[24] in the analysis can be misleading, as significant impacts may be located deeper within the supply chain. Limiting analysis to Tier 1 risks overlooking critical upstream factors. A more comprehensive approach, covering beyond Tier 1, may be needed to capture material impacts and dependencies. For example,

[21] See for further guidance TNFD. (2024). Guidance on value chains
[22] Also compare IFRS S1, paragraph 77 to 79.
[23] Reminder: When consulting resources such as the TNFD Value Chain Guidance, it's important to recognize that the concept of materiality in these reports refers broadly to impacts and dependencies. However, within the Value to Business context, materiality is more focus on financial materiality. This differentiation ensures that the analysis remains aligned with the overarching goal of assessing financial effects, rather than becoming overly broad or diluted by factors that may not directly influence the entity's financial outcomes.
[24] TNFD. (2024). Value chain guidance, p. 4-13

Extended Environmental Input-Output models (EEIO) can help analyze the entire upstream chain based on macroeconomic data.[25] Combined with impact valuation, regional issues like water scarcity or land use can be identified. However, outdated data, lack of entity specificity, and high complexity limit their application.

c. Gain an initial understanding of globally relevant impacts and dependencies (optional step)

Impacts and dependencies appear throughout the value chain with varying complexity and variety, from tangible effects like toxic substance displacement to abstract dependencies such as social cohesion. Therefore, it may be beneficial to start with a global perspective before analyzing company-specific impacts and dependencies. By examining significant global, regional, and industry-specific factors, entities can better contextualize their own circumstances.

Table 2 lists the most relevant frameworks and reports to support a top-down analysis and highlights key trends and global developments. The listed sources can help formulate possible working hypotheses and provide a strategic entry point into the entity-specific analysis. This ensures that the investigation of entity-specific impacts and dependencies is grounded in a comprehensive understanding of the larger context. For the top-down analysis the broadest topics and associated frameworks should be addressed first. For further details on the below listed resources please refer to Appendix 1.

Table 2: **Overview of sources for top-down analysis**

Report Name	Publisher	Description	Link
Planetary & Social Boundaries (doughnut economics)	Stockholm Resilience Centre, Kate Raworth, Oxfam	Framework to describe the limits of anthropogenic and social impacts on the earth system and the global society. Both frameworks are combined within the doughnut framework.	Planetary boundaries - Stockholm Resilience Centre A Safe and Just Space for Humanity: Can we live within the doughnut? (oxfam.org)
The Global Risks Report 2025 20th Edition	World Economic Forum	Report on the most relevant global risk factors for the current and upcoming state of the world	https://www.weforum.org/publications/global-risks-report-2025/
ENCORE	Global Canopy, UNEP FI and UNEP-WCMC	Online analysis tool for industry and region-specific impacts and dependencies	ENCORE (encorenature.org)
SBTN	SBTN, WWF, CI, etc.	Materiality Assessment Tool; List of High Impact Commodities; Technical Guidance for assessing impacts and dependencies;	https://sciencebasedtargetsnetwork.org/resources/
WWF Risk Filter	WWF Germany	Online analysis tool for industry and region-specific risks, impacts and dependencies	WWF Risk Filter Suite - Home
SASB Materiality Finder	IFRS Foundation	Online analysis tool for industry specific risks, impacts and dependencies	Overview - SASB (ifrs.org)

[25] For more information on EEIO see Value Balancing Alliance. (2021). Methodology Impact Statement – Extended Input-Output Modelling

The Sustainability-Linked Bond Principles – Sector Materiality	Sustainability-Linked Bonds Working Group	Assessment of industry and region-specific impacts and dependencies	Registry-SLB-KPIs_Final_2022-06-24-280622.xlsx (live.com)
Industry specific reports considering sustainability related topics	Various	Multiple consultancies, corporates, NGOs, governmental organizations and lobby groups are publishing valuable industry insights	Various
Climate Change 2022: Impacts, Adaptation and Vulnerability (Working Group II), Climate Change 2022: Mitigation of Climate Change (Working Group III)	Intergovernmental Panel on Climate Change (IPCC)	Comprehensive overview of nature- and social-related Impacts, risks mitigation and adaptation options presented per region and impact category	AR6 Climate Change 2022: Impacts, Adaptation and Vulnerability — IPCC AR6 Climate Change 2022: Mitigation of Climate Change — IPCC

(Source: Own depict)

d. Identify impacts and dependencies relevant to the entity and map out impact and dependency pathways

The identification of entity-specific impacts and dependencies is the cornerstone of the first step, serving as the critical foundation for deriving subsequent opportunities and risks. Given the tailored nature of this analysis, it is essential to develop a deep understanding of the company and to establish well-informed working hypotheses in steps 3.1.2 and 3.1.3, ensuring accuracy and relevance.

While project teams have initial ideas on actual and potential impacts and dependencies, some may only be revealed through a thorough analysis. Initial findings should be critically evaluated and validated to avoid biases like availability or confirmation bias. To better understand impacts and dependencies, so-called pathways may be used.[26] These impact and dependency pathways serve as a graphical process framework that maps company's activities with the corresponding impacts and dependencies using input-activity-output relationships. Pathways visualize clearly and systematically how activities lead to outcomes and how these, in turn, influence or depend on broader environmental, social, or economic factors.

The analysis and measurement of impacts is always conducted in comparison to or as a residual of a reference scenario. This reference scenario represents an image of the expected reality, disregarding all business activities carried out by the entity and thus also excluding all inputs used and outputs/outcomes generated.[27] The impact analysis distinguishes the stages of the value chain into upstream, own operations, and downstream.

[26] International Foundation for Valuing Impacts and Value Balancing Alliance. (2024). General Methodology 1, p. 18

[27] International Foundation for Valuing Impacts and Value Balancing Alliance. (2024). General Methodology 1, p. 18f
The Natural Capital Protocol provides the option of individually defining the reference scenario ("baseline") depending on the nature of the assessment. Possible options include, for example, historical impact levels, historical levels of capital or sector averages for impacts and dependencies (NCC, p. 39)

During the analysis the differentiation of the value chain into these three stages not only helps to structure the analysis and scoping of the overall assessment but can also provide direct approaches for possible mitigation and adaptation strategies, considering different levels of control and power of change between own operations and upstream/downstream activities.[28]

An ***impact pathway*** describes the series of consecutive, causal relationships, ultimately starting at an input for an entity's activities and linking its actions with related changes in people's well-being.[29] This involves analyzing the inputs and outputs based on the activities of the related entity and its value chain concerning outcomes for natural, human, and social capital. Based on these outcomes, the impacts on human well-being can be determined.[30] For more details on how to build impact pathways refer to General Methodology 2 of IFVI and VBA.

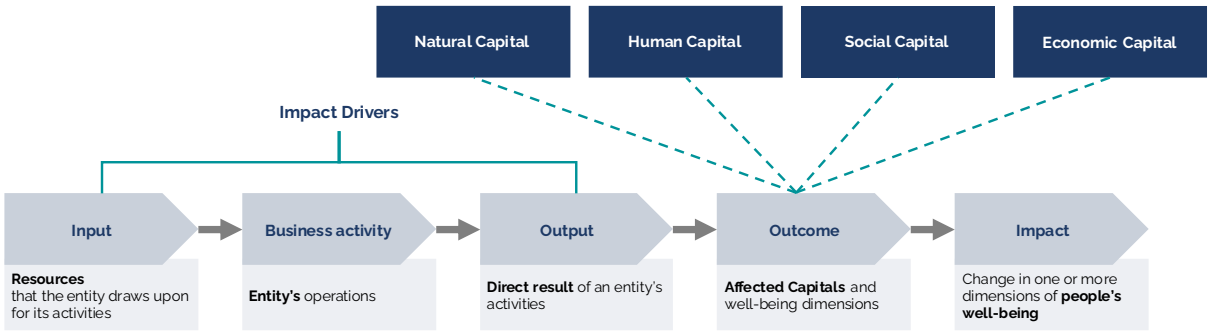


Figure 5 **Impact Pathway**
(based on IFVI and VBA, 2024)

During the creation of the entity-specific impact pathways, it is recommended to create separate impact pathways sustainability related per impact driver to be further analyzed in order to avoid confusing and complex structures. Potential interrelations or reinforcing effects between individual topics and impacts should be qualitatively considered.

Dependency pathways describe the specific link between business activities and their dependencies on natural, human, social, and economic capital. The effect of potential changes of human, social, natural, and economic capital on costs and benefits of doing business can be identified and illustrated.[31]

[28] Capitals Coalition. (2016). Natural Capital Protocol, p. 32.
For more regarding mitigation and adaption strategies, see chapter 8.4.
[29] Different authors and standard setters have slightly different systematizations for impact pathways, but all come back to an input-activity-output logic (compare e.g. Capitals Coalition. (2019). Social and Human Capital Protocol, p. 33)
[30] International Foundation for Valuing Impacts and Value Balancing Alliance. (2024). General Methodology 1, p. 18; Capitals Coalition. (2016). Natural Capital Protocol, p. 45; Capitals Coalition. (2019). Human and Social Capital Protocol, p. 33f
[31] TCFD. (2023). Task Force on Climate-related Financial Disclosures, p. 31

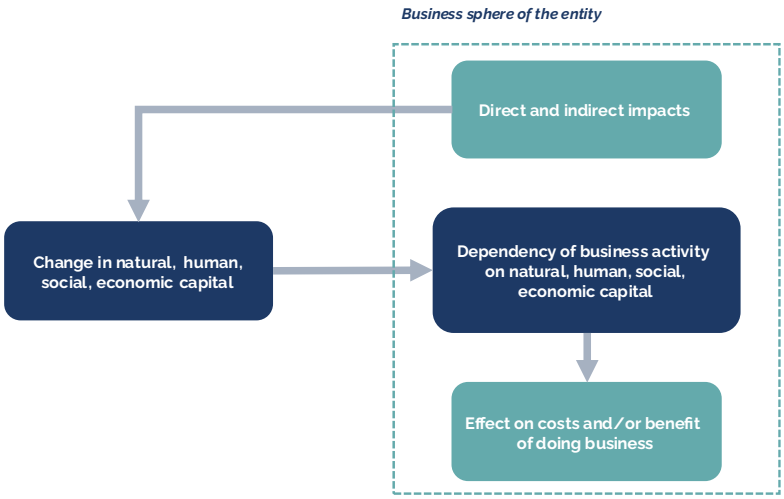


Figure 6 **Dependency Pathway** (based on Capitals Coalition, 2019)

The dependency of a specific business activity (e.g. based on material input factors) is the starting point of the analysis. By analyzing backwards connected capitals and influencing direct and indirect outcomes shall be identified. Once these interrelations have been analyzed and understood, the analysis can focus on identification of opportunities and risks resulting from the dependencies for the operational business through changes in capitals over the dependencies.

Since impacts and dependencies can have major interrelations, it is important to gain an understanding of the exact relationship. As the effects of the dependencies are driven by direct and indirect outcomes, the dependency and impact pathways are directly linked.[32]

Combining the two already presented figures illustrates the connection between business activities within the value chain, the respective impacts and the dependencies.

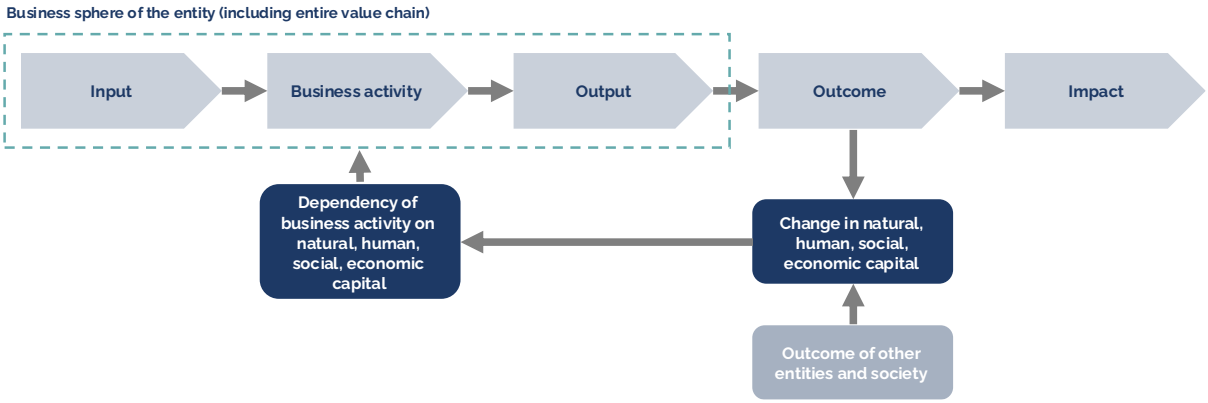


Figure 7 **Combination of impact and dependency pathways** (based on IFVI and VBA, 2024; Capitals Coalition, 2016)

The link between dependencies and the business sphere (green dotted frame) is intended to show that the dependencies in combination with a change in capital have a direct influence on the company. This influence can manifest itself at different points in the value chain, but ultimately always results in risks and opportunities. Dependency pathways consider direct outcomes (green) and indirect ones from third parties (grey). Generally, companies with a high dependency on certain types of capital (e.g., on local water resources) also tend to exert significant impacts on those same capitals. Therefore, particular attention should be given to analyzing the associated dependencies and

[32] Capitals Coalition. (2019). Social and Human Capital Protocol, p. 35

impacts, and how they reinforce one another.[33] Figure 8 illustrates the interrelations within the combined pathways with examples.

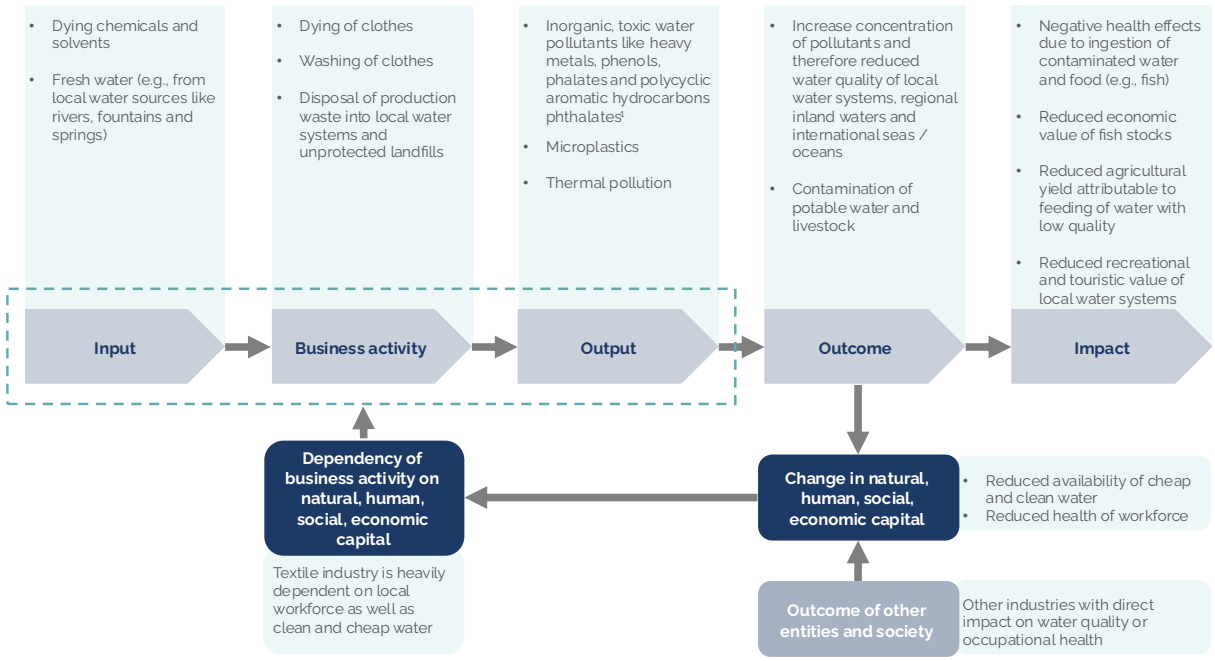


Figure 8 **Exemplary presentation of an analysis using impact and dependency pathways**
(Source: Fachverband Textilrecycling[34], 2024)

An impact analysis conducted in accordance with the ESRS as part of the double materiality analysis may be sufficient. Using these results, entities can leverage existing insights and data, ensuring that regulatory expectations align with strategic business objectives. Furthermore, the TNFD LEAP approach can support a detailed assessment, especially for nature-related topics. LEAP includes two steps of relevance for this stage of the Value to Business assessment, *Locate* and *Evaluate*. Appendix 2 provides more detailed information on how the TNFD LEAP approach can be mapped against the individual steps of the Value to Business process.

Many tools and frameworks, like ENCORE and the TNFD, emphasize the importance of **ecosystem services**. Ecosystem services represent the benefits that ecosystems provide to human society, such as timber provision, freshwater, or natural flood protection. Dependencies on nature/biodiversity can be categorized and assessed using the ecosystem service concept. Since ecosystem services are based on natural capital, a dependency on an ecosystem service constitutes a dependency on natural capital itself.

TNFD provides a checklist to assess the significance of ecosystem services within the entity`s operations. This checklist evaluates the importance of input factors supplied by ecosystem services and the potential financial losses if these services are disrupted. It also considers the broader social implications of such disruptions.[35]

[33] Capitals Coalition. (2016). Natural Capital Protocol, p. 35
[34] European Parliament. (2024). Environmental impact of textile production and textile waste. European Parliament, based on data from Fachverband Textilrecycling.
[35] TNFD. (2023). Guidance on the identification and assessment of nature-related Issues: The TNFD LEAP approach, p. 88

When an ecosystem service plays a significant role in a company's value chain, whether directly or indirectly, it constitutes a critical dependency. Any restriction or decline in scope or quality of these services due to environmental or ecological changes could have substantial financial implications for the entity. Therefore, conducting a Value to Business analysis requires a thorough assessment of the key ecosystem services used by the entity, as well as potential changes in these ecosystems. The TNFD identifies five primary drivers of nature change: climate change; changes in land, freshwater and ocean use; resource use and replenishment; pollution and pollution removal; and the introduction or removal of invasive alien species.[36] Ecosystems can be classified into biomes, which are large ecological areas characterized by similar climate conditions, flora, and fauna. Each of these biomes provides a unique combination of ecosystem services.[37] The TNFD "Guidance on Biomes" provides a list of all biomes and their ecosystem services, offering guidance on potential business connections to the respective biomes (see Table 3).

For location analysis, tools like the "Nature Map Explorer" using the "terrestrial habitat type" filter can be used.[38] If exact biomes are unknown, a heuristic table provides an overview of relevant biomes per industry sector. This can serve as a starting point for a nature-related dependency analysis.[39] However, depending on the location[40] in which an entity is operating and based on the specific business model an individual assessment of the relevant biomes should always be considered.[41]

Table 3: **Industry sectors and likely relevant biomes[42]**

Industry sector	Likely relevant biomes
Consumer goods	Tropical and sub-tropical forests (T1) Temperate-boreal forests and woodlands (T2) Intensive land-use systems (T7) – Excluding urban and industrial ecosystems Intensive land-use systems (T7) – Urban and industrial ecosystems (T7.4) Rivers and streams (F1)
Electric utilities and power generation	Temperate-boreal forests and woodlands (T2) Intensive land-use systems (T7) – Urban and industrial ecosystems (T7.4) Rivers and streams (F1) Marine shelf (M1)
Energy (oil, natural gas and renewable energy)	Tropical and sub-tropical forests (T1) Temperate-boreal forests and woodlands (T2) Savannas and grasslands (T4) Intensive land-use systems (T7) – Excluding urban and industrial ecosystems Marine shelf (M1)

[36] TNFD. (2023). Recommendations of the Taskforce on Nature-related Financial Disclosures, p. 31.
[37] TNFD. (2023). Recommendations of the Taskforce on Nature-related Financial Disclosures, p. 25-28; TNFD. (2023). Guidance on Biomes, p. 5f.
[38] The nature map explorer was developed by International Institute for Applied Systems Analysis (IIASA), the Instituto Internacional para Sustentabilidade (IIS), the UN Sustainable Development Solutions Network (SDSN), and the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) Map | Nature Map Explorer
[39] Such a work step could also be assigned to a top-down analysis but is presented here for the sake of coherence
[40] The same biomes in different locations will provide similar ecosystem services
[41] TNFD. (2023). Guidance on Biomes, p. 14-16, and adjusted for further biomes in cooperation with Helmholtz Institute
[42] Numbers in brackets represent scientific classification based on GET (Global Ecosystem Typology)

Food and beverage	Tropical and sub-tropical forests (T1) Savannas and grasslands (T4) Intensive land-use systems (T7) – Excluding urban and industrial ecosystems Rivers and streams (F1) Marine shelf (M1)
Food and beverages (aquaculture and fishing) Forestry management Pulp and paper products Other forest-based enterprises and users of formerly forested land	Tropical and sub-tropical forests (T1) Temperate-boreal forests and woodlands (T2) Intensive land-use systems (T7) – excluding urban and industrial ecosystems Rivers and streams (F1) Marine shelf (M1)
Hospitality and recreation (tourism)	Tropical and sub-tropical forests (T1) Temperate-boreal forests and woodlands (T2) Savannas and grasslands (T4) Intensive land-use systems (T7) – Urban and industrial ecosystems (T7.4) Rivers and streams (F1) Marine shelf (M1)
Infrastructure	Tropical and sub-tropical forests (T1) Temperate-boreal forests and woodlands (T2) Intensive land-use systems (T7) – Urban and industrial ecosystems (T7.4) Savannas and grasslands (T4) Rivers and streams (F1)
Metals and mining	Tropical and sub-tropical forests (T1) Temperate-boreal forests and woodlands (T2) Savannas and grasslands (T4) Intensive land-use systems (T7) – including urban and industrial ecosystems Rivers and streams (F1) Marine shelf (M1)
Resource transformation	Intensive land-use systems (T7) – Urban and industrial ecosystems (T7.4) Rivers and streams (F1)
Transportation	Intensive land-use systems (T7) – Urban and industrial ecosystems (T7.4) Rivers and streams biome (F1) Artificial wetlands biome (F3)

(Source: Global Ecosystem Typology, Own depict)

A nature-related dependency analysis may comprise the following steps if location-specific data are available (e.g., for own operations or direct suppliers):

(1) identifying the specific location and the corresponding biomes,

(2) identifying the most important ecosystem services per biome,

(3) identifying the ecosystem services most relevant to the specific entity based on an analysis of the business model (e.g., production process),

(4) deriving dependencies based on the identified ecosystem services, and

(5) deriving opportunities and risks based on an analysis of the drivers of nature change (e.g., pollution to water or air).

If this information is not available, starting point should be the input factors and required resources for the business process. This requires additional steps like:

(1) analyze production and value chain process
(2) identify material input factors and required resources for production or in the upstream value chain stages (e.g., water, timber, copper, soy,…),
(3) specify potential locations of input factors and resources (cultivation, mining, etc.) e.g. based on macroeconomic and statistical data (EEIO models) or market studies[43],

[43] For example, approx. 25% of global copper production results from Chile. Together with Peru, Kongo, these three countries unite approx. 50% of global production

(4) verify this data is possible with additional data (e.g. from suppliers).

Resources like ENCORE can be used to narrow down analyses or to doublecheck analysis results. There are numerous other approaches in the current literature that may support the identification of impacts and dependencies. A list of additional support material is provided in Table 4.

Table 4: **Overview of sources for bottom-up analysis**

Report Name	Publisher	Description	Link
Natural Capital Protocol	Capital Coalition	Decision-making framework that enables organizations to identify, measure and value their direct and indirect impacts and dependencies on natural capital.	Natural Capital Protocol – Capitals Coalition
Human and Social Capital Protocol	Capital Coalition	Decision-making framework that enables organizations to identify, measure and value their direct and indirect impacts and dependencies on social capital & human capital	Social & Human Capital Protocol – Capitals Coalition
Taskforce on Nature-related Financial Disclosures (TNFD) Recommendations	Task Force on Nature-related Financial Disclosures	Set of general requirements for nature-related disclosures and a set of recommended disclosures structured around the four pillars of governance, strategy, risk and impact management, and metrics and targets.	Taskforce on Nature-related Financial Disclosures (TNFD) Recommendations – TNFD
CRREM Project	Consortium of various academic institutes; financed by the European Union	Tool for analysis of real estate portfolios with respect to stranded assets.	CRREM Project

(Source: Own depict)

e. Measure impact drivers and dependencies (optional)

For the identification of material impacts and dependencies, measurement of impact drivers and dependencies is optional in the Value to Business process. The determination of key metrics related to the specific impacts and dependencies may help in the identification process, serving as a starting point of the financial analysis if impact drivers and financial effects are directly linked. The measurement can be carried out on a qualitative, quantitative or monetary basis, depending on requirements.

Qualitative assessments primarily comprise descriptive descriptions of changes in natural, social and human capital. This form of assessment is particularly suitable for an initial indication of relevant impacts and dependencies and is therefore of particular importance in the Value to Business concept.

Quantitative assessment involves the numerical measurement of (physical) changes. Quantitative measures include both the inputs (e.g., amount of chemicals used) and outputs (e.g., CO_2 emissions) of an entity's operations, or changes of the state of nature (e.g., increased number of pollutants in local freshwater reserves). Such quantification is particularly important within the Value to Business assessment if a direct, calculable link between an impact pathway and a financial effect can be recognized and. Quantitative data

is created by using either primary data (e.g., internal business data), secondary, or proxy data (e.g., based on Lifecycle Assessments or EEIO models).[44]

Monetary impact valuation captures the value creation and erosion for society from a change in people's well-being, resulting from altered natural, social, and/or human capital. Monetization can help to identify trends or differentiate between the severity of certain impacts caused by certain projects or on certain stakeholder groups.45 The impact accounting methodology developed by VBA and IFVI (now Capitals Coalition) provides a common global baseline for monetary valuation of impacts. Impact valuation can provide comparable and evidence-based results as well as profound insights into the value chain and is therefore an excellent starting point for the Value to Business analysis. The general logic of applying monetary valuation of impacts is outlined in Figure 9.

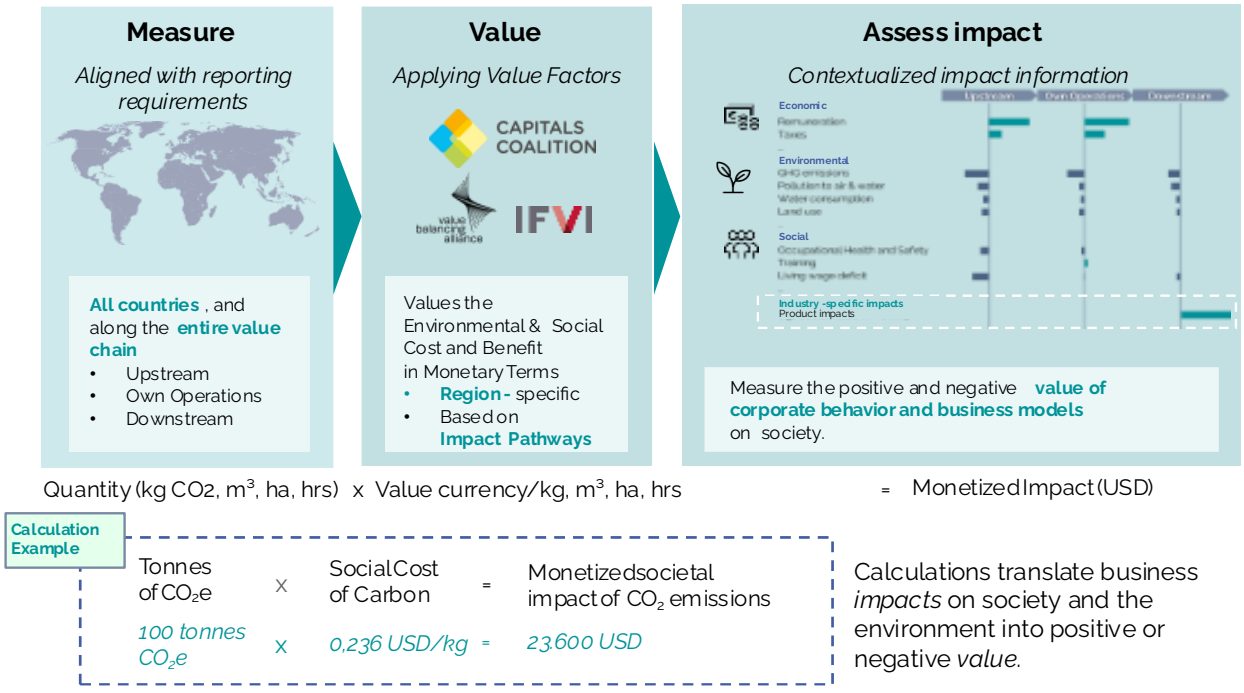


Figure 9 **Impact Valuation Logic – From Measurement to Valued Impacts** (Source: Value Balancing Alliance)

Using impact valuation requires consumption data for key input factors, which needs to be collected on location- or at least country-level. For value chain assessments, additional data from input-output modelling or life cycle assessments is used, similar to other quantitative assessments.

Using impact valuation offers a dual benefit: It provides a clear overview of the company's value chain impacts, and it reveals which input factors are most critical to value creation, including their regional origin. These inputs may also represent significant dependencies, highlighting areas that require closer examination and management. Thus, impact valuation not only captures environmental and social impacts but also helps identify the

[44] TNFD. (2023). Guidance on the identification and assessment of nature-related Issues: The TNFD LEAP approach, p. 90; TNFD. (2023). Recommendations of the Taskforce on Nature-related Financial Disclosures, p. 67; For further information regarding data collection process please refer to the following guidelines: Capitals Coalition. (2016). Natural Capital Protocol, p. 60

[45] Capitals Coalition. (2016). Natural Capital Protocol, p. 37f. and p. 62f; For examples on indicators of different impact drivers, see Capitals Coalition. (2016). Natural Capital Protocol, p. 61f.

key dependencies that are essential for sustaining company's operations and long-term success.

However, it should be noted that a Value to Business analysis focuses specifically on the financial effects of impacts and dependencies. It is important not to confuse monetized impact values with actual or anticipated financial effects. An impact that appears minor from a Value to Society perspective may entail significant financial opportunities and risks due to (over-)internalizations or links to critical dependencies. Furthermore, the measurement approach must be tailored to the specific Value to Business use case.

f. Iterative adjustments of the results throughout the course of the overall assessment

As the analysis progresses, insights into impacts, dependencies, and future scenarios may become clearer, improving identification of impacts and dependencies in an iterative process.[46] After step 2.1.5, revisiting step 2.1.3 may be helpful to reassess hypotheses using broader data, creating a back-and-forth process that strengthens the overall analysis. Additionally, Chapter 2.1.3 outlines a holistic approach including company and market analyses to link impacts and dependencies to financial risks, often uncovering new insights. When this occurs, the initial analysis should be refined.

3.2. **Step 2** – Derivation of financial risks and opportunities

This chapter will explore the connection between impacts/dependencies and opportunities/risks. Impacts usually do not have any direct financial effects on the entity. However, once internalized, e.g. through regulation or market developments, they can create opportunities and risks, so anticipated financial effects can arise.[47]

Dependencies on natural, human, and social capital often generate revenue without any direct financial costs, but shifts in these resources can affect revenue streams, cost compositions or lead to further indirect financial effects[48].

The chapter explores opportunities and risks, following these analytical steps:

(1) Current situation of the entity, focusing on internal factors that influence financial outcomes (e.g., legal status, business model, financial situation, products, technology, or employees).

(2) Entity's operating environment like market, sector trends, competitive landscape, as well as key stakeholders,

(3) Materiality assessment evaluating the probability of occurrence and extent of change of these identified opportunities and risks.

The consideration of macro and implementation scenarios is essential.[49] Factors such as inflation rates, interest rates, economic growth, and geopolitical events influence an entity's financial performance and market position. Additionally, impacts and dependencies on

[46] Refer to TNFD. (2023). Guidance on the identification and assessment of nature-related issues: The LEAP approach, p. 7, which also highlights the importance of an iterative analysis approach; See also Appendix 2

[47] Capitals Coalition (2016). Natural Capital Protocol, p. 33

[48] Also refer to Appendix 2; Comparing to TCFD and TNFD frameworks, this chapter refers to the step "Assessing Financial Impacts of Climate-Related Risks and Opportunities" and step 3 within the LEAP approach "Assess", respectively.

[49] For more details refer to the Value to Business Framework

nature, human and social capital play a crucial role in this analysis, particularly concerning physical and transition risks. This dual foresight provides a good understanding of entity's environment considering the entire value chain. Understanding economic and sustainability related dynamics ensures that the financial analysis is comprehensive and covers multiple aspects.

Figure 10 provides an overview of the different levels of analysis and their interrelation. It considers climate and social scenarios that influence natural, human, and social capital. Internalization results in opportunities and risks which can be managed by deliberate strategies. Opportunities and risks as well as responses have effects on financial statements, the risk profile of KPIs and thus on the equity value.

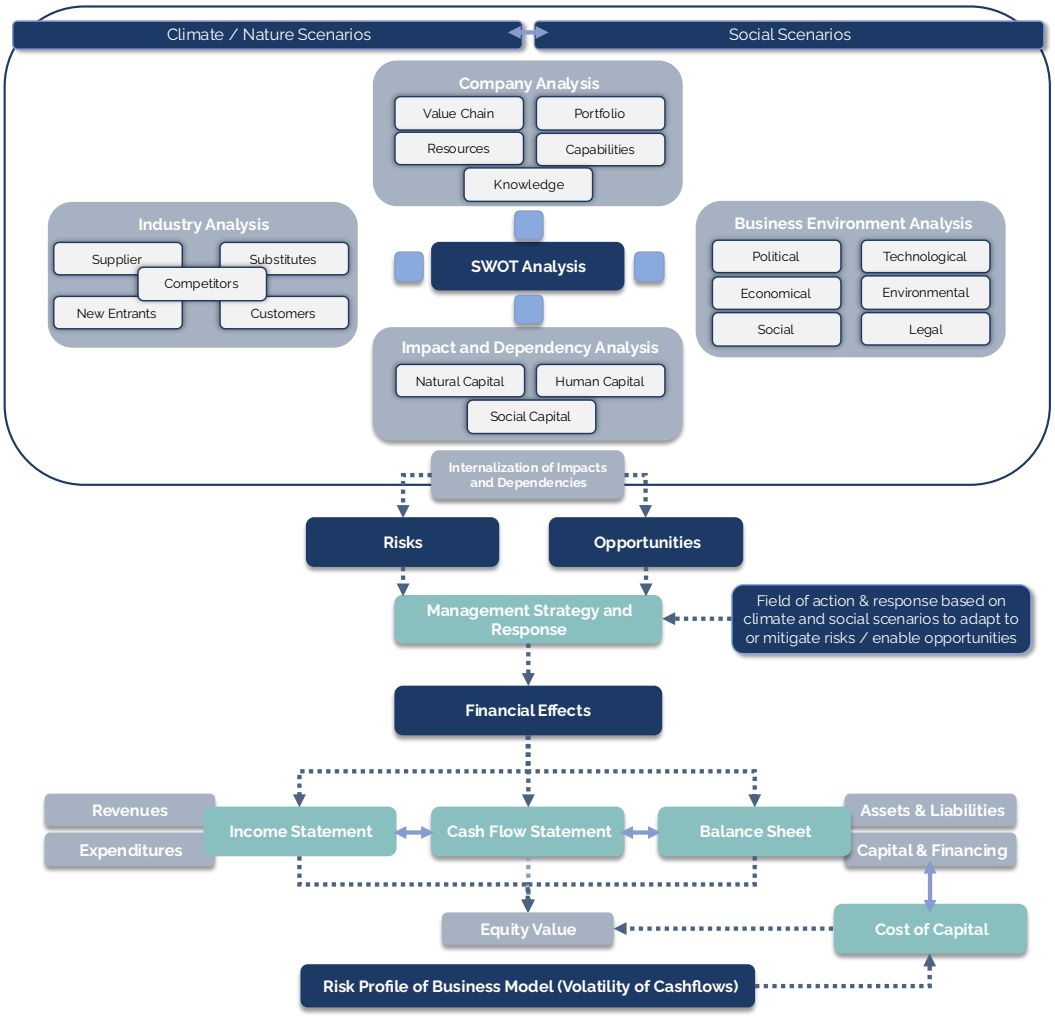


Figure 10 **Overview of opportunities and risks financially affecting entities** (Source: Based on TCFD, 2017)[50]

a. Company Analysis

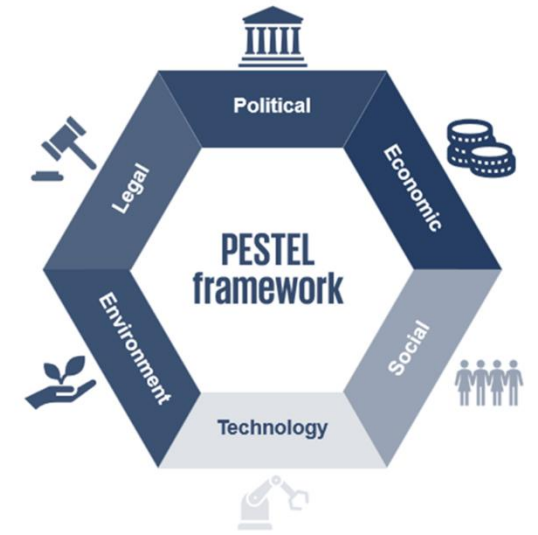
A company analysis provides a thorough understanding of the entity's legal, financial, and operational circumstances and activities across the entire value chain, serving as the foundation for identifying opportunities and risks. This includes an analysis of the existing business model including, but not limited to, important materials and sourcing, production technology, locations, R&D, products, existing sales channels, legal and organizational

[50] TCFD. (2017). Recommendations of the Task Force on Climate-related Financial Disclosure, p. 8

structure, financing, and financial situation, to understand how success and resilience is driven within the entity.

A value chain analysis identifies crucial activities contributing to competitive dis-/advantage and encompasses an assessment of already internalized impacts and dependencies. This ensures a company awareness of its internal and external influences for effective management. Strategic measures that have been initiated are reviewed to gauge their alignment with long-term objectives. In company analysis, various tools are applied to evaluate both financial and non-financial KPIs:

- ***Historical analysis*** focuses on past performance, examining financial metrics such as revenue, profit margins, and growth rates, as well as non-financial indicators like customer satisfaction and employee engagement.
- ***Performance comparison*** involves evaluating actual outcomes against original plans, including financial benchmarks (e.g., growth rates, profit margins) and non-financial objectives such as SBTi climate targets and SBTN nature targets (CO_2 reduction or energy efficiency).
- ***Reporting and corporate communication analysis*** examines both financial disclosures and sustainability reports for gathering information. Overall, these steps within the analysis should provide a holistic overview of the entity's status quo.



The **PESTLE analysis** is a business environment analysis that enables businesses to proactively address external challenges and leverage opportunities, fostering a more adaptable and resilient business model. The PESTLE analysis examines the entity's macroeconomic environment by considering six key factors: political, economic, social, technological, ecological, and legal.[51] Additionally, this model is particularly useful for systematically identifying and assessing the forces of internalization (see chapter 3.2.d).

Figure 11 **PESTEL/PESTLE framework**
(Source: IRJET Pestle Technique, 2016)

In the following, the six key factors are described with a brief description and examples:

Political: Examines the impact of government policies, regulations, and political stability on the business environment. *EU Fit for 55:* The EU's climate goals aim to reduce greenhouse gas emissions by 55% by 2030, imposing stricter environmental regulations and promoting renewable energy. *Brexit:* The United Kingdom's exit from the EU has significant impacts on trade, tariffs, and regulations for businesses operating in these markets.

[51] IRJET. (2016). Pestle Technique – A Tool To Identify External Risks in Construction Projects

***Economic*:** Assesses economic factors such as inflation, exchange rates, economic growth, and interest rates that can influence business operations and profitability. *Inflation:* High inflation rates in countries like Argentina lead to increased costs for raw materials and wages, reducing profit margins for businesses.

***Social*:** Looks at societal and cultural aspects, including demographics, lifestyle changes, and consumer attitudes, which can affect demand for products and services. *Aging Population*: In Japan, the aging population is leading to a shrinking labor market and increased demand for healthcare services and products. *Changing Consumer Preferences:* The growing preference for plant-based diets over meat in many Western countries is shifting market demand towards vegetarian and vegan food products, impacting the food industry.

***Technology*:** Analyses the impact of technological advancements, innovation, research and development, and the rate of technological change on the business. *Artificial Intelligence (AI):* Advances in AI technology are transforming industries such as the automotive sector through the development of self-driving cars and increasing energy demand for AI processing. *Hydrogen Fuel*: Innovations in hydrogen fuel technology are being developed to provide cleaner alternatives for energy, especially in heavy industries and transportation, including potential uses in aviation.

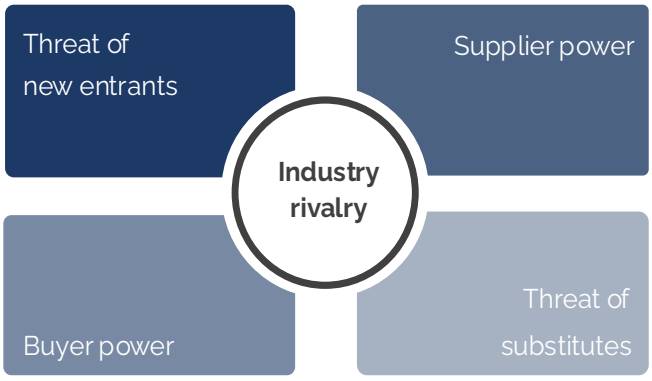
***Legal*:** Evaluates the influence of laws and regulations, including employment laws, health and safety standards, and antitrust laws, on the business. *Data Protection Laws:* The introduction of the General Data Protection Regulation (GDPR) in the EU forces companies worldwide to overhaul their data processing practices ensuring compliance. *Labor Laws:* Changes in labor laws, such as the increase in the minimum wage in various US states, affecting personnel costs and pricing strategies for businesses.

***Environment*:** Considers ecological and environmental factors, such as climate change, biodiversity, pollution crisis, and limited natural resources**.** *Climate Change*: Extreme weather conditions and natural disasters, such as hurricanes in the US, affect supply chains and operating costs for businesses. *Agricultural Impact*: Negative effects of climate change on agriculture, such as reduced crop yields and increased food insecurity, pose risks to global food supply and prices.

b. Industry Analysis

Industry analysis involves a comprehensive assessment of the market and competitive landscape to understand the current status quo. This includes defining the market by identifying its size, key players and competitors, and the market shares held by both the company and its rivals. Additionally, the analysis considers alternative products and emerging technologies that could influence market dynamics and that may be able to substitute the entity's own business. In addition, the negotiating power of customers and suppliers are significant factors to be analyzed.

A thorough benchmarking process may compare financial metrics such as revenue, profitability, and growth rates, alongside non-financial factors like decarbonization pathways and sustainability targets, reviewing how well an entity's decarbonization efforts and sustainability targets align with industry standards and best practices. This ensures a holistic understanding of the industry and positioning of the company while aligning with broader sustainability goals and regulations.



A common framework for analyzing markets and competition is Porter's ***Five Forces framework***. This strategic framework can help businesses analyze the competitive forces that shape their industry and which is widely used in business strategy.[52] Figure 12 depicts the previously described model.

Figure 12 **Porter's Five Forces** (Source: The Five Competitive Forces That Shape Strategy, (2008), p.78–93)

The five forces in Porter's framework are:

***Threat of new entrants*:** This refers to the likelihood of new competitors entering the market and increasing competition. Factors that affect this threat include barriers to entry, economies of scale, and brand recognition.

Bargaining power of suppliers: This refers to the ability of suppliers to increase prices or reduce quality, which can affect the profitability of entities in the industry. Factors that affect this bargaining power include the number of suppliers, the importance of the supplier's product to the industry, and the availability of substitutes.

Bargaining power of buyers: This refers to the ability of buyers to negotiate lower prices or higher quality from entities in the industry. Factors that affect this bargaining power include the number of buyers, the importance of the industry's product to the buyer, and the availability of substitutes.

Threat of substitutes: This refers to the likelihood of customers switching to a substitute product or service. Factors that affect this threat include the availability of substitutes, the price of substitutes, and the quality of substitutes.

Industry rivalry: This refers to the level of competition among entities in the industry. Factors that affect this intensity include the number of competitors, the size of competitors, and the level of differentiation among products or services.

By analyzing these five forces, entities can gain a better understanding of the competitive dynamics of their industry and develop strategies to compete effectively.[53]

While not specifically aimed at addressing sustainability issues, the framework's flexibility allows it to be adapted for this purpose. By integrating sustainability considerations into each of the five forces, businesses can evaluate how environmental and social factors influence competitive pressures and strategic positioning, ultimately fostering more sustainable business practices.

For this purpose, SASB used Porter's Five Forces to understand how addressing and managing sustainability issues are becoming increasingly crucial in shaping competition within an industry. Table 5 provides illustrative examples how the framework can be applied for sustainability issues.

[52] Porter, M. (2008). The Five Competitive Forces That Shape Strategy, p.78–93
[53] Porter, M. (1979). How Competitive Forces Shape Strategy, p. 25-41

Table 5: **Exemplary application of Porter's Five Forces to sustainability context**

Porter's Five Forces	Exemplary application
Threat of new entrants	• Sustainability requirements and certifications can pose a barrier for new companies from entering the market, as they often involve high costs and specialized knowledge. • These certifications can be up to 30-40 percent more expensive than traditional materials. • Established, larger firms benefit from economies of scale and efficient product certification, being able to offset these costs • Subsidies and tariffs also play a vital role in this context, especially for emerging technologies.
Bargaining Power of Suppliers	• Supplier bargaining power rises when downstream firms have limited alternatives, enabling suppliers to set higher prices. • Climate change is affecting supply chains, leading to increased input costs due to water and resource scarcity. • For instance, a manufacturing company has reported growing costs for raw materials, commodities, and water due to weather and climate changes. • Long-term risks to securing essential ingredients have driven companies to create strategies and partnerships to mitigate supplier pricing pressure, especially in regions with water scarcity.
Bargaining Power of Buyers	• Large retail customers possess significant bargaining power over their suppliers and can influence the sustainability of the products they purchase and sell. • This influence often stems from a retail company's strategy to meet increasing consumer demand for sustainable products. • For instance, retailers may use sustainability scorecards to guide over 100,000 suppliers in improving efficiency and addressing specific problem areas. Small suppliers may struggle meeting these requirements if they lack resources and knowledge.
Threat of Substitutes	• New regulations and increasing consumer preference for sustainable products are transforming the containers and packaging industry. • As trends move towards environmentally friendly packaging, the demand for traditional materials (metal, glass, plastic, paper) will shift based on their environmental impact. While this creates opportunities for sustainable innovations, companies heavily reliant on traditional materials may face increased competition and market disruption.
Industry rivalry	• Companies continuously adjust their strategies to gain a competitive edge, whether through pricing, new products and services, or increasingly through sustainability performance. • For many firms, sustainability is a key aspect of their competition, beyond just enhancing brand equity.

(Source: SASB, 2014)

Overall, systematically integrating ESG considerations into the Porter's Five Forces framework, entities gain a holistic understanding of their industry landscape and develop strategies that promote both competitiveness and sustainability. This holistic understanding supports deriving risks and opportunities for an individual entity.

Figure 13 **Growth Share Matrix**
(Source: BCG, 2024)

In addition to Porter's Five Forces, the BCG Matrix, also known as "Growth Share Matrix", is another helpful framework that supports entities in assessing their current market position and making informed decisions about which products or business units to invest in, divest, or maintain.[54]

As illustrated in Figure 13 the Growth Share Matrix is based on two dimensions: market growth and relative market share. The market growth represents how fast the market for a particular product or business unit is potentially growing. It helps identify whether the market is expanding, stable, or declining. Besides, the relative market share compares the entity's market share in a specific product or business unit to that of its largest competitor. It indicates the respective competitive position within the market of an entity.

Based on these dimensions, the matrix suggests the following four strategies for each resulting quadrant:

Cash Cows (Low Growth, High Share): These are products or business units that have a high market share in a market with low growth. Entities should prioritize milking these "cash cows" for maximum cash flow, which can then be reinvested into other areas of the business that offer growth potential.

Stars (High Growth, High Share): Products or business units in this category have a high market share in a rapidly growing market. Entities should allocate significant resources and investments to these "stars" because they represent high potential for future growth and profitability.

Question Marks (High Growth, Low Share): These are products or business units with low market share in a market that is growing rapidly. Entities face a decision here: they can invest resources to build market share and potentially turn these into future stars, or they may choose to divest or reposition them if growth prospects are uncertain.

Pets (Low Share, Low Growth): This category includes products or business units with low market share in a slow-growing market. Entities should consider divesting or repositioning these "dogs" because they are unlikely to generate significant profits or contribute to the company's strategic objectives in the long term.

By evaluating products, services, or business units across environmental, social, and governance dimensions, companies can pinpoint potential risks such as environmental liabilities, social controversies, or governance shortcomings, while also identifying opportunities, such as enhancing product sustainability, fostering inclusive workplace practices, or bolstering governance transparency, which can drive innovation and market

[54] BCG. (2024). What is the Growth Share Matrix?

leadership. The idea of the growth share matrix can be easily adopted by taking two components into account and carrying out clustering. To illustrate this with a specific example, a suitable matrix could integrate potential market growth and current/targeted CO_2 intensity covering different business units. This may help entities strategically balance revenue growth with CO_2 intensity, aligning business expansion with sustainability goals. CO_2 intensity measures the carbon intensity of a sector, indicating the environmental impact in terms of CO_2 emissions per unit of revenue. Lower values are preferred, reflecting more sustainable operations. Growth tracks the revenue growth rate within each sector, highlighting areas with potential for financial expansion. The resulting exemplary four quadrants could be:

Sustainability Pioneers (Low CO_2 Intensity, High Growth): With low CO_2 intensity and high revenue growth, these areas should be prioritized for investment to maximize both financial and environmental benefits.

Sustainable Pillars (Low CO_2 Intensity, Low Growth): Characterized by low CO_2 intensity and low revenue growth, these areas should be maintained for their stable, sustainable income that supports CO_2 reduction goals.

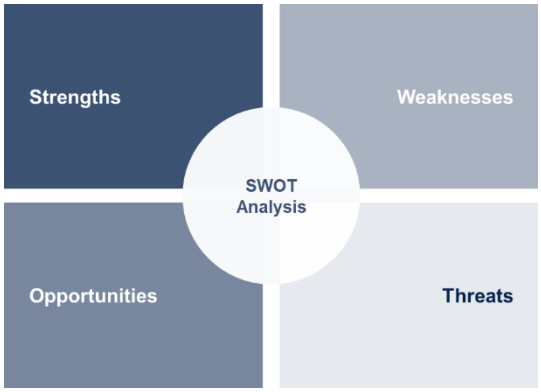
Growing Emitters (High CO_2 Intensity, High Growth): Despite high CO_2 intensity, these areas offer high revenue growth and should be targeted for investment in emissions reduction to become more sustainable growth opportunities.

Carbon Burdens (High CO_2 Intensity, Low Growth): With high CO_2 intensity and low revenue growth, these areas should be considered for divestment or restructuring to minimize environmental impact and improve portfolio performance.

This matrix can be used to assess and prioritize business activities, ensuring that growth strategies are aligned with CO_2 reduction goals. But it could be also used for supplier or customer portfolio strategies. From a customer portfolio perspective, entity should focus on high-growth and carbon-intense sectors if, for example, own products enable climate transformation (e.g. improve energy efficiency or electrification). If the product portfolio is not suitable for transformation, high-growth and low-carbon sectors may be preferred to ensure that required capital resources are available.

c. Consolidation of performed analyses

Lastly, when it comes to assessing the overall status of an entity, particularly after conducting strategic assessments like value chain analyses, PESTEL analysis, Porter's Five Forces, or the Growth-Share Matrix as previously described, SWOT analysis may be a suitable strategic tool to summarize results. Within the SWOT analysis, the strengths can be derived in combination with the opportunities that should be maximized and the weaknesses in combination with the threats that need to be minimized. SWOT provides a clear, concise overview of where an entity stands in its environment and integrates the insights from company and industry analyses into a coherent overview. This helps decision-makers prioritize strategies and actions based on a holistic understanding of the business context.



Provided that impacts and dependencies have been identified and market-relevant analyses have subsequently been carried out this provides a valuable basis for deriving entity-specific risks and opportunities. The following chapter describes how to derive potential financials risks and opportunities on an entity basis.

Figure 14 **SWOT analysis**
(Source: Own depict)

d. Internalization of impacts and dependencies

After conducting company, industry and market analyses, it should be analyzed which previously defined impacts and dependencies may internalize and therefore represent opportunities and risks for the entity. It is also possible that certain external effects may not be internalized and therefore may only have an indirect impact on the entity (e.g. overall GDP growth, taxes, inflation).

Without potential internalization, impacts and dependencies may not influence the financial conditions of entities. The key factors of the already introduced PESTLE framework may be seen as structure for the individual forces of internalization affecting the entity. The PESTLE framework can be adapted depending on its specific use and the relevant influencing factors; especially climate change and geopolitical developments, which fall under the "Political" and "Environment" categories play a crucial role. While PESTLE originally focuses on political, economic, social, technological, environmental, and legal matters, individual categories can be exchanged, removed or added.

The PESTLE analysis needs to consider the entire value chain as material opportunities and risks, e.g., resource efficiency or sustainable product footprint. The analysis of impacts and dependencies across different value chain stages from step 1 of the Value to Business process can be used as starting point for the internalization analysis based on PESTLE. In this context, it is crucial to assess which specific impacts have already been internalized by the company. Overall, the exact analysis of an individual entity always depends on entity-specific circumstances.

The key forces of internalization are critical factors that must be considered within a comprehensive opportunity and risk analysis, especially as businesses and governments navigate the complexities of global operations. These forces include, but are not limited to

Factual Climate Crisis (Environmental), where the economic impacts of a 2 to 3°C global warming trajectory and the increasing frequency of natural disasters pose significant risks to global business models and investments while entities have to manage mitigation challenges at the same time.

Society and stakeholder dynamics (Social) that need to be considered with its local differences and requirements, like rising purchasing power of younger generations and advocacy for sustainability of specific stakeholder groups that are reshaping consumer behavior and corporate responsibility.

Capital Markets (Economic) becoming more focused on sustainability, with a surge in sustainability-aligned investments and heightened expectations for transparent sustainability reporting and disclosures.

International Regulatory Power (Political, Legal) through initiatives like the EU Green Deal, EU Taxonomy, and other policies from major powers like China, driving greater data transparency and compliance requirements.

Innovation and Technology (Technology) *which* are also pivotal, with new sustainable technologies and disruptive start-ups presenting both opportunities and risks to traditional industries.

Geopolitics (Political) play a critical role, as rising global conflicts over resource scarcity, particularly between major powers, could significantly impact global stability and economic growth.

According to TCFD, the arising financial risks will either directly or indirectly affect an entity looking at revenues, expenditures, assets or liabilities, and capital and financing.[55] This view on understanding financial implications of climate change can also be translated to further environmental, economic, and social components.

An analysis of internalization barriers in the context of climate adaptation can be found in the Sixth Assessment Report (AR6) published by the IPCC[56]. The report outlines constraints that hinder the planning and implementation of human adaptation measures in different regions of the world, highlighting the intensity of these constraints in six key areas. Figure 15 summarizes these respective constraints.

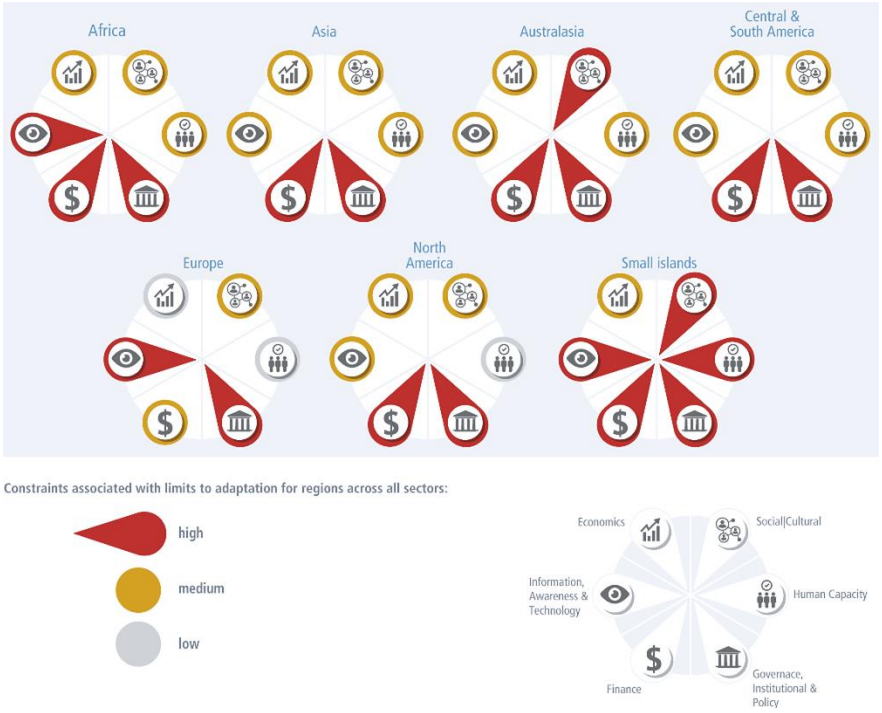


Figure 15 **Barriers to Human Climate Adaptation**
(Source: IPCC, 2022)

[55] TCFD. (2022). Task Force on Climate-related Financial Disclosures, p. 4
[56] IPCC. (2022). AR6 Technical Summary, p. 78

e. Derivation of potential financial risks and opportunities

Based on the internalization analysis, entities may derive a long list of potential financial opportunities and risks. These risks and opportunities need to be described and specified on a qualitative basis before quantifying them in step 3.2.4.

For instance, an opportunity may arise when an entity focuses on improving working conditions through effective human resource management. By enhancing employee satisfaction, motivation, and identification with the entity, the entity can boost efficiency and reduce costs associated with sick leave or employee turnover. In contrast, of course, potentially higher human resources cost may have to be considered as well.

An entity facing mid- to long-term shortages of agricultural products due to rising demand driven by increasing customer requirements can greatly benefit from sustainable sourcing. By establishing partnerships with environmentally responsible suppliers, the entity can secure a more stable supply chain, mitigate risks associated with environmental regulations or resource scarcity, and potentially reduce costs by avoiding penalties linked to unsustainable practices. Furthermore, sustainable sourcing can enhance the entity's reputation, attract eco-conscious consumers and expand market share. However, supply and demand dynamics will influence pricing, raising the question of whether the entity can pass these price effects on to customers. It is essential to qualitatively assess whether higher prices represent an opportunity for increased revenue or a potential risk, as customer willingness to absorb price increases may vary.

In the Value to Business Framework, various categories for different forms of risks are explained. A non-comprehensive list of additional risks, which is not exhaustive but can serve as a starting point for further exploration and can be found in the Appendix 3. Such opportunities and risks can materialize in positive or negative anticipated financial effects depending on how an entity addresses or manages them on time. Since they can evolve over time, different timeframes must be considered. For example, climate risks may vary significantly over short-, medium-, and long-term periods.

Assessments of future milestones, like in year 2030 and 2050 allow organizations to anticipate and prepare for potential changes in risk and opportunity over time. Table 6 summarizes examples where extending the financial planning horizon of an entity may be advantageous or even required.

Table 6: **Examples of extending the financial planning horizon due to sustainability-related opportunities and risks**

Category	Examples	Need for planning phase extension
Climate Change Adaptation and Mitigation	• Climate-mitigating technologies such as widespread use of green hydrogen or carbon capture and storage • Climate Resilience Projects such as flood defense	• Reduced operational costs and carbon footprint • Prevention of future losses and sustainable operations • Capital expenditures and financing requirements
Sustainable Supply Chain Management	• Circular economy models	• Reduced supply chain disruption risks • Improved supply chain transparency and compliance
Human Capital Development	• Employee Training and Development anticipating future skills/requirements • Diversity and Inclusion Initiatives	• Enhanced workforce skills and motivation • Improved company culture, talent attraction, and innovation

Governance Improvements	• Board Diversity and Independence • Robust governance frameworks that anticipate future ethical and regulatory standards	• Improved decision-making and stakeholder trust • Prevention of legal issues and enhanced reputation
Product Innovation and Development	• R&D expenses for technologies that address future market needs • Circular Economy Models	• Competitive advantage and meeting consumer demand • Reduced waste and resource consumption
Regulatory Compliance and Anticipation	• Proactive Compliance • Scenario Analysis	• Reduced risk of non-compliance fines • Development of strategies to mitigate risks and capitalize on opportunities

(Source: Own depict)

f. Probability and financial materiality assessment

After the qualitative specification of opportunities and risks, a materiality assessment may be performed to focus efforts. This involves evaluating the probability of identified risks and opportunities as well as the extent of the potential financial effect. This step requires an estimation of the possible monetary consequences associated with each risk and opportunity. This includes estimating potential losses or gains, considering both direct financial effects and indirect effects on operations, reputation, and market position. The aim of this analysis is to create a short list for the following quantification of opportunities and risks (see chapter 3.2.4). As a detailed quantification is time-consuming and complex, the short list should consist of opportunities and risks which either have a high probability of occurrence, could have a significant effect or even have both characteristics. It should be mentioned that a high degree of difficulty and complexity in quantification is not an exclusion criterion for excluding an opportunity or a risk in the short list. In such cases, there are various options for quantification and forecasting techniques. Any uncertainties in planning can be taken into account using approaches such as scenarios, simulations, and sensitivity analyses (see also Value to Business Framework).

TNFD and NCP both recommend a similar approach, considering probability and potential extent or magnitude of opportunities and risks (or change).[57] NCP highlights that this approach is particularly important when assessing dependencies, as many external drivers of impact are beyond direct control, leading to uncertainty or unknown precision. Developing probability-weighted estimates of changes is essential in this risk-based approach. For changes observed in real-time, the probability is certain, but for future or unobserved changes, an entity must apply a suitable approach to estimating probability.[58]

By multiplying the extent of change by the probability of occurrence, entities can calculate the probability-weighted change (see Figure 16). This approach ensures that both the magnitude and probability of potential changes are considered, allowing entities to prioritize and respond to the most significant risks and opportunities.

Figure 16 **Calculation of probability-weighted change according to NCP**
(Source: Capitals Coalition, 2016)

[57] TNFD. (2023). Recommendations of the Taskforce on Nature-related Financial Disclosures, p. 51 f.
[58] Capitals Coalition. (2016). Natural Capital Protocol, (2016), p. 76

When conducting this analysis, financial effects can be categorized as significant, moderate, low, or minor, while the probability is rated from certain to unlikely. Each probability category is given a factor, which is multiplied by the financial impact to determine the materiality score. This score helps classify risks and opportunities as critical, significant, material, important, or informative. This approach ensures that all potential financial effects are properly assessed, prioritized, and managed according to their materiality. Entities should use their current approaches or materiality assessments, adapting them if necessary to incorporate considerations of natural, social and human capital. A possible way to present the results is through a heatmap, with one axis showing the probability of occurrence and the other showing the financial effect, both ranging from high to low. This visual representation assists in quickly identifying and prioritizing risks and opportunities for further analyses and the quantification.

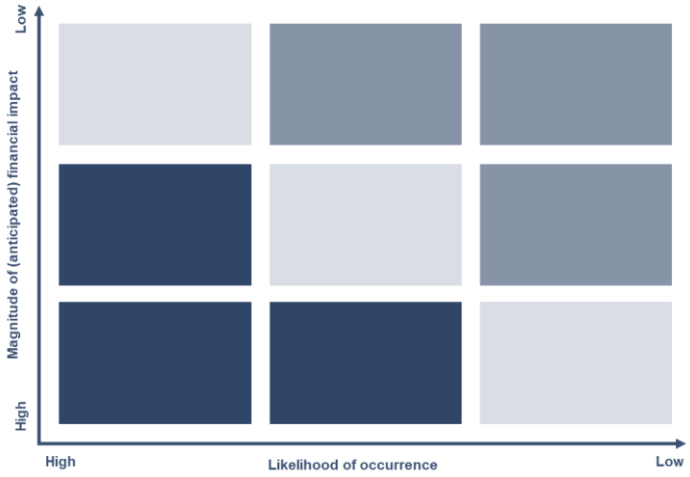


Figure 17 **Exemplary risk management heat map**
dark blue = highest likelihood of occurrence and highest magnitude of financial impact
(Source: Own depict)

This analysis is then used to determine which opportunities and risks should be quantified or substantiated in numbers and which opportunities and risks currently require less urgent attention. However, it is imperative that the analysis is updated regularly, as the probability of occurrence and the extent of opportunities and risks can change significantly over time.

There are multiple resources which can help in assessing probabilities and magnitude. One example is shown in Figure 18 coming from the IPCC report[59]. This overview shows the economic losses and gains resulting from projected climate risks at 1.5˚C and 3˚C global warming compared to no additional warming. The table compares these risks for different regions of Europe (Northern Europe, Western and Central Europe, Eastern Europe, Southern Europe), also including confidence level and sources from GDP or well-being.

[59] IPCC. (2022). AR6 Technical Summary

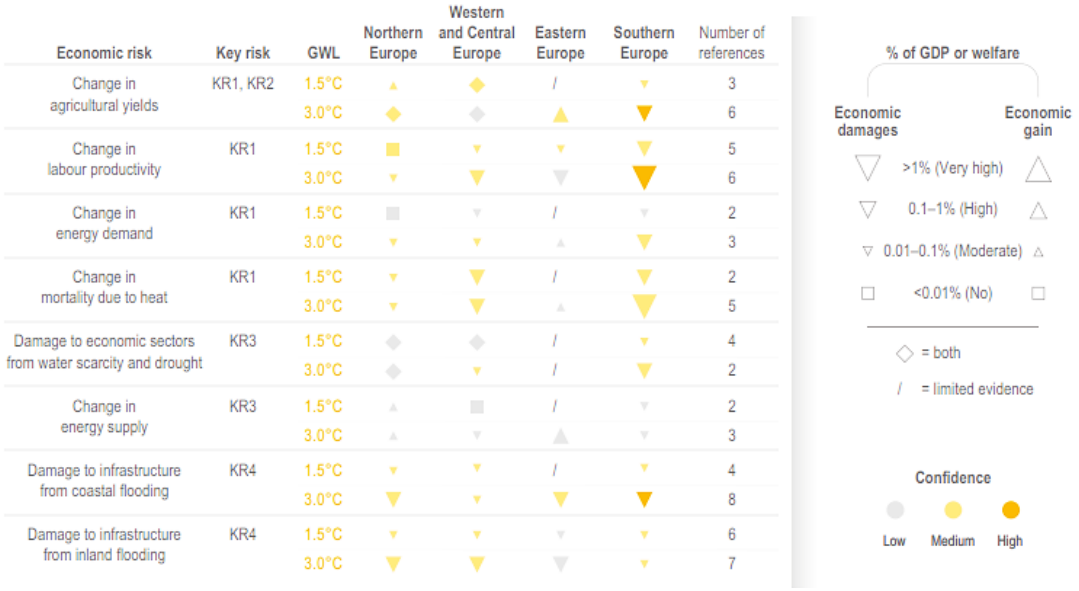


Figure 18 **Economic damages and gains due to projected climate risks** for 1,5˚C and 3˚C Global Warming Levels (GWL) relative to no additional warming
(Source: IPCC Impact p. 1881)

g. Summary of material opportunities and risks

In summary, conducting detailed analyses of both internal and external micro- and macroeconomic environment is essential to identify and derive significant opportunities and risks. The main result of this process step is to derive opportunities and risks that have not already been analyzed and addressed in the past. These identified opportunities and risks then have to be evaluated based on their materiality level. The aim of this evaluation is to convert an original long list of identified opportunities and risks into a short list.

Based on the short list, those influences that may have a material impact on the entity because they either have a high probability of occurrence, a significant extent or even both characteristics, can be incorporated into management strategy and response and quantified in further detail (see chapter 3.4).

The TCFD also highlights three essential parts of understanding potential financial implications of climate change:

Defining risk drivers, *Physical*: Temperature rises, increased sea levels, further destructive natural catastrophes, etc. and *Transition*: Policy changes, advanced technologies due to innovations, shifts in consumer preferences, etc.

Assessing potential economic effects, such as business disruptions, decrease in productivity, reinvestments/replacements, or higher raw material prices.

Evaluating potential financial effects, e.g., declining property values and asset prices, decreased corporate profits, household wealth, losses in financial markets, or credit market losses. Further details on this evaluation in chapter 3.4.

Capitals Coalition also provides an approach for specifying risks and opportunities within the Natural Capital Protocol.[60] It starts with understanding the effects of impacts and dependencies. For this purpose, the impacts and dependencies already defined (see

[60] Capitals Coalition. (2016). Natural Capital Protocol, p. 80 ff.

Chapter 3.1) should be analyzed in more detail, considering direct and indirect aspects as well as the concept of internalization.

3.3. **Step 3** – Management strategy and response (optional)

Changes in the business environment provide an opportunity to review the strategic direction, processes, product mix or other topics. These factors determine the resilience of the business model and may require adaptation to these new circumstances. The increasing importance of sustainability criteria is currently one of the most important drivers for strategic realignment and changes in business models. Incorporating the financial implications of strategic changes and responses on defined opportunities and risks into a comprehensive Value to Business analysis is a crucial part of this process. Guidance providers like the TNFD, TCFD, or Capital Coalition as well as standard setters like the European Commission (with respect to the CSRD) emphasize the importance of aligning corporate strategy with ESG-related opportunities and risks.[61]

Therefore, the third step in the Value to Business process involves the review of potential and/or planned changes in management strategy and business model and its financial implications. It is essential, however, that the fundamental strategic orientation of the entity, along with its market environment, has already been thoroughly analyzed in Chapter 3.2. The analysis here is considered optional and specifically addresses the sustainability-related elements of the strategy – or potential responses on risks and opportunities. It builds on the opportunities and risks identified in Chapter 3.2, as well as considering the organization's impacts and dependencies on sustainability matters as identified in Chapter 3.1.

The core concept of strategy remains unchanged in sustainability-related discussions. Therefore, established frameworks for strategy development, such as Mintzberg's 5Ps[62] or the Harvard-concept of strategy formulation[63] are still relevant and applicable. These classic models are simply augmented by new considerations like:

- What influence does the organization exert on sustainability matters?
- How are sustainability topics shaping or influencing the organization?[64]

This broader strategic approach, integrating nature, human and social capitals alongside financial objectives, is often referred to as the "**triple bottom line**" approach, which encompasses profit, planet, and people. This expansion recognizes that businesses must balance financial performance with their responsibilities to both society and the environment.[65]When selecting strategic directions, care must always be taken to ensure that these are made and analyzed against the background of previous business decisions (e.g., location decisions) and available resources (e.g., management capacities, capital and core competencies).

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[61] TNFD. (2023). Recommendations of the Taskforce on Nature-related Financial Disclosures, p. 14, 39; TCFD. (2017). Recommendations of the Task Force on Climate-related Financial Disclosures, p. V; Capitals Coalition. (2015). Natural Capital Protocol, p. 22; European Commission. (2023). C/2023/5303 ESRS 2, paragraph 38-42.

[62] H. Mintzberg, B. Ahlstrand, J. Lampel. (1998). Strategy Safari, a guided tour through the wilds of strategic management, p. 9 ff.

[63] K. R. Andrews. (1987). The concept of corporate strategy, p. 13, 21

[64] Compare the disclosure requirements of the TNFD. (2023). p. 45f.

[65] Embedding Project. (2017). The Road to Context, p. 5; J. Elkington. (1994). Towards the Sustainable Corporation: Win Win Win Business Strategies for Sustainable Development.

A variety of potential strategic directions can and should be explored within a Value to Business analysis. The following non-exhaustive list highlights several key areas:[66]

Market Changes: Sustainability issues are rapidly reshaping regulatory frameworks and transforming customer preferences. This evolution presents opportunities for new or improved products while simultaneously shrinking or eliminating traditional markets. Analysis should include market shifts, growth projections, and the resulting effects on market share, revenue, and profit margins.

Product development: If new products are launched on the market, appropriate product development measures must be planned. Among other things, an entity must decide whether to use a first mover or a late mover strategy. First mover strategies (high investments to be the first on the market) may bear higher risks and require high investments but can also yield correspondingly high margins, growing market shares and higher returns.

Location decisions: Decisions to open and close plants are often strategic decisions that are driven by local cost advantages, regulations or market entry barriers. In the sustainability context, it is also important to bear in mind that impacts and dependencies, and therefore also opportunities and risks, can differ significantly at a local level (e.g., regulations or working conditions). Financial consequences can be diverse and range from loss of sales due to reputational damage to the complete loss of the business due to arbitrary nationalization.

Procurement: Strategic procurement decisions for raw materials and other input factors are increasingly being weighed up between pure cost considerations and sustainability criteria. Important points of analysis are dependencies on natural raw materials and impacts from the extraction and production of input factors. Possible human rights violations (labor protection, fair wages, modern slavery, etc.) within long supply chains are also an increasingly relevant issue.

Production process: Reorganizing production processes using more efficient machines and procedures or improving working conditions can initially result in high investment spendings but can also lower operating costs in the future. It may not always be the case if a non-financial target, such as emission reduction, needs to be approached. These costs should be analyzed against the background of long-term benefits, for instance, from a reduction in negative impacts or existing dependencies (e.g., energy input).

Risk Management: New challenges such as climate change or stricter sustainability-orientated legislation create new physical and transformational risks (depending on impacts and dependencies). As part of strategy development, an entity will consider how to deal with these risks according to its risk appetite and current risk profile. Typical strategies include risk mitigation, acceptance, transfer and control.[67] Relevant fields of analysis therefore consist of the costs of risk prevention, the costs of risk transfer (e.g., via insurance), the damage resulting from a lack of risk prevention or transfer, and the probability of risk materialization.

Governance and organizational structure: The increasing importance of good corporate governance often requires entities to change their organizational structure and to introduce new corporate governance mechanisms. In this context, it is important to

[66] Also compare: Capitals Coalition. (2015). Natural Capital Protocol, p. 20; Capitals Coalition. (2015). Social and Human Capital Protocol, p. 68f.
[67] TCFD. (2017). Recommendations of the Task Force on Climate related Financial Disclosures

compare the additional costs of possible control bodies and monitoring procedures with the potentially avoided costs of poor governance (e.g., wrong decisions, fraud, loss of reputation, etc.).

Resilience: The global sustainability-driven transformation of markets, business models and environmental factors is generating a high level of disruptive risk. Companies will endeavor to increase their resilience to be prepared for these changes. A Value to Business analysis should therefore always pay attention to the effects of disruptive changes or exogenous shocks, particularly in the context of existing dependencies, competitive advantages and established markets. In addition, it must be considered how planned strategic measures contribute to or weaken enterprise value.

The analysis of potential changes in strategy or responses to opportunities and risks is optional in the Value to Business analysis. The value of the planned strategic initiatives or alternatives can be calculated using a delta calculation (e.g., entity value incl. strategic initiatives minus entity value excl. strategic initiatives = value of the strategic initiatives). Additionally, various strategic alternatives in terms of their effects on the entity can be analyzed. It is designed to assess the effects on opportunities, risks, and ultimately the financial position and performance of the entity. In such analyses scenario planning and simulation models are particularly helpful, offering deeper insights into potential outcomes and helping to forecast the financial implications of different strategic paths. For further guidance please also refer to the Value to Business Framework or the TNFDs Guidance on scenario analysis.[68]

In the context of strategic measures, company valuation standards such as the current version of the IDW S1 of the German Institute of Public Auditors (Institut für Wirtschaftsprüfer, IDW) require an objectified company value to be determined taking into account the initiatives already initiated and specifically documented.[69] ESRS reporting standards define that anticipated financial effects resulting from opportunities and risks should be determined before actions are taken.[70]

When the management strategy and response are incorporated into the Value to Business analysis, they often encompass strategic initiatives that reshape the company's opportunity and risk landscape.[71] Consequently, a second materiality analysis becomes necessary, as risks that were previously considered significant may no longer be deemed material from a financial perspective and may thus fall outside the scope of the Value to Business analysis. This second materiality assessment should be viewed as the concluding step in strategy evaluation, building on the insights from Chapters 3.1, 3.2, and 3.3. It serves as the foundation for determining the financial implications (see Chapter 3.4).

Strategic initiatives have a range of potential implications for the derivation of anticipated financial effects and the overall enterprise value. These effects must be carefully

[68] TNFD. (2023). Guidance on scenario analysis
[69] Institut der Wirtschaftsprüfer in Deutschland e. V.. (2008). IDW Standard: Grundsätze zur Durchführung von Unternehmensbewertungen (IDW S 1, 2008, p. 9f). This standard is currently being revised. Within this revision, the assumptions regarding the recognition of strategic initiatives are also being adjusted. In future, these will only be included in an objectified valuation if they meet the expectations of market participants
[70] ESRS 2 SBM 3 48 f.
[71] When a strategy is formulated, it should usually focus on impacts, dependencies, opportunities and risks from the first materiality assessment described as most material

considered to accurately reflect the consequences of strategic decisions in financial forecasts and company valuation:

Extended Planning Phases and Terminal Value Adjustment: When strategic transformation processes are initiated, the time required for the company to reach a self-sustaining state may increase. As a result, the transition to the terminal value (TV) phase could be delayed. This extends the detailed planning phases, postponing the TV year. The financial model needs to accommodate this prolonged transformation period by recalibrating the timing and scope of expected cash flows.

Changes in Key Planning Parameters: Strategic initiatives can significantly alter key planning parameters. In the case of substantial transformations, the entire value driver logic may need revision. Even in less dramatic cases, the characteristics of the planned value drivers, such as revenue growth, operating margins, or capital expenditures, are likely to shift. These changes must be reflected in the financial models to ensure accurate projections of future performance.

Planning Uncertainty: Strategic planning is inherently uncertain, particularly when it involves transformative initiatives. The level of uncertainty and risk appetite should guide the selection of initiatives – those with a more aggressive growth trajectory will carry higher risks, while more conservative strategies may offer greater predictability.

Adjustment of Capital Costs for Changes in Risk: If strategic transformations introduce a risk profile that deviates from the company's original risk level (increasing volatility of cashflows), adjustments to the cost of capital are necessary. Higher-risk initiatives will demand a correspondingly higher return on capital to compensate for the increased uncertainty. This will influence the company's cost of capital and, ultimately, its enterprise valuation.

Multiple Valuation: If a company significantly changes its business model based on a sustainability-oriented strategy, for example by changing the depth of value creation or opening new product-market combinations, it may be necessary to change the peer group as part of a comparable company analysis. At the same time, attention should be given to the strategic measures peers have already planned and how these have been reflected in capital market evaluations.

3.4. **Step 4** – Analysis and planning of financial effects

The following chapter will provide a detailed breakdown of the methods used to derive these financial consequences, ensuring that all relevant factors are appropriately measured and accounted for in the quantification and valuation process. Analyzing and planning of (anticipated) financial effects is a comprehensive process providing a deep understanding how sustainability related opportunities and risks shape an entity's financial position, financial performance, and cashflow. It can be based on the following steps:

Analysis of the existing business plan to identify which opportunities and risks have already been factored in,

Constructing a value driver tree to identify the financial key value drivers that influence business models to create a mathematical logic between these key value drivers,

Data collection from various sources, and

Planning the financial effects of identified risks, opportunities, and strategic decisions using different types of forecasting techniques to handle different levels of uncertainty.

Various target metrics like profitability, return on investment, or cash flow, depending on the scope of the analysis can be addressed. This analysis must be tailored to the entity's unique circumstances, considering industry specifics and regional and location specific differences. By focusing on key value drivers and aligning the financial effects with these specific variables, a clear financial plan can be created that supports informed strategic decisions as well as internal and external stakeholder requirements.

To strengthen alignment with international disclosure expectations, entities may also refer to the ISSB's definition of anticipated financial effects, which requires companies to disclose how sustainability-related risks and opportunities are expected to affect financial position, financial performance and cash flows over the short, medium and long term[72].

a. Analysis of existing business plan

To evaluate anticipated financial effects, an analysis of existing business plans should be conducted to assess to what extent and at what level of detail any financial effects from sustainability-related risks and opportunities are already reflected in the financial planning. This helps identify any gaps and lays the groundwork for future financial planning. The required level of detail may range from specific KPIs and financial metrics. While singular quantification of specific sustainability topics using isolated metrics and forecasts is common practice (e.g. EBITDA effect of water scarcity in 2030), this approach often overlooks interdependence between sustainability topics as well as between various financial and non-financial KPIs. Comprehensive integrated financial planning enables a deeper evaluation, revealing cumulative effects and (dis-)synergies that may be overlooked when focusing on isolated variables, which offers a more accurate assessment of the business plan's financial and strategic consequences.

It is essential that assumptions are consistent, clear, comprehensible, and aligned with past performance, market conditions, and entity analyses, allowing a knowledgeable third party e.g. auditors) to reach similar conclusions.[73] Based on a simplified example the process of quantification and the inclusion of different forecasting techniques to address uncertainty like scenario analysis and simulations shall be explained.

[72] ISSB. (2025). *Disclosing information about anticipated financial effects applying ISSB Standards*, p. 2–5

[73] Please refer to the Value to Business framework to receive further information

Example:
This example examines the anticipated financial effects related to climate change of a leading global industrial manufacturer.
Based on the double materiality analysis according to ESRS the company has identified material financial risks and opportunities to sustainability topics. In the context of potential regulatory requirements according ESRS 2 and for their internal risk and investment management, the company intends to quantify the following risk and opportunity related to climate change mitigation:

Climate Change	
Risk (transitional)	**Availability of energy at competitve costs** Climate change drives the transition to renewable energy sources. Depending on the initial energy system, implementation speed, and political framework, this transformation may result in significant additional costs. (Medium - to long-term)
Opportunity	**Sustainable products and solutions** The company offers a broad range of products that support the transition to climate - friendly technologies and solutions. This enhances the competitiveness of the offerings, enabling a differentiation from competitors and expand market share. (Long-term)

(Source: Own depict)
For this project, the Sustainability department together with Group Accounting set up a small project team. Topic-specific experts (e.g., energy procurement), production site managers, account managers in specific segments, and controlling functions are part of the project team to evaluate risks and opportunities.
A first analysis shows that complexity of the quantification can be reduced as

1) Energy cost risk mainly concentrates on two production sites in Europe,
2) Opportunity should be analysed with focus on additional potential in one single end market.

The current business plan of the company includes fiscal years 2026 to 2030 (5 years). The business plan does already include potential actions and expectations for 2030. The company did not develop any forecasts for the years beyond the detailed planning horizon. Based on the description of the risks and opportunities, while the existing transition pathway includes underlying decarbonization actions and a net zero goal for 2045, the company decides to perform a long-term quantification and financial planning for 2026 to 2045. The analysis also shall provide insights about the cash flow and risk profile in specific scenarios.
In order to have a reference point for the quantification, the company decides to create a reference scenario which is the status quo including the current energy mix and energy volume for the risk-side, and current product design and end market for the opportunity-side.

b. Construction of value driver tree

The TCFD identifies two main areas for financial effects, income statement and balance sheet, which each include different major categories. These are listed below:[74]

[74] TCFD. (2017). Recommendations of the Task Force on Climate-related Financial Disclosures, p. 9

Income statement

- **Revenues:** Carbon pricing could affect revenues, especially in industries with different stages of decarbonization of entities. Entities should consider both the potential risks and the opportunities to create new revenue streams through sustainable actions.
- **Expenditure:** The cost structure of an entity, such as its choice of suppliers or investment in resilience, like a globally diversified production site structure, may play a key role in how it adapts for instance to environmental changes.

Balance sheet

- **Assets and liabilities:** Changes in policy and regulation, technology, or market conditions can influence the book value of assets and liabilities. For example, long-lived assets and reserves may lose value or face impairments due to climate- or nature-related risks. Entities must assess and disclose how nature, human and societal capital changes affect these assets, particularly for future investments.
- **Capital and financing:** Sustainability-related risks may influence an entity's ability to raise debt or equity, potentially affecting its capital structure. Entities might need to raise new equity, refinance existing debt, or account for impairments and restructuring to stay financially stable in the face of multiple environmental and social challenges.

Income statement and balance sheet determine the resulting cash flow. The preferred approach for integrated financial planning considers profit and loss statement (P&L), balance sheet, cash flow statement, as well as financial and important non-financial KPIs. This is especially relevant in the context of major transformation and investment projects which require high investments and cash outflows to ensure a sustainable and well-managed financing strategy.

A **value driver logic** breaks down how specific operational, sustainability-related, or market variables (value drivers) mathematically influence key financial outcomes such as revenues, costs, cash flows or asset values.
It creates a transparent, traceable link between sustainability risks or opportunities and financial performance, enabling consistent quantification, scenario analysis, and strategic decision-making grounded in the company's real economic mechanics.

Using value driver logic is particularly useful for visualizing complex structures and in situations where stakeholders or subject-matter experts are unfamiliar with value driver analyses. Working with value drivers and variable input factors allows for high flexibility, quick and dynamic adjustments if assumptions change.[75]

When creating the value driver tree, insights from already defined opportunities, risks, and potential responses (see previous chapters) should be incorporated. The granularity of the value driver tree depends on the business model, data availability, and data accuracy. Existing data and knowledge should be adapted and integrated in an appropriate manner.

A value driver tree can be created for revenues, profit figures (e.g., EBIT, EBITDA, net income), or cash flows. Determining cash flow requires more data and assumptions than focusing on, for instance, P&L figures, as more assumptions have to be made. This increases complexity of the forecast but widens the perspective from pure performance to a cash perspective. It's important to identify both positive and negative effects on

[75] Please refer to the Value to Business framework, which provides a deeper understanding of the basic concept of the value driver logic

profitability. For instance, a new sustainable product might increase market share or revenues but also may raise production costs due to higher certification standards or more expensive material in purchasing.

A value driver tree should link key financial metrics (e.g. revenues, costs of goods sold (COGS), operational expenditures (OPEX), earnings before interest and tax (EBIT), free cash flow) with non-financial metrics (e.g. CO2 emissions, carbon offset, water consumption, number of employees). By varying inputs like energy prices and water costs, the tree highlights the impact of environmental factors on operational efficiency and business performance. Figure 19 depicts a simple example of a value driver tree and illustrates how rising raw material prices affect supply chain costs for a manufacturing company. Prices are influenced by global and local supply-demand dynamics, geopolitical factors, and regulations. The entity's choice of suppliers and sourcing strategy also play an important role.

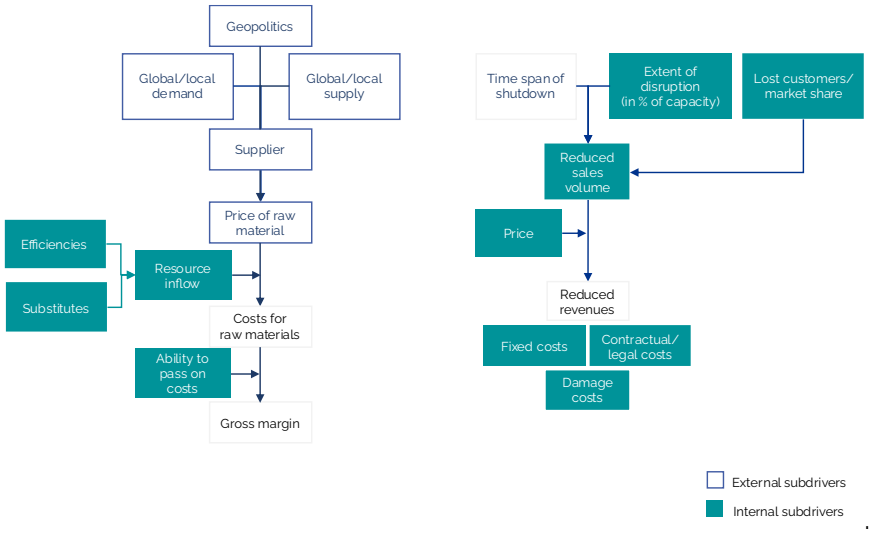


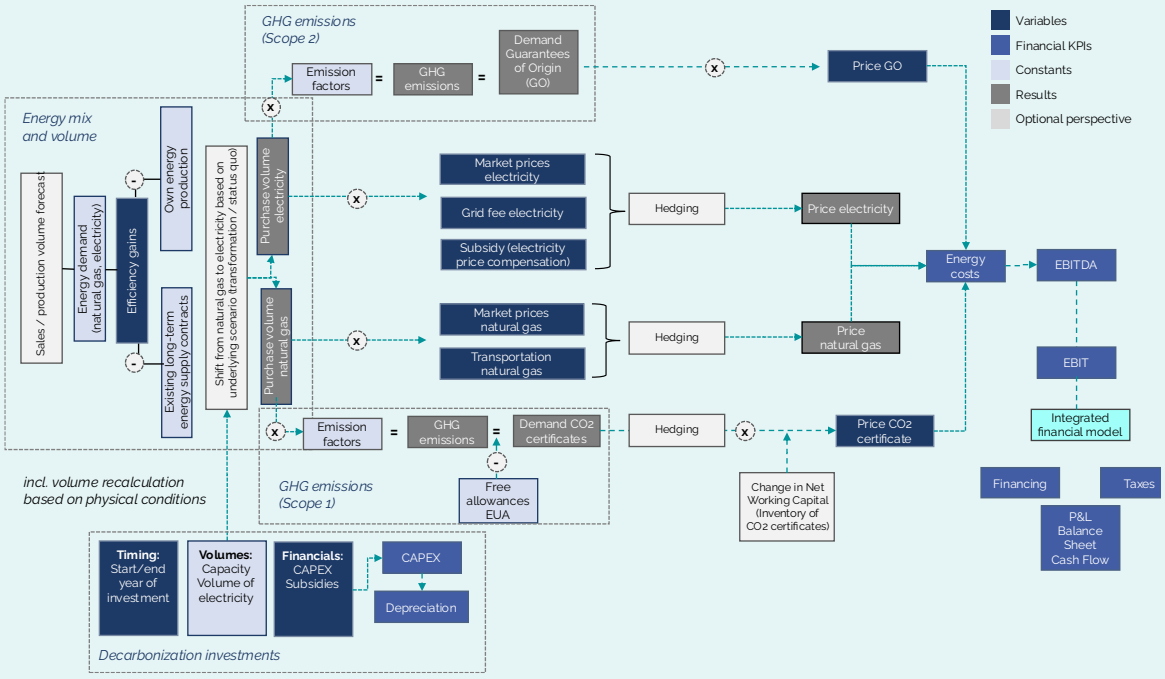
Figure 19 **Exemplary Value Driver Tree**
(Source: Own depict)

These external factors feed into the value driver model, together with entity-specific variables like production volume, which is affected by efficiency gains and potential substitutes. Another key question is whether costs can be passed on to customers. If materials are not only expensive but unavailable, production disruptions may occur. The financial effect depends on timing (peak or low season), length of interruption, and the scale of the disruption. Such interruptions can lead to customer losses, harm reputation, affect financing as well as book values of tangible and intangible assets, and reduced future revenues. Besides lost revenue, companies may face fixed costs, legal or contractual penalties, and repair costs if shutdowns damage equipment. This logic helps entities evaluate potential cost increases and adjust their operational strategies based on supply chain risks and external market conditions and can be applied to a portfolio of raw materials in order to manage associated risks. As soon as the value driver logic has been developed, the specific value driver (input variable) needs to be filled with internal and/or external

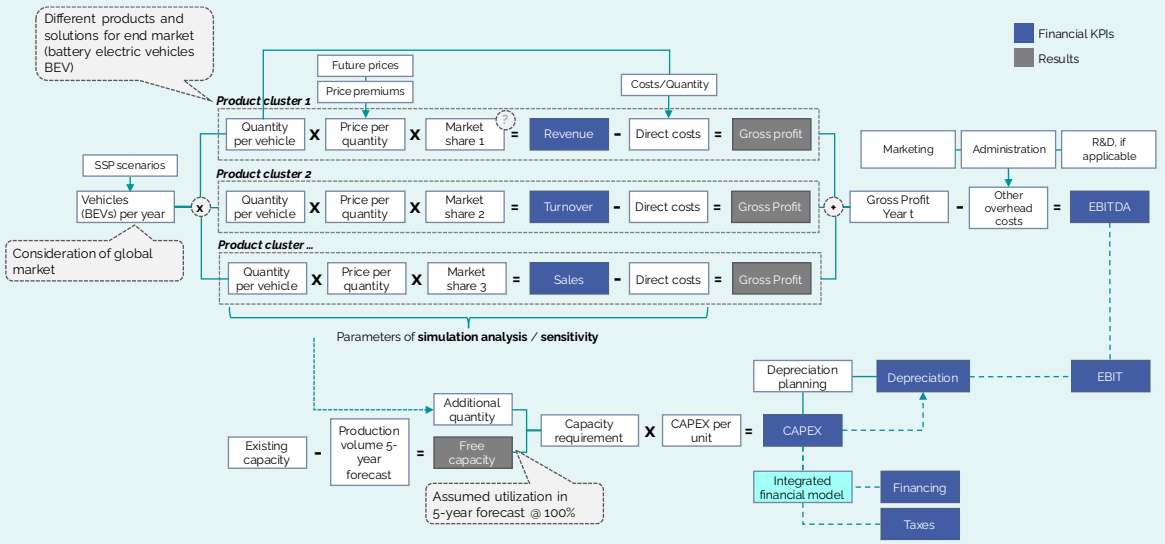
assumptions and data points. The examples show various starting points for mapping sustainability-related opportunities, risks and value drivers in a value driver tree.

Example:
In our example, the company starts with a qualitative description of the risk and the opportunity which already involves specific experts. Based on this qualitative assessment, the company develops the following value driver trees for

a. Energy cost risk



b. Market opportunity



In order to continue with the example, the diagram shows key financial and operational drivers. Coloured boxes represent input parameters (variables and constants) and affected profit and loss (P&L) and balance sheet items.

a. Energy cost risk:

The company's production requires large amounts of electricity and heat. Two major sites face significant energy price risk due to high demand and local regulations. These sites produce critical products, making energy cost management essential. Focus areas include energy efficiency, electrification, and GHG reduction.

Energy demand and mix

Future energy demand depends on sales and production forecasts and planned efficiency measures. Two scenarios are analyzed:

Transition scenario – full electrification replacing natural gas

Status quo scenario – current mix of natural gas and electricity

Electrification affects energy mix, efficiency, investment needs, subsidies, and consumption patterns. A detailed breakdown of future energy needs by source is required.

GHG emissions

Emissions are calculated from projected energy use and standard emission factors. Scope 1 covers on-site heat generation; Scope 2 covers purchased electricity. Transition scenarios assume declining Scope 1 emissions. CO_2 certificates and free allowances are considered under three scenarios (low, base, high) from 2031 to 2045. Residual emissions will require offsets, so future offset costs must be included.

Energy costs

Costs depend on projected consumption by source and future unit prices which are based on commodity price expectations The company uses price ranges for electricity and natural gas (low, base, high) and considers grid fees, transport costs, subsidies, and compensation scenarios. Hedging instruments are applied short- and mid-term.

Resulting scenarios

Analysis combines energy demand scenarios (transition vs. status quo), commodity price scenarios (low, base, high), free allowance scenarios, and electricity compensation assumptions. This provides a broad set of scenarios which can be used for the analysis.

b. Market Opportunity

The company supplies products and solutions for the automotive industry, including components designed for battery electric vehicles (BEVs). With the shift to BEVs—especially in China and Europe—the company expects additional sales and performance potential.

Sales potential

Global BEV production forecasts for 2026–2035 based on external data are extended to 2045. Three SSP scenarios guide analysis:

SSP 1: High sustainability focus

SSP 2: Middle of the road

SSP 5: Low sustainability focus

BEV growth varies by scenario. The company calculates total market size based on product quantities per vehicle and applies assumed market shares (stable or growing) to estimate sales volumes.

Revenue potential:

Unit prices per product cluster differ by SSP scenario. Premium pricing applies to high-quality products.

Profitability potential:

EBITDA is derived from direct costs and overhead (marketing, administration, R&D). Two views are used:

- **Absolute impact** – total effect of BEV-related products
- **Gap perspective** – incremental upside vs. ICE vehicles

Production capacity:

Capacity planning ensures sufficient output. Additional capacity triggers CAPEX, depreciation, and cash outflows. Utilization assumptions and CAPEX per unit are included in the analysis.

Key Performance Indicators (KPIs):

To assess financial impacts on the P&L, balance sheet, and cash flow, the company integrates the results of risk and opportunity planning into an integrated planning model. This enables detailed analysis of financing needs, cash flow implications, and compliance with key loan covenants.

Critical KPIs vary by stakeholder and purpose. For example, energy procurement focuses on consumption patterns and energy cost changes, while finance prioritizes liquidity and overall financial performance. The KPIs identified for monitoring include Free Cash Flow, liquidity, EBIT, Revenues, and GHG emissions. These metrics serve as the basis for evaluating both financial and environmental outcomes.

c. Data sources and data collection

Based on the value driver tree the relevant assumptions and input variables need to be collected. Ideally, multiple data sources should be used and compared to ensure reliability. The selection process should prioritize sources that best serve the Value to Business use case, offer high data quality and accuracy, and maintain consistency with other assumptions. Internal assumptions should be validated against external market perspectives, and vice versa, to enhance credibility.

As per ESRS requirements, critical assumptions used to quantify the anticipated financial effects, as well as the sources and level of uncertainty of those assumptions, must be disclosed.[76] Therefore, it is important to document the data collection process thoroughly.

During data collection, the entity will gather estimates for various input variables that may differ across a range. These ranges should be utilized as additional information: As indicators of uncertainty, as mentioned in the ESRS[77]. The entity can use these ranges in further quantification analyses and incorporate these ranges into scenario or simulation analyses. This approach is especially beneficial when disclosing results within a range, as it uses the variability in input data rather than relying on arbitrary adjustments (e.g., a simplified ±10% around a single point estimate).

Example:
In our example we have the following input variables for which estimates need to be collected:

Input variables and potential data sources for energy cost projection

Input variables	Data source
Energy prices per energy source (oil, natural gas, gas from renewable resources, electricity (grid), electricity (PPA), district heating, fleet fuel)	- International organizations (World Bank, IMF, Eurostat) - National statistics and authorities (Statistisches Bundesamt, BAFA, EIU) - Financial and economic data (Bloomberg, Reuters, Refinitiv) - Energy and climate economic data (Agora/Prognos, Enervis, IEA, IETA) - Market and contractual data (Internal PPA contracts)
Consumption planning including efficiency gains / losses from electrification actions, general efficiency gains from normal production process improvements, consumption / emission reduction from actions	Internal estimates based on specified actions Plausibility checks based on former efficiency projects and first decarb pilot projects Gains from electrification verified based on benchmark data from peers and industry studies
Offsetting prices (carbon)	IETA, Bloomberg, Argus
CAPEX and OPEX for actions related to consumption / emission reduction incl. write-off period	Planning based on detailed action plan and experience of former projects
Assumptions regarding Working Capital changes due to change in energy mix and consumption	Based on historical average consumption per day adjusted by reduced assumption per day and adjusted for price changes

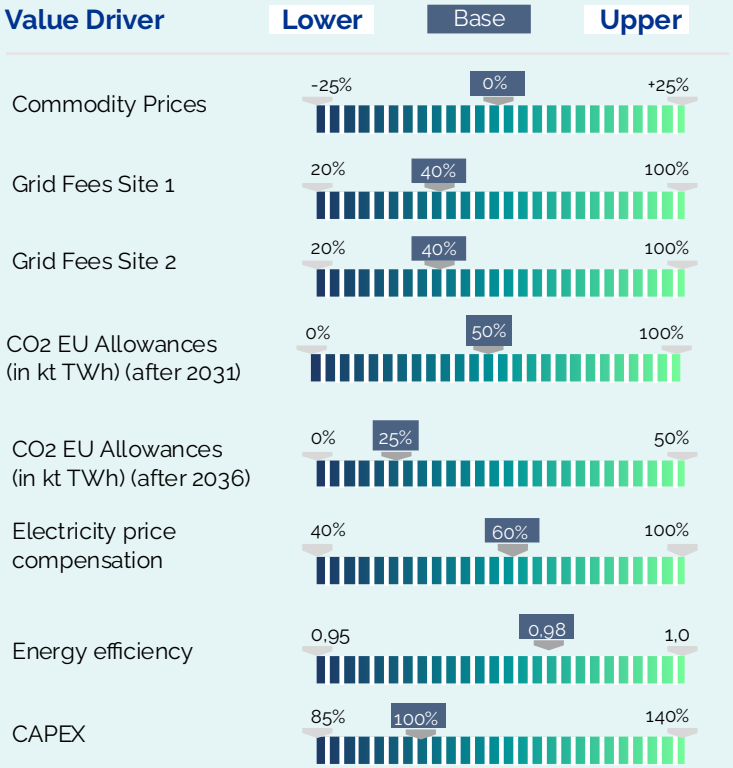
(Source: Own depict)

With the multiple data sources mentioned in the above table taken into account, the figure below exemplifies bandwidths for material input variables that can be derived from them which we use in our example case.

In our example we have the following input variables for which estimates need to be collected. For example, the bandwidth of expected energy prices from grid for the underlying time period are expected to vary between -25% and +25% based on the base case projection. CAPEX related to the assigned decarbonization actions are expected to vary between 85% of base case projection of €380 million (base case) and 140%, which indicates a very high level of uncertainty.

[76] ESRS E2 Pollution, E2-6 (39c)
[77] ESRS 1, para. 88

Variation and bandwidths of key value drivers



(Source: Own depict)

The value ranges have been determined during the process of financial planning and are based on expert projections. Similar analyses have been conducted for market share, unit prices and market expectations in the market opportunity case.

d. Planning of financial effects from risks, opportunities and strategic decisions

Understanding and tracking the financial effects of sustainability matters can be challenging. Many entities struggle to identify, evaluate, and report these effects due to insufficient knowledge, a focus on short-term risks, and difficulty measuring long-term financial consequences.[78]

To prepare a reliable forecast model, various methods and modelling techniques are available to overcome inherent challenges in forward-looking projections. The different financial forecasting methods are outlined in the Value to Business Framework.

The defined input variables and corresponding data points are integrated into an overall financial model, including P&L statements, balance sheets, cash flow statements, and key non-financial metrics. Based on the existing business plan and the developed value driver logic, the financial planning may be adjusted for specific circumstances of the Value to Business use case. Once a robust model is established, techniques to address uncertainty

[78] TCFD. (2017). Final Report – Recommendations of the Task Force on Climate-related Financial Disclosures, p. 8

within the planning assumptions can be selected, such as sensitivity, scenario, and simulation analysis.

The model should also integrate non-financial KPIs, like energy consumption and CO_2 emissions, which influence financial outcomes through internalization. Additionally, it should capture interdependencies, such as the need for more hires as revenue increases, considering key factors like labor conditions and regulations in forecasts. An integrated cash flow approach offers a holistic view of an entity's liquidity by connecting operating, investing, and financing activities. Close collaboration with corporate planning, controlling, and operational departments is crucial for developing, aligning, and incorporating entity-wide assumptions into the budgeting and planning processes.

Sensitivity analysis

A sensitivity analysis evaluates how changes in one key variable affect outcomes within a defined value range, identifying the most influential variables. For instance, an entity operating in the energy sector might assess how fluctuations in energy prices could affect the profitability of a project and thus help to adapt to different markets and regulatory environments. Another example would be an entity evaluating the implications of a change in minimum wage on operational costs and employee satisfaction. The sensitivity analysis can predict the trade-offs between increased labor costs and improvements in productivity and retention.

The sensitivity analysis can be carried out in Excel using the data tables' function. To perform a basic sensitivity analysis, a flexible financial model with key input parameters (such as sales volume, costs, or prices) and target KPIs (such as profit or revenue) is required. By adjusting one input parameter at a time (e.g., sales volume or cost), entities can observe how the adjustment affects target metrics. This approach allows to pinpoint critical factors materially affecting financial forecasts and can help pre-identify the most important input variables and KPIs before launching financial models.

Figure 20 shows a sensitivity analysis using the data table function in Excel, considering two changeable input parameters and their effect on entity cash flow. The effects of variations in the input parameter CAPEX variation are combined with a variation in energy prices to determine entity cashflow effects. The second part combines the effects of adjustments in energy consumption with a variation in remaining CO_2 emissions to estimate cashflow effects.

Sensitivity analysis – Total cash flow 2030

		PPA price variation				
		-50%	-25%	0%	100%	200%
Capex variation	50%	11.567	11.527	11.487	11.328	11.169
	75%	11.529	11.489	11.450	11.290	11.131
	100%	11.492	11.452	**11.412**	11.253	11.094
	150%	11.417	11.377	11.337	11.178	11.018
	200%	11.342	11.302	11.262	11.103	10.943

		Variation in remaining tCO2 emissions				
		-	50	75	100	200
Energy consumption reduction	-	11.396	11.383	11.376	11.370	11.356
	2%	11.414	11.401	11.395	11.388	11.377
	3%	11.432	11.419	**11.412**	11.406	11.397
	6%	11.465	11.452	11.446	11.439	11.436
	9%	11.497	11.484	11.477	11.472	11.472

Figure 20 **Example of simple sensitivity data tables** (Source: KPMG)

However, sensitivity analyses come with limitations, e.g., typically only one variable can be changed at a time, ignoring interactions between factors. Additionally, it does not provide expected values, and their probability distribution making the outcomes less applicable for decision-making. Overall, sensitivity analysis is a quick and easy method for understanding

the financial effect of varying assumptions. Sensitivity analysis allows for a simple consideration of uncertainty, helping entities to identify the most critical variables that drive financial forecasts.

Sensitivity analysis of key value driver (input variables) on EBIT

(Source: KPMG)

The figure above depicts an illustrative overview of the results of multiple sensitivity analyses for the input parameters 'Commodity Price', Grid Fees Site 1 & 2', CO2 allowances', 'Electricity price compensation'' and 'Energy efficiency' and their effects on entity EBIT.

The bars show the magnitude of the financial effects for each value driver listed. An increase or decrease in value drivers lead to different positive or negative financial effects. Relevance can be determined by the magnitude of the sensitivity effect on target KPI (e.g. change in EBIT) or the bandwidth of the value range used for the sensitivity analysis. In the example, commodity price development, energy efficiency actions and electricity price compensation are the main value drivers.

Scenario analysis

This type of analysis enables an entity to explore how different future events or external factors, such as different climate change policies, could affect their business model. By considering a range of potential future scenarios, e.g., stricter carbon regulations, increased costs of emissions, or mandatory shifts towards renewable energy, the entity can assess how each scenario might affect its revenue streams, supply chain, or overall competitiveness. This approach helps prepare for uncertainties by considering best-case, worst-case, and base case, allowing the company to make informed strategic decisions, such as adjusting CAPEX or operational plans in line with anticipated policy and sustainability trends. The Value to Business Framework elaborates on the application of macro scenarios.

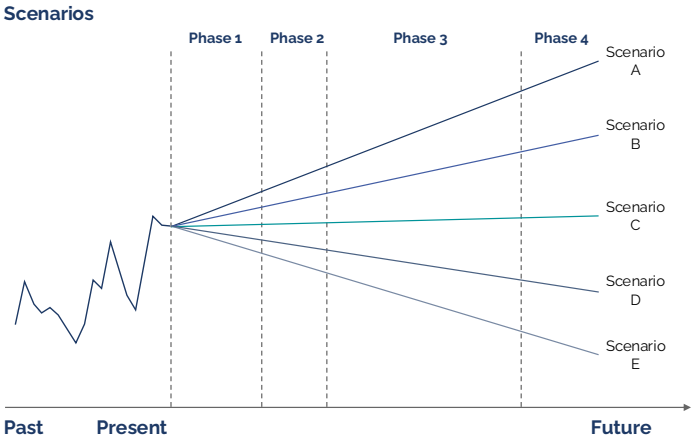


Figure 21 **Example for illustration of scenario analysis results** (Source: KPMG)

In simple cases, a scenario analysis can consider two or more scenarios, each with an estimated probability of occurrence. Figure 21 provides an example of how a scenario

analysis with five scenarios can be presented graphically. The outcomes of the scenarios considered can be combined into an expected value by summing the probability-weighted results of each scenario.

Figure 22 shows a more complex example of an entire decision tree using the case of an entity operating in the automotive industry.

Illustrative

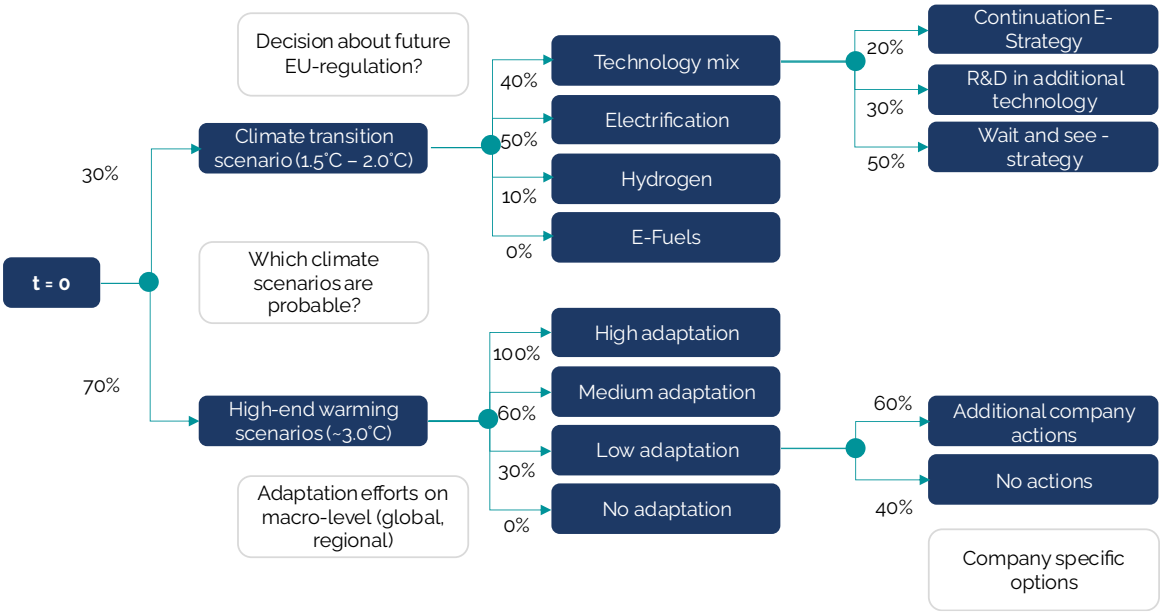


Figure 22 **Scenarios in combination with decision trees**
(solely illustrative calculation example, Source: Own depict)

Starting from t=0 timepoint[79], various future scenarios are conceivable. Assigned weightings can indicate the probability of a scenario to occur, for example a climate transition scenario that is accompanied by certain EU regulations. Within each scenario, an entity should be aware of available operational options to respond. Following the example in Figure 22, these options could include decisions to focus on electric cars, hydrogen fuels, e-fuels or a technology mix. The second possible scenario is a high-end warming scenario, in which the entity needs to consider adaptation requirements and respective consequences.

The use of scenarios in combination with decision trees can help visualize possible paths, assigning probabilities to different outcomes and adapting strategies accordingly. This is particularly useful in high-uncertainty contexts, such as legal disputes, geopolitical conflicts, or major policy shifts.

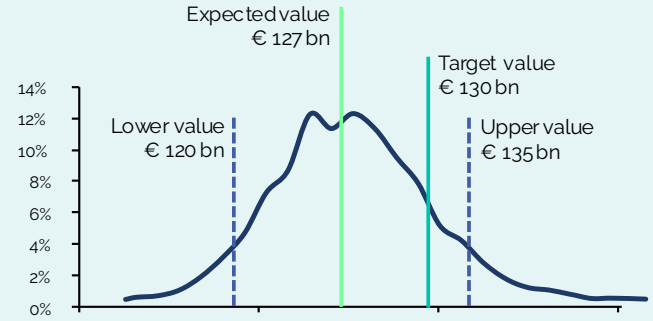
Scenario analyses offer several advantages and disadvantages in financial planning. Advantages include the consideration of a wide range of potential futures, evaluation of multiple variables and their interactions, and clearly conveying risks and opportunities associated with different scenarios, making them an effective tool for stakeholder communication. Drawbacks of scenario analysis are the complicated, resource-intensive, and time-consuming process, which often requires significant data and expertise to execute effectively. Additionally, the selection of scenarios and determining variable combinations can be subjective and the likelihood of occurrence for each scenario is not

[79] Calculation example solely illustrative - no objective probabilities.

part of the calculation itself, lacking an estimation of expected values. It should be further avoided to overestimate the significance of extreme scenarios to not misguide strategic decisions.

Example: The figure below displays a target distribution curve that represents possible outcomes when varying the material input variables. In a real-world example, 5.000 different random combinations of input variables were included in the simulation analysis. The curve shows all possible outcomes for the target KPI "entity value", linked to the underlying probabilities. The central peak represents the most probable outcome (expected value), with upper and lower bounds showing a value range between €120bn and €135bn in which with a probability of approx. 90% the results are concentrated. The broader the distribution curve, the higher the volatility of results and the higher the risk profile of the target KPI. The results help to visualize the potential range of outcomes and assess risks or opportunities in more detail as well as understanding how variations in these drivers influence business performance or financial outcomes.

Target distribution curve according to varied parameters



(Source: KPMG)

Simulation analysis

Simulation analysis allows entities to incorporate uncertain factors such as future market trends, interest rates, exchange rates, commodity prices, and other input variables into their models. By using techniques like Monte Carlo simulations, entities can create a range of possible outcomes based on varying assumptions and probabilities, providing a comprehensive view of potential financial performance under a few thousand scenarios. Figure 23 depicts an exemplary illustration of a simulation analysis.

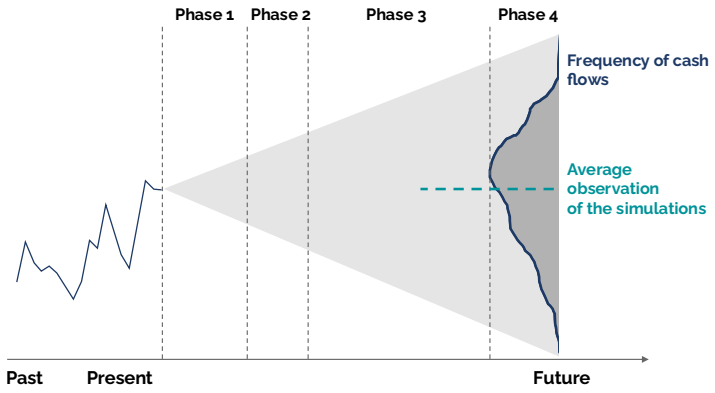


Figure 23 **Illustration of simulation analysis**
(Source: KPMG)

Monte Carlo simulation is a complex analytical method that requires advanced computational skills and a thorough understanding of statistical techniques. Developing and implementing these simulations involves not only the ability to manipulate large

datasets but also the expertise to design sophisticated algorithms for modelling a wide range of variables and their potential outcomes. While this expertise may already exist, e.g. in the Risk Management departments, some entities may find it necessary to seek assistance from external consultants or invest in building internal expertise. Simulations allow for a deep understanding of the reactions of complex systems under uncertainty, specify probabilities of occurrence to enhances risk assessment and provide an expected value of potential financial outcomes. However, the process requires specific computational skills and expertise to develop and run simulations, and the quality and reliability of the outcomes depend heavily on the assumptions and data used in the model, The complexity of interpreting simulation results often requires a background in statistics.

When working with discounted values in a Value to Business context, for instance in the context of investment calculations or entity valuations, following considerations must be made:

(1) **Discounting versus entire time horizon:** Depending on the Value to Business use case, it is important to decide whether a discounted cash flow (DCF) analysis is appropriate or if an alternative approach, covering the full financial planning period and timing of forecasted effects, is needed. In case specific temporal aspects or milestones are crucial the entire planning horizon should be considered to align with timing of cash flows and strategic objectives. This allows for a more comprehensive understanding of short-, mid-, and long-term implications.

(2) **Adverse effects of discounting**: Discounting can reduce the perceived urgency for changes and transformation (e.g. climate-related actions), as negative effects in the distant future appear less material in present-value terms. For this reason, it is advisable to assess developments across the entire planning horizon in absolute terms, rather than relying solely on an entity or equity values as the primary basis for strategic decisions in sustainability and broader transformation context.

(3) **The right time horizon:** A critical issue when working with discounted values is the choice of time horizon. If the analysis ends before the transformation is completed, it can result in misleading entity values and strategic conclusions. Especially sustainability-related transformations unfold over very long timeframes. Figure 24 illustrates the complete transformation of a business model and the associated cash flow (e.g., phasing out a coal plant and investing green alternatives). The analysis covers the entire transformation, including the phasing-out established business, the ongoing business, and the expenditure and future cash flows of the new business. If the time horizon would end in 2035, the transformation would be incomplete, resulting in misleading entity values and conclusions. This is particularly important for sustainability-related transformation, with a very long-term perspective.

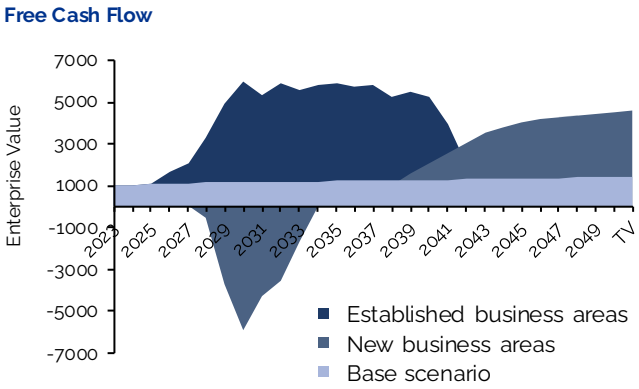
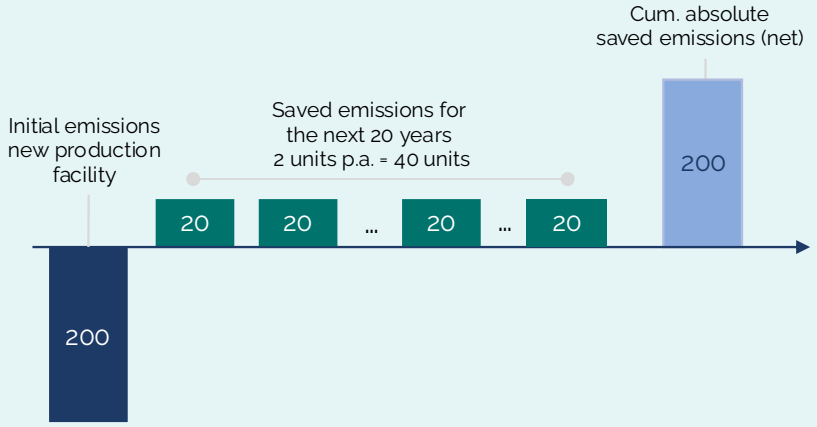


Figure 24 **Projected free cash flows of a sustainable entity development over time** (Source: KPMG)

Example:
An entity is planning an investment to reduce GHG emissions. In this case, emissions are factored into financial planning through internal carbon pricing, which also influences discounted cash flows. The figure below shows that building the facility today generates 200 CO2e, while future production avoids 400 units over 20 years, resulting in net savings of 200 units.

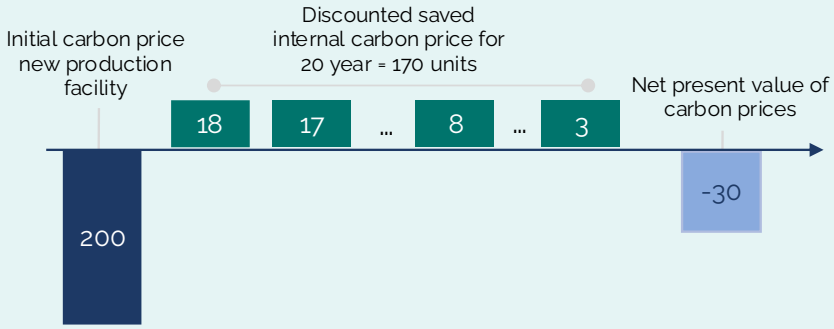
Example avoided GHG emissions (absolute terms):



(Source: Own depict)

However, when cash flows are discounted, avoided emissions are also discounted. This results in a net present value of -30 units for the GHG emissions (see Figure below), incorrectly suggesting the project is ineffective for emission reduction. Such misrepresentation can cause the true impact to be underestimated and may discourage entities from considering both positive and negative effects.

Example avoided GHG emissions (discounted terms):



(Source: Own depict)

3.5. **Step 5** – Interpretation and monitoring

After analyzing and planning financial effects, the next step is to interpret results and monitor progress. This phase turns insights into actionable strategies, measurable targets, and continuous tracking.

Interpretation means aligning findings with business objectives, while considering both Value to Business and Value to Society perspectives. A holistic view helps identify opportunities that strengthen resilience and meet societal expectations. Monitoring

ensures adaptive management. By setting clear metrics and tracking changes, organizations can respond to new challenges, such as regulatory shifts or market dynamics, and stay aligned with strategic goals.

Together, interpretation and monitoring form the crucial link between analytical insights and real-world application. A critical aspect of this phase is the linkage between the entity's Value to Business and Value to Society. By quantifying externalities from greenhouse gas emissions, air pollution, or contributions to local communities, the entity gains a comprehensive understanding of its societal footprint. Quantifying the Value to Business allows the entity to understand expected financial implications of potential opportunities and risks and enables them to enhance the overall strategy. For instance, identified risks or opportunities may prompt initiatives that reduce negative environmental impacts (e.g., lower emissions through energy efficiency) or increase positive social impacts (e.g., investments in education).

In reality, financial performance, opportunities, or risk mitigation do not always align with reducing negative societal impacts. Thus, target conflicts are common and balancing the Value to Society and Value to Business perspectives must be done carefully, data-driven and well-informed. For this balancing act, the overarching strategy builds the context, vision, and reference point. The Value to Business process also emphasizes the evaluation of potential future risks and opportunities. These insights are informed by scenario-based assessments, which consider external factors such as regulatory changes or macroeconomic trends.

In the following, guidance for interpretation or monitoring is given for most common issues:

(1) **Multiple pathways to achieve strategic targets:** In cases where specific strategic targets need to be achieved and multiple pathways are possible; options should be ranked based on their potential contributions to business objectives and societal goals. By assessing the scale and probability of identified risks and opportunities, action fields can be ranked based on their potential effects on business objectives. High-priority areas, such as those with significant financial implications or alignment with long-term goals, receive targeted attention. Building on this prioritization, the entity develops action and transition plans that define the specific steps required to address the identified issues. These plans include detailed timelines, milestones, and resource allocation, ensuring that the entity's response is both strategic and operationally feasible. The example below illustrates how different goals and their assessments can be visually presented for decision-making.

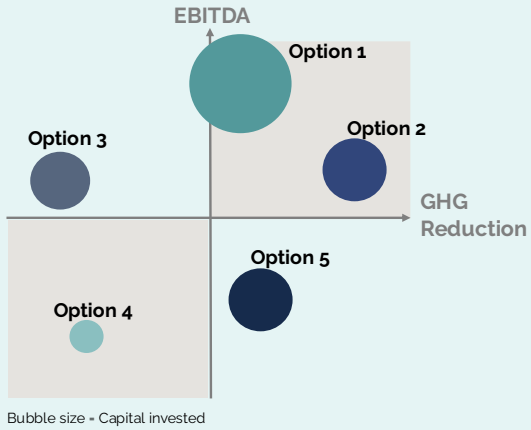
(2) **Setting quantitative targets:** A key component for translating insights from the Value to Business assessment into action is the setting of quantitative targets and sub-targets. For instance, a target to reduce greenhouse gas emissions by 50% over a decade might include sub-targets for annual reductions, aligned with actionable steps outlined in the transition plan. The derivation of strategic implications must also account for external changes, such as regulatory updates, competitive shifts, or technological advancements. The ability to adapt strategy dynamically in response to these changes ensures that the organization remains resilient and competitive. For example, new regulations may necessitate accelerated timelines for compliance, while shifts in competitor strategies might create opportunities for differentiation.

(3) **Integration into strategic framework:** Ultimately, the integration of these elements into an entity's strategic framework ensures that derived implications drive meaningful action (e.g., transition planning). By linking insights into Value to Society objectives, quantifying risks and opportunities, and embedding them into actionable plans with measurable targets, the organization positions itself to create long-term value while addressing its most pressing challenges and opportunities.

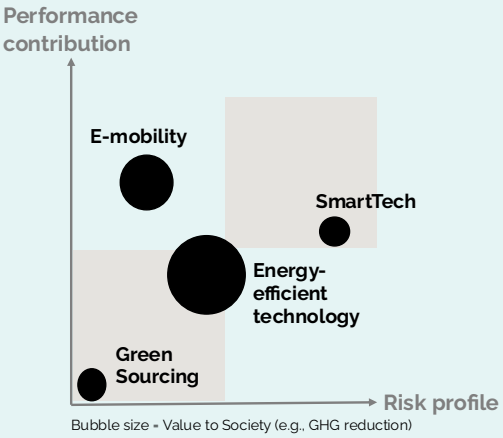
Example:
An OEM aims to achieve carbon neutrality by 2045 and focuses on the quantification and prioritization of strategic action fields, e.g., transitioning to electric vehicles, reducing emissions across its supply chain, or improving energy efficiency in manufacturing. To do so, the OEM builds on a structured comparison of GHG reduction potential, forecasted performance, and required CAPEX (left graph below). Strategic options that contribute simultaneously to performance enhancement, operational stabilization, and GHG reduction are prioritized (option 1 and option 2), while potential budget constraints help determine feasibility.

The Value to Business is assessed from both performance and risk perspective. By valuing the potential reduction of GHG emission impacts (visualized through bubble size in the right graph), the entity becomes a holistic understanding for how the different strategies contribute to value creation. Green Sourcing shows low effects on GHG emissions reduction, performance contribution and a low risk profile. Energy-efficient technologies significantly reduce GHG impacts and have a good performance and risk balance. E-mobility offers high performance improvement with low risk and good reduction of GHG impacts. SmartTech is less attractive due to high risks and limited GHG reduction potential.

Exemplary Performance -Budget Constraint



Exemplary Performance -Risk Profile based on GHG example



(Source: Own depict)

4. Outlook

The integration of sustainability into financial decision-making is still developing, but momentum is accelerating. Several developments will shape the future of how sustainability-related risks and opportunities are quantified:

Regulatory convergence and global standards

Frameworks such as ISSB, ESRS, and TCFD/TNFD are driving harmonization in sustainability reporting. This will reduce fragmentation and enable companies to apply consistent methodologies for assessing financial implications of environmental and social factors.

Data quality and digital transformation

Advancements in technology will make sustainability data more granular and accessible. AI-driven analytics, real-time monitoring, and scenario modeling will become standard tools, allowing organizations to integrate dynamic sustainability metrics into financial planning.

Internalization of externalities

Carbon pricing and similar mechanisms will increasingly translate societal impacts into direct financial consequences through internalization. This trend will converge the Value to Business and Value to Society perspective, reinforcing the need for holistic thinking and integrated valuation approaches. However, the internalization of every impact of an entity is not expected.

Embedding sustainability in core finance processes

Sustainability is already moving beyond separate reports and will become part of budgeting, forecasting, and investment appraisal. Integrated planning models combining financial and non-financial KPIs will become the norm, supporting holistic decision-making.

Resilient and transparent supply chains

Supply chain stability will become a crucial success factor. Managing dependencies on natural and social capital across multiple tiers, anticipating disruptions from climate risks or geopolitical tensions, will ensure low procurement costs and operational continuity. Transparency and collaboration with suppliers will move from “nice-to-have” to a core requirement for risk mitigation.

Emerging metrics and impact measurement and valuation

Innovative approaches for the monetary valuation of environmental and social impacts, such as those developed by the Value Balancing Alliance in partnership with the International Foundation for Valuing Impacts and the Capitals Coalition, will gain traction. These methodologies will help organizations quantify trade-offs and optimize decisions in line with both financial and societal objectives. In summary, the Value to Business concept and sustainability in corporate decision making are moving toward deeper integration, better data availability and quality, and stronger alignment between societal and financial performance. Companies embracing these developments early on will not only increase resilience but also secure competitive advantages in an economy increasingly shaped by disruptions and a rising demand for transparency.

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Appendix

Appendix 1: Summary of selected resources for top-down analysis

The concept of **planetary boundaries**, introduced in 2009 by a group of scientists, may help in a top-down analysis to gain a general understanding of critical environmental topics. Additionally, it is extremely helpful in understanding the interrelations between geo- and biosphere as well as human interactions. The planetary boundaries concept establishes limits on human impact across nine critical dimensions, each with stress thresholds that, if exceeded, could trigger large-scale, potentially irreversible changes to Earth's life-support systems. In 2025 the scientists concluded in the Planetary Health Check 2025 that the global efforts on environmental change are insufficient as seven out of the nine planetary boundaries had been crossed.[80]

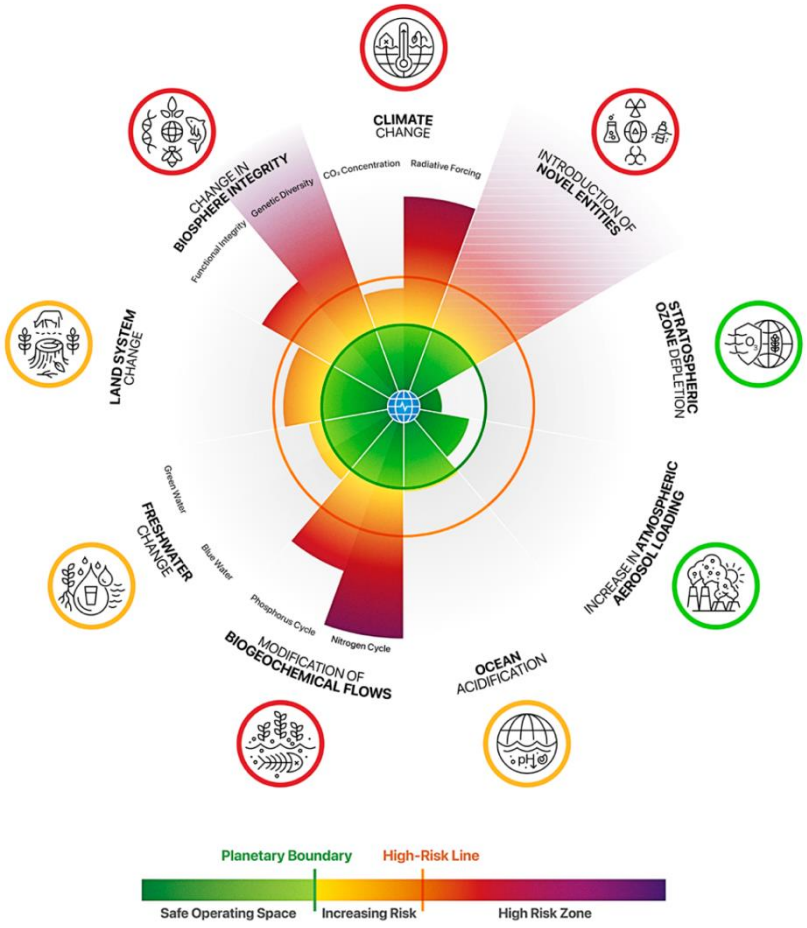


Figure 25 **Planetary boundaries PB diagram 2025**
(Source: PBScience, 2025)

[80] PBScience. (2025). Planetary Health Check 2025. Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany

Like planetary boundaries, **social boundaries** reflect the fragility of our social systems and serve as a call to action rather than merely a moral guide. The key social boundaries focus on critical resources such as food, energy and income[81] and include[82]

1. **Water:** Ensure availability and sustainable management of water and sanitation for all
2. **Food:** End hunger, achieve food security and improved food nutrition and promote sustainable agriculture
3. **Income:** End poverty in all its forms everywhere.
4. **Education:** Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. **Resilience:** Protection of and creation of capacity to recover from multiple dimensions of social stressors.
6. **Voice:** Ensure the opportunity of political participation and freedom of expression.
7. **Jobs:** Creating decent employment opportunities for the global labor force.
8. **Energy:** Ensure access to affordable, reliable, sustainable and modern energy for all.
9. **Social Equity:** Reduce inequality within and among countries.
10. **Gender Equality:** Achieve gender equality and empower all women and girls.
11. **Health:** Ensure life and promote well-being for all at all ages.

The connection between planetary and social boundaries is crucial for sustainable development. Planetary boundaries set ecological limits within humanity must operate (the "ceiling"), while social boundaries ensure that basic human needs and social justice are met (the "foundation"). Kate Raworth's "Doughnut Economics" illustrates this balance, envisioning a safe and just space where humanity thrives within these boundaries.[83]

Another approach, introduced by Johan Rockström and Pavan Sukhdev, is the **"Wedding Cake" model**, presented in 2006, which integrates Sustainable Development Goals (SDGs). The model emphasizes that economies and societies are deeply embedded in the biosphere, moving away from treating social, economic, and ecological development as separate, highlighting the interconnectivity and complexity.

[81] In comparison, the most critical resources regarding the planetary boundaries are carbon (as emission), nitrogen (as emission) and income (as a source of overconsumption of the wealthiest 10% of the world). See Raworth, 2012, Oxfam Discussion Paper: A safe and just space for humanity, A Safe and Just Space for Humanity: Can we live within the doughnut? (oxfam.org), p. 5

[82] Raworth. (2012). Oxfam Discussion Paper: A safe and just space for humanity; Leach, M et al. (2013) 'Between Social and Planetary Boundaries: Navigating Pathways in the Safe and Just Space for Humanity' in World Social Science Report 2013: Changing Global Environments; United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development

[83] Raworth. (2012). Oxfam Discussion Paper: A safe and just space for humanity; Leach, M et al. (2013) 'Between Social and Planetary Boundaries: Navigating Pathways in the Safe and Just Space for Humanity' in World Social Science Report 2013: Changing Global Environments

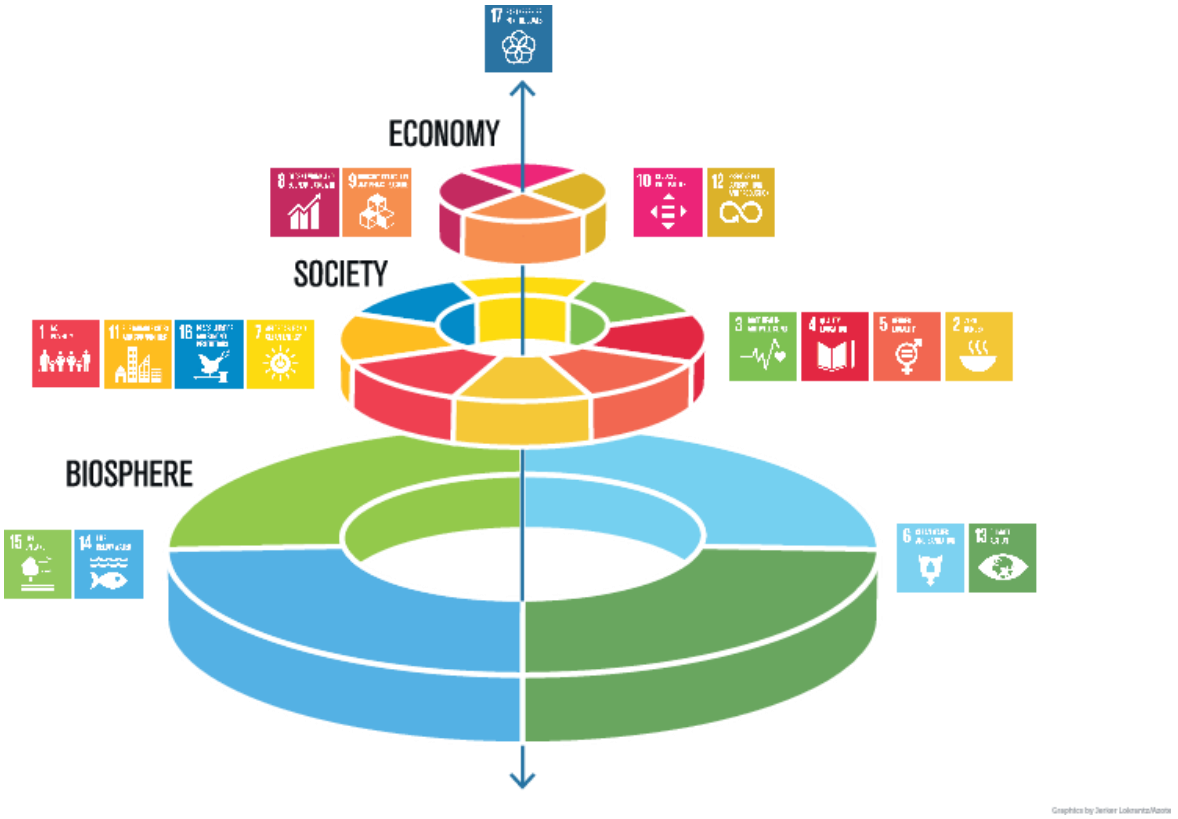


Figure 26 **SDG's Wedding cake**
(Source: Azote for Stockholm Resilience Centre, Stockholm University CC BY-ND 3.0.)

For instance, expanding monocultures and using more fertilizers might improve food security, supporting societal goals, but at the cost of exceeding planetary boundaries. This reflects potential trade-offs in societal choices and their environmental consequences. It highlights the need for holistic decision-making tools do address social justice while considering environmental safety. This perspective aligns with the VBA methodology of Value to Society which also aims to consider societal impacts due to environmental and social impact drivers. Future paths will vary depending on cultural values, visions, and political decisions.[84]

The concept of social and planetary boundaries may be used in three ways in the context of Value to Business analysis.

1) **Identifying material impacts:** Planetary and social boundaries may serve as a starting point which part of the value chain may lead to significant outcomes that affect respective dimensions (and vice versa). Since the dimensions of the boundaries are also closely linked to political will, they can also serve as a starting point for analyzing emerging internalizations. For example, it could be assumed that business activities in dimensions beyond the safe operating space and high interconnectivity like biosphere integrity and land system change are more likely to face regulatory measures in the future.[85]

[84] UNESCO. (2013). World Social Science Report, p. 86f
[85] Related political targets include those of the Global Biodiversity Framework (GBF). Also, national and regional targets apply for the respective jurisdictions (e.g. EU level or national targets). Such targets should be taken into account when applying the SBTN approach. For more details regarding GBF see 2030 Targets (with Guidance Notes)

2) **Calibrating the focus**: The boundaries give an overview of the most critical geo-ecological and social issues, helping entities to calibrate their focus and goal of the Value to Business analysis. This allows management and the Value to Business project team to adjust their priorities and avoid potential biases, such as the confirmation bias, before they subjectively distort the results of the analysis.

3) **Recognizing dependencies**: The boundaries help to identify where negative effects on natural, social, and human capitals (including ecosystem services) are already occurring or will occur in the immediate future. Especially in areas where safe operating spaces have been exceeded, entities should analyze their dependencies on respective capitals and ecosystem services.

Complementary to the concept of social and planetary boundaries, the **Global Risk Report** of the **World Economic Forum** offers insights into current and emerging global risks[86] by surveying experts from academia, business, government and more. In the latest 19th edition, 1,490 such experts were surveyed, covering risks over one, two and ten years, potential consequences from the manifestation of the discussed risks, the most relevant risk governance actions to mitigate and adapt risks as well as a prediction on the evolution of the global risk landscape. The report identifies the most pressing crises for 2024 across several key categories:[87]

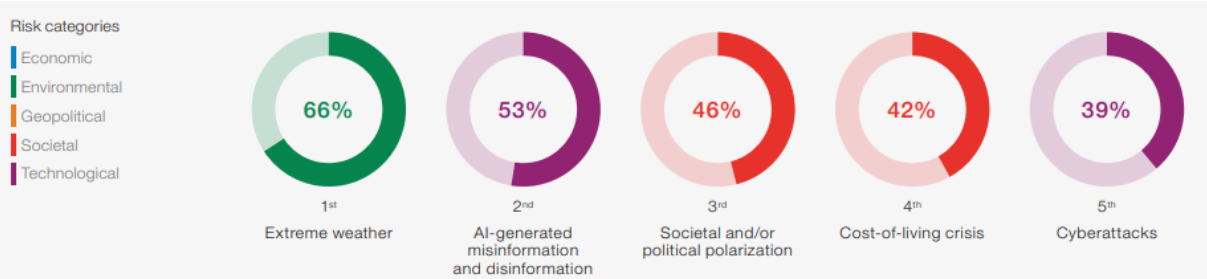


Figure 27 **Current risk landscape**
(Source: World Economic Forum, 2024)

(% values represent percentage of respondents considering the respective risk as to be under the top 5 current crisis)

The expected short- and long-term risks are represented in the following:

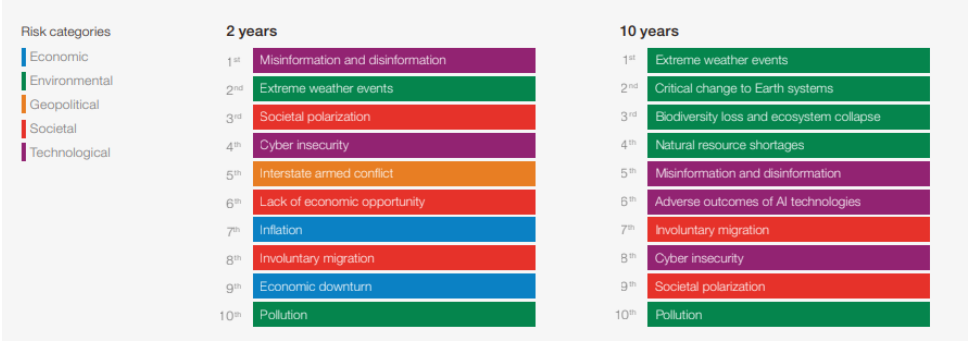


Figure 28 **Global risks by severity over the short and long term**
(Source: World Economic Forum, 2024)

[86] Although this concept concentrates on risks (which are addressed in the next chapter) and not on impacts and dependencies it provides a good overview of important trends over different time horizons as well the interconnectivity of these developments
[87] World Economic Forum. (2024). The Global Risks Report 2024 19th Edition, p. 1-8

In the long run, environmental risks clearly dominate the top risks. In contrast, social risks disappear from the top 5 over the 10-year horizon. However, this does not imply that social aspects are being increasingly neglected, especially given the interconnectedness of various risks. WEF's "interconnectedness map" highlights the links and influences within economics, as well as between economic and social risks. These results are in line with the concept of social and planetary boundaries, which also pay particular attention to interconnectedness within and between the boundaries.[88]

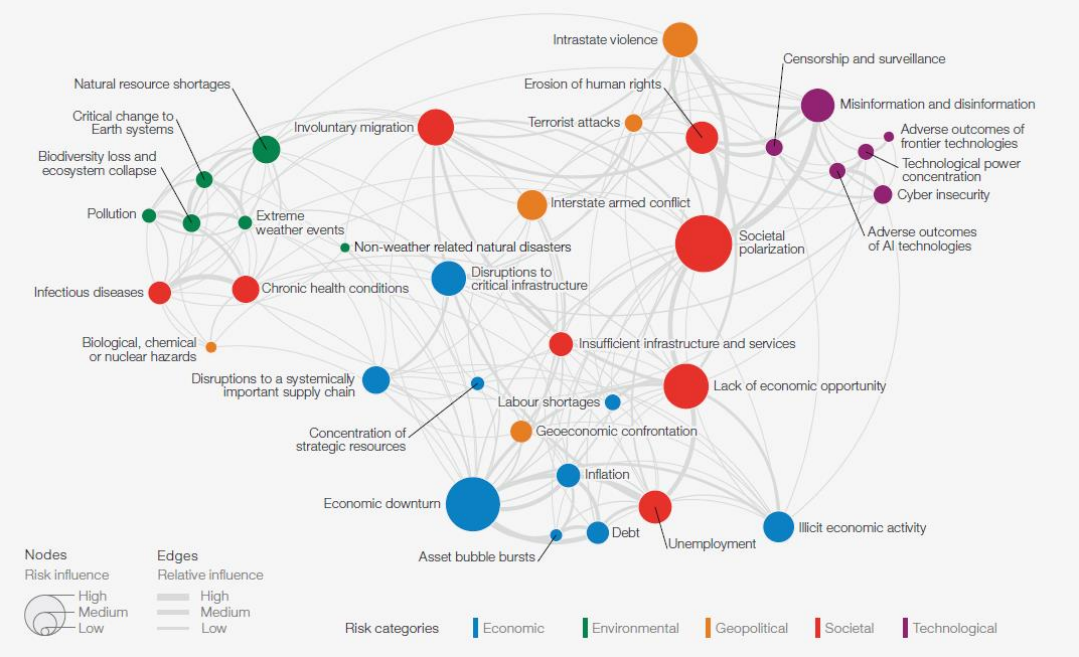


Figure 29 **Global risks landscape: an interconnectedness map**
(Source: World Economic Forum, 2024)

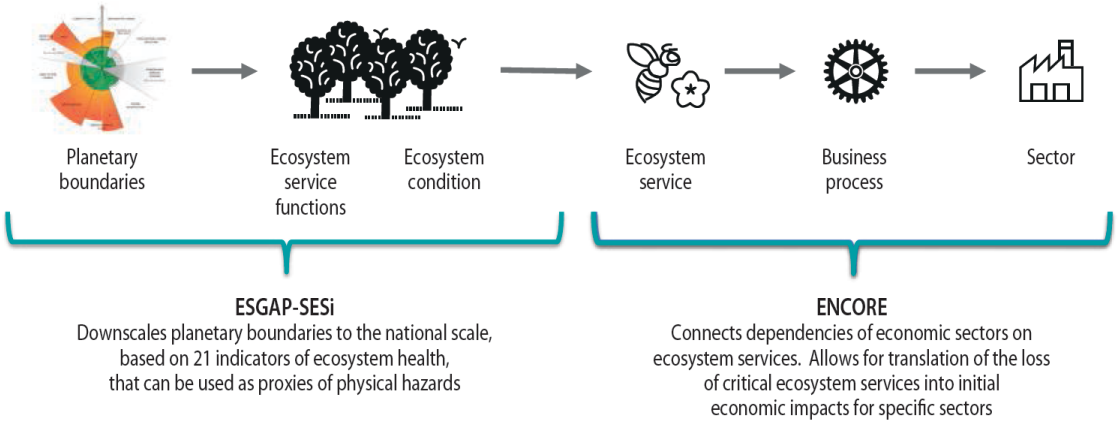
To apply insights from the WEF risk similarly to the social and planetary boundaries, entities can analyze and compare their own value chain with regard to the aforementioned risks (in particular, but not exclusively, ecological and social risks). Especially long-term risk assessments (10 years) are crucial to avoid over-focusing on the current status quo (conservatism bias). While expert surveys should be treated cautiously[89], they provide a useful forecast of potential future risks. As previously noted, the analysis should be twofold: identifying which capitals and ecosystem services are affected by current and future risks, and to what extent dependencies on these capitals exist. Furthermore, the entity should evaluate their contribution to these risks through its direct impacts and to what extent this can provide indications of impending internalizations.

In any case, the planetary and social boundaries as well as the risk report of the world economic forum provide an initial heuristic for engaging with the most globally relevant sustainability issues, as well as the associated impacts and dependencies. However, these frameworks do not provide any subdivision into specific regions, location-specific

[88] World Economic Forum. (2024). The Global Risks Report 19th Edition, p. 9
[89] This can already be assumed by the observation that there were significant differences in the statements of various surveyed groups, particularly with regard to ecological risks. For example, younger respondents perceive ecological risks as much more immediate (2-year period) compared to older survey participants (10-year period)

circumstances or according to specific industries. Such filtering represents the second level of granularity and is offered by initiatives like the **WWF Risk Filter Suite** or **ENCORE**.[90]

Figure 2.4 **Proposal for Connecting ESGAP to tools such as ENCORE, so as to translate ecological patterns into specific hazards for specific sectors/countries**



Source: Authors.

Figure 30 **Connection between global and location-specific perspectives** (Source: NGFS, 2023)

The **WWF Risk Filter Suite**[91], developed by the Worldwide Fund For Nature (WWF), provides insights into impacts and dependencies based on physical, regulatory and reputational risks.[92] The Risk Filter Suite comprises the Biodiversity Risk Filter and the Water Risk Filter.

[90] There are several more initiatives providing comparable analysis tools like the WWF Risk Filter Suite or ENCORE. This includes for example the SASB Materiality Finder (Overview - SASB (ifrs.org)), created by the International Sustainability Standards Board (ISSB) of the IFRS Foundation which gives an overview of material opportunities and risk linked to specific industries classified by the Sustainable Industry Classification System® (SICS®). In a comparable way the sustainability-linked bond principles (Sustainability-Linked Bond Principles (SLBP)), created by the International Capital Market Association (ICMA) created an ESG materiality assessment by industry sector. A respective Excel file is accessible here: Illustrative-KPIs-Registry-June-2024.xlsx (live.com)

[91] WWF, WWF Risk Filter Suite, WWF Risk Filter Suite - Home. For further information regarding the WWF biodiversity risk filter methodology see: WWF, Tackling Biodiversity Risk, WWF_TacklingBiodiversityRisk.pdf (kettufy.io)

[92] Additionally, there are plans to introduce tools in the future that will assist users in developing and implementing effective response strategies. See chapter "4 Respond" within the biodiversity as well as water risk filter

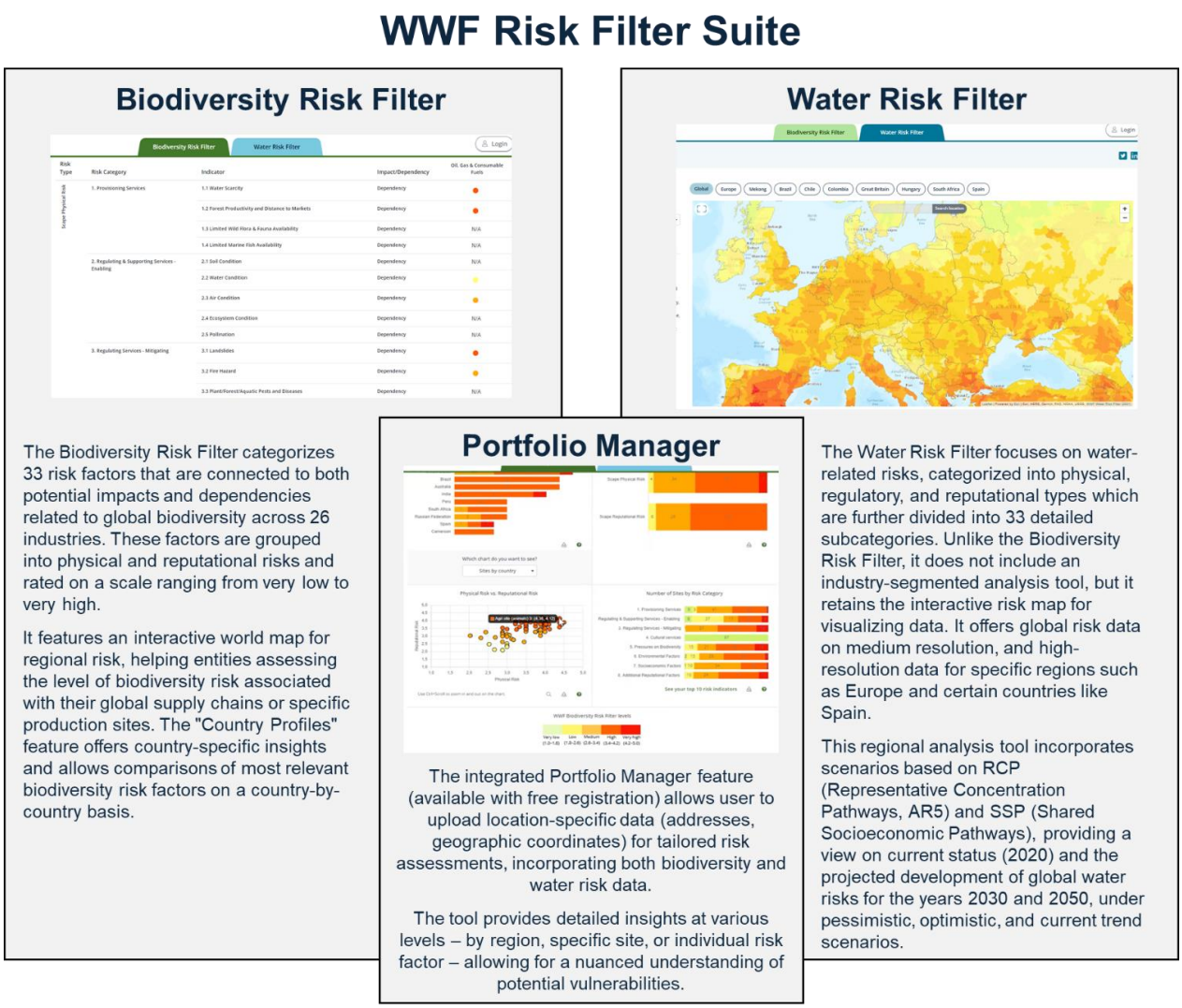


Figure 31 **WWF Risk Filter Suite**
(Source: WWF, 2020)

ENCORE[93], which stands for "**e**xploring **n**atural **c**apital **o**pportunities, **r**isks, and **e**xposures" is a free online tool designed to assist entities in analyzing their nature-related dependencies and impacts. Developed by Global Canopy, UNEP FI, and UNEP-WCMC, ENCORE links economic sectors and specific dependencies and impacts

The tool provides data on key dependencies and impacts per industry sector, clustered according to the Global Industry Classification Standards (GICS). Users can filter data by sectors, subsectors, and specific production processes. ENCORE offers an overview and descriptions of the relevant dependencies, categorized by ecosystem services and natural capital assets, as well as impacts on natural capital assets, including the specific impact drivers. For each dependency, ENCORE details the specific benefits of ecosystem services and natural capital assets[94] within the entity's value chain (e.g., direct physical impact or protection of the production process from disruption).

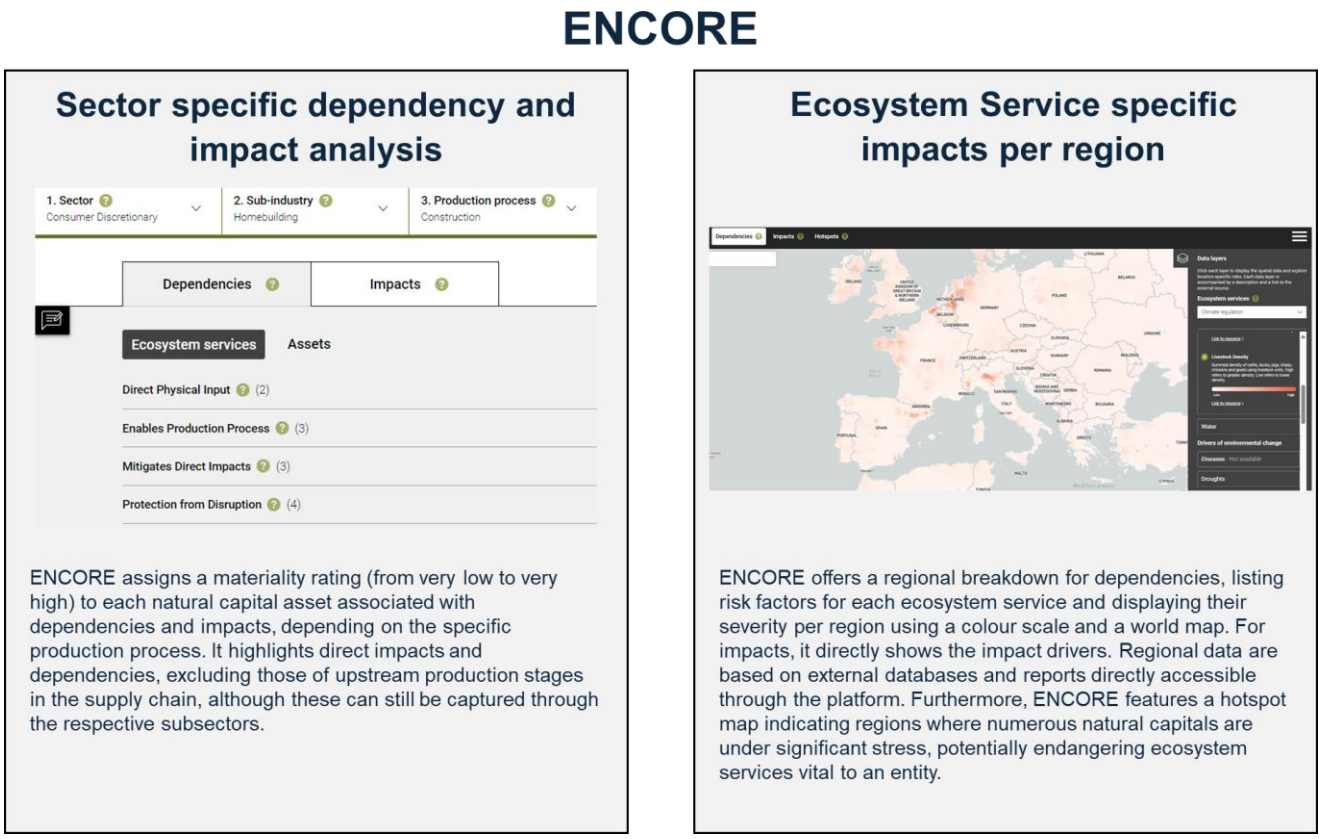


Figure 32 **ENCORE dependencies**
(Source: ENCORE)

[93] Exploring Natural Capital Opportunities, Risks and Exposure, ENCORE (encorenature.org)
[94] A list of the natural capital assets analysed by ENCORE is provided in the appendix 1 of this report. ENCORE's classification aligns with a 2019 publication in the journal "Ecosystem Services." Compare Leach et al. (2019). Ecosystem Services Vol. 36

Appendix 2: Mapping the Value to Business Process to TNFD LEAP

LEAP step		Corresponding V2B Application Guidance section	Notes
Locate	**L1**: Span of the business model and value chain	**Step 1& 2**Create an understanding of the entity with special regards to the specified analysis unit and scope chapter 3.1 b, 3.2 a, 3.2 b	Both stress the role of value chain in shaping dependencies and impacts
	L2: Dependency and impact screening	**Step 1** Create an understanding of the entity with special regards to the specified analysis unit and scope chapter 3.1 b, 3.1 c	Matching the nature interface to activities in the entity-specific context
	L3: Interface with nature	**Step 1** Identify impacts and dependencies relevant to the entity and map out pathways chapter 3.1 b, 3.1 d	*Only partial match:* Refines location-based exposure and links to value chain
	L4: Interface with sensitive locations	**Step 1** Identify impacts and dependencies relevant to the entity and map out pathways chapter 3.1 b, 3.1 d, 3.1 f	*Only partial match:* Aligns with spatial risk tools like WWF Risk Filter and ENCORE
Evaluate[95]	**E1**: Identification of environmental assets, ecosystem services and impact drivers	**Step 1** Identify impacts and dependencies relevant to the entity and map out pathways chapter 3.1 d	Mapping of natural capital components in impact pathways
	E2: Identification of dependencies and impacts	**Step 1** Measure impact drivers and dependencies chapter 3.1 d	Aligned approach to quantifying drivers
	E3: Dependency and impact measurement	**Step 1** Measure impact drivers and dependencies chapter 3.1 e	*Only partial match:* Differences in wording
	E4: Impact materiality assessment	**Step 1** Measure impact drivers and dependencies chapter 3.1 e	Covers both dependencies and impacts
Assess	**A1:** Risk and opportunity identification	**Step 2** Derivation of potential financial risks and opportunities chapter 3.2 e	Explicit IRO mapping from impact and dependency analysis
	A2: Adjustment of existing risk mitigation and risk and opportunity management	**Step 3** Management strategy and response chapter 3.3	*Only partial match:* Only conceptually addressed in V2B Application Guidance
	A3: Risk and opportunity measurement and prioritization	**Step 2** Probability and financial materiality assessment chapter 3.2 f	Risk and Opportunity matrix and heat maps for prioritization
	A4: Risk and opportunity materiality assessment	**Step 2** Summary of material opportunities and risks chapter 3.2 g	Convert an original long-list of identified ROs into a short-list

[95] Comprises the essence of the impact and dependency identification step by identifying critical environmental assets and ecosystem services on which business activities rely upon, and impact drivers induced by the entity (E1), connecting them with the activities and processes of the entity. Specific impacts and dependencies should be identified (E2) e.g. by using impact and dependency pathways. The following step (E3) is about the measurement of impacts and dependencies. Such measurements may include the measurement of inputs (e.g. amount of chemicals used), impact drivers (e.g. emitted greenhouse gas emissions) and changes of the state in nature (e.g. increased number of pollutants in local freshwater reserves). This can be done by qualitative (e.g. low to high rating) or quantitative rating (e.g. in tons), with specific metrics and illustrative examples of quantitative indicators related to different impact drivers, states of nature and ecosystem services provided; TNFD. (2023). Guidance on the identification and assessment of nature-related Issues: The TNFD LEAP approach, p. 66-99

Prepare	**P1:** Strategy and resource allocation	**Step 3** Management strategy and response chapter 3.3	Optional in V2B Application Guidance
	P2: Target setting and performance management	**Step 5** Interpretation and Monitoring chapter 3.5	Focus on KPIs and performance tracking
	P3: Reporting	**Step 5** Interpretation and Monitoring chapter 3.5	Output of process feeds reporting and disclosure uses
	P4: Presentation	**Step 5** Interpretation and Monitoring chapter 3.5	Output of process feeds reporting and disclosure uses

(Source: Own mapping based on TNFD, 2023)

Appendix 3: Exemplary non comprehensive list of actual and potential risks and opportunities

ESRS Category	Opportunity / Risk	Sub-category	Example of O&R	Potential financial effects	Source
E1 – Climate change	Opportunity	Energy source	Use of lower-emission sources of energy (e.g. electricity instead of gas)	Reduced exposure to future fossil fuel price increases, price volatility and supply constraints (e.g. driven by geopolitical dependencies and resource availability) Reduced exposure to GHG emissions and therefore less sensitivity to changes in cost of carbon and other regulatory measures Increased capital availability (e.g., as more investors favor lower-emissions producers) Increasing revenue due to raising demand for low-emission products and services Cost benefits from decreasing costs of sustainable energy sources (e.g. green electricity)	TCFD Full Report p. 18ff.; McKinsey July 16, 2024, Net-zero electrical heat: A turning point in feasibility,
E1 – Climate change	Transition risk	Market	Uncertainty in market signals and increased price volatility	Abrupt and unexpected shifts in costs for relevant production input (e.g. water, electricity, gas) Increased costs for hedging Increased business risk leading to higher cost of capital Increased monitoring costs	TCFD Full Report p. 18ff., TNFD Guidance on Biomes p. 25ff., ESRS E3 p.8f.
E2 - Pollution E3 - Water and Marine Resources	Physical risk	Pollution	Acid rain reducing agricultural productivity / crop yields	Revenue losses due to lower sales volume Price increases due to lower market supply Possible food shortages with potentially drastic effects on social and political structures, which ultimately also have a negative impact on companies' ability to operate	Natural Capital Protocol p. 73
E3 - Water and marine resources E5 - Resource use and circular economy	Opportunity	Resource efficiency	Use of: - more efficient production and distribution processes - recycling and circularity - Reduced water usage and consumption	Reduced operating costs (e.g., through efficiency gains and cost reductions) Increased production capacity, resulting in increased revenues Benefits to workforce management and planning (e.g., improved health and safety, employee satisfaction) resulting in lower costs	TCFD Full Report p. 18ff.
E4 - Biodiversity and ecosystems	Opportunity	Policy and Legal	Increased governmental efforts for protection of natural capitals	More sustainable agricultural yields: Increasing fish populations and therefore increasing fishing volumes due to ocean protection Maintaining cost stability due to ecosystem service stability and resource availability	ESRS E3 p.8f.
S1 - Own Workforce S2 - Workers in the Value Chain	Risk	Labor rights	Workers being paid less than the legal minimum wage	Cost of financial penalties and restitution Reputational loss due to high-profile convictions	WBCSD Enterprise Risk Management p. 104
G1 - Business conduct	Risk	Monitoring	Lack of oversight for trading operations (e.g. of complex products like derivatives)	Cost of financial penalties Above-average trading losses	WBCSD Enterprise Risk Management p. 104
...					

(Source: Own depict)

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