

Quality over quantity? Using corporations' climate change-related disclosure for risk assessment

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Nonfinancial corporations provide sustainability reports, mainly based on recommendations and market standards, to address the increasing demand from financial market participants for climate change risk (CCR)-related information. This paper analyzes how and to which extent companies disclose CCR information from a credit risk assessment perspective. To study the CCR information in a structured manner, we developed a template and analyzed the sustainability reports of 91 Austrian nonfinancial corporations. In summary, we find that the defined analyses aspects risk awareness, actions planned and/or taken and target setting are broadly disclosed. However, partial shortcomings in the disclosure quality are identified, also revealing differences between physical risks and transition risks. Notably, companies with higher disclosure quality are more likely to show a downward trend in their carbon emissions. In a sector comparison, the energy sector is a forerunner in CCR disclosure.

1 Background and motivation – the need for climate change risks' integration into credit risk assessment

The European Commission (EC) published its “Action Plan: Financing Sustainable Growth” in March 2018, following the Paris Agreement on limiting global warming to well below 2°C, preferably below 1.5°C, in the long-term (European Commission, 2018).

The European Central Bank (ECB) as integral part of the European Union (EU) is contributing to the standardization of CCR regulations as well as to increased clarity concerning the (legal) framework conditions. The ECB also acknowledges possible effects and dangers for monetary policy resulting from a changing climate (ECB, 2021). The action plan of the ECB (ECB, 2022) comprises the need to introduce CCR into the in-house credit risk assessment systems (ICAS) of national central banks² and banks³.

The basis for such assessments is CCR-relevant, firm-level information, currently only mandatorily disclosed by companies falling under the Non-financial Reporting Directive (NFRD)⁴, which does not provide for standardization. However, given the increasing demand for sustainability reporting from financial market participants

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² Eurosystem Credit Assessment Framework (ECAAF), which functions as a quality assurance of mobilized collateral in the Eurosystem credit operations (Auria et al., 2021).

³ See [Guide on climate-related and environmental risks \(europa.eu\)](https://ec.europa.eu/economy_finance/guide-on-climate-related-and-environmental-risks).

⁴ The NFRD entered into force in April 2014 and stipulates how financial and listed nonfinancial corporations with more than 500 employees shall disclose environmental, social and governance topics.

and supervisors, ever more companies strive to voluntarily provide such information, mainly based on recommendations and market standards.

Succeeding the NFRD, the Corporate Sustainability Reporting Directive (CSRD) demands more comprehensive and standardized reporting and specifies that sustainability has financial relevance (European Parliament; EU Council, 2022). The CSRD is accompanied by a package of European Sustainability Reporting Standards (ESRS) developed by the European Financial Reporting Advisory Group (EFRAG). Here, the European Sustainability Standards for Climate Change (ESRS E1) are of special interest as they focus on reporting aspects for CCR (EFRAG, 2022).

This paper analyzes how and to which extent companies disclose CCR information, based on current and prospective disclosure standards to be used for the assessment of CCR in the context of ICASs.

2 Categorizing a company's sustainability disclosure for climate change risk assessment – methodology and data sample

2.1 Description of the template and the analyzed criteria

To study the quality of CCR information in a structured manner, we developed a template, based on different regulatory and market standards as well as on common reporting practice, and we analyzed the sustainability reports of 91 Austrian nonfinancial corporations. Based on this template, the status quo of the companies' CCR reporting was analyzed in terms of risk awareness, actions, target setting and emissions. Furthermore, we analyzed if there is an interrelation between disclosure quality and emissions evolution.

Based on the established reporting practice, the template separates between physical and transition risks. According to the single materiality approach for CCR adopted in the context of ICAS, only information was collected which potentially has financial relevance for the company (outside-in perspective). The data collection process included open questions and categorizations into nominal variables. The assessment of the emissions evolution is based on the historic emissions data reported by the companies and on a calculated emission-intensity ratio ((scope 1 + 2 emissions) / turnover). Each category was complemented by an evaluation question to verify the quality of the reported information in a harmonized manner. To normalize the evaluation of each category, the outcomes were assigned score values, which were then summed up to a final score indicating the quality level of the companies' disclosure. The quality levels are displayed in a range from "very good" to "poor."

Challenges in filling out the template were mostly related to the open text fields as the required information had to be collected from different parts of the reports, strictly selected according to the focus of the question, and briefly summarized. Our categorizations followed the ones used by the companies, if available, and, otherwise, were developed by the author.

The analyzed criteria as well as the evaluation questions for physical and transition risks are displayed and described in annex 1.

2.2 Data sample

The sample consists of 91 nonfinancial companies domiciled in Austria. 39 are listed companies, which mandatorily report under the NFRD, and 52 are groups

which prepare their consolidated statements according to IFRS and voluntarily disclose sustainability information. The analyzed reports were published with a financial statement date between June 30, 2022, and September 30, 2023. For the analyses, the firms are classified into the four sectors construction, energy, industry, and services, a classification according to the NACE Rev2 4-digit level also used by the ERICA WG⁵, belonging to the European Committee of Central Balance Sheet Data Offices (ECCBSO).⁶ Distinguishing the different sizes, again based on the classification of the ERICA WG, 17 companies are of small size, 32 are medium-sized and 42 are large.⁷

Table 1

Distribution of companies in the data sample

ERICA sector	Size			Total
	Small	Medium	Large	
Construction	1	0	3	4
Energy	0	1	8	9
Industry	11	14	20	45
Services	5	17	11	33
Total	17	32	42	91

Source: OeNB.

3 Empirical results

3.1 Risk awareness of companies

We measured the level of risk awareness by evaluating whether the companies disclose a comprehensive risk analysis (“yes”), take a more superficial approach (“neutral”) or do not report on actual or potential climate change risks at all (“no”). In total, out of the 91 assessed companies, a share of around 75 % disclose physical and/or transition risks. However, full risk awareness, meaning a comprehensive and detailed risk description, is only attributed to a smaller fraction of around 43 %. Chart 1 separately shows the evaluation results for physical and for transition risks per sector, revealing that the energy sector takes a leading role, as comprehensive risk awareness is broadly given in both categories. Less risk awareness, but at least a certain degree of risk acknowledgment (“neutral”), is revealed for companies in the industrial and services sectors. The highest share of no risk awareness is seen in the construction sector. However, given the small number of companies, these results must be handled with caution.

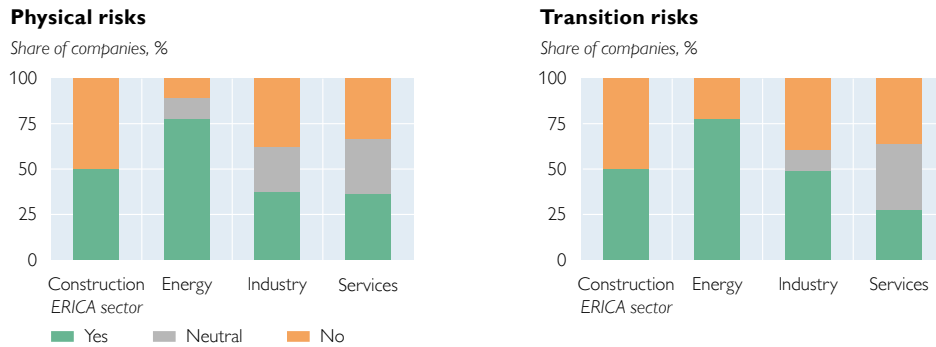
⁵ European Records of IFRS Consolidated Accounts Working Group (ERICA WG).

⁶ The ECCBSO functions as a consultative body of several national central banks (NCBs) with the goal of supporting central banks' functions by advancing nonfinancial corporations' analysis (European Committee of Central Balance Sheet Data Offices (ECCBSO), 2024).

⁷ The ERICA Working Group defined group sizes based on revenue as follows: small groups < EUR 250 million, medium-sized groups EUR 250 million to 1.5 billion, and large groups > EUR 1.5 billion.

Chart 1

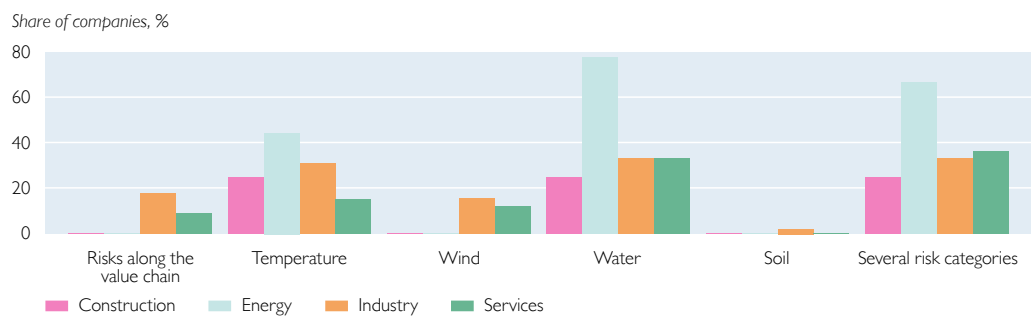
Physical vs. transition risk awareness, sector comparison



Source: OeNB.

Chart 2

Types of physical risks, sector comparison



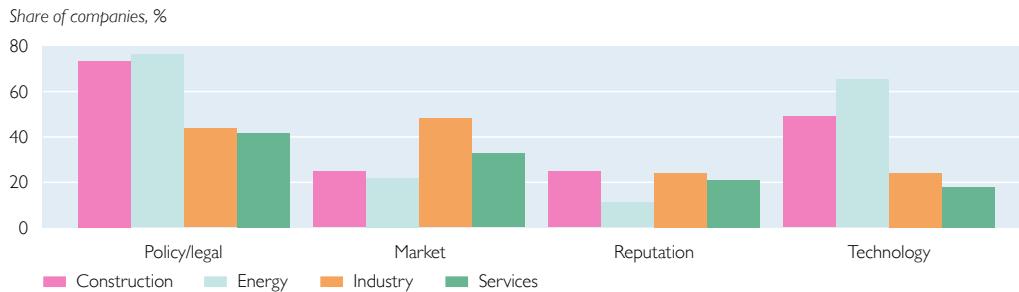
Source: OeNB.

The most frequent risk categories among physical risks are water stress (floodings, droughts) and temperature rises (see chart 2). Companies in the energy sector show the highest frequency in water stress and temperature rises. These are related risk categories with specific implications in this sector as the most common reference is to water scarcity leading to lower energy production and water scarcity itself is linked to increasing temperatures.

Among transition risks, the transmission channel policy/legal is most frequently addressed, particularly by companies in the construction and energy sector (around 75 %, see chart 3). The risk descriptions mainly refer to regulatory changes connected with the political goals towards CO₂ neutrality (energy efficiency/emissions standards) and/or to a rise in carbon prices. Changes resulting from the market are particularly relevant for the industrial sector. Often the risks are related to rising prices for energy and other input factors of production. Changing customer behavior leading to lower demand and to a weaker market position is not only addressed by companies in the industrial sector but also in the services sector. Risks resulting from technological developments are particularly pronounced in the energy sector and connected with the risk of stricter energy-related regulations, pushing companies to transition from fossil to renewable energy production. Reputational risks are listed the least often across all sectors. In some cases, a

Chart 3

Types of transition risks, sector comparison



Source: OeNB.

whole industry is confronted with a loss of prestige, e.g. the chemical or textile industry.

3.2 Actions and target setting

The disclosure of actions to address these risks as well as the disclosure of targets along a decarbonization path are further indicators of the companies' progress in tackling and reporting CCR.

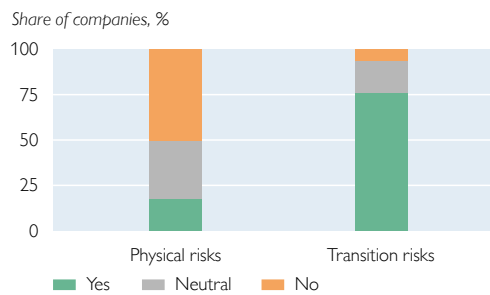
The separate assessments of actions to mitigate physical and transition risks (i.e. physical vs. transition actions, respectively), reveal that the discussion on actions related to physical risks has not progressed as far as the one on transition risks (see chart 4).

Only half of the assessed companies reflect on physical risk measures. In the energy sector, however, the share is substantially higher, at around two thirds. A fraction of around 30% of the companies show medium quality regarding their disclosed measures ("neutral"), and only a minority of 18% is confirmed to disclose comprehensive actions that are in line with the reported risks ("yes"). Physical risk actions are categorized into construction measures, location measures, process changes, and others (see chart 7 in annex 2). Whereas no company plans or takes action to relocate to an area less endangered by physical risks, construction measures are frequently mentioned by all sectors. Process changes are listed by a further 20% of the companies.

In contrast, the disclosure of actions to handle transition risks appears to be common practice as more than 75% of all companies publish actions that are in line with the reported risks, a figure rising to 100% for companies in the energy sector. However, only a fifth of the actions are precisely defined (i.e. measurable and scheduled). The fraction of measures which are further disclosed together with an implementation plan is even smaller, at around 10% of the companies publishing this kind of information.

Chart 4

Aglnment of actions with risks



Source: OeNB.

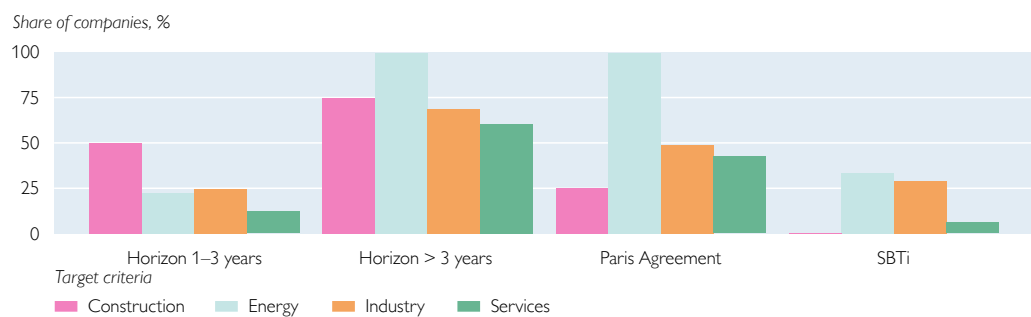
Published transition actions often comprise a switch to or a higher share of sustainable energy (e.g. purchase of renewable energy resources, purchase/construction of photovoltaic systems) or the increase of energy efficiency. Process changes are particularly in the focus of companies in the energy and construction sectors. Actions in “electrification” or “fuel switching,” mainly referring to the purchase of electric motor vehicles or to the use of alternative fuels, make up a substantial share of mentions across all sectors. Less frequent are measures related to “material efficiency/consumption reduction” and “product changes” (see chart 8 in annex 2).

In addition to actions, target setting is another crucial disclosure element for the transition to a low-carbon economy (EFRAG, 2022). To assess how far the companies have progressed in this reporting field, the disclosure of targets is analyzed regarding their timeframe (1–3 years, > 3 years) and regarding their alignment with the Paris Agreement goals. We also looked at whether the goals are science-based (i.e. certified by the Science Based Targets initiative (SBTi)⁸).

90 % of the analyzed companies disclose at least one target that meets the required criteria, i.e. the target must be measurable and scheduled, ideally with reference to a base year. As shown in chart 5, goals with a longer horizon than three years are clearly more common across all sectors, ranging from 60 % in the services sector to 100 % in the energy sector. Remarkably, all companies in the energy sector define their goals also in line with the Paris Agreement. Science-based targets are disclosed by a third of the energy and industrial companies. Full disclosure of target setting, comprising all four defined aspects, is only found in three cases. Though incorporated in ESRS E1⁹, only 57 % of the targets are defined with a clear reference to the emissions' scope. Most reported are scope 1 and 2 references, whereas only a minority of companies also disclose targets for scope 3 emissions.

Chart 5

Target setting according to different criteria, sector comparison



Source: OeNB.

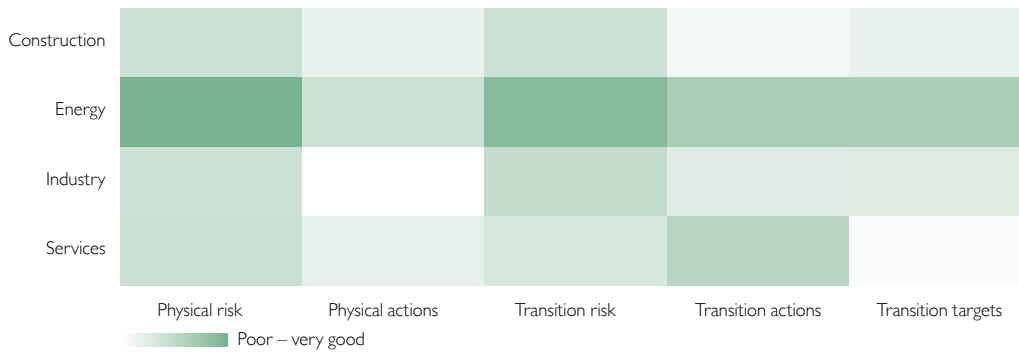
⁸ SBTi is a partnership between organizations like the Carbon Disclosure Project (CDP), the United Nations Global Compact (UNGC), the World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). Its main goal is to help companies to set greenhouse gas (GHG) emission reduction targets to meet the goals of the Paris Agreement (SBTi, 2024).

⁹ Once applicable from the financial year 2024 onward, ESRS E1-4, 35 b specifies that “GHG emission reduction targets shall be disclosed for Scope 1, 2, and 3 GHG emissions, either separately or combined. The undertaking shall specify, in case of combined GHG emission reduction targets, which GHG emission Scopes (1, 2 and/or 3) are covered by the target, the share related to each respective GHG emission Scope and which GHGs are covered.”

Figure 1

Disclosure quality of physical and transition risk aspects, sector comparison

ERICA sector



Source: OeNB.

3.3 Summary of the disclosure quality

Figure 1 depicts the disclosure quality (the darker, the better), separating physical from transition risks, actions as well as transition targets. Generally, the disclosure quality of transition risk and physical risk awareness is balanced. Regarding actions, however, a higher disclosure quality is apparent for transition risks. Acknowledging sectoral differences, the quality of transition targets roughly matches the disclosure quality of actions. It is clearly illustrated that the energy companies show the highest disclosure quality in all assessed areas. The graph also visualizes some weaker positions, such as the rather rare reference to physical actions in the industrial sector or to transition targets in the services sector.

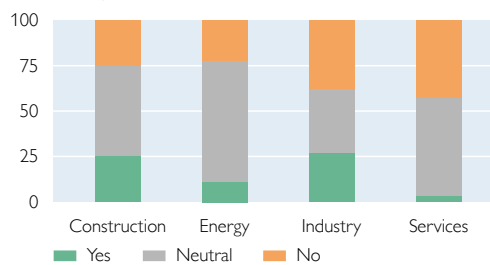
3.4 Assessment of emissions and relation to disclosure quality

The assessment of the companies' emissions evolution (absolute numbers and emission intensity¹⁰) relates to the evaluation question "Does the historic CO₂ evolution show a reduction?" In total, 45 % of the companies show a stable emissions evolution ("neutral"), 38 % display an increase and only 17 % present an emission reduction. Chart 6 illustrates the results per sector, revealing that companies in the industrial and services sectors record more often an increase in emissions. At the same time, the industrial sector also shows the highest share of companies with a downward trend in emissions. However, it must be noted that a company's business background and the calculation method applied for emissions may influence the observed development of emissions.

Chart 6

CO₂ emission reduction over time, sector comparison

Share of companies, %



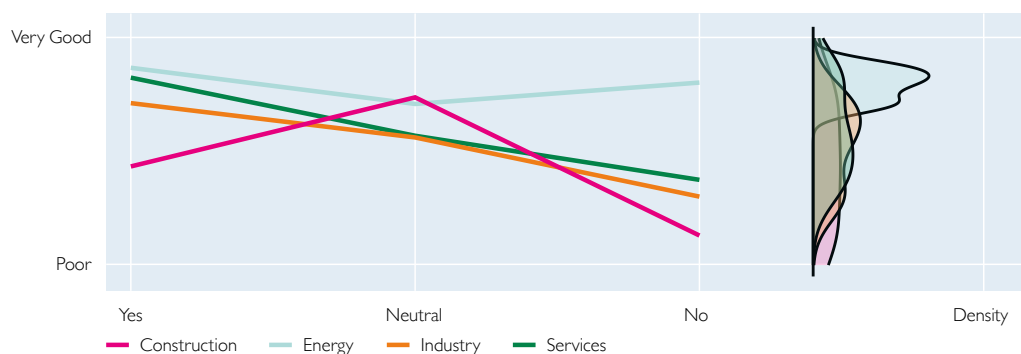
Source: OeNB.

¹⁰ Emission intensity is measured by scope 1 + 2 emissions in relation to turnover.

Figure 2

Disclosure quality in relation to CO₂ emission reduction, sector comparison

Outcome qualitative analysis



Source: OeNB.

Finally, we analyzed if companies with a higher disclosure quality are more successful in reducing emissions than other companies. The disclosure quality is determined on the basis of the evaluation questions (see annex 1), leading to a final score for each company that is further translated into a quality description, ranging from “very good” to “poor.”

The relationship between the disclosure quality and the evolution of CO₂ emissions is illustrated in figure 2. It is apparent that a high quality level is often related to a reduction in CO₂ emissions, whereas companies with poor disclosure quality tend to record an increase in emissions. Furthermore, it can be observed that companies with medium disclosure quality show a “neutral” development of their CO₂ emissions. Comparing sectors, the graph depicts that the energy sector, once more, outperforms the other sectors.

4 Conclusion

This study analyzes climate change risk (CRR)-related disclosure practices from a credit risk assessment point of view. For a sample of 91 Austrian nonfinancial corporations, the results are summarized as follows:

- Risk awareness: Generally, a share of 75 % of the assessed companies disclose information on physical and/or transition risks. However, full risk awareness, meaning a comprehensive and detailed risk description, is only attributed to a smaller fraction of around 43 %.
- The separate assessments of actions to mitigate physical and transition risks reveals that the discussion on actions related to physical risks has not progressed as far as the one on transition risks. While only 18 % of the assessed companies reflect comprehensively on physical risk measures, the share rises to 75 % for transition risks.
- Target setting for decarbonization is already well integrated in the companies' reporting practices as 90 % of the analyzed companies disclose at least one CO₂ reduction target. Long-term targets are much more frequent than short-term targets. Science-based targets, however, represent a minority. Notably, only 57 % of the targets are defined with a clear reference to the emissions' scope (most common: scope 1 and 2).

- An analysis of companies' historic emissions evolution illustrates that 45 % of companies show a stable emissions evolution, 38 % display an increase and only 17 % present an emission reduction.
- The assessment showed that there is a positive relationship between the disclosure quality and the evolution of CO₂ emissions. A high quality level is often related to a reduction in CO₂ emissions, whereas companies with poor disclosure quality tend to record an increase in emissions.
- In a sector comparison, energy companies are forerunners in CCR disclosure. Limitations of the study are the small sample size, especially in the construction sector, and the discretion applied by the authors in categorizing the heterogeneous disclosure standards applied by the companies. With the enforcement of the Corporate Sustainability Reporting Directive (CSRD), which stipulates not only more comprehensive sustainability reporting but also an assurance by external auditors, it is likely that the disclosure quality of CCR will improve at a faster pace.

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Annex

Annex 1: Template description

Table 2

Physical risks			
Criteria	Assessment	Category	Evaluation
Risks	Which relevant physical risks are reported by the company? (Open text field)	<ul style="list-style-type: none"> • Temperature • Wind • Water • Soil • Risks along the value chain • Several risk categories 	<p>Does the company show comprehensive risk awareness?</p> <ul style="list-style-type: none"> • Yes • Neutral • No
Actions	Which actions are taken to face / reduce the physical risks? (Open text field)	<ul style="list-style-type: none"> • Construction measures • Location measures • Process-related measures • Other 	<p>Are the actions in line with the risks mentioned?</p> <ul style="list-style-type: none"> • Yes • Neutral • No

Source: OeNB.

Disclosed physical risks and actions are collected in open text fields and further categorized. The categorization of risks follows Commission Delegated Regulation (EU) 2021/2139 and is based on the classification of climate-related hazards into temperature, wind, water, and soil being directly taken from it (European Commission, 2021). It is supplemented by risks along the value chain, as is common reporting practice, as well as by several risk categories, for general or overarching risks. The categorization for the key actions a company takes to reduce the physical risks (i.e. construction measures, location measures, process-related measures, other) is defined on the basis of commonly reported actions. The evaluation questions aim at the risk awareness of the company and at how targeted the reported measures are. “Yes” stands for a company-specific identification of potential or actual physical risk factors and of actions that are appropriate to minimize the named risks, “neutral” for a partly or more general fulfilment and “no” if no information is given.

Data collection for transition risks is broader than for physical risks and comprises, in addition to risks and actions, also the aspects targets and emissions evolution. We collected the description of disclosed transition risks in open text fields, first. The further classification of transition risks, into policy/legal, technology, market, and reputation, follows market standards, also adopted by the EFRAG in the defined ESRS E1 climate change (EFRAG, 2022). The related evaluation question regarding risk awareness is answered with “yes,” if the company describes its actual or potential transition risks comprehensively from different perspectives, “neutral” if the risk examination is of superficial nature, and “no” if there is no risk disclosure at all. The targets regarding the CO₂ reduction pathway are collected in an open text field, according to the companies' individual target setting. To normalize this individual information, four target-related evaluation questions were defined. The questions focus on the timeline of the disclosed targets (short-term, medium- to long-term), on whether they are in line with the Paris Agreement and

Table 3

Transition risks

Criteria	Assessment	Classification	Evaluation
Risks	Which relevant transition risks are reported by the company? (Open text field)	<ul style="list-style-type: none"> • Policy/legal • Market • Technology • Reputation 	Does the company show comprehensive risk awareness? Y/N/Neutral
Targets	Which CO2 reduction targets does the company define? (Open text field)	N.A.	<ul style="list-style-type: none"> • Definition of comprehensible short-term targets? Y/N • Definition of comprehensible medium-/long-term targets? Y/N • Are the targets in line with the Paris Agreement? Y/N • Are the targets science-based and validated (SBTi)? Y/N
Actions	Which actions are taken to reach the defined targets? (Open text field)	<ul style="list-style-type: none"> • Energy efficiency • Material efficiency • Fuel switching • Electrification • Renewable energy • Product changes • Process changes 	<ul style="list-style-type: none"> • Are the actions in line with the main CO2 causing activities, risks and targets? Y/N/Neutral • Are the actions measurable and scheduled? Y/N/Neutral • Is a comprehensible implementation plan disclosed? Y/N/Neutral
Emissions evolution	Historic CO2 emission values (scope 1 + 2 + 3)	N.A.	Does the historic CO2 evolution show a reduction? Y/N/Neutral

Source: OeNB.

on whether the targets are science-based (best case). The questions are answered with “yes” or “no.”

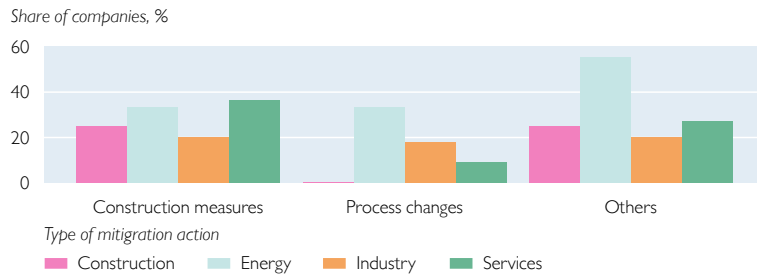
The categories for the key measures a company takes to achieve its defined CO2 reduction targets are aligned with the categorization in ESRS E1 climate change (EFRAG, 2022), complemented by the category “other.” The evaluation focuses on the target-orientation of the actions, on the precise definition regarding the timeline and on the availability of a comprehensible implementation plan. The questions are answered with “yes,” “neutral” or “no.”

The assessment of the emissions evolution is based on the historic emissions data reported by the company and supplemented by a calculated emission intensity ratio ((scope 1 + 2 emissions) / turnover). The evaluation question “Does the historic CO2 evolution show a reduction?” is answered with “yes,” if there is a clear downward trend in the emissions’ volume, “neutral” if the reported emissions values are widely unchanged or volatile and “no” if the emissions reveal an increasing tendency. For the correct evaluation of this question, other factors must also be considered, such as e.g. a change in the business scope/business units, price-related effects on the turnover etc. Such factors might distort the observable trend line.

Annex 2: Detailed analyses results

Chart 7

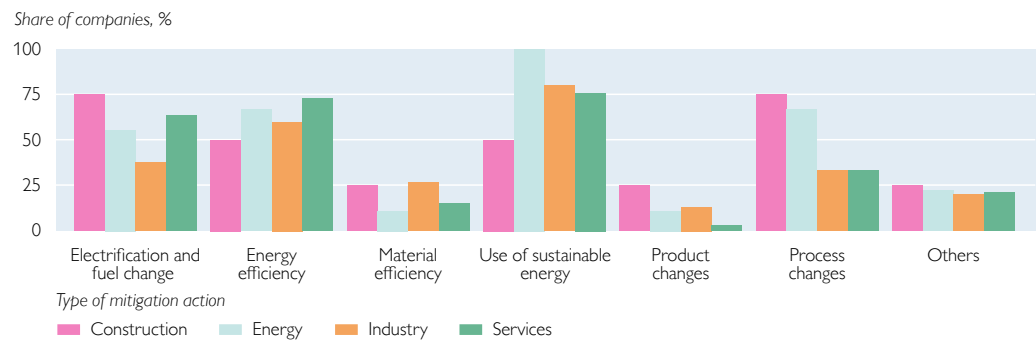
Physical risk mitigation, sector comparison



Source: OeNB.

Chart 8

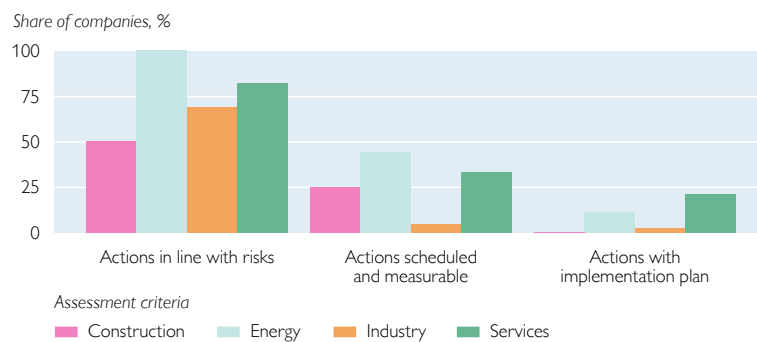
Transition risk mitigation, sector comparison



Source: OeNB.

Chart 9

Assessment of actions for transition risk, sector comparison



Source: OeNB.