



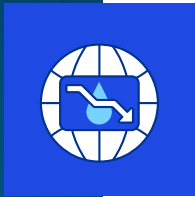
Climate risks and consequences of climate change 2023

Study on the potential of German industry and solutions based on innovation and changes to portfolios





Executive Summary



Expanding the risk agenda to accommodate climate risks and consequences of climate change

- There is greater awareness of the **impact of climate change** and its risks and consequences **on individual businesses** and their business models (outside-in approach) than the impact that those businesses have on climate change (inside-out approach).
- **Climate risks and their consequences** are viewed differently depending on **geographic location**: to date, there has been less awareness of climate risks and the consequences of climate change in Germany than in relation to the global supplier network.



Strategic integration of climate risks in organizations' business models

- **More than half of German businesses** have stated **high ambitions** for their **own climate management**. **9%** of respondents not only consider themselves to be thought leaders in the area of climate risk but also demand considerable efforts from their business partners.
- The majority of industrial firms in Germany **fail** to fully account for climate risk and its consequences in their **Risk Management Systems** (RMS). This may likely result in increasing regulatory risk (related to non-compliance), reputational damage, and supply chain disruptions.
- The companies surveyed are more likely to focus on taking specific actions than on sacrificing revenues or margins: almost half of these businesses are planning **above-average investments** to mitigate climate risks or the consequences of climate change.



Potential for solutions to protect against climate risks or reduce their consequences

- **More than three-quarters** of respondents **expect** that the shifts caused by climate change will **impact** their **product and service portfolio** in the medium term (next 3–5 years).
- In addition to climate initiatives, the topics of **climate risk and redressing the consequences of climate change** also harbour **business potential** for companies.
- Almost **three-quarters of companies** see **additional business potential** in developing new products and services that will reduce the consequences of climate change.
- **One-fourth of these businesses** have already tapped into **additional sales opportunities** from corresponding product and service innovations.

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Foreword

The Climate Change Conference in Paris in 2015 was the catalyst that **put climate change and its consequences** squarely on the risk agenda for decision-makers. However, it is only in the last five years – following the EU Green Deal – that this topic has occupied the No.1 spot in the risk agenda, not only among C-suite executives but also among the general public and politicians. So far, the public discussion and regulatory deliberations have primarily focused on climate action. Reducing greenhouse gas emissions is seen as the key to mitigate climate change and its consequences. Since the Paris Climate Accords, there has been a far greater awareness of extreme weather events such as heat waves, intense rainfall, droughts and storms. The resulting damage, such as floods, soil erosion and destruction of infrastructure, makes it clear that climate initiatives alone are no longer sufficient. Rather, businesses must now grapple with challenges related to protecting themselves against climate risks and mitigating the consequences of climate change that have already arisen. The discussion about broadening the perspective into a three-pronged approach comprising of **climate action, protecting against climate risks and mitigating the consequences of climate change** is something relatively new. For this reason, practical market analysis often still fails to clearly distinguish between the different topics. From a business perspective, however, it is possible to make this clear distinction.

- **Climate protection issues** are primarily associated with regulatory requirements, for instance, decarbonisation, resource efficiency, and requirements for energy use.
- By contrast, the topic of **protecting against climate risks** puts the spotlight on traditional risk considerations and hence economic decisions, for instance deciding on the insurance cover a business will seek going forward (investments in protective measures versus how much the premium costs).
- The **development of new products and services to mitigate the existing consequences of climate change** is firstly a business strategy decision of whether and to what extent adjustments should be made or portfolios expanded to include new business segments and revenue streams.

For businesses, **climate change and its consequences** will become a matter of broad strategic interest rather than just associated with regulatory compliance, and each and every company will have to undergo a “Trial by ordeal” to come to terms with it.

For the study “**Climate risks and consequences of climate change 2023 – Study on the potential of German industry and solutions based on innovation and changes to portfolios**”, **KPMG** and the **VDMA (German Engineering Association)** surveyed **235 decision-makers** from businesses in Germany. The analysis demonstrates firstly how businesses currently assess climate risks and factor them into their strategies, and secondly how they are currently positioned in the context of reducing the consequences of climate change. We also asked what contributions businesses are able to make – now and in the future – to reduce the consequences of climate change. The results first and foremost reflect the self-assessment of the survey respondents, which are industrial firms active in mechanical and plant engineering, and the automotive industry.

We hope that this study will provide you with revealing insights and many pauses for thought-provoking ideas and discussions. We look forward to discussing the results with you in detail.

Matthias Zelinger

Head of Competence Center Climate & Energy Verband
Deutscher Maschinen- und Anlagenbau e.V. (VDMA)

Goran Mazar

Partner, EMA & German Head of ESG and Automotive,
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Regional Head East, Head of Energy and Natural Resources
KPMG AG Wirtschaftsprüfungsgesellschaft

How businesses see themselves vs. how others see them



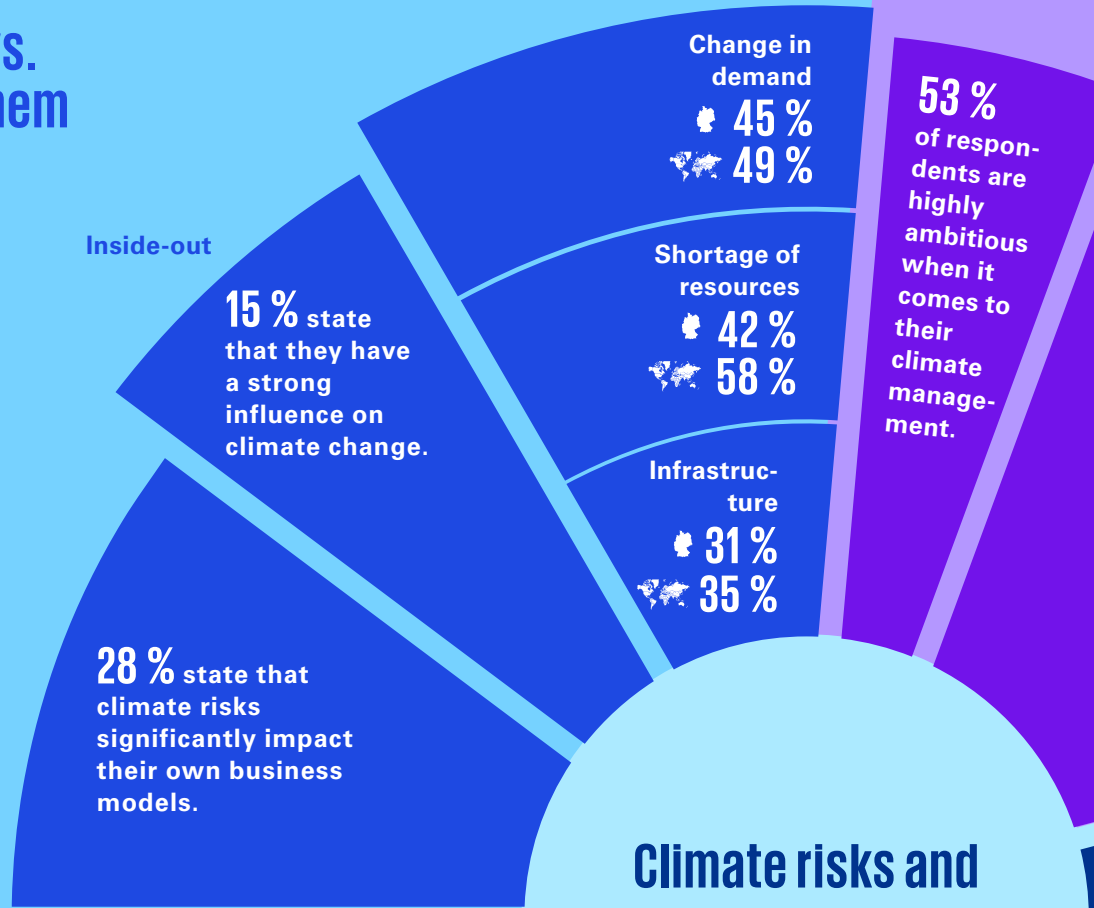
Geographical differences

To date, there has been less awareness of climate risks and the consequences of climate change in Germany than in relation to the global supplier network.



Outside-in

Consequences/risks of climate change already apparent today



Inside-out

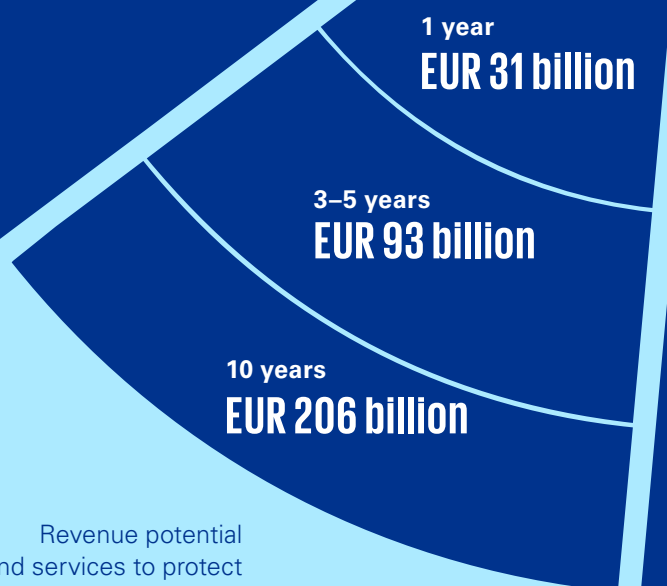
Climate management

Business potential

73% see additional business potential in efforts to develop products and services to reduce the consequences of climate change.

Condition for harnessing future revenue potential

Revenue potential
From products and services to protect against climate risks or to reduce the consequences of climate change



43% are prepared to invest a considerable/above-average share of their revenue in the "green transformation" (> 10% of annual revenue).

Capital expenditure

Source: KPMG in Germany, 2024

Ambition

Risk management

Over **50 %** of respondents state that climate risks and the consequences of climate change are not taken into full consideration in their own risk management systems.

75 % see innovation through research and development as a precondition.

73 % refer to the overall innovative environment as the key basis for harnessing new sales opportunities.

26 % have already harnessed new sales opportunities.

New sales opportunities



Businesses that systematically capture and manage ESG risks are better prepared should they materialise. That reduces the chances of adverse effects affecting their operating processes. To enable a well-founded assessment of the challenges and where necessary to identify action points, it is advisable to carry out systematic and regular evaluations. It is also essential to consider the topic of climate action separately from climate risks and the consequences of climate change."



Timo Herold

Partner, Audit,
Corporate Governance Services – Compliance,
KPMG AG Wirtschaftsprüfungsgesellschaft

Technological innovation

Openness to technology/ positive investment climate

Technological development fields



Use of regenerative technologies



Plant optimisation



Recycling/circular economy



Process optimisation and innovation



Business models of organizations should be realigned across all functions. Critical success factors for companies have to be redefined to match new areas of application, new markets and revenue models, with an investment focus covering all core processes and capabilities."



Dr. Thimo Stoll

Partner, Deal Advisory, Strategy
KPMG AG Wirtschaftsprüfungsgesellschaft



1. Expanding the risk agenda to accommodate climate risks and consequences of climate change





1.1 How climate change and businesses influence each other

Economic activities influence climate change both directly and indirectly, including through greenhouse gas emissions. As such, businesses play a critical role in shaping the global climate. The perspective for businesses is twofold. On the one hand, businesses

can influence climate change through their own activities (inside-out approach), while on the other hand, climate change can thwart efforts to pursue business activities (outside-in approach).

Figure 1:
Overview of the interrelations between business processes and climate risks



Source: KPMG in Germany, 2024

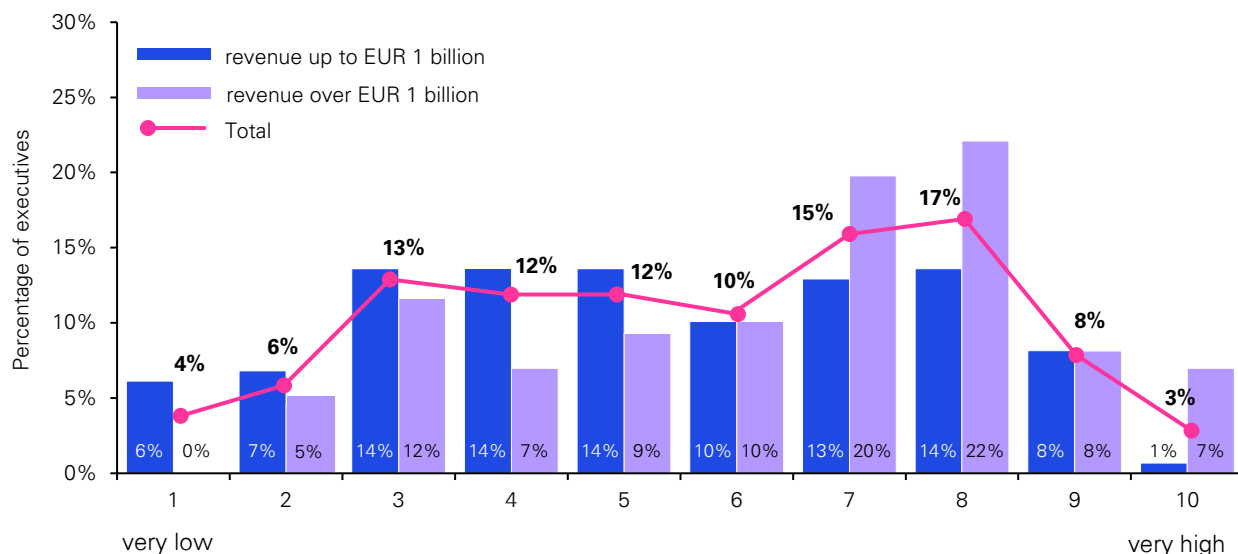


Lawmakers have already taken steps to capture and optimally manage the influencing factors under both these approaches (inside-out and outside-in). One such broad step is the introduction of corporate sustainability reporting in the EU. Far-reaching changes to the scope and type of corporate sustainability reporting are anticipated from 1st January 2024 onwards. This is as a result of the **Corporate Sustainability Reporting Directive (CSRD)** adopted by the European Parliament in November 2022 and the **European Sustainability Reporting Standards (ESRS)** adopted by the European Commission in July 2023. The **double materiality** perspective introduced in the CSRD adds a whole new layer of complexity to the reporting obligations. Going forward, businesses will have to outline the impact of their own operating and business model on sustainability aspects in two directions: on the one hand, the extent to which external

sustainability factors influence the business (financial materiality, **outside-in perspective**), and on the other hand from the viewpoint of how the company's own activities impact society and the environment (impact materiality, **inside-out perspective**). The ESG dimensions of environment, social and governance cover a wide range of individual aspects, and based on the double materiality analysis companies can concentrate solely on the topics material to them or include other topics at their discretion.

The results of our study show that there is greater awareness of the effects of climate change, its risks and consequences on businesses and their business models than the influence that the companies themselves have on climate change. As such, there is a greater focus on the outside-in perspective than the inside-out perspective.

Figure 2:
How do you rate the impact of climate change, climate risks and consequences on your company (business model)? (Outside-in perspective)



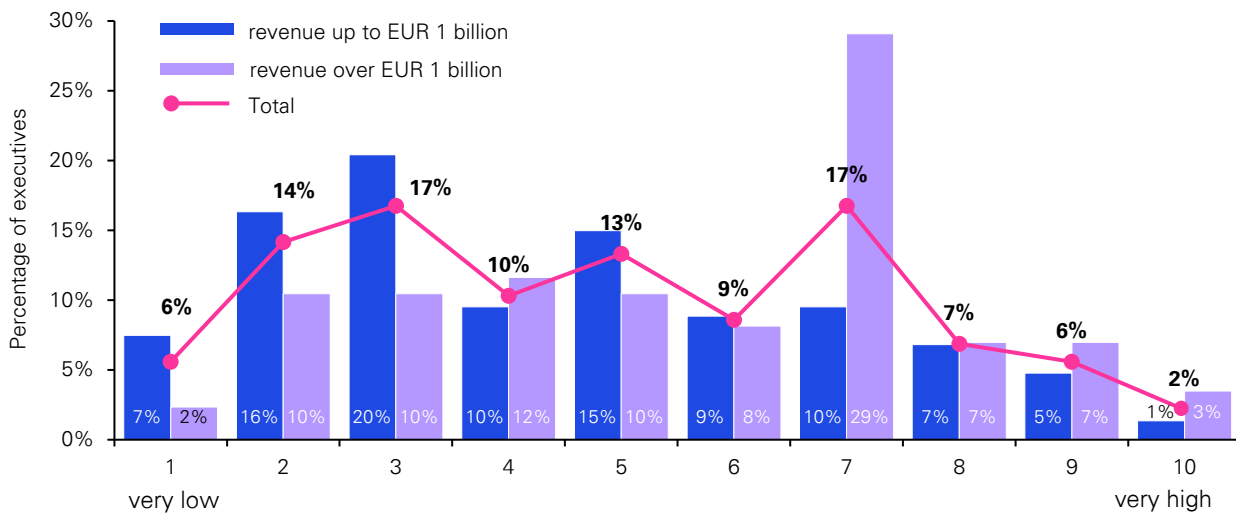
Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=233

More than a quarter of businesses (**28%**) rate the influence of climate change and the corresponding climate risks and consequences on their own company (business model) as high or very high (total of 8, 9 and 10). At the same time, nearly one in four businesses (**23%**) rate the effects of climate change and its risks and consequences on their own businesses as low or very low (total of 1, 2 and 3). There is a significant difference in how organizations of different sizes assess the effects of climate change, its risks and

consequences on their own businesses and business models: well over a third (**37%**) of businesses with revenue in excess of EUR 1 billion rate the impact of climate change on their own business as high or very high (total of 8, 9 and 10), while that figure drops to just **23%** for businesses with revenue of less than EUR 1 billion. Comparing this with the inside-out perspective, it is clear that businesses rate their own influence on climate change as somewhat less significant.



Figure 3:
How do you rate the influence of your business (business model) on climate change and the resulting climate risks and consequences? (Inside-out perspective)



Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=233

Only **15%** of respondents rated the influence of their own business on climate change and the resulting climate risks and consequences as high or very high (total of 8, 9 and 10). More than a third of companies surveyed (**37%**) assessed the role played by their own business (business model) in relation to climate change and the resulting climate risks and consequences as being of low or very low significance (total of 1, 2 and 3).

Size-related differences are also evident when assessing how a business influences climate change. A total of **43%** of businesses with revenue of less than EUR 1 billion rate the impact of their own business on climate change as low or very low (total of 1, 2 and 3), while that figure is just **22%** for businesses with revenue in excess of EUR 1 billion.



Climate change concerns us all, businesses included. The awareness of how businesses realistically impact climate change and the associated risks and consequences should therefore be analysed objectively. There is an acute need to take action, particularly in small- and medium-sized enterprises."



Goran Mazar
 Partner
 EMA & German Head of ESG and Automotive,
 KPMG AG Wirtschaftsprüfungsgesellschaft



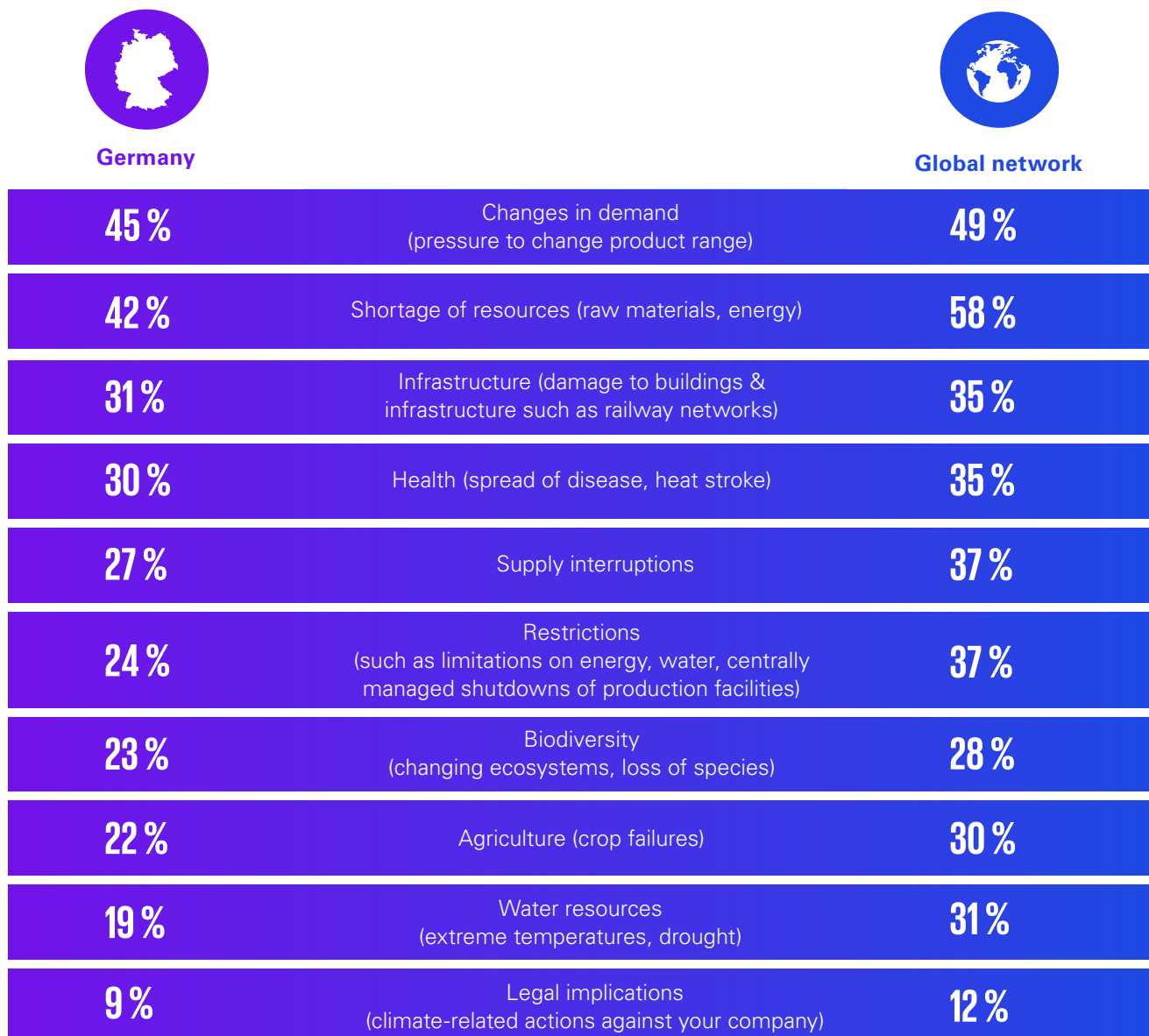
1.2 Geographic characteristics of climate risks and consequences

The specific consequences of climate change are no longer limited to rising temperatures. Globally, climate change is also responsible for extended heat waves and droughts, heavy rainfall and flooding, storms and wildfires. The impact varies from one region to another, but no part of the world is spared. The results

of our study show that the effects of climate change, its risks and consequences are already being felt by businesses in Germany and around the world. The most significant shift observed was the **change in demand** for companies' own products, and **shortage of resources** like energy and raw materials.

Figure 4:

What specific climate risks and consequences of climate change are you already experiencing today in relation to your own business?



Source: KPMG in Germany, 2024; figures in percent, multiple responses possible. This form of presentation takes into account the responses to perceived climate risks and consequences of climate change in Germany and the global value network, and not the third possible response ("no impact"), n=235



In total, **45%** of respondents state that they can see climate risks and the consequences of climate change leading to **changes in demand** in Germany and pressurizes them to modify their product and service portfolios. The **change in demand** is even more pronounced in relation to the respondents' global network - **49%** of respondents agree with this statement.

By contrast, more than a third (**35%**) of respondents do not perceive any impact from climate risks and the consequences of climate change in connection with a change in demand, either in Germany or in the global network of their partners and suppliers.

42% of the companies surveyed sense the impact of climate risks on their supplies of **raw materials and energy** in Germany. In total, **58%** are also aware of a **shortage of resources** in their overall international network. **26%** of all respondents do not perceive these effects.

A trend that can be observed across all possible responses is that to date there has been less awareness of climate risks and the consequences of climate change within Germany than in the global supplier network.

The results of the survey show that larger companies are more aware of climate risks and the consequences of climate change than small- and medium-sized enterprises. For example, among companies with revenue in excess of EUR 1 billion, the risk awareness for operations in Germany across the individual aspects is roughly **10 percentage points** higher than for companies with revenue of less than EUR 1 billion. The risk assessments of companies with revenue in excess of EUR 1 billion is even clearer when it comes to their global value chains: here, the risk awareness is some **15 percentage points** higher than the average assessments of companies generating revenue of less than EUR 1 billion.



The severe weather and heavy rainfall in Slovenia led to furloughs and plant closures in Germany. The events of 2023 summer clearly show that climate events have to be actively observed across all locations or in connection with the supply chain to avoid risks and negative consequences for a company's own business. It is therefore imperative for companies to integrate climate risks into their risk management systems."



Keywan Ghane

Partner,
Deal Advisory, Strategy
KPMG AG Wirtschaftsprüfungsgesellschaft



Expert opinion

Given the urgent need to tackle climate change, more and more businesses are recognising the need to develop more sustainable business models and to take action to reduce their ecological footprints. Businesses that take climate action seriously are not merely helping to reduce emissions, they are also minimising their risk profile with respect to climate risks and by doing so, are able to unlock long-term business success. Companies are also increasingly facing statutory regulations and requirements from lenders and investors demanding a systematic analysis of the impacts of climate change on their business models. In order to meet these growing international requirements, ESG risks must be integrated into existing risk management systems and appropriate management approaches be developed to reduce risk. In particular, the CSRD explicitly provides for a robust climate risk analysis of not only physical and transitory risks, but also of opportunities. Risks should be analysed based on climate scenarios and actions must be put in place to make modifications in the case of material risks. In addition to the CSRD, the EU Taxonomy Regulation also contains requirements for a climate risk and vulnerability assessment to be carried out.

A clear sustainability strategy must be developed and put in place as a condition for meeting the reporting requirements laid down in the CSRD. In addition, responsibilities must be defined for implementing the key ESG solutions, identifying and assessing the associated risks and opportunities, and defining actions to manage those issues. Furthermore, suitable measures and indicators (KPIs) must be identified to form a basis for measuring performance. A key first step to do so is the materiality analysis, which factors in the risks and opportunities identified and assessed.

Businesses that systematically capture and manage ESG risks are better prepared should they materialise. That reduces the danger of adverse effects on their operating processes. To enable a well-founded assessment of the challenges, and where necessary to identify action points, businesses must carry out systematic and regular evaluations.



Timo Herold

Partner

Audit, Corporate Governance Services – Compliance
KPMG AG Wirtschaftsprüfungsgesellschaft



2. Strategic integration of climate risks in organizations' business models





2.1 Target operating model as a condition for strategic positioning

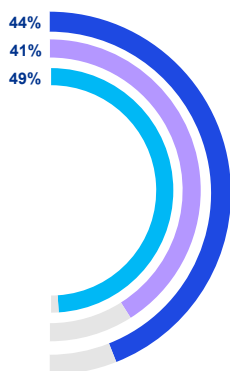
Sustainability has become far more than just a buzzword or a compliance issue – it offers major opportunities for businesses to grow and increase value. An ESG strategy must be developed that is a perfect fit for the company, the business model and the needs of its stakeholders, that creates added value and competitive advantages in the long term. Doing nothing can prove to be an expensive option, as all businesses face the risk of financial losses and/or

reputational damage. Given this, having a target vision can serve as a point of reference to tailor decisions and actions to ensure that ESG topics are well-integrated in a company’s strategic positioning. Without a vision, businesses can lose their competitive edge, miss out on the chance to expand into new markets or business areas, or even come at loggerheads with the regulatory authorities.

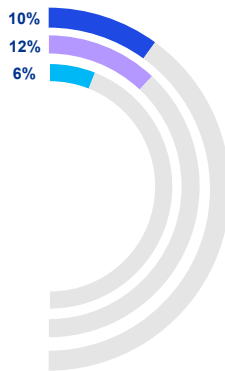
Figure 5:

What vision do you pursue in positioning your company with respect to comprehensive climate management?

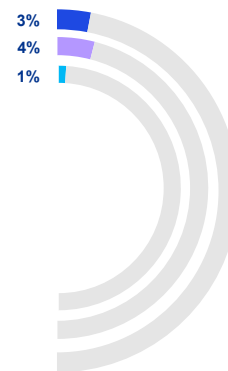
We take an active approach to manage climate-related risks and opportunities and see climate risk management as a competitive advantage



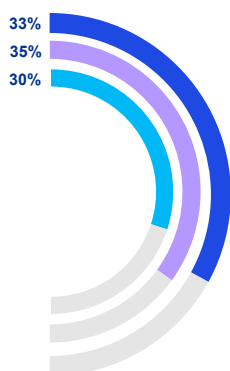
We do what we need to (regulatory minimum requirements and contractual arrangements), but do not go out of our way to make our voice heard in the climate debate



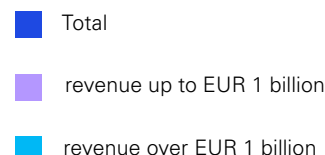
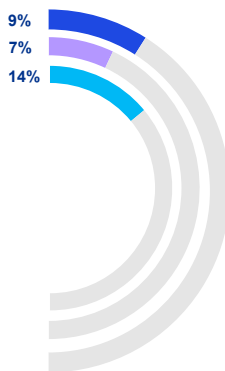
We do the bare minimum to avoid censure but don't go beyond that



We manage obvious risks and opportunities where these impact our financial position or operating activities



We position ourselves as a thought leader in the area of climate risk and demand considerable efforts from our business partners



Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=233



More than half of businesses have stated high ambitions for their own climate management.

9% of participants consider themselves to be **thought leaders in the area of climate risk** and also demand considerable efforts from their business partners. Companies with revenue in excess of EUR 1 billion are twice as likely to consider themselves thought leaders than businesses below this threshold (< EUR 1 billion revenue: 7% versus ≥ EUR 1 billion revenue: 14%).

The greatest consensus (**44%**) concerned the statement that businesses take an active approach to managing climate-related risks and opportunities and see **climate risk management as a competitive advantage**. One-third of respondents (**33%**) take into consideration **obvious risks and opportunities** where these impact their own financial position or operating activities.

Roughly one in eight businesses (13%) concede that their ambitions are low.

3% of the businesses surveyed state that they only do the bare minimum with respect to ESG, in other words meet the statutory requirements. Another **10%** of respondents state that they only do what they need to. This includes meeting the regulatory minimum requirements as well as other contractual arrangements and the minimum requirements of stakeholders. The size of the company also plays a role in these two latter aspects: while **12%** of businesses with revenue under EUR 1 billion do only **what is necessary** to meet regulatory minimum requirements and contractual arrangements, the figure for businesses with revenue in excess of EUR 1 billion is just **6%**.



Many companies are clear in setting out their climate management ambitions. Nevertheless, we often see big discrepancies between their sustainability mission statements and how they actually integrate ESG aspects into their strategic and operating processes and their workflows. That said, it is evident that stakeholders and regulators are increasingly conscious of companies merely paying lip service."



Ulrich Ackermann

Head of Tax
Head of Industrial Manufacturing
KPMG AG Wirtschaftsprüfungsgesellschaft



Expert opinion

To anchor all ESG aspects in their businesses in a way that is structured and will stand the test of time, companies need to pursue an integrated, holistic approach. This creates touch points between almost all of a company's functions: from compliance, risk management, production to sales, finance and HR. These functions should work hand-in-hand with the sustainability team/ department to precisely define how they will cooperate and drive forward integration in the existing risk management structures.

Also, a shared vision with readily understandable elements is needed to better coordinate how these various stakeholders work together. This includes the jointly communicated definition of how the company acts and what specific, measurable KPIs the company has put in place to make its vision a reality.

The focus is also on measures and activities that the company uses to achieve its strategic goals.

It is important for the vision to be formulated clearly in a way that can be understood by all of the company's employees. Companies must also define criteria to measure successful implementation in a transparent manner. The vision should be reviewed and updated at regular intervals to ensure that it remains relevant and achievable. A schedule should be drawn up to indicate when the company intends to achieve its goals.

Another key prerequisite for bringing the sustainability transformation to a successful conclusion is to prepare and provide the resources the company needs to achieve its goals. An equally important prerequisite for making the company's vision a reality is not just for the senior management team to clearly commit to ESG topics, but also to integrate them into the corporate culture and continuing development. Information, participation and education for all employees must be leveraged to bring about a cultural shift, in particular where the human factor is concerned.



Lisa Schosser

Partner
Audit, Finance & Governance Advisory
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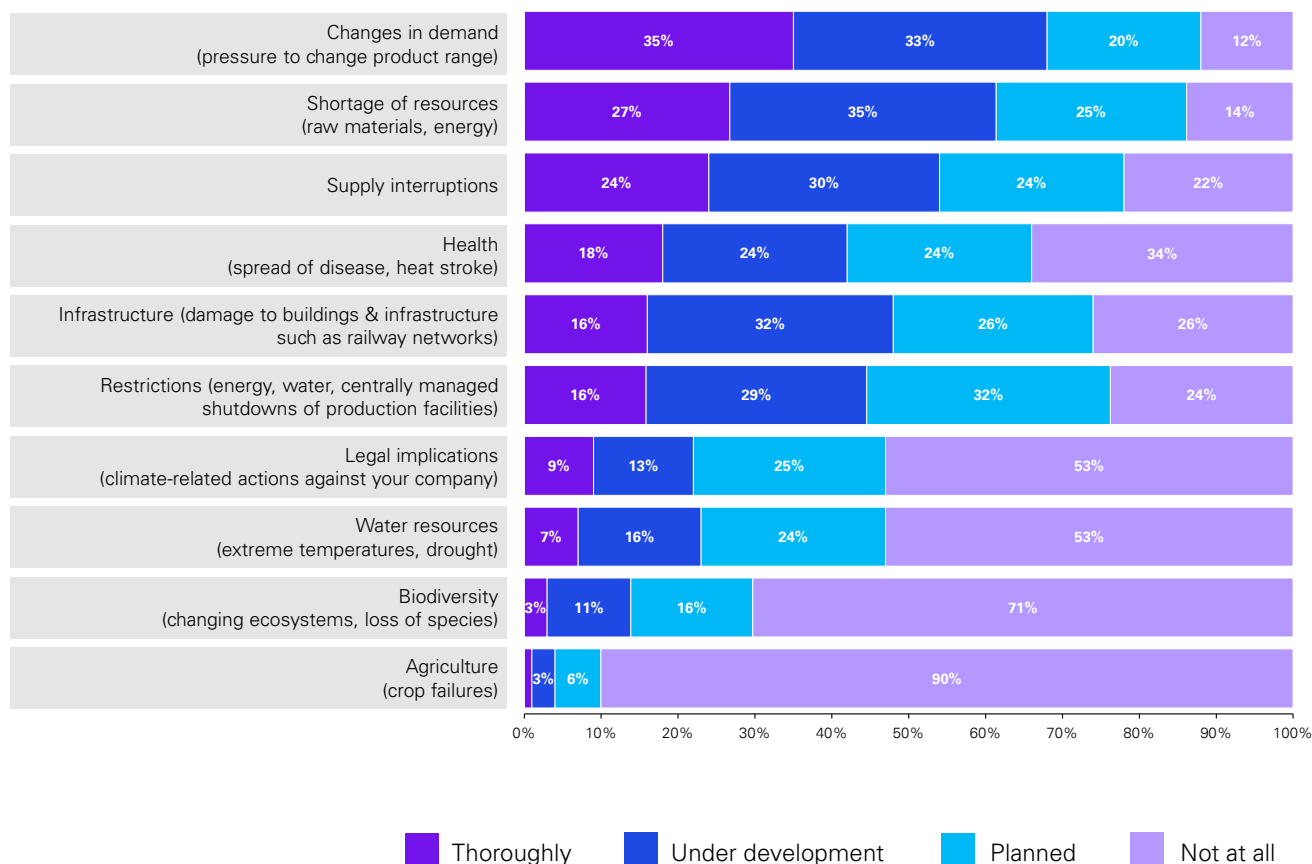
2.2 Managing climate risks as a basis for formulating strategy

Only very few companies have put in place reliable processes to analyse the ESG requirements and define their ambition in a structured manner within their businesses. This puts pressure on board members and executives to act, not least because their remuneration goals are increasingly tied to ESG indicators.

A first step in defining a comprehensive strategy and in identifying and implementing suitable processes is to analyse the risks and incorporate them into the existing risk management system.

Figure 6:

To what extent are the following climate risks already factored in to your risk management system?



Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=233



The majority of industrial firms in Germany fail to fully account for climate risks and the consequences in their risk management systems (RMS). This poses the risk of significant damage, such as regulatory violations, reputational damage and supply disruptions. In addition, the majority of risks identified are transitory in nature.

Most frequently, the companies surveyed took **changes in demand** caused by climate risks into consideration in their risk management systems: **35%** have already fully integrated “the pressure to modify the product and service portfolio” as a climate risk in their RMS. A further **53%** agreed that such modifications to the risk management system were under development or planned. Only **12%** of respondents did not take account of this **transitory risk**.

The next two relevant topics taken into consideration **are those pertaining to value addition: 27%** of the companies surveyed actively and comprehensively manage the risk topic **shortage of resources**, and a further **60%** are developing or planning an internal control system to manage the range of issues surrounding raw material and energy supplies. **14%** pay no attention whatsoever to this topic.

Almost a quarter of businesses (**24%**) already take full account of the challenges associated with **security of supply**, and more than half of companies (**54%**) have included or are planning to include the topic of supply chain disruptions and interruptions in the supply network in their RMS.

Our study shows that more than one in five companies (**22%**) are likely unprepared for supply interruptions.

Here, too, there are significant differences depending on the amount of revenue generated. For the **consideration of changes in demand**, almost half (**48%**) of companies with revenue in excess of EUR 1 billion state that they include this aspect in their RMS, while the figure for SMEs is just **27%**. The risk of supply interruptions is another example: While **35%** of companies with revenue in excess of EUR 1 billion have already focused on this topic, this figure drops to just **17%** for SMEs (< EUR 1 billion).

Extreme weather events have considerable impact, not just on **public infrastructure** but also on companies’ own properties. In particular, the consequences of climate change can also take the form of **physical damage** to plants, machinery and buildings. Such events often lead to lengthy business interruptions. Businesses have to prepare themselves for this issue and adapt their infrastructure appropriately. For example, one key aspect is flood management and flood-water protection to minimise the damage caused by water ingress. Architectural design also plays a key role in making buildings more resilient in the face of climate change. **Business continuity management (BCM)** is already part of many risk management systems, but should be managed even more closely with integrated external data (geodata, meteorological data), empirical data and scenario analysis.



In risk management, we draw a line between the physical risks, such as damage to infrastructure, and transitory risks that capture long-term changes to the underlying conditions as we adapt to climate change. Businesses have to be aware of both types of risks and plan and implement the appropriate protective measures.”

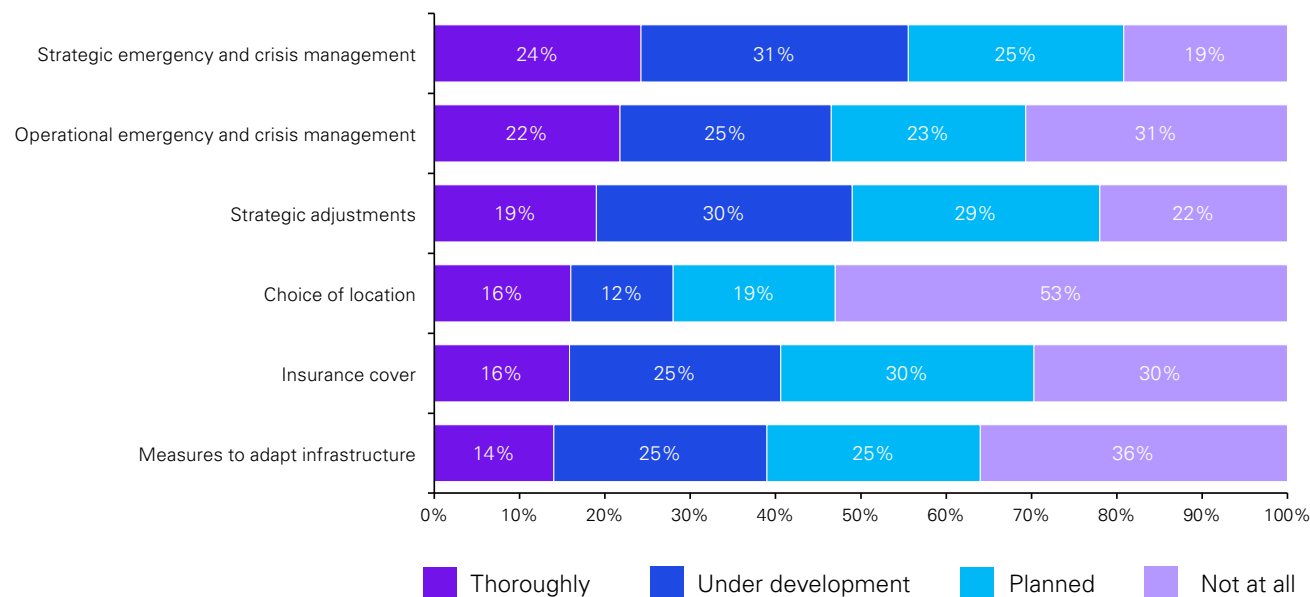


Thomas Künzel
Senior Manager
Deal Advisory, Strategy
KPMG AG Wirtschaftsprüfungsgesellschaft



Figure 7:

To what extent have you already initiated or implemented the following actions in the context of managing climate risks or the consequences of climate change?



Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=233

Specific actions in the context of actively managing climate risks and the consequences of climate change are most often taken as part of emergency and crisis management.

24% of respondents have already implemented comprehensive measures to address **strategic emergency and crisis management** in their RMS, while 31% state that this is at least under development. According to our study, the second most frequent aspect (22%) comprehensively implemented in the RMS is **operational emergency and crisis management** (in the sense of business continuity management). Another 25% of respondents stated that this was still under development. More than half of the

businesses (53%) have taken no action to address **choice of location** in the context of managing climate risk and the consequences of climate change.

Analysing the responses by size of the companies surveyed clearly shows that the cluster of businesses with revenue in excess of EUR 1 billion consistently consider all of the aspects referred to at least twice as frequently when taking the corresponding action in the context of their internal management of climate risks and the consequences of climate change. This difference is particularly stark when it comes to **strategic and operational emergency and crisis management**: for both of these aspects, the two size clusters are more than 20 percentage points apart.



Overall, there are myriad actions that can be taken to reduce the impact of climate change. Businesses should develop a comprehensive strategy tailored to their specific needs and objectives that covers the various actions to minimise potential climate risks.”



Timo Herold
Partner
Audit, Corporate Governance Services – Compliance
KPMG AG Wirtschaftsprüfungsgesellschaft



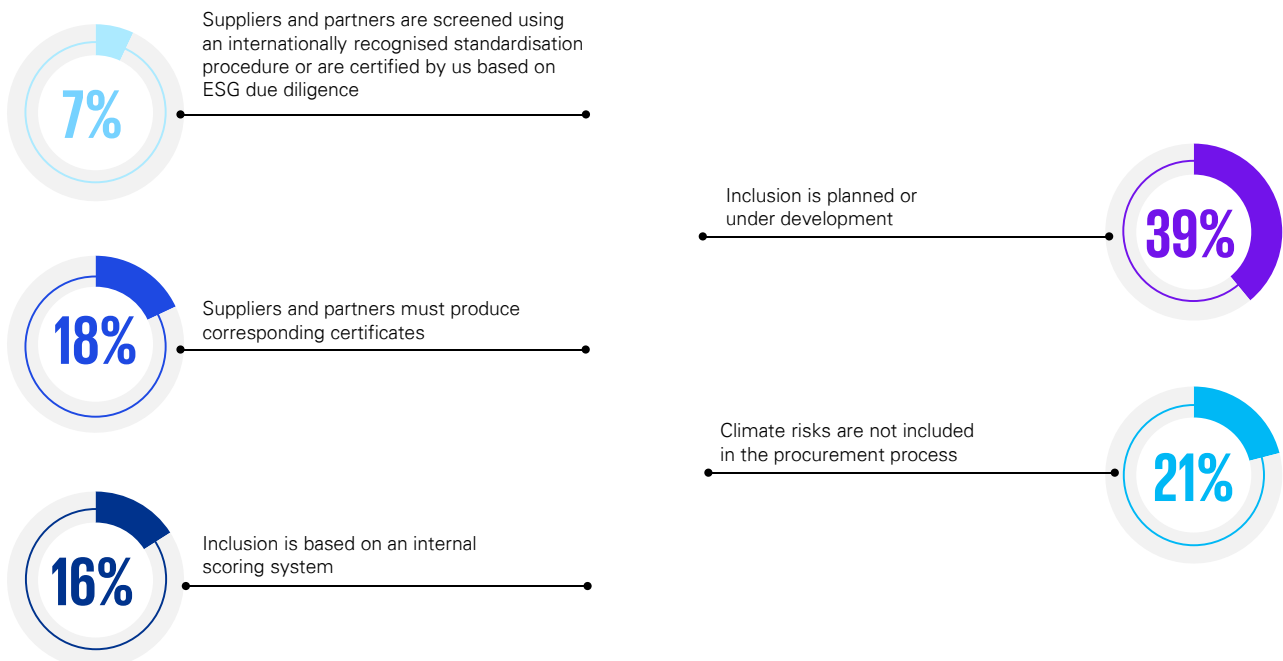
Deep dive: Factoring climate risks into the procurement process

The regulatory landscape in Europe has gone through significant changes in the past few years. The introduction of the EU Green Deal and the German Supply Chain Due Diligence Act (LkSG) has upped the pressure on businesses to disclose sustainability risks along the entire value chain. This relates to risks concerning international human rights as well as environmental protection.

The LkSG shines a spotlight on purchasing in particular, and it is in this area that many businesses are now required to take action. Non-compliance with the regulations is punishable with a fine and a possible exclusion from public procurement procedures, and may also involve damage to a company's image that may adversely affect revenue as well as costs arising due to supply shortages.

Figure 8:

How are climate risks and the potential consequences of climate change already included in the procurement process?



Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=222

Most businesses do not currently include the impact of climate risks and the consequences of climate change in their procurement processes.

Our analysis shows that **41%** of the businesses surveyed currently pay heed to climate risks and the consequences of climate change in their procurement processes, for example when selecting suppliers and business partners.

7% take a proactive approach to managing the inclusion of climate risks in the procurement process. They claim to screen suppliers and partners themselves using an internationally recognised standardisation process, or to have them certified pursuant to ESG due diligence initiated by the company. A further **18%** require that suppliers and partners provide corresponding certificates issued by (recognised) third parties. **16%** include climate risks in the procurement process based on an internal scoring system.



Expert opinion

It is surprising that so many businesses fail to take climate risks or the potential impact of climate change into consideration in their procurement processes, despite it being increasingly clear that climate change is responsible for more frequent and severe extreme weather events. The resulting supply bottlenecks and other disruptions pose a considerable danger to the resilience of supply chains. Businesses that ignore these risks leave themselves open to considerable financial losses, production outages and reputational damage.

One potential explanation is that some businesses are not sufficiently aware of the impact that climate change and climate risks can have on their supply

chains and procurement processes, and as such underestimate the scale of this impact and the urgency. Another reason may be that businesses are fearful of generating additional costs by factoring climate risks into their procurement processes. Many businesses could reap significant benefits from an effective sustainability programme in their procurement activities. There is frequently a lack of understanding of the opportunities, benefits and actions.

These days it is no longer enough for businesses to look at their own processes. Companies are increasingly required to review the entire value chain, which also relates to sales partners and suppliers at all locations.



Julia Ruf

Partner
Consulting, Value Chain Transformation
KPMG AG Wirtschaftsprüfungsgesellschaft





2.3 Investing in a successful ESG transformation

Activities and investments to reduce climate risks or lower the consequences of climate change have now become a key factor in the long-term success of many businesses. This has led some companies to change their thinking: they are ready to sacrifice short-term profits in pursuit of long-term sustainability goals. This readiness is not a foregone conclusion at all companies, since sustainability is often thought of as purely a cost factor. A new approach is to consider sustainability alongside the aspect of **moral obligation**, including as an economic advantage – for instance in relation to **cost savings** on more efficient processes, greater customer loyalty on the back of a more positive image, or the development of new products and services.

However, it is first and foremost **economic aspects** that are currently expected to play the deciding role in adopting and implementing climate change adaptation actions. For example, the potential damage caused by extreme weather events will be compared against the costs of any adaptation measures. This makes it all the more important for businesses to adequately assess the risks of being affected by the consequences of climate change going forward. This is the only way to measure the magnitude of future loss and damage, and subsequently make meaningful investment decisions.

Figure 9:

Which of the following statements concerning activities and investments to reduce climate risks or the consequences of climate change do you agree with?

	Total	up to EUR 1 billion revenue	over EUR 1 billion revenue
We are refraining from/reducing business travel and are prepared to limit personal contact with customers	45 %	48 %	40 %
We are prepared to invest a considerable/above-average share of our revenue in the “green transformation” (e.g., > 10% of annual revenue)	43 %	36 %	54 %
We will be implementing our strategic plan to reduce climate risks and the consequences of climate change and/or without making sacrifices and additional investments	27 %	26 %	27 %
We are prepared to sell parts of our operations and business units that are particularly harmful to the climate	13 %	12 %	14 %
We are prepared to sacrifice a considerable share of margins (e.g., > 10% of our profit margin)	5 %	8 %	0 %
We are prepared to sacrifice a considerable share of revenue (e.g., > 10% of revenue)	5 %	8 %	0 %

Source: KPMG in Germany, 2024; figures in percent, multiple responses possible, n=224



Almost half of businesses are planning above-average investments to reduce climate risks or lower the consequences of climate change.

In general, the businesses surveyed are very willing to support climate action in order to actively combat climate change. Nevertheless, they are significantly less willing to sacrifice sales, revenue or margins to do so.

Almost half of the respondents (**45%**) are prepared to limit personal contact with customers and refrain from/reduce business travel. A higher proportion of businesses with revenue of less than EUR 1 billion are willing (**48%**) to cut down on business travel than businesses with revenue in excess of EUR 1 billion (**40%**).

Almost as many businesses (**43%**) state that they are prepared to invest a significant share of their revenue (**10%** or more) in the “green transformation”. More than half (**54%**) of businesses with revenue in excess of EUR 1 billion would like to make in-depth investments in green technologies, however this figure falls to just **36%** for businesses with revenue of less than EUR 1 billion.

Businesses are more focussing on forward-looking investments or specific actions that don't negatively impact their revenues or profit margins.

A meagre **5%** state that they are prepared to sacrifice a considerable share (more than **10%**) of their current revenue and/or profit margin in order to reduce climate risks and the consequences of climate change. All of these are businesses generating less than EUR 1 billion in revenue.



Large, often diversified companies generally find it easier to discontinue parts of their business or to reallocate investments than small, specialised businesses. All decision-makers should be aware of this: there will be no sustainable transformation without safeguarding the existence of affected suppliers in the SME sector. Their activities are essential for the stability of supply chains in Germany, and without them there would be a very real threat to the country's supply situation.”



Ulrich Ackermann

Head of Tax
Head of Industrial Manufacturing
KPMG AG Wirtschaftsprüfungsgesellschaft



Expert opinion

Many companies today still view climate action and risk mitigation primarily through the lens of additional cost. In Germany, this approach has stirred up heated debate about sustainability and environmental protection. We often forget that the business world has already overcome major challenges in the past, such as the banning and phasing-out of CFC greenhouse gases.

Still, climate change is far more complex a topic and therefore offers companies a chance to develop any number of innovative solutions.

The first step is for companies to realise what climate risks they face and to analyse how those risks affect their organisations. The focus, at present, lies primarily on decarbonisation. This is because the reduction of carbon emissions represents the pivotal point of climate change initiatives around the world. However, other aspects are increasingly falling into focus: health impacts, supply chain disruptions and biodiversity loss are becoming ever harder to ignore. Because of this, companies now need to consider other factors as they manage their climate risks.

Once all the risks have been identified, suitable measures need to be taken to protect against them. If companies can recognise these challenges, they can also develop relevant, innovative solutions that create value. Technologies and software applications such as the KPMG Climate IQ Tool provide vital assistance to

companies looking to take that next leap. The level of complexity involved in a successful, sustainable transformation is extremely high. Every internal and external stakeholder has to be involved, whether the aim is to ensure supply chain sustainability, optimise internal processes or manage the property portfolio. Successfully navigating this complexity requires the right technological solutions.

It is paramount that companies examine their risks because they are affected by the risks and the implications of climate change in equal measure. Encouragingly, many companies have recognised the most pressing issue of our era and are not only investing in initiatives to actively combat climate change and prevent its worst impacts, but also developing sustainable business models. This is undoubtedly a right step in the right direction. The ingenuity that fuels Germany's economy will be the driving force behind this transformation, and our study reveals that pioneers in sustainability are either already actively leveraging this potential or have, at a minimum, factored it into their planning. The development of new technological solutions and cooperation will play a key role in this context.

I firmly believe that there is no alternative to sustainable transformation. In my opinion, the challenges represent major opportunities and successful companies will be rewarded with increased value in the long run.



Goran Mazar

Partner
EMA & German Head of ESG and Automotive
KPMG AG Wirtschaftsprüfungsgesellschaft



3. Potential for solutions to protect against climate risks or reduce the consequences of climate change



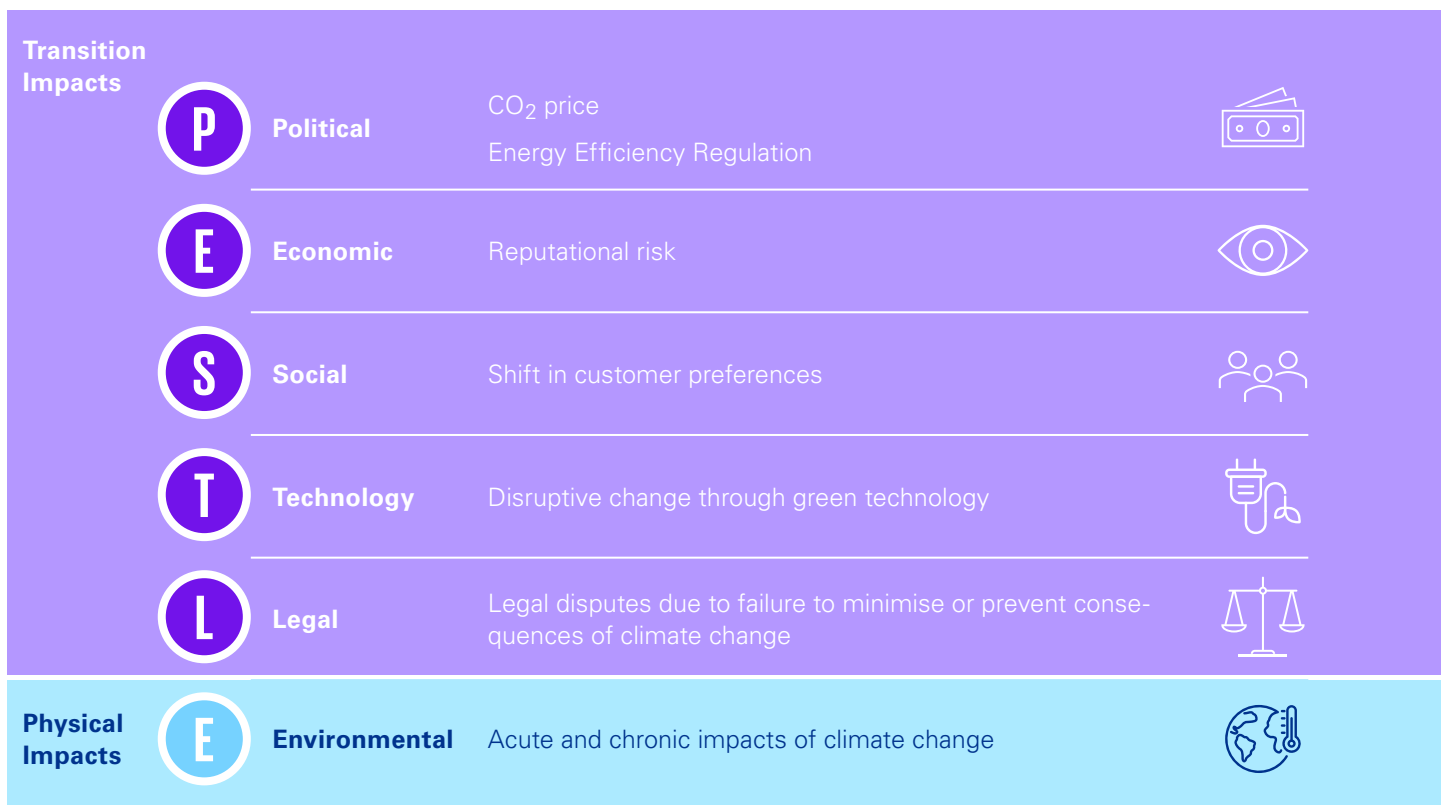


3.1 Climate-related changes to the product and service portfolio

Companies in the manufacturing sector are increasingly forced to confront the impacts of climate risks and the consequences of climate change on their product and service portfolio. The use of a structured analytical approach such as the **PESTLE analysis** makes it possible to examine key factors that affect a company. This approach helps companies to **classify**

sustainability and climate risk-related issues, promotes a greater understanding of macroeconomic conditions and enables companies to assess the relevant risks and opportunities. The model serves as a basis for identifying threats and developing potential responses to them.

Figure 10:
Applying the PESTLE analysis to climate change issues



Source: KPMG in Germany, 2024



Changes in general regulatory and legal conditions and other developments can affect various links in a company's value chain, including the product development process, supply chain, technologies used and the needs of customers.

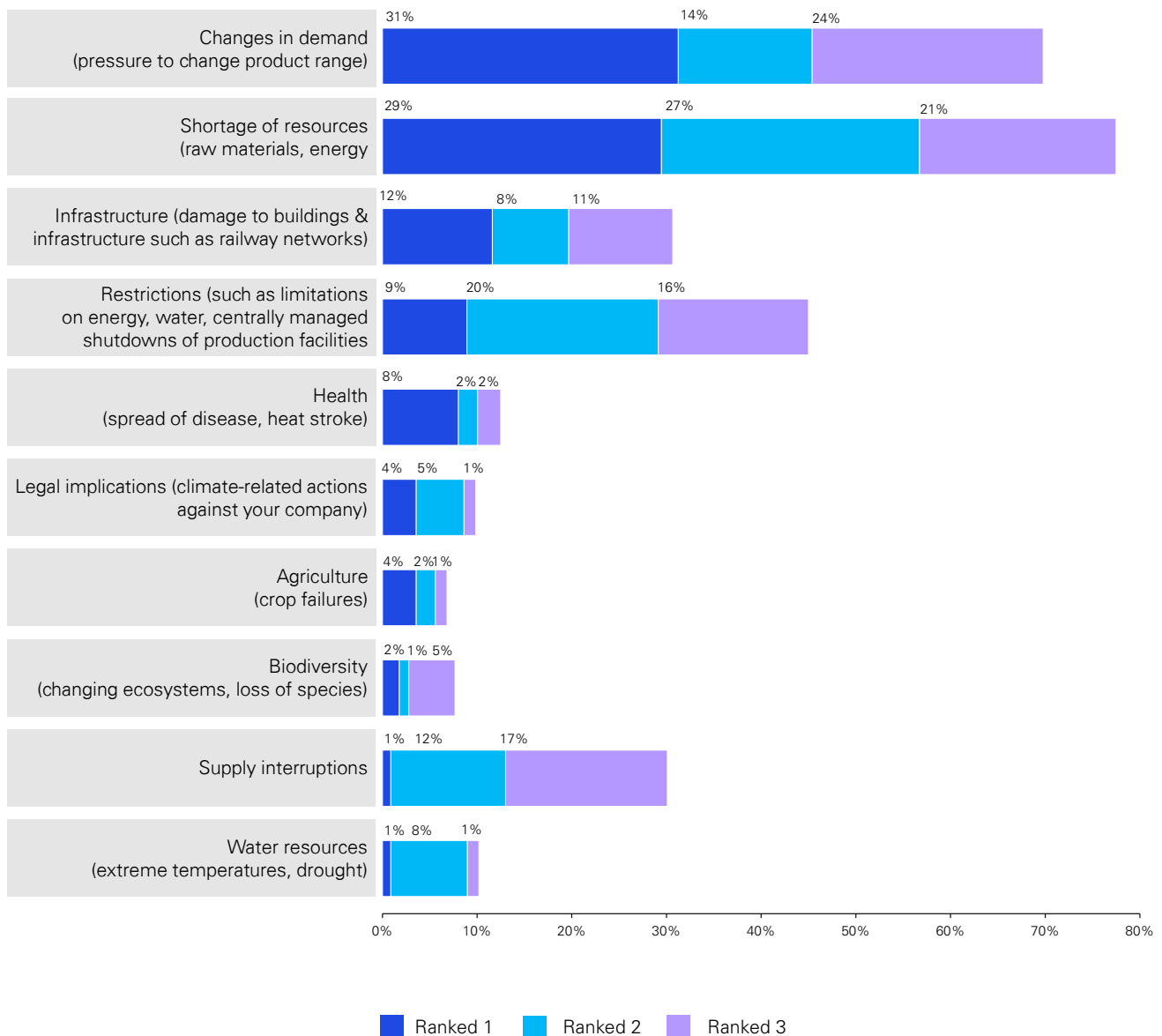
In the future, companies will face sweeping changes to their environment which will have a significant impact on their business model. Any changes to their product and service portfolio will need to be considered carefully in order to ensure that they meet

the needs of customers and align with the core competencies of the company, while remaining sustainable and economically viable.

The survey reveals that many companies are already looking at how climate change impacts their product and service portfolio. **76%** of participants expect changes in their product and service portfolio in the medium term (3–5 years). Only **18%** expect no climate-related changes to their own product and service portfolio in the medium term.

Figure 11:

Where do you expect the greatest changes in the medium term (3–5 years)? Please select the three most relevant areas.



Source: KPMG in Germany, 2024; Ranked, n=112



Respondents ranked **changes in demand** and resulting pressure to modify their own product and service portfolio as the change most likely to affect them in the medium term. Nearly one in three companies (**31%**) ranked **changing customer needs** as the most relevant development. More than two out of three respondents (**69%**) consider **changes in demand** to be among the top 3 issues. Behind the clear compulsion to adapt, which affects sales, respondents believed that there would be changes in procurement: **29%** of companies expect medium-term changes resulting from **shortages of resources** and the resulting impact on **the use of raw materials and energy**.

More than three out of four companies surveyed (**77%**) prioritise sustainable development when considering **resource availability** – as a consequence of climate risks and the impacts of climate change on their own product and service portfolio – to be a top transformation issue.

Infrastructure (31%) was ranked as the third-most important issue. Here, the focus falls on issues of coordination and consultation between the private sector and municipal and regional administrations, as there is often no clear dividing line as far as responsibilities and impacts are concerned.





3.2 Market potential for solutions to address the consequences of climate change

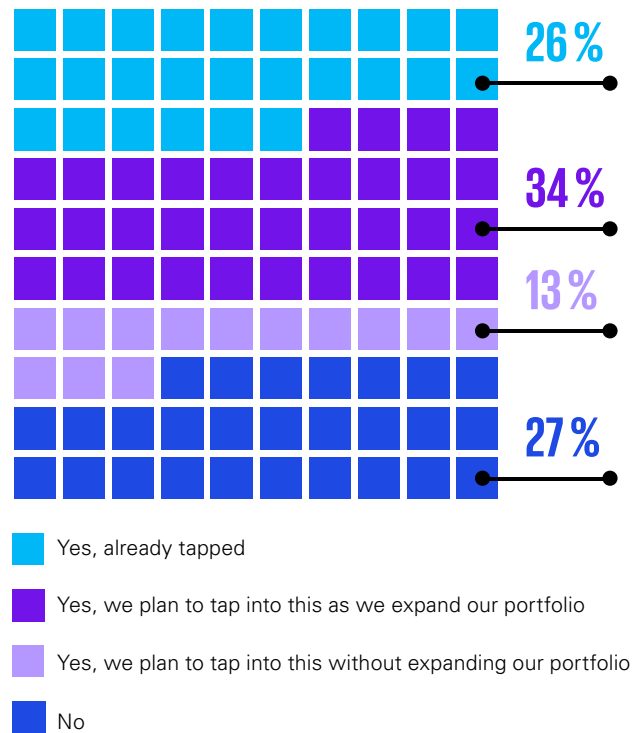
Beyond the main climate protection initiatives (aimed at avoiding harm), companies are seeing new business opportunities arise in connection with climate risks and efforts to mitigate the consequences of climate change.

However, manufacturers have to consider a range of factors when adapting their products and services in response to climate risks. This should be done as early as possible in the product development stage. Aside from developing **sustainable products aligned with their own core competencies**, companies should consider integrating more supplier innovations into their own solutions. Manufacturers can create added value not only through sustainability-driven selection but also by ensuring optimal interplay between the individual elements of the end product. Procurement selection criteria ought to cover the **entire product lifecycle** and ensure that built-in components enable the energy-efficient use of the product by the end customer throughout its useful life, followed by simple, resource-sparing recycling afterwards.

Innovative production and manufacturing processes and materials can also open up further potential, although this also necessitates new know-how and often adapted processes. In addition, opportunities to work with customers and suppliers to develop sustainable solutions together are often overlooked. For instance, companies can forge strategic partnerships with their suppliers to reduce harmful emissions in their upstream value chain by promoting and advancing the systematic use of renewable energies. They can do so by offering to pay a higher price to procure more sustainable products or by giving preferential treatment to suppliers with smaller product carbon footprints.

Figure 12:

Do you see additional business potential in the development of products and services to reduce the consequences of climate change?



Source: KPMG in Germany, 2024; figures in percent, n=224

73% see additional business potential for their company in the development of products and services to mitigate the consequences of climate change. One in four companies (**26%**) have already tapped into additional sales potential through relevant innovations, **34%** plan to do so and a further **13%** intend to do so without expanding their portfolio.



More than one in four companies (27%) have so far identified no additional business potential for their own company resulting from the development of products and services to minimise climate risks and the consequences of climate change.

Companies earning more than EUR 1 billion in revenue are more likely to recognise additional business potential (EUR < 1 billion in revenue: **29%** versus EUR ≥ 1 billion in revenue: **44%**). By contrast, the share of SMEs which recognise no additional business potential for their own company resulting from the development of products and services to minimise climate risks and the consequences of climate change is nearly twice as large as that for large companies (EUR < 1 billion in revenue: **33%** versus EUR ≥ 1 billion in revenue: **17%**).



Over many decades, the German mechanical and plant engineering industry has made a name for itself thanks to its technical know-how and ingenuity. The industry is currently plagued by multiple crises – transformation is the order of the day. Companies have to get back to basics and drive development within the industry by harnessing new business potential in connection with protecting against climate risks and mitigating the effects of climate change.”



Ulrich Ackermann

Head of Tax
Head of Industrial Manufacturing
KPMG AG Wirtschaftsprüfungsgesellschaft



Expert opinion

Although the challenges stemming from the consequences of climate change will affect countries and regions around the world to differing degrees, they will impact every thread of the social and economic fabric of our lives. The range of solutions and products generated by the manufacturing industry touches nearly every aspect of our lives, and every potential and conceivable approach to reducing climate risks and the impacts of climate change will vary greatly.

The manufacturing sector in particular will need to come up with solutions which can be parleyed into additional market potential through the successful development of products and services. To do that, companies will have to find the answers to some key questions. For one thing, it will be necessary to estimate the timing and strength of demand for innovative products, services and business models at marketable conditions. An analysis of current and future need will additionally be required. It may also prove crucial to identify the necessary partnerships that will make it possible to close gaps in expertise so as to serve the identified field of application.

To identify the opportunities and risks in connection with the consequences of climate change, it is important to analyse the company's product and service portfolio, in many cases taking into account completely new aspects. The application of new procedures and manufacturing techniques as well as new materials can also provide new momentum, as can the use of advanced technologies. And artificial intelligence, blockchain technology and the Internet of Things (IoT) can also help to improve products and services. However, companies need not necessarily use disruptive or incremental technologies and processes to develop innovative products.

Tapping into previously ignored sales markets can also represent a crucial step in developing business. Customer involvement is key. Integrating customer needs into your innovation process early on makes it possible to create added value for the customer and generate a lock-in effect. For manufacturers with no direct customer contact, product partnerships can provide access to the end customer. In addition, platform-based collaboration concepts such as crowdsourcing and open innovation methods can serve as an incubator for ideas and resources, both inside and outside the company, translating into the development of solutions for new sales markets. And technical solutions from a company's own field of expertise can be transferred to applications in other industries, thereby expanding the company's innovative potential.

This type of collaboration requires a pre-set form of secured access to internal know-how, which opens up new perspectives and can facilitate access to expertise from an entirely different industry. Generally speaking, conditions have to be established that enable a company to break through the confines of silos within its own organisation, which can prove beneficial in terms of strategy.

Any attempt to generate additional business potential through the development of products and services to minimise the consequences of climate change must follow a detailed analysis that factors in a variety of climate change scenarios. This is because the extent to which analyses are able to identify new green tech opportunities in previously untapped areas of application and the ability of companies to rapidly and successfully leverage opportunities in new markets are as unique to each company as its own product and service portfolio.



Dr. Thimo Stoll

Advisory, Head of ESG Strategy & Value Chain
KPMG AG Wirtschaftsprüfungsgesellschaft

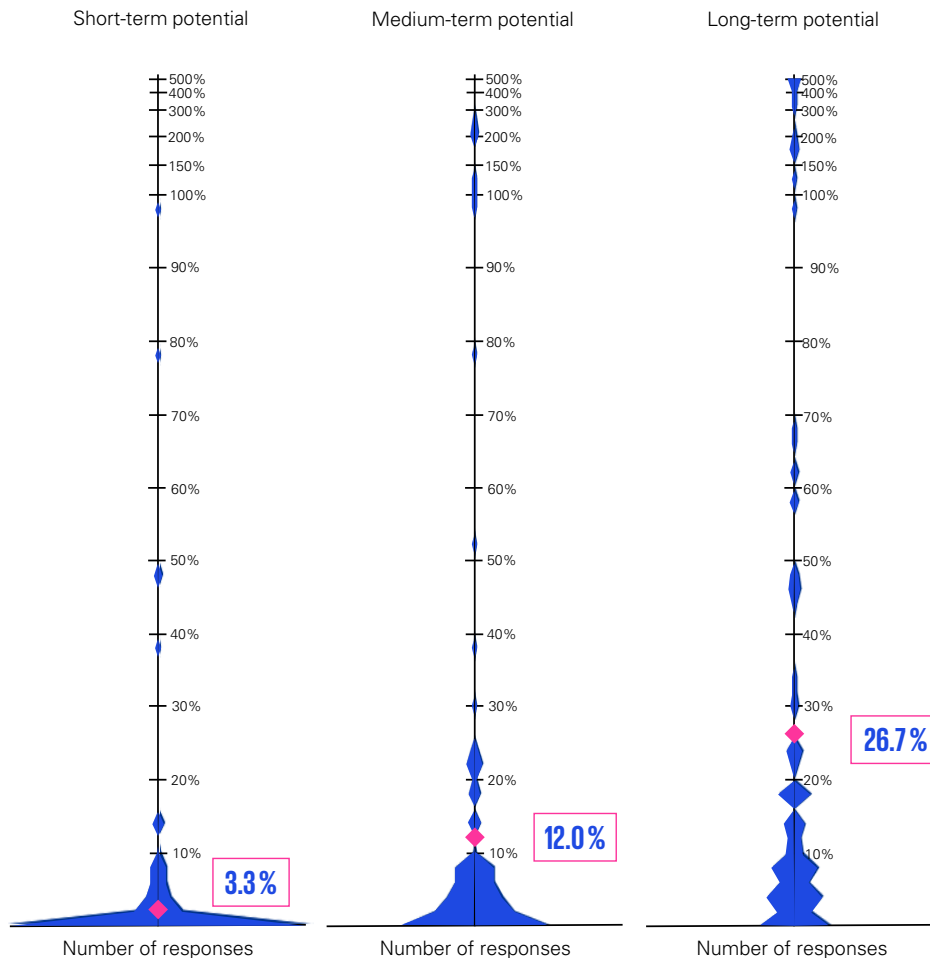


In order to illustrate the significance of products and services to reduce the consequences of climate change for companies, industrial firms were asked what volume of revenue they expected to generate in

the short, medium and long term with their product and service portfolios offering solutions for protecting against climate risks or mitigating the consequences of climate change.

Figure 13:

What revenue potential (short, medium and long-term) do you believe you can generate with your product and service portfolio offering solutions for protecting against climate risks or mitigating the consequences of climate change?



Source: KPMG in Germany, 2024; figures in percent, n = 170 across all participants

The potential revenue from products and services to protect against climate risks or mitigate the consequences of climate change is presented as a percentage of the current revenue reported by respondents. Many companies see only slight potential to increase their revenue in the short term. At the same time, there are also companies which see significant potential in the short term of less than one year. **28%** of companies have identified more than **5%** in potential revenue growth over the medium term. The trend continues over the long term.

On the whole, companies with annual revenue of less than EUR 250 million offer the most optimistic estimates of potential, and companies with annual revenue between EUR 5.1 billion and EUR 10 billion are the most pessimistic. Across all participants, estimated short-term potential averaged **3.3%**, estimated medium-term potential averaged **12%** and estimated long-term potential averaged **26.7%**.



In order to exhaust the full potential of products and services to mitigate the consequences of climate change, a variety of different measures can be considered. These might include improving your company’s offering through accretive growth – i.e. strategic acquisitions and takeovers. It goes without saying that this would also entail comprehensive due diligence, taking into account sustainability aspects.”



Dirk Nawe

Partner

Deal Advisory, Country Specialist in ASEAN/China/India

KPMG AG Wirtschaftsprüfungsgesellschaft



A closer look at the mechanical and plant engineering industry



Here we take a closer look at the mechanical and plant engineering industry. The companies we surveyed in this industry had a somewhat more positive take on the growth potential for solutions to protect against climate risks or reduce the consequences of climate change. They expected average annual revenue potential of **4.2%** in the short term, **12.4%** in the medium term and **27.5%** in the long term.

Taking the revenue currently generated by the European machinery and plant engineering industry as a baseline, we can extrapolate potential annual revenue of up to EUR 206 billion in ten years.

It is clear that the development of products and services to reduce the effects of climate change not only plays a key role in solving current and future problems but also offers tremendous revenue potential.

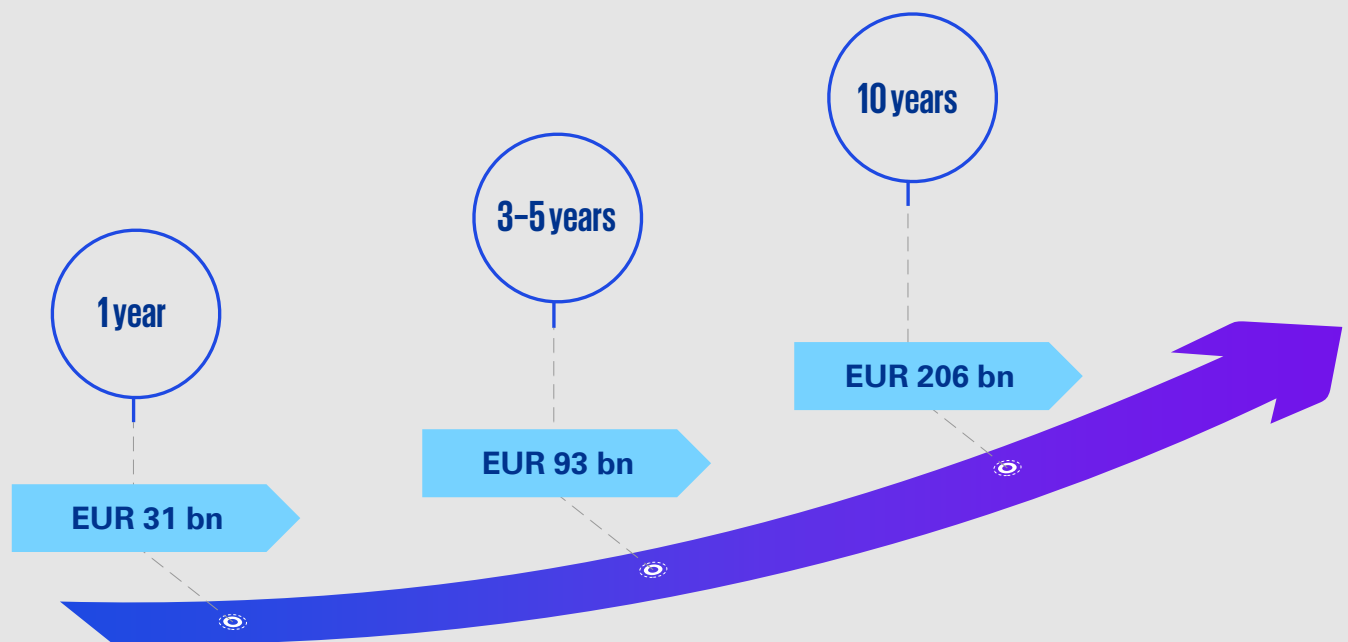
Our analysis reveals that many manufacturers can realise significant revenue growth, particularly in the medium and long term. It is therefore essential that opportunities be recognised and actively engaged with in this sector.

Even companies which currently do not see any business potential should monitor technologies and markets to identify the technologies, materials and manufacturing processes under development, as well as how these might be used to optimise or round off their business model.

In addition, they should analyse which solutions are in demand in sales markets outside their core market and how relevant their own product and service portfolio will be in this context in the long run.

Figure 14:

Extrapolation of European revenue potential in the mechanical and plant engineering industry based on solutions to protect against climate risks or reduce the consequential damage from climate change



Source: KPMG in Germany, n = 120 companies in the mechanical and plant engineering industry



Expert opinion

Mechanical engineering firms can tap into additional business potential – particularly in after-sales – by expanding their consulting and service portfolio and by helping customers to optimise machinery during its useful life. Companies can use analytics and digital twins to develop offerings which customers can use to improve monitoring and maintenance, thereby increasing their availability and efficiency. To increase this added value for customers, employees should be trained to identify potential efficiency gains and discuss them with development and manufacturing experts. Service staff can be authorised to advise customers on site, for instance on matters relating to energy efficiency, which can help to increase the use of products and services to mitigate the consequential damage from climate change.

In addition, data analysis and machine learning can be used to mould internal know-how as well as the experience accumulated by service staff into new business models, for example through the introduction of pay-per-use models or the provision of predictive maintenance services. Data analytics can translate customer use patterns and wear-and-tear data into valuable information for maintenance, repairs and

next-generation product design. In the future, companies which are able to analyse these data points in a structured and efficient manner will be able to establish a far closer relationship with their customers while also increasing the productivity of their own machines and further improving future products.

By working closely together with their customers, mechanical engineering firms can also offer bespoke solutions tailored to the specific needs and requirements of the individual customer. On the whole, the optimisation of machinery during its useful life offers significant potential to mechanical engineering firms seeking to expand their business and stand out from the competition. If nothing else, firms can show prospective new customers how they help existing ones with decarbonisation as well as with measures to boost efficiency and cut costs.

Any portfolio expansion should be interdisciplinary. Gaps in expertise need to be closed through training, recruitment and/or cooperation so as to enable the firm to offer its customers a holistic range of products and services.



Sascha Glemser

Partner
Consulting, Value Chain Transformation
KPMG AG Wirtschaftsprüfungsgesellschaft





3.3 Conditions for additional market potential

Establishing sustainable and future-facing business processes often requires significant investment, which also exposes a company to financial risks. In order to reduce these risks and exhaust the full potential of new markets, companies need to bear a number of factors in mind. Understanding customer needs and markets is essential to the successful development of

a new market. Aside from this, regulatory risks have to be taken into account, as do the availability of required expertise and the necessary know-how in the potential areas of application for the new products and services. In general, all of the internal and external conditions which impact a company's decision-making have to be considered.

Figure 15:

What conditions do you believe are necessary in order to generate the above medium and long-term revenue from products and services to protect against climate change-related risks or systematically reduce the losses resulting from climate change?



Source: KPMG in Germany, 2024; figures in percent, multiple responses possible, n=151



Companies view innovation, openness to technology and a positive investment climate necessary conditions for tapping into future revenue potential.

Three out of four companies surveyed (**75%**) cited **innovation** through research and development as a necessary condition for realising their projected revenue potential. Moreover, an **openness to technology and a positive investment climate**

were frequently cited: **73%** of respondents listed this innovative environment as the central foundation for the realisation of new sales potential.

Roughly two-thirds of companies stated that available **specialists (70%)** and **regulation** and stable conditions through legislation (**65%**) form the basis for new revenue streams. Fewer than half of respondents said that realising future revenue potential depended on **grants and subsidies**.



The sustainable transformation of the economy, and hence of companies, is a central plank on the agenda of policymakers in Germany and Europe. Subsidies and special grants are intended to support this transformation. From our experience, we can say that many companies lack the knowledge and structures needed to identify appropriate subsidy programmes and leverage them to their benefit. Because of this, companies are missing out on a great opportunity to minimise financial risks and bolster their own funding and know-how."



Marc Ennemann

Partner
Consulting, Head of Value Chain Transformation &
Head of Alliance Management
KPMG AG Wirtschaftsprüfungsgesellschaft



Expert opinion

Collecting grants and subsidies is an attractive option for fundraising. For many companies implementing sustainability projects, it therefore makes sense to check whether they are eligible to receive public funds. Companies considering applying for grants and subsidies need to establish a consistent, professional subsidy management organisation which performs project analyses in advance, verifies eligibility to receive public funds, and manages the application process through to allocation of funds. It is important that the high degree of complexity of the projects be accounted for in the day-to-day business. The subsidised project, which is usually a one-off from the company's perspective, requires expertise in technical, legal and financial matters. This expertise is necessary in order to satisfy not only the criteria of the subsidy

programme but also the organisational and procurement law requirements. Often, such expertise is unavailable in day-to-day operations or not even represented within the company.

However, certainty as to procedural and legal matters is elementary to a company's ability to master the challenges and risks of the subsidised project. The downstream review of the project and documentation of the use of funds present additional hurdles. In some cases, companies have no knowledge of existing subsidy and grant programmes, and in others the complexity of the application process can be a deterrent. As a result, companies often opt not to apply after weighing the costs against the benefits.



Clemens Dicks

Partner
Consulting, Value Chain Transformation
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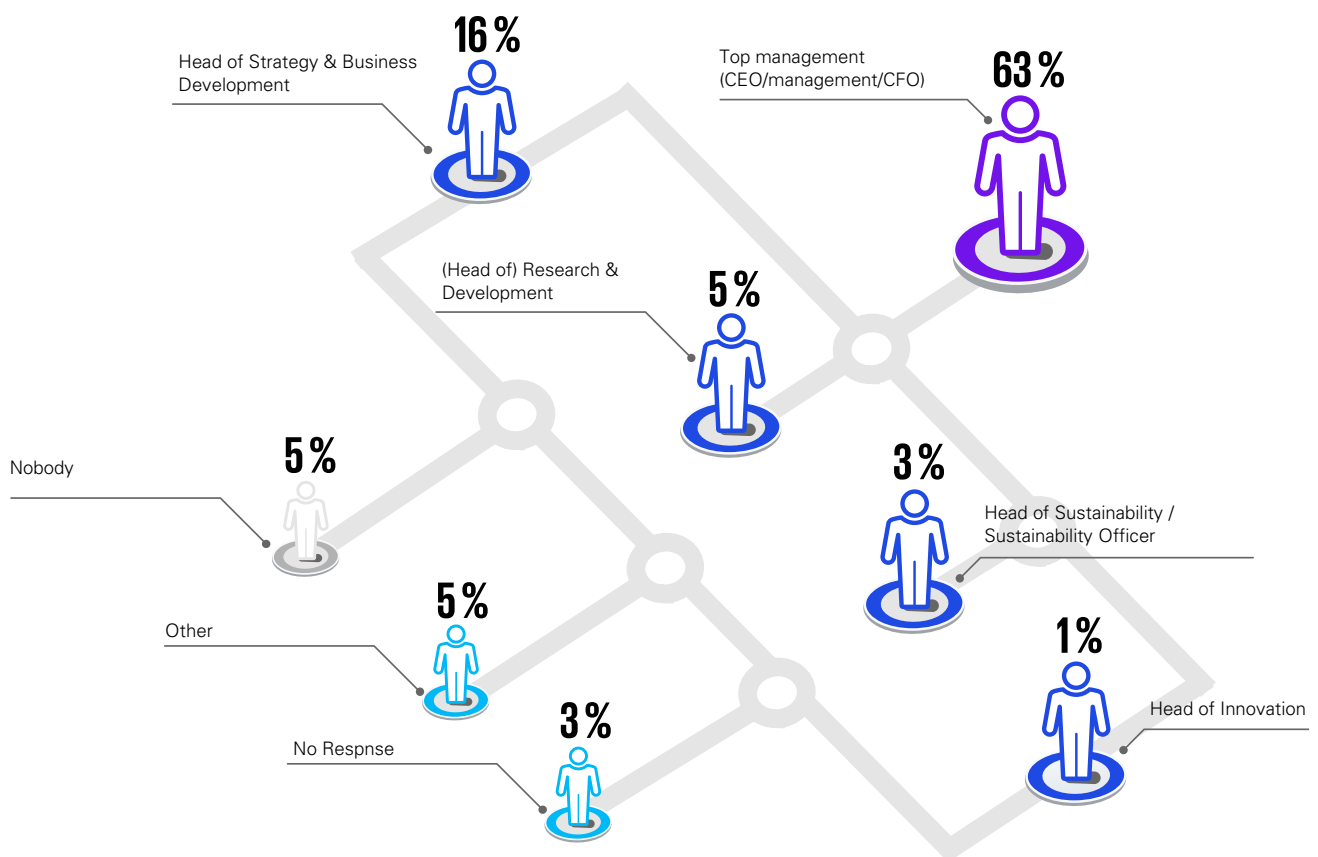


When companies invest in new markets, success and failure are on a knife's edge. Favourable outcomes depend not only on the ability to transfer existing core skills to new fields of application. The pace of professionalisation based on the continuous monitoring of skills gaps and the standardisation of

practical experiences in the new business area are also mission-critical when developing new markets. The ability to bring new products and services to the market hinges on pragmatic organisational structures and a clear division of responsibilities for developing new opportunities.

Figure 16:

Who at your company is responsible for bringing to market products and services to protect against climate risks or to mitigate the consequences of climate change?



Source: KPMG in Germany, 2024; figures in percent, deviations from 100% due to rounding differences, n=153

At most companies, the top level of management (C-Suite, 63%) is responsible for developing new markets for products and services to protect against climate risks or to mitigate the consequences of climate change.

The Head of Strategy & Business Development came in at a distant second (16%). The Head of R&D at one in every 20 companies (5%) is responsible for tapping into market potential.

Tasking the top management with developing markets for products and services creates a key foundation for success in these strategic endeavours. When establishing standard reporting structures, the internal processes should be defined, and controls and structures created, to ensure speedy and seamless implementation at the operational level.



We are seeing increasing requirements for members of supervisory and oversight bodies to have a deep understanding of a company's business processes and risks, and hence also to develop the ability to assess the long-term product and service strategy. In order for them to be able to fulfil their oversight and advisory function in this context, these boards seek the necessary information from the management. The management, in turn, can only provide the desired information if it has a full overview of all of the relevant issues. Managing changes in customer expectations and needs, new business potential and regulatory requirements therefore has to be integrated into the organizational structures by the operational management team."



Angelika Huber-Strasser

Regional Head South &
Head of Audit Committee Institute
KPMG AG Wirtschaftsprüfungsgesellschaft

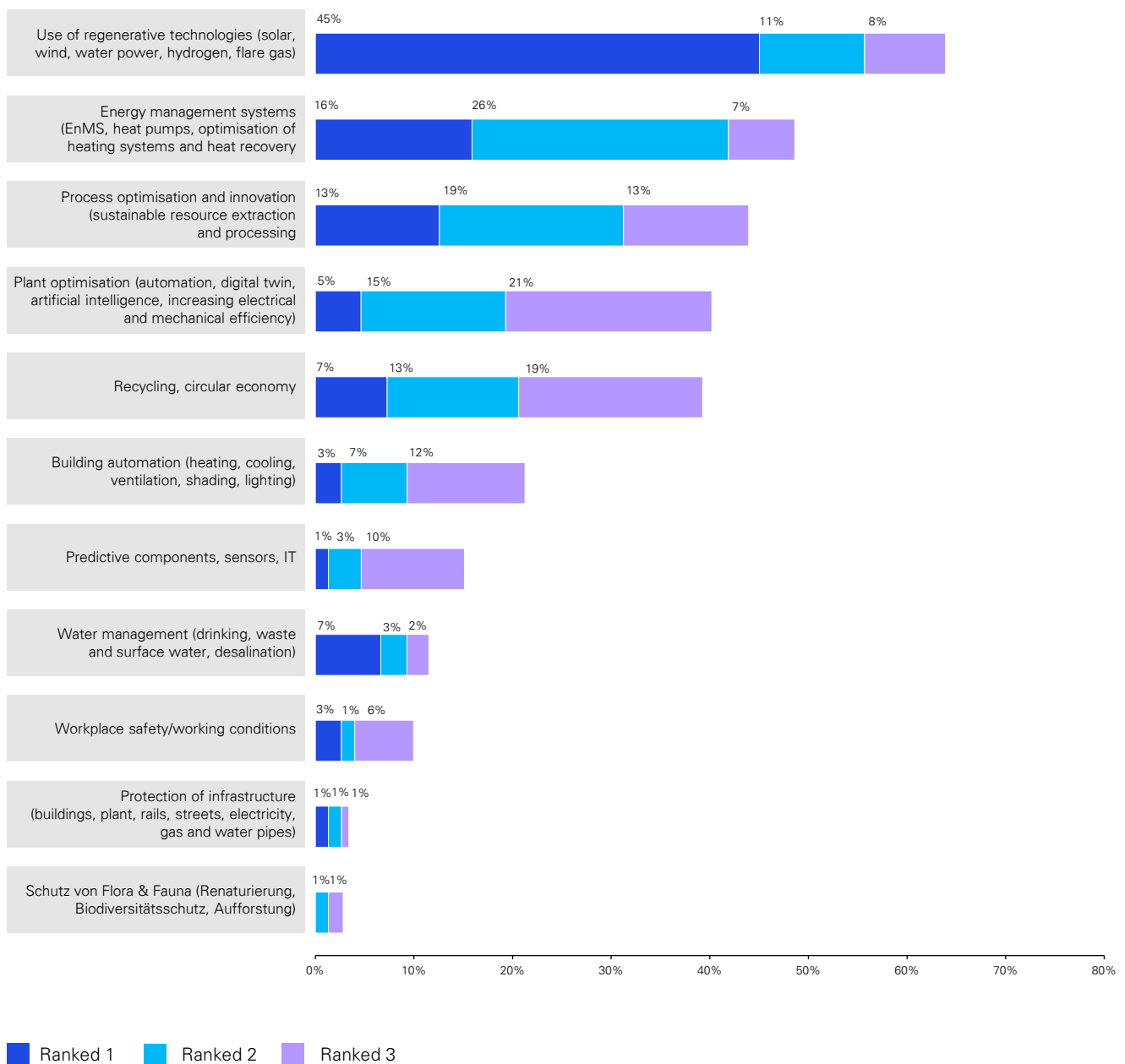


3.4 Investment priorities in the development of sustainable technologies

Standing out from the competition will require peak technological performance in future, although it is not enough to focus on that alone. Customers have come to expect manufacturers to offer holistic systems and service expertise.

This means that manufacturers need to divorce themselves from the notion of focusing solely on products and technologies and start integrating USPs into their business model that go beyond physical product characteristics.

Figure 17:
In which areas are you focusing future investment to develop new/refine existing sustainable technologies?



Source: KPMG in Germany, 2024; figures in percent, ranked, n=112



Portfolio adjustments and expansions are focusing on business models for the development and use of regenerative technologies and energy management systems.

45% of all respondents stated that the highest priority of future development investments was on the use of **regenerative technologies** – for nearly two out of three companies (64%), the use of **solar, wind and water energy** and/or **hydrogen technology** were ranked in the top three priorities for future development budgets. Investments in **energy management systems** followed at some distance, as did opportunities for process optimisation and innovation for resource extraction and processing.

Until recently, climate debates revolved chiefly around ideas for stopping climate change. People are now beginning to accept that we need to take a

three-pronged approach comprising climate action, avoiding climate risks and mitigating the consequences of climate change.

This is because no matter how hard we try, focusing solely on climate protection is not enough to overcome the challenges we currently face. We therefore need to look into how we can better forecast climate risks and how we can mitigate the consequences of climate change – or even reverse them altogether in some sectors. The economy and businesses have only just begun to consider this. Many solutions will therefore be a number of years in the making. Companies are called upon to achieve their sustainability goals while at the same time reducing the impacts of climate change. In light of this, many are currently grappling with the question of which technological advancements to focus on in the coming years.



The transformation of our energy systems represents a precondition for, and a key step in, achieving climate protection goals. Development subsidies which promote the establishment and expansion of a new market accelerate the introduction of new technologies. Companies need to bear in mind that their USP will still guarantee market viability even after the subsidies cease. Ultimately, experience has shown that transitioning from a temporarily subsidised market to a regulated one represents the greatest challenge.”



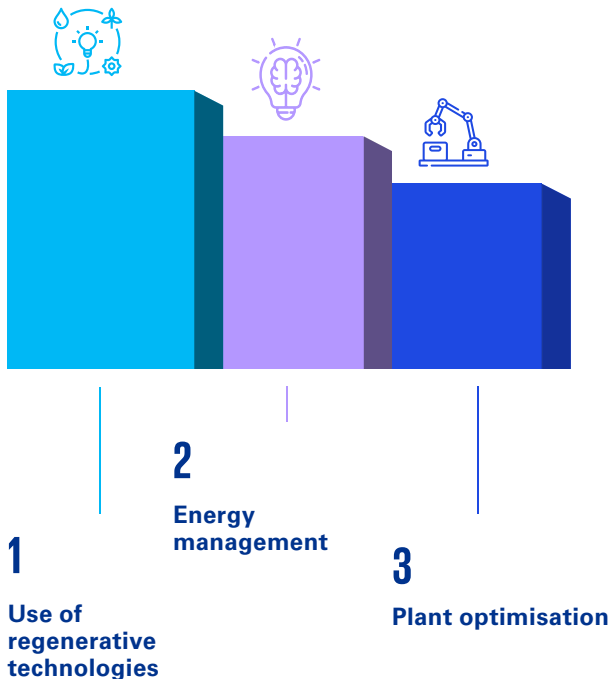
Michael Salcher
Regional Head East
Head of Energy and Natural Resources
KPMG AG Wirtschaftsprüfungsgesellschaft



Figure 18a:

Top 3 responses to the question about planned technological innovations and advances over time

Short-term development (1 year)



Source: KPMG in Germany, 2024, n=153

In particular, respondents expect new and more sophisticated **regenerative technologies** to emerge in the short term, including solar, wind and water energy as well as hydrogen. However, they also believe that there is potential in the short term for innovation and advancement in **energy management systems** such as heat pump technologies, state-of-the-art heating systems and heat recovery. **Plant optimisation** is also believed to harbour significant potential.

Achieving net zero in Germany by 2045 will require a fundamental change in Germany's energy system, both as far as generation and reducing consumption are concerned. This change brings with it not only ecological opportunities but also economic and technological potential.

The use of (new) regenerative technologies along the entire value chain for manufacturers will become a competitive success factor in the future, as this will help companies do business more cost effectively and without impacting the climate.

While the work continues to develop sufficient quantities of renewable energy sources, conventional power plants have to remain in operation. Fluctuating prices on the markets for raw materials mean that energy price volatility is going to remain high.

Companies will need to take this into account until the transition to green energy has been fully accomplished.

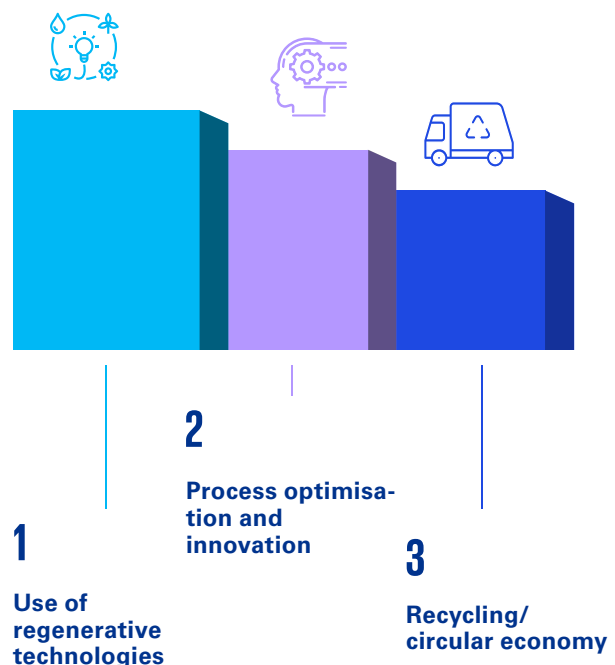
Another challenge is that Germany alone will not be able to produce enough regenerative energy in the medium term. This means that it will have to maintain strategic partnerships with other countries better suited to producing sufficient quantities of renewable energy.

The market for regenerative energies is still subsidised at the moment, with public funds sustaining technological advances (such as automation) and the necessary expansion of infrastructure (such as electricity grid decentralisation). Companies can benefit from this subsidisation while doing their part in the transition to a sustainable economy.

Figure 18b:

Top 3 responses to the question about planned technological innovations and advances over time

Medium and long-term development (3–5 and 5–10 years)



Source: KPMG in Germany, 2024, n=151

Respondents believe that the use of **regenerative technologies** will remain the first priority over the medium to long term. However, **process optimisation and innovation as well as recycling/circular economy** will become more and more significant as time passes.



Expert opinion

Reducing climate risks through process optimisation and innovation

Where energy efficiency and productivity enhancement are concerned, the continuous optimisation of production processes and every other link in the value chain has long since been anchored within management systems.

As the relevance of climate risks and reducing emissions continues to grow, additional optimisation targets are emerging, as are clashes between certain goals. Making systems more resilient means adapting

them to a greater variety of environmental conditions. Covering wider temperature ranges often goes hand in hand with more efficient air conditioning systems. This must be designed in terms of holistic optimisation together with static and dynamic energy efficiency, i.e. energy efficiency that is time-dependent and thus reacts to the energy supply.

This example shows why reducing a company's climate risks will be comprehensively incorporated into management systems and, above all, into process design.



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Deep dive: The circular economy

The concept of the **circular economy** is growing ever more significant. Companies, policymakers and consumers are increasingly recognising that the four Rs of the circular economy – reduce, recycle, reuse, remanufacture – over the **entire life cycle of resources** are becoming a key factor in managing many of the issues we currently face.

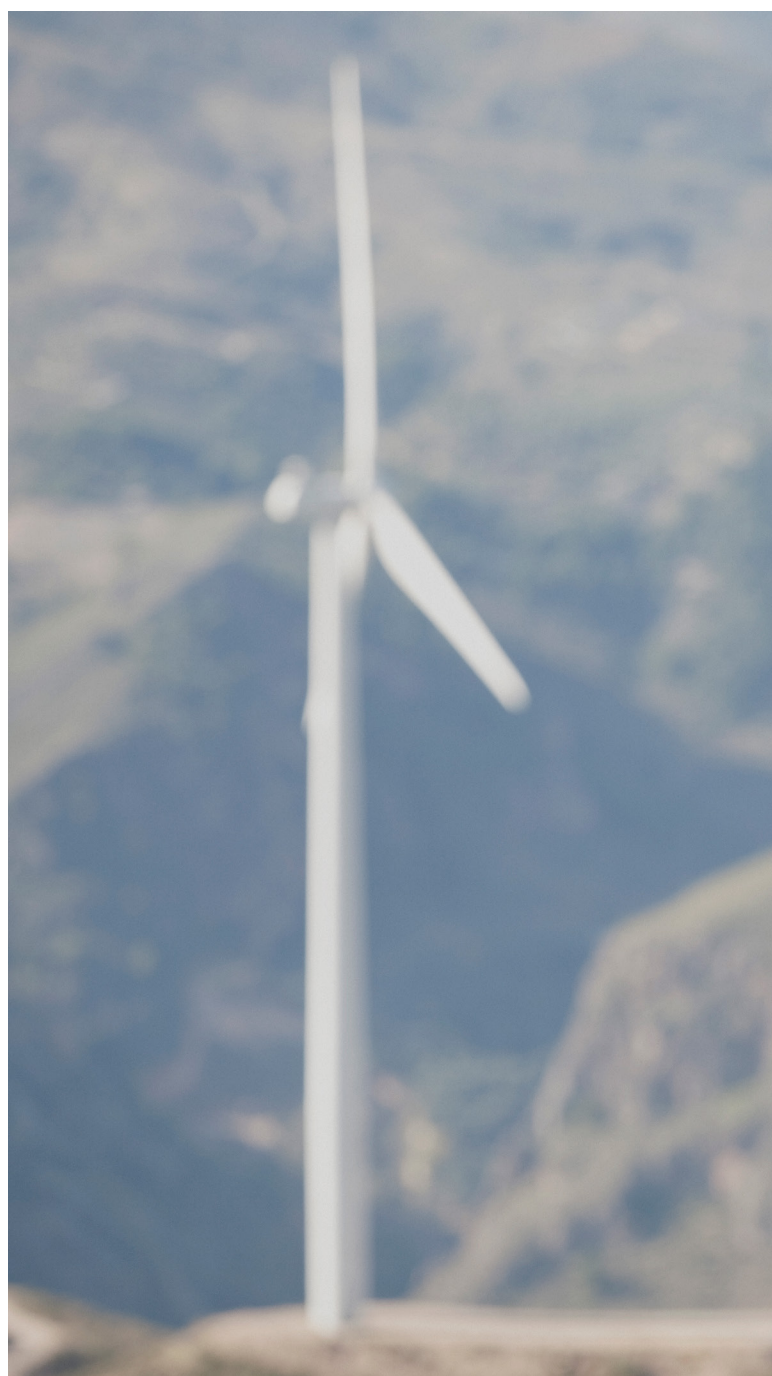
This approach can help to alleviate potential price fluctuations and supply bottlenecks – particularly for non-substitutable resources – and **reduce demand for new resources and cut emissions**. Some companies are already working to implement circular strategies. Nevertheless, the current efforts, above all with respect to recycling, are nowhere near sufficient. In order to achieve true change, the circular economy needs to be broadly positioned as a central form of collaboration between all companies.

The switch to the circular economy requires **investment in new technologies** and infrastructure, which can represent a financial burden for some companies. In addition, cooperation along the entire value chain is necessary in order to guarantee a seamless transition. Employees and customers also need to be sensitised to sustainable practices. Regulatory hurdles, unstable markets and the need to rethink conventional production methods can represent additional obstacles.

Research and development (R&D) plays a key role in establishing a circular economy strategy. It is vital to the development of solutions for reducing the amount of energy consumed by products, using sustainable materials and manufacturing processes and increasing the recyclability of products. The R&D department also provides considerable assistance in shaping products so that they can be reused or recycled at the end of their useful life. This reduces raw materials and energy consumption and minimises the strain on the environment.

A look at the relevant technological innovations and advances reveals that the issue of energy is at the very top of the agenda for companies. In the years to come, efforts will focus primarily on our ability to secure the availability of the energy we require in Germany so that we can maintain our economic competitive edge.

Only once we have found the solution to this central issue will the focus shift to further optimisation of processes and innovations as well as the **circular economy**. This implies that there is still much potential for the German economy stemming from solutions relating to innovation and portfolio adjustments.



Outlook

Climate change and the resulting climate risks and consequences are changing economic cooperation worldwide and especially in Germany, one of the world's leading exporters. The challenges for companies are immense: on the one hand, they have to deal with the further protection of the climate and cope with the changes that have already occurred and, on the other, they have to safeguard their economic existence.

We should be aware that we only have one planet capable of sustaining human life and it is our responsibility to preserve it for future generations. However, in some regions the changing environment and our exploitation of resources mean that we are already perilously close to the point of no return. Sustainable business is thus no longer an option but rather a necessity.

The results of our survey show that the pioneers and thought leaders in the business world are successfully meeting these challenges while remaining economically viable. In principle, every company has a chance to not only protect the environment by operating sustainably, but also to maintain its competitive edge in the long run. The capacity for growing sales, cutting costs and tapping into new market potential is high, but companies must start now to consistently seize the new opportunities for themselves.

The economy alone cannot solve every problem. It is up to the political class to create clear and stable conditions for corporate decision-making. Policymakers should not steer the ESG transformation through regulations and bans alone. They need to provide incentives and work to dismantle economic restrictions.

Success is only possible if every stakeholder from politics, society and business pulls together. This will not be an easy journey – but there is no alternative to transformation.

We look forward to shaping a sustainable future together with you.



Methodology

For the study „Climate risks and consequences of climate change 2023 – Study on the potential of German industry and solutions based on innovation and changes to portfolios“, KPMG and the VDMA surveyed 235 decision-makers from businesses across Germany in August 2023. The results offer insight into mechanical and plant engineering as well as the automotive industry. The decision-makers were asked how their companies are already positioned with regard to climate risks and the consequences of climate change, and what contribution their company can make to reducing the damage caused by climate change.



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Find out more at our landing page:



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