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Regulatory framework conditions for a future-oriented Mittelstand policy – The example of the green transition

Ordnungspolitische Rahmenbedingungen für eine zukunftsorientierte Mittelstandspolitik – Das Beispiel der grünen Transformation

Michael Holz, André Pahnke, and Hans-Jürgen Wolter
IfM-Materialien Nr. 313

Abstract

Characteristics such as high flexibility, rapid decision-making processes and a long-term orientation favor the transformation efforts of Mittelstand companies. However, smaller Mittelstand companies often lack the time and financial resources to cope with the green transition. In order not to place an excessive burden on Mittelstand companies, restrictive commands, prohibitions and reporting requirements should be avoided as far as possible. Instead, the emission trading system should be expanded. To avoid disadvantages for Mittelstand companies in international competition, certificates could (once again) be allocated free of charge. The transition phase should be extended, and the costs of converting the energy infrastructure should be largely financed by the public sector and not passed on to Mittelstand companies.

Keywords: *Regulatory policy, Mittelstand policy, green transition, Mittelstand companies, SMEs*

Zusammenfassung

Eigenschaften wie z. B. hohe Flexibilität, schnelle Entscheidungsprozesse oder Langfristorientierung begünstigen die Transformationsanstrengungen mittelständischer Unternehmen. Je-doch fehlt es insbesondere dem kleineren Mittelstand oft an zeitlichen und finanziellen Mitteln, um die grüne Transformation bewältigen zu können. Um den Mittelstand nicht übermäßig zu belasten, sollte auf Ge- und Verbote sowie Berichtspflichten soweit wie möglich verzichtet werden. Stattdessen sollte der Zertifikatehandel ausgebaut werden. Um Benachteiligungen mittelständischer Unternehmen im internationalen Wettbewerb zu vermeiden, könnte (wieder) eine unentgeltliche Zuteilung der Zertifikate erfolgen. Die Übergangsphase sollte zeitlich gestreckt werden, die Kosten für die Umstellung der Energieinfrastruktur sollten weitgehend öffentlich finanziert und nicht auf mittelständische Unternehmen umgelegt werden.

JEL: K32, Q54, Q58

Schlagwörter: *Ordnungspolitik, Mittelstandspolitik, grüne Transformation, Mittelstand, KMU*

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Mittelstand policy as a reliable, framework-oriented policy approach

The concept of “Ordnungspolitik” (roughly translated as ordoliberal regulatory framework policy) is commonly regarded as a key principle of the social market economy and aims to reconcile a market-based economic system with social balance and social participation. Mittelstand policy should provide Mittelstand companies with planning certainty, enabling firms to focus on their core entrepreneurial activities. This does not preclude adjustments to the regulatory framework in times of large-scale disruptions. The green transition currently constitutes such a radical change.

Largely refrain from mandatory obligations, prohibitions and information obligations

The environmental policy in Germany and the EU, still largely based on mandatory obligations and prohibitions, is both inefficient and shows a low ecological effectiveness. Similar criticism applies to information obligations, such as sustainability reporting and labelling requirements. Both approaches place a particular burden on the Mittelstand, as they are associated with substantial additional bureaucracy. Due to their rigid specifications, they also prevent flexible solutions tailored to the specific circumstances of individual enterprises.

The Mittelstand disposes of specific strengths and weaknesses in implementing the green transformation

Characteristics such as high flexibility, quick decision-making processes and long-term orientation facilitate the transformation efforts of Mittelstand companies. The societal responsibility that many Mittelstand companies feel towards their region, their employees, and their market partners counteracts cost-driven relocation decisions, which are becoming increasingly relevant for non-Mittelstand companies. At the same time, however, the typically smaller size of Mittelstand companies is associated with tighter resource constraints. Smaller Mittelstand companies often lack the time and financial means to make investments in the green transformation in addition to their day-to-day operations and economically necessary (replacement) investments.

Large-scale emissions trading system to be pursued

Policy makers should largely rely on emissions trading when shaping the framework conditions for the green transition. Complementary measures are needed to prevent international competitive disadvantages for Mittelstand enterprises. The border adjustment mechanism preferred by the EU is excessively complex and bureaucratic and should therefore be rejected from a Mittelstand perspective. For Mittelstand companies, the free allocation of certificates would be the optimal solution, as it generates minimal additional bureaucracy and imposes on average significantly lower financial burdens on businesses than an auctioning system while achieving comparable ecological effectiveness.

Design a Mittelstand-friendly transition phase

The transition to a greenhouse gas-neutral economy should be extended over a longer period. This would allow Mittelstand companies to better align the investments required for the green transformation with other (replacement) investments. The costs of backup power plants needed to compensate for periods of low renewable power generation (“dark doldrums”) as well as the development of complex grid infrastructure should be publicly funded rather than passed on to Mittelstand companies. An “industrial electricity price” for a narrowly defined group of enterprises is associated with well-known problems, such as determining eligibility, and should therefore be rejected. Support should instead be directed towards research into the new technologies necessary for the green transition.

1 Introduction

With the Federal Climate Protection Act *(Bundes-Klimaschutzgesetz (KSG))* coming into force in December 2019, Germany's national climate protection targets were incorporated in law for the first time. In line with the 2015 Paris Agreement, the focus is on achieving net greenhouse gas neutrality in the country through gradual decarbonization by 2045. In addition, negative greenhouse gas emissions are to be achieved from 2050 onwards, which will necessitate additional measures to remove greenhouse gases from the atmosphere by then at the latest (Section 3 (1) and (2) KSG). In addition, Basic Law obliges the state not only to protect the climate, but also – especially as climate change is advancing – to gear its actions as a legislator towards achieving climate neutrality (BVerfG, decision of March 24, 2021, 1 BvR 2656/18 et al., headnotes 1 and 2).

With regard to the implementation of national climate protection targets, this not only creates a particular sense of urgency. It rather calls for a special political responsibility and particularly intensive political action. After all, the next 20 years will be crucial for creating the necessary conditions for decarbonization so that the private sector can appropriately implement the structural change required to achieve climate neutrality by 2045 (Hüther et al. 2023).

Like its predecessor, the new federal government formed in spring 2025 remains committed to German and European climate targets. To enable Germany to "remain an industrialized country and become climate-neutral," the current coalition agreement provides for an approach "that combines climate protection, economic competitiveness, and social balance and focuses on innovation" (CDU/CSU/SPD 2025, p. 28). From a political perspective, the fundamental goal is to achieve an effective reduction in greenhouse gas emissions at an optimal economic cost, without causing social hardship or deindustrialization of the German economy (Steinbach/Valta 2019).

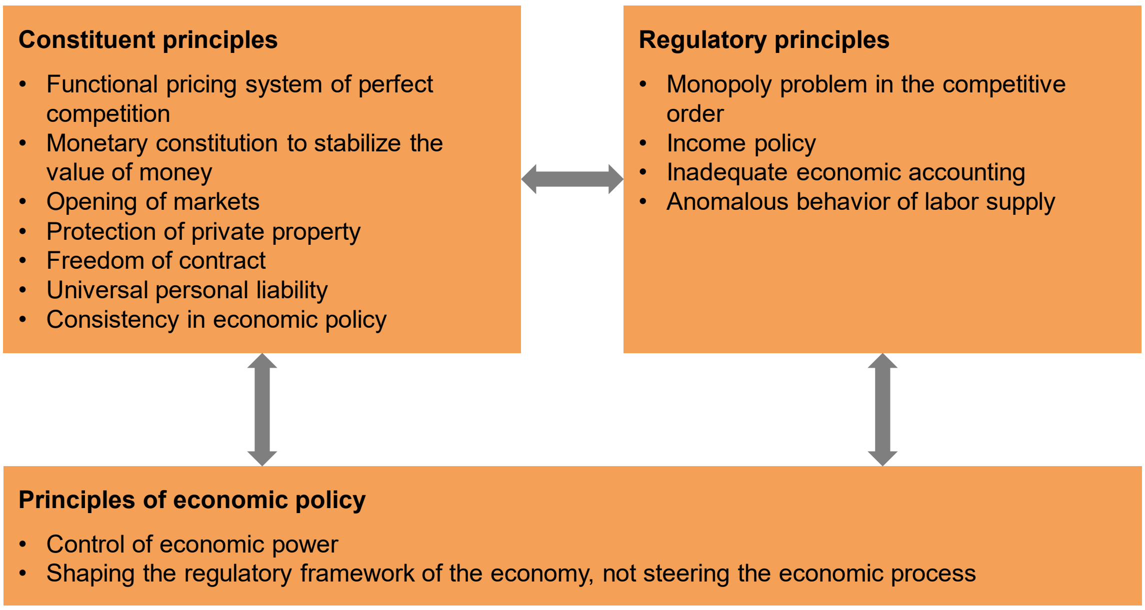
This study examines how the framework conditions in Germany can be designed to meet as far as possible the challenges of decarbonization and the requirements for regulatory and Mittelstand policy. Finally, the current economic structural change, which is driven by climate policy but also by fundamental crises, that occur repeatedly, raises the question of the continued existence or renewal of our current economic order (Fremerey/Hüther 2023). Not only due to the complex situation outlined here, it is by no means trivial to redesign the framework conditions necessary for a successful "green transformation" of the German economy. There is rather a danger that ad hoc measures or short-term impulses will create long-term structures that run counter to regulatory principles and, in particular, prevent the German Mittelstand from playing to its original strengths (flexibility, long-term orientation, etc.) (Welter et al. 2014).

2 Fundamentals of a regulatory Mittelstand and environmental policy

2.1 Regulatory and Mittelstand policy and their interactions

According to Eucken (1952), the economic order is the entirety of all laws, regulations, and standards that shape and determine economic activity in a national economy (see Figure 1). The specific form of this economic order is determined by regulatory policy. It is considered the key guiding principle of the "social market economy" of the Federal Republic of Germany (Lampert 1997) and is intended to reconcile the market economy with social equality and social participation. The relationship between competitive and social aspects can change over time and depends on the prevailing fundamental values in society (Schlecht 1990).

Figure 1: The regulatory framework of a market economy according to Eucken (1952)



Source: Based on Stoetzer (2001, Figure 1, p. 209), own translation.

In Germany, the Stability and Growth Act of 1967 *(Stabilitäts- und Wachstumsgesetz)*, last amended in 2015, provides the framework for the generally accepted objectives of economic policy (i.e., price stability, a high level of employment, steady and appropriate economic growth as well as foreign trade equilibrium (StabG 1967; BMWI 2015; Sachverständigenrat 2015). New challenges such as demographic change, digitalization, globalization, resource scarcity, and environmental degradation have led to the formulation of additional goals, like ecological balance, for instance (BMWI 2015).

A modern Mittelstand policy should primarily provide a reliable framework and offer planning security that Mittelstand companies to focus on their core business and realize their potential to the fullest. However, this does not mean that once regulatory framework conditions have been decided upon, they should be set in stone for all eternity. If due to technological progress or changing values new alternatives of action arise or if problems are reassessed, economic policy can and should respond. The greater the uncertainty and the more unpredictable developments occur, the more regulatory constraints lose their advantages (Klump 2013). In such situations of upheaval, temporary government intervention in the market may also be justified, for example, to steer economic structural change in a certain direction by promoting promising innovations (Hax 2004).

2.2 Environmental policy instruments

From an economic perspective, the emission of climate-damaging greenhouse gases because of economic activity represents a negative external effect whose consequences are not considered by the actors involved. These external effects must therefore be internalized (Pigou 1920). Coase (1960) showed that under ideal-typical circumstances (no transaction costs, complete information, and clear definition of rights of disposal), the desired goal can also be achieved by a (private) negotiation. In practice, however, these circumstances rarely occur, which is why government regulation becomes necessary.

For this purpose, the following environmental policy instruments are essentially available:[1]

- Regulatory instruments (mandates and prohibitions)
- Environmental economic instruments (environmental taxes, certificate trading)
- Indirect instruments (sustainability reporting, information, subsidies, etc.)

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1 For the sake of completeness, reference should also be made to the possibility of civil law regulation through appropriately designed environmental liability law. This works only under very restrictive assumptions that are not typically found in the field of climate protection (see, for example, Endres/Rübbelke 2022).

These will be briefly presented below. To highlight the specific advantages and disadvantages of each measure, we will first assume a closed economy.

Regulatory instruments are generally highly effective in terms of environmental impact, as they specifically prescribe or prohibit certain activities (Rogall 2010). For this very reason, however, they are also inefficient in macroeconomic terms, as they do not take individual circumstances into account. The marginal costs of greenhouse gas avoidance – which must be identical for all economic actors in the optimum (see, for example, Fritsch 2011) – differ.[2] In addition, there is no incentive for environmental innovation, as exceeding the applicable standards does not offer any advantages. Since regulations are often based on the current state of the art, there is, on the contrary, an incentive to prevent the development of new (more expensive) environmental technologies (Wolfsteiner/Wittmann 2011). Bonus (1984) succinctly refers to this as the "silent cartel of senior engineers."

When it comes to **environmental economic instruments,** a basic distinction can be made between price control through the imposition of an environmental tax and quantity control ("CO_2 certificates"). The levying of an environmental tax goes back to Pigou (1920) ("Pigou tax"): the cause of a negative external effect is charged a tax, with the tax rate ideally corresponding to the marginal external costs that arise in the social optimum. The emitter will now reduce its emissions as long as the marginal costs of greenhouse gas avoidance are lower than the tax rate to be paid (Endres/Rübbelke 2022).

In the case of quantity control through environmental certificates, a maximum limit is set for the annual amount of greenhouse gas emissions, and tradable rights of use are sold or allocated for this purpose (Wolfsteiner/Wittmann 2011).[3] Each actor will now reduce their greenhouse gas emissions as long as their marginal costs of greenhouse gas avoidance are lower than the market price of CO_2 certificates. Both systems result in the marginal costs of greenhouse gas avoidance being identical across all economic operators. They are therefore

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2 If the marginal costs of greenhouse gas avoidance differ, identical ecological effectiveness could be achieved at lower overall costs by allowing the actor with the higher marginal costs to avoid one unit of CO_2 less and the actor with the lower marginal costs to avoid one unit of CO_2 more. The total amount of CO_2 emitted would be identical, but the total costs would be lower. Consequently, the initial situation cannot be efficient.

3 Regarding the desired incentive effect, it is irrelevant whether the certificates are sold or allocated free of charge, since free allocation of greenhouse gas emissions incurs opportunity costs in the form of lost sales revenue.

efficient, as it is not possible to achieve a given emission level at lower overall economic costs (Endres/Rübbelke 2022). Furthermore, both approaches provide considerable incentives for the implementation of environmental innovations. Reduced greenhouse gas emissions lead directly to lower tax payments or to revenue from the sale of surplus CO_2 certificates (Wolfsteiner/Wittmann 2011). In terms of ecological accuracy, certificate trading has a more immediate effect, as the permissible emission quantities are clearly defined. In the case of environmental taxes, effectiveness suffers from the fact that emission values are not directly specified, and the tax rate cannot be easily reconciled with the target quantity (Endres/Rübbelke 2022).

Indirect instruments aim to change the behavior of economic actors by offering incentives or providing information. These can be purely voluntary offers, such as the provision of support programs for the implementation of climate-friendly measures in companies or private households, or the offer of (voluntary) environmental management systems ("eco-audits"). The instruments can also be mandatory, e.g., sustainability reporting or labeling requirements. But even in these cases, it is up to the customer to decide whether to base their behavior on this information (Rogall 2010).

At least the purely voluntary instruments, such as the launch of support programs, generally enjoy a high level of acceptance (Rogall 2010). However, this does not apply to mandatory instruments such as sustainability reporting, which often incur considerable costs and administrative expenses for those affected (Neligan et al. 2024), with dubious ecological benefits. The information provided does not directly save a ton of CO_2 emissions. And given the findings of game theory (e.g., prisoner's dilemma, free rider principle), it seems unlikely that it will trigger large-scale behavioral changes among customers. Subsidy programs, in turn, tend to be very inefficient due to the high free-rider effects typically associated with them. Overall, the ecological accuracy of indirect measures can therefore be considered very low (Rogall 2010).

3 Regulatory assessment of the green transformation of the German economy

In Chapter 2.2, we showed that, under ideal conditions, the green transition can best be achieved by means of environmental economic instruments. However, practical problems were not taken into account here. In this chapter, we first outline these problems and examine their impact on the fundamentally ideal environmental economic instruments.

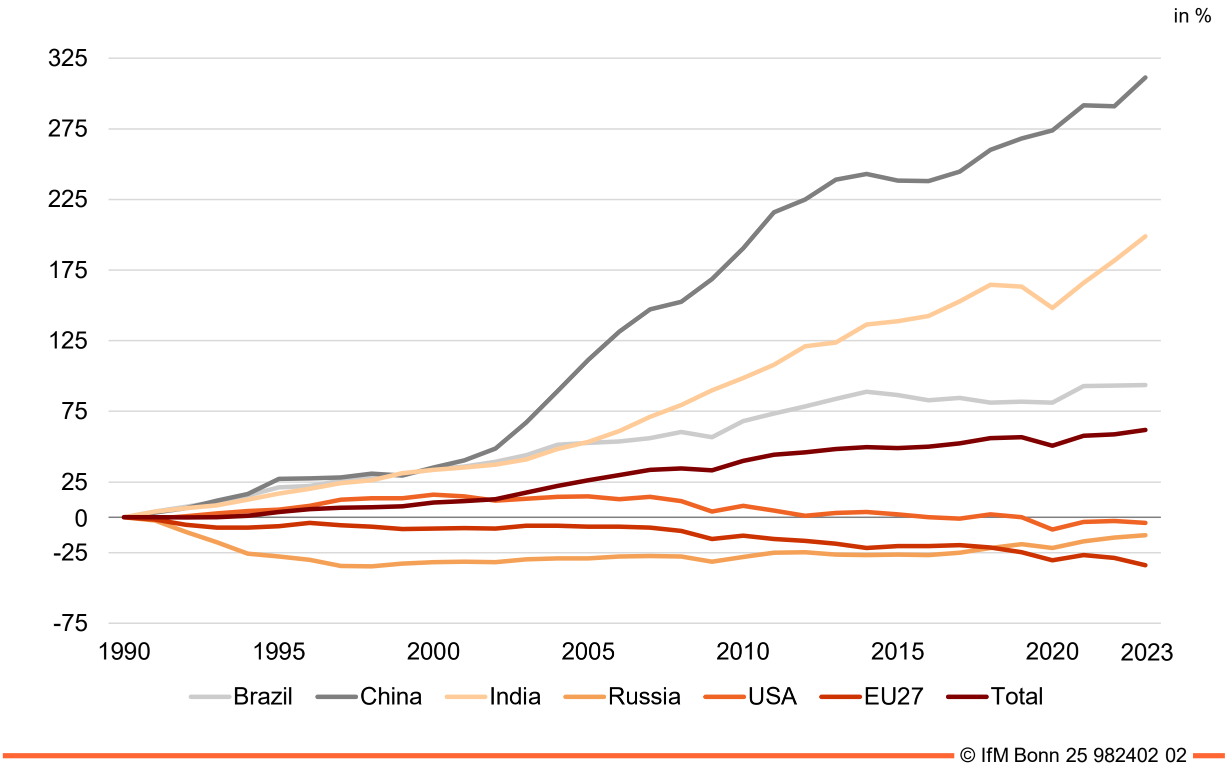
3.1 Fundamental challenges of the green transition

The green transition essentially aims to prevent unchecked anthropogenic global warming. Since there is no global authority that can impose binding regulations and sanction non-compliance, the joint efforts to combat climate change set out in the 2015 Paris Climate Agreement ultimately represent only national commitments ("Intended Nationally Determined Contributions"): Each country independently determines the percentage by which it wants to reduce its greenhouse gas emissions. This leads to the following challenges when establishing the necessary framework conditions:

- Global coordination and incentive problem
- Politically induced fundamental structural change in a short period of time
- Ongoing innovation problem
- Balancing continuity and flexibility in the framework conditions
- Acceptance of climate policy in business and society

The **global coordination and incentive problem** stems from the fact that global climate protection is a public good. Its benefits accrue to all countries, regardless of whether they participate in climate protection or not. From the perspective of individual countries, it would therefore be optimal to benefit from the efforts of other countries as "free riders" without implementing cost-incurring measures themselves. This leads to a divergence between the (selfish) individual interests and the collective interest of all countries in limiting climate change. This could be resolved by establishing and enforcing binding regulations through a higher authority, which, however, does not exist at the global level. In extreme cases, this can lead to isolated climate protection efforts in some countries causing certain climate-damaging activities to be relocated to countries with lower climate protection and environmental standards, resulting in an increase in global greenhouse gas emissions.[4] This effect is also evident in the fact that global greenhouse gas emissions have continued to rise despite the ambitious climate protection efforts of Germany and the EU (see European Commission 2025a). Even an immediate cessation of all greenhouse gas emissions in the EU would have virtually no measurable effect on the global climate, as EU emissions currently account for only 5.9% of global greenhouse gas emissions (see European Commission 2025a). European solo efforts are therefore largely ineffective and run the risk of sacrificing valuable value creation and welfare potential with good intentions, which – once lost – cannot be rebuilt or can only be rebuilt in the very long term.

Figure 2: Development of greenhouse gas emissions in the European Union and in the five other countries with the highest emissions worldwide, 1990-2023 (base year: 1990)



Source: European Commission (2025b), Emissions Database for Global Atmospheric Research, own calculations.

The green transition requires fundamental structural change in all areas of the economy and society. Structural change is quite normal for market-based

4 In fact, (Western) European countries emit significantly less CO_2 per unit of gross domestic product than most other countries (European Commission 2025a).

systems. However, it is usually initiated by innovations that trigger far-reaching consequences and follow-up innovations in the economy.[5] The main drivers of structural change are the profit opportunities (temporary monopoly profits) that open up for innovators and encourage them to take risks and make the necessary investments. In contrast, the green transition is a **politically induced structural change**.[6] It therefore cannot rely on market economy momentum, or only to a limited extent. In addition, the transformation process is to take place within a short period of time amid a high degree of uncertainty, and not all countries are pursuing ambitious climate protection policies. This results in different competitive conditions that can affect European companies in their business model and investment decisions. This is not only due to higher energy prices resulting from the transformation, but also to uncertainties as to whether companies will be able to generate sufficient demand on the markets for their climate-friendly or climate-friendly manufactured products. In some cases, it is not even clear whether the technical production requirements for climate-friendly production processes will be available in the near future.

Ongoing innovation is necessary for the green transition to succeed. Ideally, products and processes will be developed that are both climate-friendly and economically advantageous. This requires fundamental innovations in many areas (e.g., nuclear fusion energy or energy storage technologies), although it is currently uncertain which technologies will be used to avoid or neutralize greenhouse gas emissions in the future and how the economy, mobility, energy supply, and heating systems can be organized. This requires bringing together knowledge and potential distributed among decentralized actors such as universities, research institutions, and companies and harnessing it for the most cost-efficient green transformation possible. The scientific and societal search for the best solutions (also over time) should be kept open, and as many actors from different countries and sectors as possible should be involved.

Another important point is the need to **strike a balance between continuity and flexibility in the framework conditions.** On the one hand, the green

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5 Nikolai Kondratieff (1926) and later Joseph Schumpeter (1939) developed a theory of long-term, wave-like fluctuations in the global economy. These long waves, which last approximately 50 to 60 years, are triggered by fundamental technological innovations, known as basic innovations, and their widespread use leads to profound changes in the economy.

6 This does not rule out the possibility that lucrative new market opportunities may arise for individual economic sectors (e.g., climate-friendly technologies), especially if many countries pursue climate neutrality as a binding goal.

transition requires significant adjustments and investments, especially from companies that are heavily affected. To this end, they need the greatest possible planning security – both with regard to expected market conditions and the (economic) policy framework. On the other hand, there are considerable uncertainties regarding the technologies that will be available in the future, as well as geopolitical developments. It is therefore hardly possible to consider all development scenarios and effects of policy measures in advance. As a result, readjustments may be necessary, which in turn can cause uncertainty among companies. However, it may not make sense to insist on a status quo that proves to be suboptimal, for example, in the wake of new technical developments.

Finally, the **acceptance of climate policy in the economy and society** also poses a challenge. In free, democratically organized societies, politically induced changes that imply a fundamental transformation of economic and lifestyles always require a certain degree of acceptance by the population. The desired structural change can only be successfully implemented if companies, research institutions, and other stakeholders contribute their expertise (preferably intrinsically motivated). Since the resources used for climate protection compete with other uses of funds, the acceptance of climate policy depends largely on the cost-benefit ratio of the expenditures and thus on their proportionality. The strong dependence of the effectiveness of climate policy on the behavior of other countries can have a negative impact on acceptance, especially in the event of possible evasive reactions by companies. In countries such as Germany, the United Kingdom, and Australia, which are "pioneers" in pursuing very ambitious climate policies, negative developments such as job cuts, investment hesitancy, and production relocations are increasingly evident in the industrial sector (see, for example, DIHK 2025; Küper et al. 2025 for Germany).[7] If these developments continue, it is foreseeable that ambitious climate policies in Germany, the EU, and also outside the EU (e.g., in developing and emerging countries) will face increasing acceptance problems.

Germany's climate policy, which is particularly ambitious by international standards, is already resulting in high energy prices. In addition, it is foreseeable that the EU Emissions Trading System (EU ETS) will gradually make greenhouse gas-based production processes increasingly expensive. This will result in competitive disadvantages for companies that compete internationally. For companies to continue to make substantial investments under these difficult conditions,

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7 Of course, these are not caused exclusively by climate or energy policy.

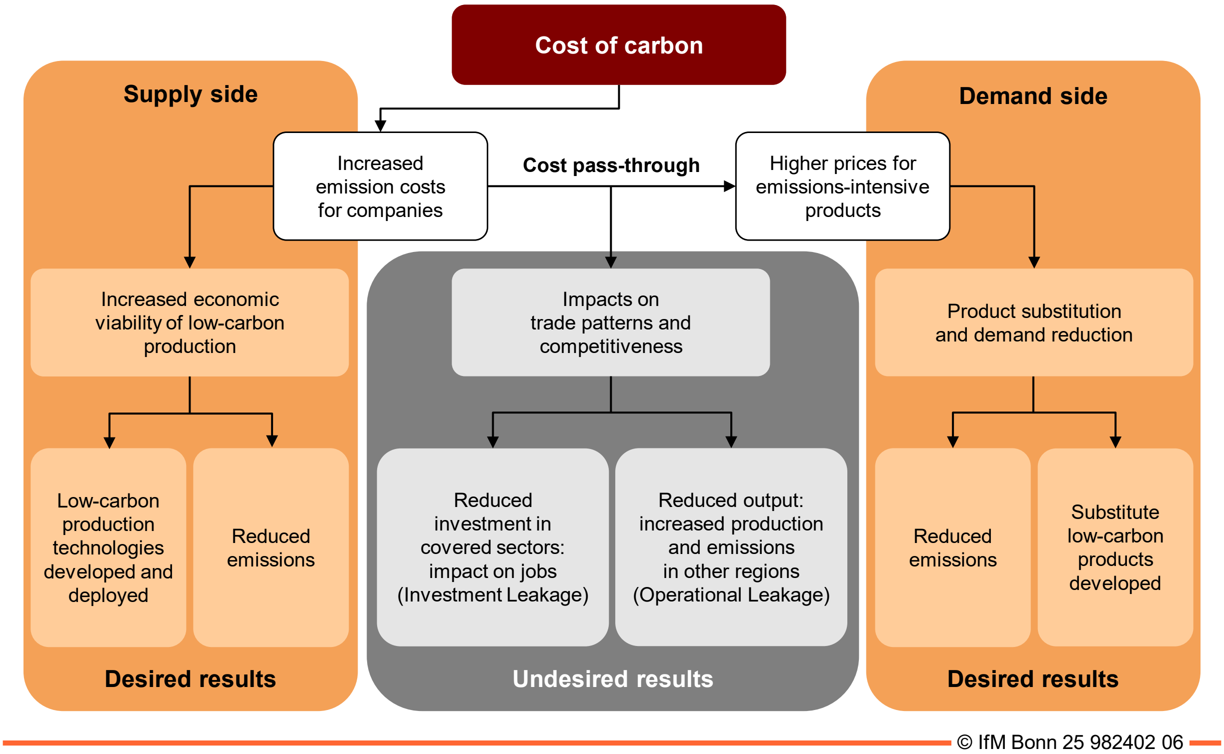
they must have other distinct competitive advantages that can be maintained even under the climate neutrality target and that more than compensate for the price disadvantages. Otherwise, they will either modify their business model, relocate their business activities outside the EU, or (largely) cease operations.[8] From the perspective of companies, stable (economic) policy conditions that promote planning security are undoubtedly important. However, their content and the implicit (international) competitive effects are also relevant. From the perspective of global climate protection, achieving national climate targets is ultimately meaningless if industrial production and greenhouse gas emissions are simply relocated to countries with lower climate protection standards.

3.2 Choice of environmental policy instruments under the specific conditions of the green transition

The pricing of greenhouse gas emissions – whether through a tax, an emissions trading system, or a hybrid of the two – is generally regarded as an integral and cost-effective way of reducing emissions and mitigating the negative effects of climate change (see, for example, Baumol/Oates 1988). Especially when the reduction of a specific amount of emissions is to be achieved at the lowest possible cost (static efficiency), environmental economic instruments are preferable to regulatory instruments (Wein 2025). However, the political implementation of this uniform pricing of greenhouse gas emissions is challenging given the different starting points and interests in industrialized and developing countries (Meckling/Chung 2009). Global coordination and incentive problems can lead to internationally unharmonized climate policy, in particular inconsistent pricing of greenhouse gas emissions (Rafaty et al. 2025). This leads to "carbon leakage," which is undesirable from a climate policy perspective: greenhouse gas emissions are shifted to countries with less restrictive climate policies instead of being reduced overall (Grubb et al. 2022). To avoid or at least mitigate such undesirable effects on existing trade and competition structures (see Figure 3), supplementary measures can be taken (Branger/Quirion 2014).

8 According to the German Chamber of Industry and Commerce (DIHK 2025), companies lack a clear vision of how they can become climate neutral as quickly as possible while remaining competitive – instead of taking action, they are adopting a wait-and-see approach. Just under 37% (or 59%) of (large) industrial companies are planning or implementing a reduction in their domestic production and relocation abroad.

Figure 3: Desirable and problematic effects of greenhouse gas emissions pricing



Source: Own representation based on Grubb et al. (2022, Figure 5, p. 762).

It should be noted here that – apart from the unrealistic case of generally binding and uniform pricing of greenhouse gas emissions for all economic entities based on a correspondingly designed international climate agreement (Branger/Quirion 2014) – none of these supplementary measures can comprehensively solve the challenges associated with the green transformation on their own (Böhringer et al. 2012).

One option is to refund the additional government revenue generated by greenhouse gas emissions pricing to those affected. Where possible, a flat-rate form should be chosen rather than "targeted" relief. Exemptions for selected industries reduce the effectiveness and efficiency of greenhouse gas pricing and also disadvantage companies from non-favored industries that may well be in competition with companies that receive relief.

Another option is to allocate emission allowances to market participants free of charge within the framework of emissions trading systems. This is a simple and unbureaucratic measure that also largely preserves the effectiveness and efficiency of certificate trading. The problem here may be determining the allocation formula. For example, allocation based on past consumption favors long-established companies over new entrants (“grandfathering”).

Finally, attempts can be made to reduce undesirable steering effects by means of a border adjustment mechanism. This approach, which is also pursued by the EU within the framework of the EU ETS (European Union 2023), provides for a levy on imports from regions that have implemented no or less restrictive measures for climate protection and greenhouse gas emissions pricing, while on the other hand, exports from EU companies to these regions are relieved (Peterson/Schleich 2007). This approach is opposed by doubts about its legality under international trade agreements (Ruddigkeit 2009). In addition, they have a negative impact on the effectiveness and efficiency of an emissions trading system and incur considerable transaction costs (Crals/Vereeck 2005).

In addition to these purely economic factors, the social acceptance of climate policy and thus ultimately its long-term success depend on a distribution of its costs that is perceived as fair (Baranzini et al. 2017). There are therefore certain hurdles to the political implementation of greenhouse gas emissions pricing, as these instruments tend to have a regressive effect and place a proportionally greater burden on lower-income households (compared to higher-income households) (Noka et al. 2021). This makes it all the more important to redistribute the additional government revenue generated by greenhouse gas emissions pricing back to citizens. Similar to comparable compensation payments to companies, this should take the form of a lump sum rather than a reduction in the cost of energy consumption, which would counteract the incentives to reduce emissions created by the pricing of greenhouse gas emissions (Baranzini et al. 2017).

4 Policy assessment of the green transformation

4.1 Impact on the Mittelstand

Not least because of its heterogeneity, the German Mittelstand can be affected by the transformation to varying degrees, either directly or indirectly. The impact is felt through various real economic, regulatory, and more "atmospheric" channels (see Overview 1). The greater the impact, the greater the challenge for companies to respond to the changed conditions and modify their production processes and their product and service ranges in the direction of "climate neutrality".

Overview 1: Impact on Mittelstand companies – channels of impact

Type of impact channels	Specific influencing factor
Real economy	Direct impact: • Extent of greenhouse gas emissions in the production process (pricing of CO_2 allowances, regulations and prohibitions) • Proportion of goods and services produced whose use/provision is associated with greenhouse gas emissions • Extent of energy consumption (energy costs) Indirect impact: • Transformation-related changes in scarcity and prices for important production factors • Transformation-related (quantity and price) changes among important customers or suppliers, or even at more distant stages of the value chain
Regulatory	• Extent of control/regulatory density and bureaucratic costs
Atmospheric	• Extent of uncertainty regarding future market and technology developments and (climate policy) framework conditions • Overall social and economic sentiment or assessment of the green transformation

Source: Own representation.

In terms of the **real economic impact channels**, the extent to which Mittelstand companies are affected depends directly on the extent to which their production processes involve greenhouse gas emissions or the extent to which the goods and services they produce release greenhouse gases when used/provided. Over time, rising costs due to the EU ETS and the resulting weakening of (price) competitiveness are to be expected. The pressure to adapt to climate neutrality is therefore likely to increase. In addition, companies are currently also affected by high energy costs, which put them at a disadvantage in international competition. The level of energy costs is ultimately also a result of the energy transition towards climate neutrality.

Companies may also be indirectly affected by the green transformation through real economic channels. If important production factors (e.g., capital, personnel, raw materials, etc.) are needed for the green transformation, they are no longer available for expanding production potential. If Mittelstand companies are integrated into value chains, the impact of the green transition on important suppliers (e.g., from the steel or chemical industry) or customers (e.g., in the automotive industry) can spread along the value chain in the form of price or volume changes, resulting in further indirect impacts on the German Mittelstand.

The extent of the impact via **regulatory channels** depends on how “Mittelstand-friendly” or burdensome the regulatory framework for the green transition is. Ideally, it will give Mittelstand companies generous scope for action and flexibility to implement company-specific solutions. In reality, however, there are often detailed regulatory requirements that do not allow this. In addition, regulations are often associated with additional bureaucracy, which causes monetary and psychological burdens and deprives companies of scarce resources (Holz et al. 2023).

The **atmospheric channels of influence** in the form of uncertainty about future market, technology, and competitive conditions, or even about the climate policy framework conditions that will apply in the future, can trigger varying degrees of uncertainty among companies and influence their investment and transformation decisions. Some of these uncertainties are inherent to transformation, as future market and technology developments and potential innovation leaps are difficult to predict. However, they can also be the result of frequently changing and inconsistent regulations. Finally, the mood and assessments of society as a whole and the economy as a whole regarding the green transition can also have a motivating or paralyzing effect, thus impairing the transition process of companies and the overall economic dynamic.

4.2 Transformation-related strengths and weaknesses of the German Mittelstand

Although Mittelstand companies are heterogeneous in nature, they are characterized by certain values and structural features that shape their behavior and thus also their response to the diverse challenges of the green transformation (see Overview 2).

Overview 2: Transformation-related strengths and weaknesses of the German Mittelstand

Strengths	
Goals/attitudes/ values	• High importance of meta-economic goals (including climate protection) • Social responsibility toward employees, market partners, region, etc. (even in crisis situations, loyalty to company location) • Long-term orientation
Company specifics	• Motivating corporate and innovation culture • Greater flexibility and faster decision-making processes • Non-price competitive advantages (quality, service, close customer relationships)
Weaknesses	
Goals/attitudes/ values	• Skepticism regarding the acceptance of external capital • Lower risk appetite/preference for a more gradual approach (innovation, financing, corporate development)

Company specifics	• Lower availability of resources:
	  • Lower strategic management and time capacities
	  • Lower staffing levels
	  • Lower financial reserves
	• Lower risk-bearing capacity

Source: Own representation.

The target system of owner-managed Mittelstand companies often differs from that of (management-led) non-Mittelstand companies. The unity of ownership and management enables Mittelstand entrepreneurs to bring their own values and goals to the company. They are generally under less external pressure to maximize profits and, due to their strong regional ties, place greater value on creating and maintaining so-called socio-emotional wealth (SEW), i.e., recognition and reputation in their home region (Gómez-Mejía et al. 2007). The long-term orientation, which is usually much more pronounced in Mittelstand than in non-Mittelstand companies, also favors their transformation efforts (Pahnke et al. 2019). These aspects also motivate them to proceed cautiously and, as far as possible, in a manner that preserves their assets when it comes to their transformation plans and any necessary (high) investments, despite (sometimes considerable) risks and uncertainties.

As a result, Mittelstand companies are increasingly implementing environmental goals in their business practices. This is reflected, among other things, in a greater willingness to take climate protection measures, such as innovations in production processes (Pahnke et al. 2019). Furthermore, they generally feel a great social responsibility towards their employees, market partners, and the region (Schlepphorst et al. 2022). Not least for this reason, relocations (due to cost considerations), which larger companies are increasingly considering in the transformation process (DIHK 2025, Küper et al. 2025), are often not an acceptable option for Mittelstand companies (Rieger-Fels et al. 2024).

Various attributes specific to Mittelstand companies can also have a positive effect on the success of the green transformation. The appreciative and motivating corporate and innovation culture found in many Mittelstand companies (Finger et al. 2024), which deliberately creates entrepreneurial flexibility, allows new innovative solutions to be developed and implemented, also in collaboration with external partners. The unity of ownership and management enables greater flexibility and rapid decision-making processes in Mittelstand companies (Pahnke et al. 2019). Many Mittelstand companies operating in international markets also have non-price competitive advantages (e.g., quality, service, close customer relationships) (Holz et al. 2016), which can compensate to a certain extent for the cost disadvantages arising from the green transformation.

However, these strengths are offset by specific weaknesses of Mittelstand companies, which can make the adjustments required in the course of the green transformation more difficult. For example, the desire for independence, that is characteristic of many Mittelstand companies, often results in skepticism about raising external (equity) capital. Many owners fear that the associated rights of co-determination and control will have a negative impact on their independence and their corporate culture, which is more oriented toward the common good and cooperation (De Massis et al. 2018). In this way, however, Mittelstand companies prevent the expansion of their traditionally limited (financial) resources, which are particularly needed in the upcoming transformation process. In addition, the pursuit of long-term independence, responsible action, and (personal) liability for losses tend to result in a risk-averse corporate policy (Pahnke et al. 2019). As a result, Mittelstand companies show a preference for a gradual approach in many areas (e.g., innovation, financing, corporate development). They are often skeptical of major upheavals, such as the green transformation.

In general, the tendency for Mittelstand companies to be smaller in size goes hand in hand with a certain scarcity of resources: smaller staffing levels and the heavy involvement of owners in day-to-day business mean that Mittelstand companies in particular often lack the expertise and time to strategically shape the green transformation. Transformation efforts are also hampered by the lower financial resources and risk-bearing capacity of Mittelstand companies.

4.3 Assessment of the green transition from the view of the German Mittelstand

The fundamental regulatory problem of the green transition for Mittelstand companies is that the (initially) unilateral restructuring of the economy and society towards climate neutrality implies different international framework, competitive, and cost conditions. At least initially, this leads to substantial cost disadvantages and uncertainties regarding market, technology, and framework conditions. These impair the international competitiveness of Mittelstand companies and make necessary investments more difficult.

If strategic plans are made, industrial companies often include restrictions on domestic production and relocation abroad (DIHK 2025). After all, around one-fifth of industrial companies have not yet looked closely at the green transition and have not yet drawn up any transition plans with specific climate neutrality targets (DIHK 2025; Scherer/Eckardt 2025). Some are too heavily involved in day-to-day business; some do not (yet) see any viable prospects for their climate-friendly transformation; and some are critical of the success of the green transformation as a whole and expect a fundamental change in the framework conditions, so that they do not want to make extensive and risky investments at the current stage.

It is sometimes claimed that the German Mittelstand lacks the willingness to take risks and the “visionary power” to fundamentally rethink and further develop their own business models – even in the face of growing international cost pressures (Demary 2024). This is countered by the fact that Mittelstand companies have operated successfully on global markets without the additional cost burden associated with transformation, and that their competitors outside the EU (who often produce in a more CO_2-intensive manner) are exempt from the need for fundamental, risky transformation (Küper et al. 2025; Astheimer/Jansen 2025). Not least for this reason, despite the climate awareness of the German Mittelstand, the green transformation is facing acceptance difficulties that will continue to increase with the rising cost pressure from the EU ETS. Uncertainties, risks, high investment costs, and a lack of energy infrastructure stand – even with the best intentions – in the way of the investments that would be necessary to enable climate-neutral and competitive production.

The problems described above, which the German Mittelstand faces in the course of the green transformation, are primarily related to the framework conditions set by politicians and fundamental regulatory decisions. According to the experts we interviewed, policymakers have placed too much emphasis on setting targets ("greenhouse gas emission targets") in the design of the green transition and too little consideration on the transition processes themselves and the multitude of challenges they entail. Particular mention should be made here of critical key processes and bottleneck factors, international repercussions, and the development of alternative energy infrastructures. However, the consistency and coherence of the transformation instruments and measures have also been given too little consideration.

In addition, Mittelstand companies note that they are not sufficiently involved in shaping the transformation and the (regulatory) framework conditions, with the result that these often do not adequately take into account the needs of businesses. Above all, the extensive "compliance bureaucracy" ties up the scarce resources of Mittelstand companies, which are urgently needed for the transformation. It is also seen as a (further) sign of the government's mistrust of their entrepreneurial integrity and qualifications.

Under the current conditions of internationally varying pricing for CO_2 emissions, the green transition is creating a significant number of "artificial" (transitional) markets for climate-friendly production processes and products, supported by subsidies and grants. This is done in the expectation that many countries will follow the example of Germany or the EU as quickly as possible and that cost-saving, fundamental innovations will be developed. The transformation policy in Germany thus aims to compensate for the disadvantages of climate-friendly production processes and products resulting from the transformation. However, the wide range of (support) measures and subsidies is associated with high costs and significant risks of losses and misallocations. They also imply extensive bureaucracy (in terms of control and verification) and a high density of regulation. This is accompanied by an impairment of market economy dynamics and the "ethos of the German Mittelstand", which is generally characterized by independence, performance orientation, self-efficacy, market competitive advantages, and independence from government transfers.

From the perspective of the German Mittelstand, a key question of the green transformation is how companies can achieve climate-friendly restructuring while remaining competitive. Value chains and business models, which have often developed gradually over many years or decades through trial and error, must now be abruptly rebuilt at great expense and with considerable risk. These problems and risks argue in favor of a transformation process spread out over time, allowing more time for market-based search processes and a more gradual restructuring. In this way, the necessary investments could also be more easily integrated into the regular, long-term (often 20-year cycle) investment planning of Mittelstand companies.

5 Conclusion and recommendations for action

Due to their long-term orientation and awareness of their social responsibility, the majority of the German Mittelstand is intrinsically motivated to contribute to climate protection (Dienes et al. 2021). However, many Mittelstand companies are still reluctant to implement the green transition in practice. This is partly because many current and planned climate regulations are economically inefficient and also place a particular burden on the German Mittelstand. Although the green transition will inevitably result in burdens and upheavals for the German Mittelstand as well, its framework conditions should, however, be efficient and, as far as possible, "Mittelstand-friendly". In particular, legal requirements should enable Mittelstand companies to leverage their specific advantages, such as flexibility and creativity, to advance the green transition. A number of key points should be reconsidered for the transition phase.

The current and planned climate regulations are a hodgepodge of different and uncoordinated measures: In addition to environmental economic elements (e.g., pricing of greenhouse gas emissions), there are still a multitude of regulatory requirements and prohibitions, reporting obligations, and subsidies. This is economically inefficient, as a given level of climate protection could be achieved at lower cost with a stringent environmental economic system. Climate regulations also place a particular burden on the German Mittelstand: they create a considerable amount of additional bureaucracy, which causes particular problems for Mittelstand companies due to their tendency to have limited resources. In this context, the extensive "compliance bureaucracy" is particularly noteworthy, as it ties up resources that would be better used directly for the transformation. It is also seen by many Mittelstand companies as (yet another) sign of the government's mistrust of their integrity and qualifications, thus undermining the intrinsic motivation of companies to do something for climate protection, which is certainly present. The numerous regulatory requirements, in turn, prevent the German Mittelstand from playing to its original strengths and developing creative, company-specific solutions.

Precisely because the green transition will inevitably entail burdens and structural changes for the German Mittelstand, a good regulatory framework should be designed in such a way that additional, unnecessary burdens on Mittelstand companies are avoided. Politicians should therefore bear in mind that the better the transformation policy is thought through holistically, the more successfully the German Mittelstand will be able to implement the transformation, while at the same time ensuring planning security, long-term stability, and flexibility in the framework conditions. Here, Mittelstand policy has a fundamental decision to make about the relationship between government intervention and market dynamics. With regard to climate policy, consistency and reliability are called for. At the same time, the appropriateness and proportionality of the targets must be ensured. A climate policy that does not take into account losses of prosperity, possible job losses, and (social) redistribution effects in Germany and in economically weaker (EU) countries runs the risk of failing due to a lack of acceptance. Similarly, a climate policy that goes hand in hand with advancing deindustrialization in Germany and the simultaneous relocation of production to countries with lower environmental standards (and subsequent re-importation of goods) will meet with little understanding. Ideally, regulatory measures and the like should be dispensed with and a global CO_2 trading system should be put in place instead. This seems unrealistic at present. However, at the very least, as many countries as possible should be persuaded to participate in a uniform CO_2 trading system. Unilateral solutions fail to recognize economic realities: fossil fuels that are not used in Germany or the EU do not remain unused in the ground but are instead used in other countries.

For climate protection within the EU, this means that the economically and ecologically sensible CO_2 trading system must be accompanied by flanking measures to keep “carbon leakage” within reasonable limits. There are various options here, none of which are perfect. The introduction of a border adjustment mechanism currently planned for the EU will entail additional bureaucracy, especially Mittelstand companies that are oriented toward the global market. This approach is also problematic in that it leads to distortion in favor of (relieved) exports. On the one hand, this would reduce the climate protection effects and, on the other hand, it would disadvantage Mittelstand companies, which tend to focus on EU markets on average (Pahnke et al. 2023), relative to large companies. It also seems questionable to what extent the idea of imposing a corresponding tax on imports into the EU can be implemented without running the risk of triggering trade wars.

Alternative options are based on the assumption that incentives for the avoidance of CO_2 emissions depends solely on the substitution effect and not on the income effect. This could be achieved by continuing to issue allowances free of charge or by providing companies with a (flat-rate) refund of revenues. Both approaches avoid the disadvantages of the border adjustment mechanism described above. However, it is by no means trivial to determine the allocation mechanism or refunds. From the perspective of the German Mittelstand, both options have the advantage of significantly lower bureaucratic burdens. The financial burden on Mittelstand companies is also significantly reduced on average due to the reduced income effect, while the ecological effectiveness remains the same.

The transition period to a greenhouse gas-neutral economy should be extended. The current timeline (EU by 2050) appears very ambitious given the fundamental restructuring it entails. Considering the enormous uncertainties and risks associated with the transformation, as well as the high investment requirements, a longer time horizon for the green transition would allow more time for the development and implementation of the necessary technologies. This would also be helpful for the transformation of Mittelstand companies as it would prevent them from becoming overburdened. Under no circumstances should Germany strive to “exceed” the EU targets.

Essential technologies (energy storage media, nuclear fusion, etc.) are currently still lacking for the transition from fossil fuels to renewable energies. As a result, very high energy prices in international comparison place an additional burden on industrial Mittelstand companies in particular. Reliable framework conditions also include reasonable energy costs. The latter are essential prerequisites for the success of the green transformation. Climate policy and energy policy should therefore be closely interlinked. In this context, it seems ill-advised to introduce an “industrial electricity price” for a narrowly defined group of companies. This is associated with well-known problems, such as the delimitation of beneficiary companies, which will always be arbitrary to a certain extent. Instead, the politically induced part of energy costs, such as back-up power plants for dark doldrums or a complex grid infrastructure, should be publicly financed in accordance with the “who orders, pays” principle and not passed on to Mittelstand companies. Finally, government research funding, especially for basic research, could help to develop the necessary technological advances for the green transformation as quickly as possible, thereby keeping the problematic transition phase as short as possible.

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