

Andreas Fischer

Europe's Twin Imperative: Securing Energy Supply While Advancing Climate Goals

Europe faces a dual challenge: eliminating lingering dependencies on energy imports while simultaneously accelerating the transformation towards climate neutrality. Recent shocks – Russia's attack against Ukraine in 2022 and the disruption to oil and liquefied natural gas flows via the Strait of Hormuz in 2026 – expose how fragile today's supply structure remains and how directly this fragility weighs on industrial competitiveness and macroeconomic performance. This article argues that resilience and decarbonisation are not mutually exclusive and that the only durable response to both imperatives is a consistent, cost-efficient clean energy transformation – pursued with urgency and coordinated at European scale.

The blockade of the Strait of Hormuz and the resulting energy supply constraints – affecting roughly one-quarter of global oil flows and one-fifth of global liquefied natural gas (LNG) shipments (IEA, 2026b) – are a painful reminder of the price volatility in the early days of Russia's invasion of Ukraine. Although direct European exposure to Hormuz transit routes is limited, price increases on global markets still reach Europe. The macroeconomic consequences have already prompted significant downward revisions to European and global growth forecasts: according to a recent study, world GDP growth stands at only 2% and global trade at 1.7% in 2026 (Grömling et al., 2026). Europe may thus be confronted by the second structural energy shock since 2020.

The recurring pattern is clear: every crisis reveals the accumulated cost of fossil dependency. The case for treating energy security and climate transformation as a single challenge has never been stronger. Already during the 2022-2023 energy crisis, the EU identified the clean energy transition – a massive expansion of renewable capacity

combined with cross-sectoral electrification – as the principal long-term strategy for reducing import dependence and strengthening resilience. That conclusion remains correct, and it applies with equal force to the current supply shock: transformation simultaneously advances climate goals and builds the resilience that the EU has declared a central objective. It does so in two ways: first, by expanding locally generated, climate-neutral electricity supply and electrification; and second, by enabling Europeans to construct and operate this future energy system as efficiently as possible, thereby reducing energy costs durably and strengthening the competitiveness of European industry. Some progress has already been made in this regard, but significant dependencies and obstacles to the transformation remain.

Resilience, not just diversification: A united energy transition

The EU's ambition to strengthen its resilience – above all, in energy supply – raises the question of what resilience actually means and what can realistically be achieved. Resilience, unlike robustness, does not imply complete insulation from external shocks. It denotes the capacity to absorb disruptions without lasting damage and to restore supply chains quickly. Several measures can be taken to strengthen resilience. Less invasive options, such as closer supply chain monitoring or larger buffer stocks, improve preparedness and adaptability, but do not fundamentally reduce vulnerability. Meaningful protection requires structural change: a decisive shift towards nearby and trusted suppliers, and in particular, greater domestic provision of critical inputs (Kolev-Schaefer et al., 2025).

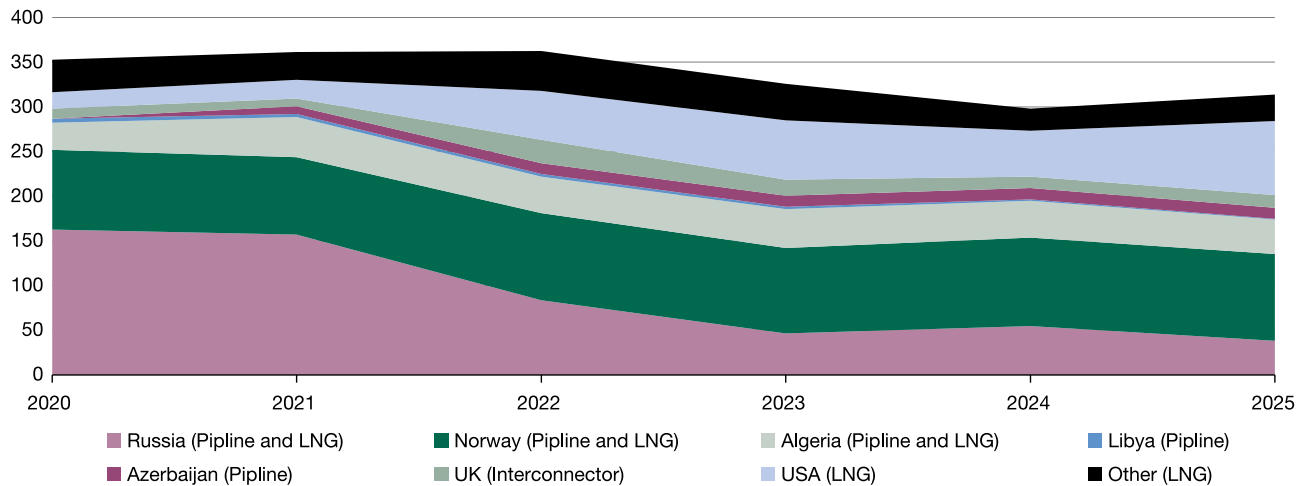
© The Author(s) 2026. Open Access: This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<https://creativecommons.org/licenses/by/4.0/>).

Open Access funding provided by ZBW – Leibniz Information Centre for Economics.

Andreas Fischer, German Economic Institute (IW),
Cologne, Germany.

Figure 1
EU natural gas imports by origin, 2020-2025

in billion cubic metres



Note: LNG: liquefied natural gas.

Source: Bruegel (2026).

Applied to energy supply, this framework points beyond a simple diversification of import sources – as has occurred for gas since 2022 through expanded LNG procurement from a wider supplier base. The deeper question is how Europe can systematically reduce its dependence on fossil energy imports altogether. The answer must be pursued in tandem with two other objectives: the transition to climate neutrality and the maintenance of open global trade. Balancing these three goals simultaneously is demanding, and trade-offs are unavoidable.

This compounds the existing challenge of transforming Europe's energy system – with a focus on clean power generation and the electrification of end uses such as electric vehicles, heat pumps and industrial processes – in order to achieve climate neutrality by 2050 while at the same time capturing the cost advantages of cheap renewable energy and an integrated European electricity grid. This energy transition will not make Europe entirely independent, but it remains the central pathway and the foundation for a more resilient and competitive energy supply. The path to resilience runs through the joint development and optimisation of Europe's energy system and, ideally, through a coordinated approach across all member states.

A structural snapshot: How dependent is Europe's gas supply?

The scale of Europe's remaining fossil import dependence – and the extent of adjustments already made – is

clearest in the case of gas (see Figure 1). Since Russia's invasion of Ukraine, Europe has, under considerable effort, reduced its dependence on Russian gas from nearly 50% to slightly above 10% – a reduction of more than 75% (Bruegel, 2026). This did not happen overnight: it required targeted infrastructure adjustments and European coordination to restructure supply (Fischer et al., 2022).

Russian gas continues to reach eastern Europe via the Turk-Stream pipeline, and Russian LNG deliveries to EU ports remain ongoing. Pipeline imports from Norway and Algeria have partially offset Russian losses: Norway's share has risen from 25% in 2020 to over 30% in 2025, while Algeria's share has increased modestly (Bruegel, 2026). Small volumes also arrive by pipeline from Azerbaijan – a supplier that has extended deliveries as far as Germany and Austria since 2026. Overall, however, the scope for additional pipeline substitution remains limited.

EU gas demand has also fallen sharply, by approximately 19% between 2021 and 2024 through household savings, industrial substitution and fuel switching in power generation (Eurostat, 2026). This demand reduction is itself a major security contribution as it widens the buffer between supply and consumption. However, it was also accompanied by significant economic losses due to declines in production.

The most striking structural change is the rise of LNG: its share of EU gas imports has grown from around 20% in 2021 to approximately 45% in 2025, facilitated by exist-

ing and newly built regasification infrastructure. Today, around 20%-25% of all European gas imports arrive from the United States – a threefold increase since 2021, representing roughly 60% of EU LNG imports (Bruegel, 2026). Thanks to its increased focus on LNG, Europe has become significantly less dependent on individual suppliers. This is because, unlike pipeline connections, tankers from all over the world can serve as suppliers. The downside, first of all, is the generally higher historical cost of LNG, due to the greater expense involved in liquefaction, transportation and, in many cases, extraction – for example, in the case of US fracking gas. In addition, higher gas prices directly raise electricity prices for businesses and consumers through their effect on wholesale power markets.

However, structural constraints remain: at the start of the 2022 energy crisis, Spain held around 40% of the EU regasification capacity, but cross-Pyrenean pipeline capacity to central Europe was limited and remains so to this day (entsog, 2021). Since 2022, EU-wide infrastructure investment has expanded the LNG import capacity, making it possible for every member state to receive gas from at least two sources, including reverse flows between neighbours (European Commission, 2026d). Redistribution infrastructure, however, still lags behind raw import capacity.

Aside from shipments from Qatar, only very small additional quantities from the United Arab Emirates reach Europe via the Strait of Hormuz. Therefore, European gas supplies should only be marginally affected. Still, European gas prices are directly affected by the closure of the Strait of Hormuz. The EU's growing dependence on LNG imports means that global LNG spot prices now exert a far stronger influence on European gas prices than before. As a result, supply shortfalls – which in the event of a Hormuz blockade would primarily affect Asian markets – can rapidly translate into higher prices for natural gas and electricity across Europe as well. At the same time, the EU's heavy reliance on US LNG has introduced a new set of supply dependencies. The realignment of import sources has added flexibility and strengthened resilience against the loss of individual supplier countries. Yet Europe's energy supply remains exposed to the effects of volatility on international markets.

Business sentiment: Survey results from German industry

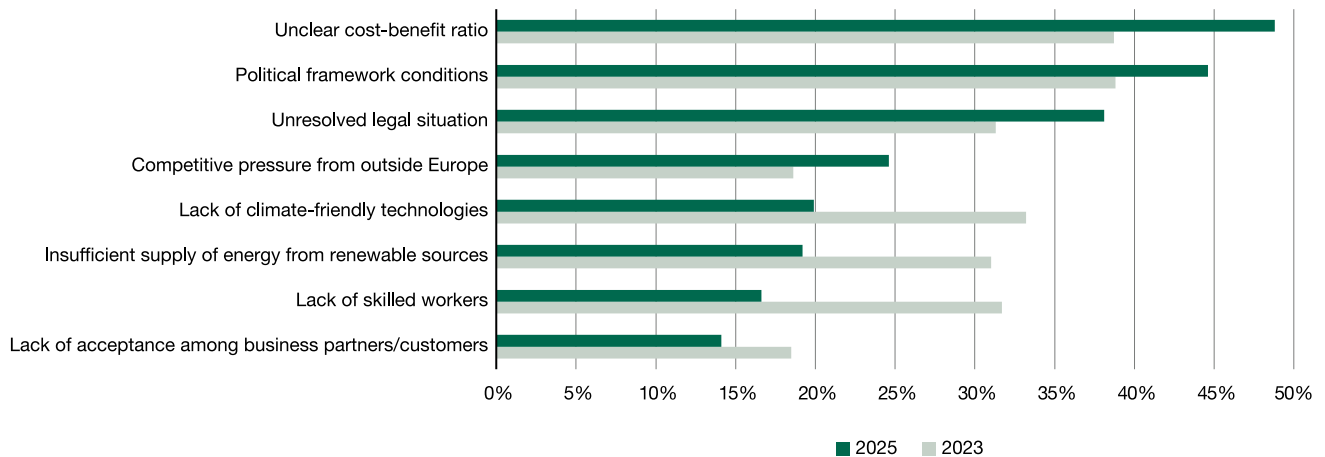
Europe's import dependency in energy is not an abstract concern – it affects the real economy directly. Alongside gas, oil dependency remains considerable. And recent studies show significant impacts of sustained high oil prices for European economies (Kolev-Schaefer et al.,

2026). Additionally, corporate surveys conducted by the German Economic Institute (IW) among German industrial firms show that energy supply ranks among the relevant location factors: more than half of firms surveyed cite it as such, and this figure rises to 76.6% in energy-intensive basic materials industries. (Fischer et al., 2023). This concerns the energy supply as a whole – not only the fossil fuel-based supply, which currently still predominates and is largely covered by imports, but also the newly developed renewable energy sources that are playing an increasingly important role as part of the energy transition. Companies understand that this transition is necessary not only to reduce emissions but also to address certain dependencies on imports, and they are already taking steps in that direction. However, obstacles and uncertainties frequently outweigh the benefits at present.

More than three-quarters of surveyed firms (75.8%) had already planned, initiated or completed adjustments to their business models in response to the energy transition by 2023. The single most frequently cited precondition for a successful transformation – named by 86.2% of respondents – is access to climate-neutral energy at competitive prices (Fischer et al., 2023). However, only a small number of companies (12.3%) reported having or planning to have advanced electrification to strengthen their own resilience (Kolev-Schaefer et al., 2025). Company representatives primarily emphasised the competitiveness of energy prices, but they also identified the reliability of energy supply as a second key dimension (Fischer et al., 2024; Neligan et al., 2025). Furthermore, when it comes to recruiting employees, whose availability and relevant qualifications are cited in surveys as an important location factor (Fischer et al., 2023; Neligan et al., 2025), it is clear that this transformation is becoming increasingly important for companies. An analysis of job postings in Germany from 2019 to 2025 shows a significant increase in positions related to areas relevant to the energy transition, such as renewable energy and the circular economy (Büchel et al., 2026). Both areas are key to enhancing Europe's resilience: renewable energy as a form of regional energy production that is less vulnerable to sudden supply disruptions, and the circular economy as an opportunity to make greater use of existing secondary raw materials and reduce dependence on imports of primary raw materials.

Nevertheless, transforming business operations – often through the electrification of internal processes – is hampered by several obstacles and uncertain investment conditions. Therefore, the picture from a survey of over 1,000 German industrial firms in January 2025 is more troubled: 56% considered their business model at risk, whereas

Figure 2

Barriers to climate-friendly transformation reported by German industrial firms in January 2025

Source: Küper et al. (2025).

only 41% believed they could successfully adapt. As shown in Figure 2, the most frequently cited barriers are an unclear cost-benefit ratio for climate-friendly technologies (48.8%) and inadequate political frameworks (44.6%). Competitive pressure from outside Europe has grown as a concern, cited by 25% of respondents – up from 18.6% in 2023 (Küper et al., 2025). The 2025 assessment coincided with a period of international trade disruptions and challenges, such as the tariff disputes with the United States and persistently high energy prices since 2022. A further survey from 2025 confirms that unreliable regulatory conditions, excessive bureaucracy and uncompetitive energy prices remain the key barriers to investments (Neligan et al., 2025). The proportion citing insufficient renewable energy supply and climate-friendly technology options as a major obstacle has nonetheless fallen from one-third to one-fifth over two years – a tangible sign that the renewable build-out is being felt on the ground (Küper et al., 2025).

The core dilemma is clear: fossil energy costs and supply uncertainty undermine competitiveness today, while an incomplete transformation fails to deliver the renewable advantages needed tomorrow. Industry's scepticism is understandable, as they are still facing current obstacles and do not yet have a clear picture of what a successful transformation would look like due to its regulatory unpredictability (leading to a lack of business cases) and the resulting investment risk. The way out runs through a consistent transformation strategy backed by reliable, long-term policy frameworks and a clear vision of the destination – including decisive reforms to the European Emissions Trading System (EU ETS-1) and accompany-

ing instruments to support firms through the transition (Matthes et al., 2026).

Crisis as catalyst: The transformation opportunity

The parallels between the 2021-2023 energy crisis and the current situation in the Strait of Hormuz demonstrate that persistent dependence on fossil energy imports makes repeated price shocks and their economic consequences a structural feature, not an exceptional event. The current situation reveals both progress and persisting vulnerability. Europe is demonstrably more resilient than in 2022: import diversification has worked, yet price exposure from oil and LNG markets extends far beyond the volume of direct physical imports. Even limited exposure to a critical chokepoint reverberates immediately through global markets.

The combination of LNG and oil price exposure reveals a systemic vulnerability that fossil fuel diversification alone cannot eliminate. Strengthening resilience over the long term through structural adjustments means building a system in which supply shocks progressively lose their leverage. This requires electrification of transport and industrial heat as well as grid-serving renewable expansion, which, in the long term, will also lead to a decline in primary energy demand.

Globally, too, the importance of decentralised energy supply through climate-friendly electricity is growing: the steep increase in global electricity demand is partially already driven by electrified applications such as electric cars and heat pumps, and to a large extent cov-

ered by new renewable capacities (IEA, 2026a). Soaring fossil fuel prices have acted as a price signal, accelerating the shift to alternatives. The European electricity market is already delivering a climate-and-cost double dividend by making the power supply more flexible and, through a well-connected grid, optimising the use of affordable and, in many cases, climate-friendly electricity (Fischer, 2024). It must be extended through more sub-sea cables, border interconnectors, storage and grid-serving renewable deployment. European electricity trade is not a future aspiration – it is a functioning proof of concept.

Although there are currently supply dependencies even with renewable energy sources, e.g. with solar modules, and these are unlikely to be completely avoided in the long term, there are nevertheless significant differences compared to the current dependence on fossil fuels. This is due to the reduced impact of a short-term supply disruption, since renewable energy plants continue to generate electricity even if they cannot be expanded for the time being, whereas a disruption in fossil fuel supplies would result in an immediate halt to operations. Additionally, the expansion of renewable generation capacity relies only to a limited extent on scarce intermediate products, such as semiconductors or certain rare earth elements (Kolev-Schaefer et al., 2025).

It is worth noting that even a fully achieved clean energy transition will not make Europe energy self-sufficient for other reasons as well: many locations worldwide offer conditions that make it cheaper to generate energy locally than in most European locations and to supply major industrial consumers directly on-site. These locations in particular attract energy-intensive industrial processes due to exceptionally low energy prices – the so-called renewables pulls effect (Samadi et al., 2023). These “sweet spots” for cheap renewable energy within and outside the EU must be utilised to keep European energy costs competitive. In addition, direct electrification has its limits. Alternative fuels and feedstocks will remain necessary in sectors such as aviation, shipping, some areas of heavy industry like chemicals and steel, as well as high-temperature processes and dispatchable power generation. In the short and medium term, these will still be of fossil origin. However, in the long term, they can increasingly be replaced by hydrogen – produced primarily from climate-friendly electricity – and, to some degree, by biofuels. Hence, hydrogen and hydrogen-based intermediate products, such as methanol or ammonia, will be imported to a certain extent from regions with superior renewable potential, and natural gas will also remain relevant at least in the medium term.

The energy transition will not make Europe entirely independent, but it remains the central pathway and the foundation for a more resilient and competitive energy supply – one that must be advanced collectively at the European level. The recurring price shocks of recent years thus open a political window. The task is to use it: advancing transformation not only for climate reasons but to secure a competitive, reliable and increasingly resilient energy supply.

EU solutions: Plans and transformation priorities

The current crisis underscores that the European level is the only appropriate and necessary scale for a decisive policy response. The EU has already moved significantly in this direction. The REPowerEU plan was the foundational response: accelerated renewable expansion, import diversification and demand reduction. Russian gas imports have fallen from around 162 to 38 billion cubic metres from 2020 to 2025 (Bruegel, 2026). The REPowerEU Gas Regulation introduces a binding, stepwise ban on Russian LNG and pipeline gas – a full LNG ban by the end of 2026 and a full pipeline ban by November 2027 (European Commission, 2026e). On infrastructure, EU-wide LNG terminal and interconnector investments since 2022 have significantly increased the imports options of individual member states (European Commission, 2026d).

Since the 2022-2023 energy crisis, the EU has also sought to make better joint use of its market power, accelerate electrification and protect consumers from sharp price fluctuations. The EU Energy and Raw Materials Platform provides a joint purchasing mechanism covering LNG, natural gas, biomethane, hydrogen and raw materials – though joint purchasing remains voluntary, not mandatory (European Commission, 2026c). The Affordable Energy Action Plan aims to cut electricity bills and advance the Energy Union through renewable integration, demand reduction and deeper market integration (European Commission, 2026a). In addition, the EU Electrification Action Plan was recently unveiled, with the aim of further advancing electrification across all sectors. (European Commission, 2026b).

In this context, efforts to accelerate electrification are particularly well founded, whereas measures aimed at capping import or end-user prices do not constitute a long-term solution. Member states face pressure to reduce prices directly through caps, as was tried during 2022-2023. But these emergency support measures address symptoms rather than underlying causes. More helpful in the long run is reducing statutory cost components: lowering electricity taxes, for example, as previously recommended by the EU and partially implemented in the mem-

ber states, benefits all consumers – lower-income households disproportionately – while simultaneously strengthening electrification incentives and avoiding the market distortions associated with price caps. In contrast, price ceilings distort scarcity signals essential for system flexibility, and sustained caps entail high public expenditure. Nationally divergent interventions also risk market distortions within the EU that smaller member states with fewer fiscal resources increasingly find troubling. The path to resilience runs through the joint development and optimisation of Europe's energy system, and ideally through a coordinated approach across all member states.

No-regret measures – infrastructure investment, cross-border cooperation and grid optimisation – are clearly preferable. The path to resilience runs through the joint development and optimisation of Europe's energy system and, ideally, through a coordinated approach across all member states. And the most powerful single lever remains the European electricity grid itself: where climate-friendly generation dominates, electricity prices are below the EU average. Expanding cross-border interconnection reduces price volatility and CO₂ intensity simultaneously. For example, a key bottleneck – the severely under-dimensioned transmission capacity from the Iberian Peninsula through France to Central Europe, relevant for electricity, gas and prospectively hydrogen – must be resolved. Also, the cancellation of a planned interconnector between Sweden and Germany in 2024 points in the wrong direction: more, not fewer, connections are needed.

Building a more resilient and climate-neutral energy system therefore requires the joint development of shared infrastructure for cost-efficient supply – above all, cross-border electricity grids. Efficient grid expansion and the exploitation of flexibility potential can reduce electricity costs substantially, strengthening resilience through lower prices. Since the EU's transformation agenda foresees a sharp shift towards electrification across all sectors – electric vehicles, heat pumps, industrial processes – electricity prices are becoming the pivotal variable.

Conclusion: Two goals, one path

The “twin challenge” of supply security and climate neutrality is only apparently a dilemma. The fastest route to energy security is the fastest route to independence from fossil imports – and the evidence from recent years shows these goals are mutually reinforcing, not competing.

In 2022, short-term constraints were real: Russian gas could not be replaced overnight. The structural lesson is that dependency had been allowed to accumulate over

decades of misplaced confidence in geopolitical stability. By 2026, Europe has made genuine progress: Russian gas imports are down more than 75% from their peak, US LNG is diversifying seaborne supply, and renewables have reached nearly 50% of the electricity mix in 2025. Yet new vulnerabilities – shipping disruptions in the Strait of Hormuz, US LNG concentration, low storage, slowing heat pump deployment and a difficult investment climate for firms – demonstrate that the transition remains structurally incomplete.

Corporate surveys confirm that industry is not opposed to the direction of transformation: it demands a stable policy framework that would make transformation investment rational. Firms will not commit to climate-friendly technology under regulatory unpredictability. A stable, long-term framework is the most important precondition that government needs to set to allow for a functioning market mechanism.

The EU's regulatory architecture – REPowerEU, the recently published Electrification Action Plan – is pointing in the right direction. Priority must be given to the joint build-out of Europe's energy infrastructure, with cross-border electricity interconnection at its centre. A shared renovation of the electricity system can durably stabilise energy costs across the continent. The risk is not the direction; it is the pace and the coherence of implementation. A consistent, cost-efficient clean energy transformation is not a luxury that can be deferred until markets stabilise. The rise in energy prices in 2022 and 2026 have done what no policy document could: they have made the cost of inaction immediate and tangible. The window of opportunity is open. It will not stay open indefinitely.

References

- Bruegel. (2026). *European natural gas imports*.
- Büchel, J., Mertens, A., Neligan, A., & Engler, J. F. (2026). *Die deutsche Wirtschaft auf dem Weg zur Green Economy: Eine Analyse von Online-Stellenanzeigen*. Bertelsmann Stiftung.
- entsog. (2021). *System Development Map 2020 / 2021. European Network of Transmission System Operators for Gas*.
- European Commission. (2026a). *Action Plan for Affordable Energy: Unlocking the true value of our Energy Union to secure affordable, efficient and clean energy for all Europeans*.
- European Commission. (2026b). *Electrification*.
- European Commission. (2026c). *EU Energy and Raw Materials Platform*.
- European Commission. (2026d). *A more secure and stable energy system*.
- European Commission. (2026e). *REPowerEU – phase out of Russian energy imports*.
- Eurostat. (2026). *Supply, transformation and consumption of gas*.
- Fischer, A. (2024). *Gut für Klima und Portemonnaie. IW-Kurzbericht*, No. 30.
- Fischer, A., Bakalis, D., Schaefer, T., & Schmitz, E. (2023). *Standortvorteil Erneuerbare Energien? Die Bedeutung der Verfügbarkeit von Erneuer-*

- baren Energien als Standortfaktor in Deutschland. EPICO Klimainnovation; Institut der deutschen Wirtschaft; Stiftung KlimaWirtschaft.
- Fischer, A., Knoop, K., Leuthold, A., & Samadi, S. (2024). *Relevanz von „Renewables Pull“ in der Grundstoffindustrie: Interviews mit Unternehmensvertreter*innen zur Einordnung des Phänomens potenzieller Verlagerungen aufgrund internationaler Kostenunterschiede beim Einsatz erneuerbarer Energien*. SCI4climate.NRW.
- Fischer, A., Küper, M., & Schaefer, T. (2022). Gaslieferungen aus Russland können kurzfristig nicht kompensiert werden. *Wirtschaftsdienst*, 102(4), 259–261.
- Grömling, M., Bardt, H., Beznoska, M., Demary, M., Henger, R., Obst, T., Pimpertz, J., Puls, T., Schäfer, H., Schaefer, T., & Seele, S. (2026). *IW-Konjunkturprognose Frühjahr 2026: Deutsche Konjunktur in instabiler Seitenlage*. IW-Report, No. 20.
- IEA. (2026a, July 9). *Electricity – Global Energy Review 2025 – Analysis* - IEA.
- IEA. (2026b, July 9). *Strait of Hormuz -Factsheet-* IEA.
- Kolev-Schaefer, G., Matthes, J., Schaefer, T., Schmitz, E., Weber, B., & Schmitz-Brieber, J. (2025). *Resilienz der deutschen Lieferketten nach der Zeitenwende*. Studie des EPICO Klimainnovation e.V. in Zusammenarbeit mit dem Institut der deutschen Wirtschaft.
- Kolev-Schaefer, G., Obst, T., Puls, T., & Sultan, S. (2026). Auswirkungen eines steigenden Ölpreises auf die deutsche Wirtschaft. *IW-Kurzbericht*, No. 17.
- Küper, M., Büchel, J., Schmitz, E., & Urrich, F. (2025). *Transformationskompass 2025: Herausforderungen und Chancen für Unternehmen in Deutschland*. Gutachten im Auftrag der Wirtschaftsvereinigung der Grünen e.V.
- Matthes, F. C., Schaefer, T., Cludius, J., Cook, V., Fischer, A., Gaber, F., Graichen, J., Hermann, H., Küper, M., & Skribbe, R. (2026, July 14). *Reform des EU-ETS-1 und flankierende Instrumente: Ein Policy Mix für die Dekarbonisierung der Industrie*. Öko-Institut & Institut der deutschen Wirtschaft.
- Neligan, A., Schaefer, T., & Schmitz, E. (2025). *In die Zukunft investieren: Ergebnisse aus einer aktuellen Unternehmensbefragung im IW-Zukunftspanel*. Studie im Auftrag des Bundesverbands der Deutschen Industrie e. V. (BDI).
- Samadi, S., Fischer, A., & Lechtenböhmer, S. (2023). The renewables pull effect: How regional differences in renewable energy costs could influence where industrial production is located in the future. *Energy Research & Social Science*, 104, 103257.