SJPS | Slovak Journal of Political Sciences
Scientific article
sjps.fsvucm.sk I ISSN 1335-9096 (online)
2022 The Faculty of Social Sciences
University of Ss. Cyril and Methodius, Trnava.
DOI: https://doi.org/10.34135/sjps.260103

ENERGY SECURITY AFTER DIVERSIFICATION: IS THE EUROPEAN UNION ENTERING A POST-CRISIS VULNERABILITY TRAP?

Elmir Badalov[1]

Abstract
The European Union's response to the energy crisis triggered by Russia's invasion of Ukraine has been widely regarded as a policy success. Russian gas imports declined from over 40 per cent of EU supply in 2021 to below 15 per cent by end-2023, while LNG import capacity expanded by more than 30 per cent. Yet as the acute phase recedes, less attention has been paid to the longer-term structural vulnerabilities emerging from this transformation. This article examines whether the EU's post-2022 energy strategy risks entrenching a new form of structural fragility — conceptualised here as a post-crisis vulnerability trap. Drawing on a structured qualitative analysis of EU policy documents, market data from the IEA, ACER, and Eurostat, and comparative assessment of national implementation patterns between 2022 and 2024, the article argues that diversification has reconfigured rather than resolved energy insecurity. New exposures have emerged in the form of LNG price volatility, fiscal asymmetries among member states, infrastructure lock-in, and growing social contestation over energy costs. The analysis identifies a systemic pattern of EU reactive crisis governance that transcends the energy domain.

Keywords: *EU energy security, Post-crisis vulnerability trap, LNG diversification, Infrastructure lock-in, Fiscal asymmetry, Energy justice, Path dependence*

INTRODUCTION

The Russian invasion of Ukraine in February 2022 constituted a critical rupture in the European energy order, fundamentally challenging long-standing assumptions about the relationship between economic interdependence and security. For decades, energy relations between the European Union and Russia had been interpreted primarily through the lens of liberal interdependence theory, which posits that dense economic linkages reduce incentives for coercion by increasing the mutual costs of disruption (Keohane and Nye, 1977). Within this framework, the integration of Russian hydrocarbons into European markets was widely understood as

[1] Khazar University, Department of Political Science and Philosophy, Baku, Azerbaijan, 41 Mehseti Str. AZ 1096, e-mail: elmirbadalov@khazar.org, ORCID: 0000-0003-3858-9079.

This Article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

both economically rational and politically stabilising (Goldthau and Sitter, 2015; Natorski and Herranz Surrallés, 2008; Yergin, 2006).

The EU's response to the resulting energy shock has been widely portrayed as a policy success. Faced with an abrupt reduction in Russian gas supplies — from approximately 155 billion cubic metres (bcm) in 2021 to around 27 bcm by 2023, a decline of over 80 per cent (IEA, 2023) — the EU rapidly diversified import sources, expanded LNG infrastructure, and deployed emergency market interventions to stabilise prices and ensure supply continuity. By the winter of 2022–2023, fears of widespread shortages had largely receded, storage levels exceeded 90 per cent of capacity before the heating season, and Russian energy dependence had been sharply curtailed. The EU demonstrated an unprecedented capacity for collective action under crisis conditions, a pattern consistent with the bloc's broader reactive integration dynamic (Niemann and Speyer, 2018).

Yet the dominant narrative of resilience risks obscuring a more complex reality. Crisis management, by definition, prioritises speed, flexibility, and short-term stability. While such measures are indispensable during acute shocks, they may also generate longer-term structural consequences that are less visible in the immediate aftermath (Helm, 2017). As the emergency phase of Europe's energy crisis subsides, critical questions emerge regarding the sustainability, distributional effects, and strategic implications of the post-2022 energy transformation. The central concern is not whether diversification worked in the short term, but whether it has produced a durable and equitable foundation for long-term energy security — a distinction that existing scholarship has only partially addressed (Siddi and Prandin, 2023).

Existing analyses of European energy security since 2022 have focused predominantly on supply substitution, infrastructure deployment, and regulatory innovation (Goldthau and Youngs, 2023; IEA, 2023; Tagliapietra, 2020). This literature has provided valuable insights into how diversification reduced exposure to Russian leverage and restored market stability. However, it has paid comparatively less attention to the second-order effects of these changes: altered cost structures, reconfigured fiscal burdens, accelerated infrastructure lock-in, and intensified social contestation over energy affordability (Sovacool and Mukherjee, 2011). These dynamics raise the possibility that short-term resilience may coexist with, or even conceal, emerging forms of structural fragility.

This article introduces the concept of a post-crisis vulnerability trap to capture this condition. A vulnerability trap arises when policies that

successfully mitigate an immediate shock simultaneously entrench economic, infrastructural, or political constraints that undermine long-term stability. In the European energy context, the rapid expansion of LNG capacity, heavy reliance on emergency fiscal support, the systematic under-investment in demand-side efficiency measures, and uneven national implementation of diversification strategies may generate new dependencies and internal asymmetries that narrow future policy choice.

The central research question guiding this article is: has the European Union's post-2022 energy diversification strategy reduced strategic vulnerability, or has it laid the foundations for a new form of structural fragility? The article advances three interrelated arguments. First, diversification has increased exposure to price volatility and fiscal strain by embedding European energy security more deeply in global LNG markets. Second, emergency infrastructure investment risks creating path dependence and lock-in that complicate the EU's decarbonisation objectives. Third, uneven national capacity, rising social costs, and the marginalisation of demand-side governance threaten the political legitimacy and cohesion of Europe's energy strategy.

The article proceeds as follows. Section 1 situates the argument within debates on energy security, crisis management, and post-crisis vulnerability, and specifies the two organising concepts of the post-crisis vulnerability trap and reconfigured dependence. Section 2 outlines the methodology. Sections 3 through 7 analyse five interconnected dimensions of post-crisis vulnerability: diversification trade-offs, economic and fiscal fragility, infrastructural lock-in, demand-side governance, and social legitimacy. Section 8 compares this experience with prior EU crisis episodes. Section 9 synthesises the analysis, confronts alternative interpretations, and presents conclusions.

1 ENERGY SECURITY, CRISIS MANAGEMENT, AND POST-CRISIS VULNERABILITY: A CONCEPTUAL FRAMEWORK

1.1 Energy Security: Dimensions and Debates

Energy security is a polysemic concept whose analytical meaning varies significantly across traditions. Classical formulations centred on the 'four As' — availability, accessibility, affordability, and acceptability — have been refined by scholars seeking to capture the multi-dimensional and politically contested nature of energy security in complex modern systems (Chester,

2010; Sovacool and Mukherjee, 2011). Cherp and Jewell (2014) advance a tripartite framework encompassing sovereignty, robustness, and resilience, each corresponding to distinct threats and governance responses. More recent contributions emphasise systemic interdependence, governance architecture, and the interaction between security imperatives and low-carbon transition goals (Goldthau and Sitter, 2015; Scholten, 2018; Overland, 2019). Müller-Kraenner (2008) underscores the geopolitical dimension, while Aalto (2008) situates European energy security within a multi-level governance architecture that shapes both policy response and structural outcomes.

The post-2022 European crisis adds a further layer: the interaction between geopolitical rupture and structural transformation at a moment of deep uncertainty. Within this expanded framework, energy security is understood not as a static condition but as a dynamic process shaped by infrastructure trajectories, political economies, and institutional capacities. Correljé and van der Linde (2006) argue that the geopolitics of energy supply cannot be decoupled from the institutional frameworks through which supply relationships are managed — a proposition directly confirmed by the post-2022 transformation, in which the collapse of EU–Russia supply arrangements immediately revealed the limits of market-centred energy governance.

1.2 Crisis Management and Reactive Governance

Energy security scholarship has traditionally oscillated between two analytical poles: crisis management and long-term transition. In periods of disruption, research and policy analysis tend to prioritise immediacy — supply adequacy, price stabilisation, and emergency coordination — while longer-term studies focus on decarbonisation pathways, technological change, and structural reform. Neither approach fully captures the vulnerabilities that emerge after a crisis has been successfully managed.

Crisis management frameworks emphasise speed, flexibility, and exceptional governance. In the European Union, this logic has been evident in responses to financial, migration, and public health crises, where temporary measures were adopted to restore stability under conditions of uncertainty (Niemann and Speyer, 2018; Hooghe and Marks, 2001). Energy policy since 2022 has followed a similar trajectory. Emergency interventions — ranging from coordinated gas storage obligations to price caps and accelerated infrastructure permitting — were designed to avert immediate shortages

and market collapse. Evaluated against these objectives, the EU's response was largely effective. However, crisis-centred analysis tends to treat success as an endpoint rather than a transition, leaving the structural consequences of emergency measures insufficiently examined.

1.3 Path Dependence and Infrastructural Lock-in

Path dependence provides an important theoretical lens for understanding post-crisis vulnerability. Pierson (2000) demonstrates that political and institutional decisions are shaped by increasing returns dynamics, whereby early choices constrain future options and make reversal progressively costly. In the energy domain, capital-intensive infrastructure investments typically exhibit strong path dependence: assets constructed under crisis conditions carry long operational lifetimes, high sunk costs, and embedded commercial interests that resist early retirement (Helm, 2017; Markard et al., 2012). The rapid expansion of LNG regasification capacity in Europe illustrates this dynamic. Pierson identifies two reinforcing mechanisms: increasing returns, which reward continued use of established systems, and exit costs, which make departure from entrenched configurations economically and politically irrational even as superior alternatives emerge.

1.4 Economic and Social Dimensions

Economic and fiscal dimensions further contribute to post-crisis vulnerability. Crisis responses frequently rely on extraordinary public spending to shield consumers and industries from price shocks. While effective in maintaining social stability, these interventions can exacerbate fiscal divergence among member states and distort market signals, raising questions about long-term affordability and competitiveness (CEPS, 2024; IMF, 2022). Social legitimacy constitutes an additional, often overlooked dimension. Energy security strategies that impose sustained cost burdens or bypass participatory processes may encounter growing public resistance once the immediacy of crisis fades. Research on energy justice highlights how distributional effects influence public acceptance of energy policy, particularly during periods of high prices and rapid change (Bouzarovski and Simcock, 2017; Jenkins et al., 2016; Sovacool and Dworkin, 2015).

1.5 The Demand-Side Governance Gap

A dimension that has received insufficient attention in post-2022

analyses is demand-side governance: the set of policies aimed at reducing energy consumption through efficiency improvements, behavioural change, and structural transformation of energy-intensive sectors. In the immediate post-crisis literature, the emphasis has overwhelmingly fallen on supply-side measures — diversification, new infrastructure, alternative sourcing — with demand reduction treated as secondary or supplemental (IEA, 2021; von Malmborg, 2023). Yet the IEA (2022b) estimates that demand-side measures could contribute as much as 30–40 per cent of the emission reductions required by 2030 targets, and that gas demand reduction in Europe was the single largest contributor to supply–demand rebalancing during the 2022–2023 winter. The marginalisation of demand-side governance in the post-crisis environment — driven partly by political resistance to restrictions and partly by the institutional momentum of supply-side investment — represents a structural vulnerability in its own right, reinforcing lock-in by increasing utilisation of fossil infrastructure and reducing the scope for decarbonisation-consistent transition paths.

1.6 Conceptualising the Post-Crisis Vulnerability Trap

This article conceptualises post-crisis vulnerability as a distinct condition in which energy systems remain exposed to structural risks despite the resolution of immediate threats. Post-crisis vulnerability does not imply policy failure; rather, it reflects the trade-offs inherent in emergency governance. Measures that prioritise speed and scale — such as rapid LNG deployment or expansive fiscal support — can entrench economic, infrastructural, and political dynamics that complicate future adaptation. Vulnerability thus persists in transformed rather than eliminated form.

Conceptually, post-crisis vulnerability differs from traditional notions of energy insecurity in two key respects. First, it is temporal: it emerges after the apparent resolution of crisis, when attention shifts from emergency response to normalised governance. Second, it is structural: it reflects embedded constraints arising from infrastructure, fiscal commitments, and institutional arrangements rather than immediate supply threats. This distinguishes it from both acute insecurity and long-term transition risk, positioning it as an intermediate condition with distinct analytical and policy implications. The concept of a post-crisis vulnerability trap builds on this foundation, capturing the feedback loop through which crisis-management success generates structural constraints that limit future policy choice. The post-crisis vulnerability trap is related to, but distinct from, several adjacent

concepts. Unlike the resource curse, which links resource abundance to institutional underdevelopment, it concerns the structural after-effects of crisis response rather than of endowment; unlike carbon lock-in (Unruh, 2000), which is a general property of fossil-based techno-institutional systems, it is temporally bounded to the post-crisis interval; and unlike a generic transition or resilience trap, it specifies a feedback mechanism in which successful emergency governance itself narrows subsequent policy choice. Table 1 synthesises the five analytical dimensions through which this trap operates.

Table 1: Five Dimensions of Post-Crisis Vulnerability: Analytical Framework

Dimension	Core Mechanism	Theoretical Lens	Post-2022 EU Evidence
Market & Supply Reconfiguration	Bilateral dependence replaced by global spot-market exposure	Complex interdependence (Keohane and Nye, 1977); supply adequacy (Cherp and Jewell, 2014)	Russian gas: >40% to <15% of EU imports; US LNG: ~47% of EU LNG; TTF peak €340/MWh
Fiscal & Economic Fragility	Emergency spending deepens inter-state fiscal divergence	Path dependence (Pierson, 2000); energy affordability (Sovacool and Mukherjee, 2011)	€700 bn+ national support; Germany >€200 bn; inflation peaked 10.6%
Infrastructural Lock-in	Capital-intensive investments generate multi-decade asset lifetimes and exit barriers	Path dependence (Pierson, 2000); stranded asset risk (Helm, 2017; IEEFA, 2023)	EU regasification +30%; LNG contracts to 2030s; mismatch with 2030 targets
Demand-Side Governance Gap	Supply-side bias sidelines efficiency and demand reduction, sustaining fossil throughput	Demand governance (IEA, 2022b; von Malmborg, 2023); carbon lock-in (Unruh, 2000)	EU gas demand −13% in 2022 yet demand policy receded; REPowerEU supply-weighted
Social & Political Legitimacy	Sustained cost burdens generate public contestation	Energy justice (Bouzarovski and Simcock, 2017; Jenkins et al., 2016)	9%+ EU households unable to heat homes; energy protests; Green Deal pressures

Source: Author's compilation based on Pierson (2000), Cherp and Jewell (2014), Keohane and Nye (1977), Goldthau and Youngs (2023), Bouzarovski and Simcock (2017), Jenkins et al. (2016), and Markard et al. (2012).

1.7 Reconfigured Dependence: A Conceptual Specification

A second concept requires specification alongside the post-crisis vulnerability trap: reconfigured dependence. Reconfigured dependence denotes a condition in which the resolution of one concentrated dependency generates a new, structurally distinct pattern of dependency rather than the elimination of dependency as such. It is defined here by three properties: first, the substitution of a single dominant supplier relationship with a more dispersed but still externally contingent portfolio; second, a shift in the locus of vulnerability from bilateral political leverage toward systemic market exposure — price volatility, global demand competition, and financial transmission; and third, the persistence of asymmetric adjustment capacity among the actors managing the new dependency. So defined, reconfigured dependence is distinct from strategic dependence, which denotes reliance on a specific and potentially adversarial supplier, and from supply diversification, which describes the policy instrument of broadening sources. Diversification is the mechanism; reconfigured dependence is its structural outcome when the diversified portfolio remains exogenously governed.

Conceptually, reconfigured dependence extends the complex-interdependence tradition (Keohane and Nye, 1977) and its recent revision in the literature on weaponised interdependence (Farrell and Newman, 2019). Where classical interdependence theory treats dense economic linkages as mutually constraining, and weaponised interdependence emphasises how asymmetric network positions can be exploited coercively, reconfigured dependence identifies an intermediate condition: the diffusion of dependence across a market network reduces any single actor's coercive leverage while simultaneously exposing the dependent party to non-agentic systemic risks that are harder to attribute, anticipate, or govern. In the European case, replacing pipeline dependence on Russia with exposure to globally traded LNG did not restore autonomy so much as relocate vulnerability from a geopolitical relationship to a market structure (Goldthau and Witte, 2010). This distinction underpins the analysis of diversification trade-offs developed in Section 3.

2 METHODOLOGY

2.1 Research Design and Analytical Logic

This article employs a qualitative research design centred on document analysis and structured comparative case assessment. The empirical focus is on the European Union's energy governance trajectory from 2022 to 2024 — a period spanning the acute crisis phase and its immediate aftermath. The analytical logic is that of a structured, theory-guided interpretive case analysis. It draws on the logic of mechanism-oriented process-tracing (George and Bennett, 2005) in connecting crisis-management decisions to post-crisis structural conditions — tracing how specific emergency choices, such as FSRU commissioning, emergency permitting, and fiscal support instruments, generate observable downstream constraints. It does not, however, constitute full process-tracing in the strict sense: the design does not test competing within-case mechanisms against systematically specified causal-process observations, and it makes no claim to have eliminated rival explanations through such tests. Rather, it applies an explicit analytical framework to interpret a bounded case — an approach appropriate for understanding how emergency choices create path-dependent outcomes that are not easily reversed once circumstances change (Pierson, 2000). The designation is therefore best understood as structured analytical case interpretation informed by process-tracing logic rather than as process-tracing per se.

The article does not claim causal sufficiency — multiple factors shape European energy outcomes — but argues that the mechanisms identified are theoretically coherent, empirically observable across the five domains examined, and consistent with a well-established pattern of EU reactive crisis governance. The unit of analysis is the EU's energy governance system as a whole. Member-state material performs a deliberately bounded illustrative function: national cases are introduced to demonstrate the presence and variation of the structural dynamics identified at EU level, not to generate cross-national causal claims. To make this function transparent, the illustrative cases are selected to span the principal axes of variation relevant to the argument — fiscal capacity, geographic and infrastructural exposure, and political orientation toward diversification. Germany exemplifies high fiscal capacity combined with rapid supply-side build-out; Bulgaria and Romania represent lower fiscal capacity and acute energy-poverty exposure; Hungary illustrates a politically divergent trajectory of

maintained Russian contracts. Where Sections 4 and 7 engage national detail more closely, they do so to evidence the mechanism at work rather than to explain cross-national outcomes, and the interpretive weight of the argument remains at the systemic level.

2.2 Data Sources

Primary sources include official EU policy documents — notably the REPowerEU Plan (European Commission, 2022), the Fit for 55 legislative package (European Commission, 2021), and the Recovery and Resilience Facility implementation reports (European Commission, 2023) — alongside statistical data from Eurostat, the International Energy Agency (IEA, 2022a; 2022b; 2023; 2024), ENTSO-E, and the Agency for the Cooperation of Energy Regulators (ACER, 2023). Secondary sources include peer-reviewed scholarship on energy security, European integration, and political economy, as well as policy-oriented analyses from the Bruegel Institute (2023; 2024), the Centre for European Policy Studies (CEPS, 2024), and the Institute for Energy Economics and Financial Analysis (IEEFA, 2023). All secondary data sources were assessed for methodological transparency and institutional credibility. Statistical figures relating to fiscal support, energy prices, and supply volumes were cross-referenced across multiple sources to mitigate reliance on any single institutional narrative.

2.3 Analytical Strategy and Limitations

The article's analytical framework identifies five interconnected dimensions of post-crisis vulnerability: (1) market and supply reconfiguration, (2) fiscal and economic fragility, (3) infrastructural lock-in, (4) demand-side governance gaps, and (5) social and political legitimacy. Each dimension is examined through a combination of primary documentary evidence and published empirical data. Where quantitative evidence is cited, it is drawn from verified institutional sources; where qualitative judgements are made, they are grounded in the documentary record and theoretical reasoning. The five dimensions were derived deductively from the conceptual framework set out in Section 1 rather than inductively from the data: each corresponds to one of the mechanisms — reconfigured dependence, fiscal path dependence, infrastructural lock-in, demand-side governance failure, and legitimacy erosion — through which the post-crisis vulnerability trap is theorised to operate. Evidence was assembled

for each dimension by triangulating three source types: primary EU policy documents for stated objectives and instruments, institutional statistical series for magnitudes and trends, and peer-reviewed and policy-analytical literature for interpretation and contestation. Within each dimension, salience was weighted toward indicators that were both documented across more than one institutional source and anticipated by the framework, so as to limit reliance on any single narrative. It should be acknowledged that the evidentiary base leans substantially on secondary and tertiary institutional reporting — notably the IEA, Bruegel, ACER, and CEPS — rather than on primary market microdata or elite interviews; while these sources were selected for methodological transparency and cross-referenced against one another, this reliance is a limitation appropriate to a framework-building rather than a hypothesis-testing study. Limitations include the relatively short timeframe under examination (2022–2024) and the difficulty of distinguishing crisis-induced from pre-existing structural conditions. Future research should extend the analysis longitudinally and incorporate primary interview data from national energy ministries and major infrastructure operators.

3 DIVERSIFICATION AS SUCCESS — AND CONSTRAINT

The European Union's diversification strategy following Russia's invasion of Ukraine achieved its primary objective: the rapid stabilisation of energy supply. By the end of 2022, Russian gas imports had fallen from approximately 155 bcm in 2021 to around 80 bcm, and by end-2023 to approximately 27 bcm — a cumulative decline of over 80 per cent in two years (IEA, 2023). EU gas storage levels exceeded 90 per cent capacity before the 2022–2023 heating season, and systemic shortages were avoided despite severe disruption to established supply routes. From a crisis-management perspective, diversification represented a clear success.

Gas substitution lay at the centre of this transformation. EU-wide LNG imports approximately doubled, from roughly 80 bcm in 2021 to over 160 bcm in 2023, with the United States emerging as the dominant supplier — accounting for approximately 47 per cent of EU LNG supply by volume in 2023, up from around 13 per cent in 2021 (IEA, 2024; ACER, 2023). Emergency deployment of floating storage and regasification units (FSRUs), expedited permitting procedures, and flexible contractual arrangements enabled a rapid expansion of import capacity, particularly in Germany (five FSRUs commissioned within six months), the Netherlands, and Southern Europe.

Yet the speed of diversification introduced trade-offs that extend beyond the immediate crisis. LNG-based substitution embedded European energy security more deeply within global spot markets, exposing consumers and governments to heightened price volatility and external competition. Unlike pipeline gas supplied under long-term contracts, LNG prices are shaped by global demand fluctuations, shipping constraints, and financial market dynamics (Boersma and Johnson, 2012). Dutch TTF benchmark prices peaked at approximately €340 per megawatt-hour in August 2022 — approximately fifteen times the pre-crisis average — before moderating in 2023 (IEA, 2023). Even after moderation, prices remained structurally higher and more volatile than pre-2021 levels, reflecting the EU's increased exposure to global LNG markets and competition with Asian demand centres.

Infrastructure expansion further illustrates the dual character of diversification. Emergency investment prioritised speed and capacity over strategic optimisation, resulting in a concentration of new regasification facilities in a limited number of coastal hubs. Member states with existing infrastructure and access to maritime terminals benefited disproportionately, while landlocked or infrastructure-poor countries remained dependent on cross-border transit and solidarity mechanisms (IEA, 2025). The contractual dimension also carries long-term implications: medium- and long-term LNG contracts extending into the 2030s sit uneasily alongside the EU's commitment to reduce fossil gas consumption by 55 per cent by 2030 (European Commission, 2021). In replacing one form of concentrated dependence with a more dispersed but still politically contingent supply portfolio, the EU has traded a known risk for a more diffuse set of external exposures — the condition of reconfigured dependence specified in Section 1.7.

4 ECONOMIC AND FISCAL FRAGILITY

The economic consequences of Europe's post-2022 energy diversification constitute a central dimension of post-crisis vulnerability. While emergency interventions succeeded in preventing immediate supply shortages, they did so at significant economic and fiscal cost. Between September 2021 and early 2024, EU member states collectively allocated more than €700 billion in national fiscal measures to shield households and firms from energy price shocks, including price caps, tax reductions, direct transfers, and subsidies (Bruegel, 2024). Germany alone accounted for over €200 billion, while several Central and Eastern European countries deployed packages an

order of magnitude smaller relative to GDP. Table 2 presents a comparative overview across seven member states.

Table 2: EU Member State Fiscal and Demand-Side Responses to the Energy Crisis (2021–2024)

Member State	Support Package	% GDP	Primary Instruments	Demand-Side Measures
Germany	>€200 bn	~5.5%	Gas price brake; 5 FSRUs; electricity cap	Gas demand −14%; insulation subsidies
Italy	~€100 bn	~5.0%	Price caps; VAT reductions; bilateral deals	Saving campaign (−8% target)
France	~€45 bn	~1.8%	Tariff shield; nuclear stabilisation	Sobriety plan (−10% energy demand)
Spain	~€25 bn	~1.9%	Iberian gas cap; bono social; VAT cut	4.5 GW+ solar installed (2023)
Poland	~€25 bn	~3.8%	Price controls; coal subsidies; Baltic Pipe	Limited demand management
Romania	~€3 bn	~1.3%	Price caps; grid modernisation	Neptun Deep approved; limited efficiency
Hungary	<€5 bn	<1.5%	Price freeze; Gazprom contracts maintained	Minimal demand-side effort

Source: Bruegel (2024), IEA (2023), ACER (2023), European Commission (2023).

This divergence reflected differences in fiscal capacity rather than differences in energy price exposure, deepening asymmetries within the internal market. Following Russia's invasion, European wholesale gas prices surged to unprecedented levels, with the TTF benchmark peaking at approximately €340 per megawatt-hour in August 2022 — approximately fifteen times the pre-crisis average (IEA, 2023). Although prices moderated in 2023 and 2024, they remained structurally higher and more volatile than pre-2021 levels. This volatility transmitted into higher electricity prices and into inflation more broadly: euro-area inflation peaked at 10.6 per cent in October 2022, with energy prices contributing disproportionately (Eurostat, 2023; IMF, 2022).

The macroeconomic effects were uneven but significant. Energy-intensive industries — chemicals, metals, fertilisers, and glass manufacturing — experienced production declines ranging from 10 to 25 per cent in several member states during 2022–2023, with some capacity reductions becoming permanent (IEA, 2023; Bruegel, 2023). These developments raised concerns about industrial competitiveness and the risk of structural deindustrialisation under prolonged high-cost energy conditions. Sustained energy cost differentials between the EU and competitor regions — particularly the United States, where the shale gas revolution has maintained low domestic gas prices (Boersma and Johnson, 2012) — risk accelerating the relocation of energy-intensive production, with long-term implications for the fiscal base that sustains energy transition investments.

Market distortion constitutes a further dimension of economic fragility. Price suppression mechanisms dampened incentives for demand reduction and efficiency improvements during the crisis. While politically necessary in the short term, these interventions delayed behavioural adaptation and increased cumulative fiscal exposure. As emergency measures are gradually withdrawn, governments face a politically sensitive recalibration process, raising the risk of renewed social discontent and policy reversal (Goldthau and Youngs, 2023). From a post-crisis vulnerability perspective, these economic and fiscal pressures function as amplifiers rather than temporary side effects — constraining industrial competitiveness, weakening solidarity mechanisms, and eroding social legitimacy simultaneously.

5 INFRASTRUCTURE LOCK-IN AND TRANSITION TENSIONS

The rapid expansion of energy infrastructure after 2022 addressed immediate security imperatives but also introduced a structural tension between short-term resilience and long-term decarbonisation objectives. Emergency-driven investment decisions, taken under conditions of uncertainty and political urgency, carry long asset lifetimes and high sunk costs. From a post-crisis vulnerability perspective, this raises the risk of infrastructure lock-in, whereby measures adopted to stabilise supply constrain future policy flexibility and complicate the EU's climate transition.

Liquefied natural gas infrastructure illustrates this dilemma most clearly. Between 2022 and 2024, the EU expanded regasification capacity by more than 30 per cent, largely through the deployment of FSRUs and accelerated terminal construction (IEA, 2023; ACER, 2023). While these assets enhanced supply security during the crisis, many are expected to operate well into the

2030s, creating a temporal mismatch with the EU's commitment to reduce fossil gas consumption by 55 per cent by 2030 and achieve climate neutrality by 2050 (European Commission, 2021). Even where infrastructure is formally described as 'transitional', commercial incentives and contractual obligations create pressure to maximise utilisation.

Path dependence deepens this tension in a theoretically predictable way. Pierson (2000) identifies two mechanisms through which early choices foreclose alternatives: increasing returns and exit costs. Both are present in the post-2022 European energy context. The concept most directly applicable here is carbon lock-in, developed by Unruh (2000, 2002), which describes how techno-institutional complexes organised around fossil energy become self-reinforcing through co-evolving technological, organisational, and institutional increasing returns, systematically disadvantaging low-carbon alternatives even when the latter are economically superior. The post-2022 expansion of gas-import infrastructure represents precisely such a techno-institutional commitment, extending carbon lock-in under the political cover of security necessity. Emergency permitting procedures, streamlined environmental assessments, and public financial guarantees lowered barriers to fossil-related infrastructure during the crisis. Once established, reversing these precedents becomes politically and legally challenging, particularly if future projects face stricter scrutiny under normalised governance conditions (Helm, 2017; Markard et al., 2012).

Stranded asset risk represents a further dimension. If gas demand declines in line with climate targets, newly built LNG terminals and associated infrastructure may become underutilised or economically unviable before the end of their intended operational lifespans. Such outcomes would impose financial losses on operators and public authorities, generating political resistance to rapid decarbonisation and increasing the cost of the transition (IEEFA, 2023). Infrastructure lock-in also operates through political narratives: the success of emergency infrastructure deployment has reinforced the perception that energy security challenges can be resolved through rapid supply-side capacity expansion, marginalising demand-side measures that are less visible but essential for sustainable resilience.

6 THE UNDEREXPLORED DIMENSION: DEMAND-SIDE GOVERNANCE

One of the structural weaknesses of Europe's post-crisis energy strategy is the relative marginalisation of demand-side governance. During the acute crisis phase of winter 2022–2023, demand reduction played a quantitatively

significant role in balancing supply shortfalls. The IEA (2022b) reported that EU gas demand fell by approximately 13 per cent in 2022 relative to 2021, contributing more to supply–demand rebalancing than any single new supply source. National 'energy sobriety' or saving campaigns — most prominently France's plan de sobriété énergétique — demonstrated that behavioural and structural demand management can be mobilised rapidly when political leadership is clear (IEA, 2022b).

Yet as the supply crisis stabilised, demand-side measures receded from the policy agenda. EU energy governance frameworks have historically prioritised supply adequacy over demand management (Natorski and Herranz Surrallés, 2008; Aalto, 2008), and the REPowerEU Plan (European Commission, 2022) — while including a demand-reduction target — devoted the large majority of its investment provisions to supply diversification and renewable deployment. The post-crisis environment has reinforced this supply-side bias. Emergency price support mechanisms, by shielding consumers from the full cost of energy, reduced the economic signal for efficiency investment and behavioural adaptation, creating a structural gap: the very interventions that preserved social stability also delayed the structural demand transformation that would reduce long-term exposure to global commodity markets.

From the perspective of post-crisis vulnerability, this demand-side governance gap has two compounding effects. First, it increases the EU's residual dependence on gas — and therefore on LNG imports and their associated price volatility — beyond what would be required under a more aggressive demand-reduction trajectory consistent with Fit for 55 targets (Vezzoni, 2023). Second, it reinforces infrastructure lock-in by sustaining demand levels that justify the continued operation and financial viability of newly installed regasification capacity. Closing this gap requires integrating efficiency standards, building renovation programmes, and industrial heat electrification into the EU's post-crisis strategic framework as primary instruments rather than supplemental additions.

7 SOCIAL LEGITIMACY AND POLITICAL RISK

The durability of Europe's post-2022 energy strategy depends not only on physical supply and economic sustainability, but also on its social legitimacy. Crisis governance prioritised rapid stabilisation and protection against immediate hardship, often through extraordinary fiscal intervention and accelerated decision-making. While effective in preventing acute disruption,

these measures have produced distributional effects and political tensions that increasingly shape the post-crisis environment. From a vulnerability perspective, erosion of public consent constitutes a significant risk, constraining policy autonomy and undermining the long-term coherence of energy security strategies.

Rising energy costs represent the most visible source of social tension. Despite the easing of wholesale prices after 2022, household energy bills remained elevated in many member states due to lagged pass-through effects, reduced fiscal support, and persistent market volatility. Eurostat data indicate that energy expenditure as a share of household income increased disproportionately among lower-income groups, exacerbating pre-existing inequalities (Eurostat, 2023). Energy poverty, already a structural challenge in parts of Southern and Eastern Europe, intensified: more than 9 per cent of EU households could not adequately heat their homes in 2022, with the share exceeding 15 per cent in Bulgaria, Romania, and several other Central and Eastern European states. Bouzarovski (2018) situates these patterns within a broader analysis of infrastructural divide — the spatially uneven distribution of energy infrastructure quality that compounds the affordability challenge for peripheral populations.

Research on energy justice underscores that perceived procedural unfairness can be as destabilising as material costs, particularly when communities feel excluded from decision-making (Jenkins et al., 2016; Sovacool and Dworkin, 2015). Accelerated permitting procedures and emergency exemptions reduced opportunities for consultation and environmental assessment, generating local opposition to energy projects. While these processes were justified by security imperatives, their continuation in the post-crisis phase risks eroding trust in institutions and fuelling resistance to future infrastructure development — including renewable energy projects essential for long-term transition.

Political contestation over energy policy has broader implications for democratic governance. As energy costs became a salient electoral issue, governments faced pressure to prioritise short-term affordability over long-term transition goals. In several member states, energy-related grievances contributed to the rise of populist narratives that framed diversification and climate policies as elite-driven or socially regressive (Lockwood, 2018). Such dynamics threaten to politicise energy security in ways that undermine policy continuity and long-term strategic planning. The relationship between social contestation and the EU's decarbonisation agenda is particularly salient: the Green Deal depends on sustained public and political support

across twenty-seven member states with divergent energy systems, fiscal positions, and social preferences (Giddens, 2009).

8 COMPARATIVE CRISIS GOVERNANCE: EU PRECEDENTS AND THE VULNERABILITY TRAP PATTERN

To assess whether the dynamics identified represent an energy-sector anomaly or a systemic feature of EU crisis governance, it is instructive to compare the post-2022 energy trajectory with three prior EU crisis episodes: the eurozone crisis (2010–2015), the migration crisis (2015–2016), and the COVID-19 pandemic (2020–2021). Table 3 presents a structured comparison across five dimensions.

The selection of these three episodes is deliberate rather than arbitrary. They constitute the three most consequential EU-wide crises of the post-2009 period in which an external or systemic shock triggered emergency collective governance at Union level, and together they span the principal domains of EU crisis activity — monetary and fiscal (eurozone), external and security (migration), and public health with a major fiscal dimension (COVID-19). This variation-maximising logic permits a demanding test of whether vulnerability-trap dynamics recur across substantively dissimilar policy fields. The 2008 global financial crisis is not treated as a separate case because its EU-governance phase is precisely the eurozone crisis included here; still earlier episodes are excluded because they predate the emergency-governance repertoire — joint borrowing, agency creation, and cross-border solidarity instruments — that defines the comparison.

Table 3: Comparative EU Crisis Governance: Post-Crisis Vulnerability Patterns

Crisis Episode	Emergency Instruments	Structural Residues	Post-Crisis Vulnerability	Parallel to Energy Crisis
Eurozone (2010–2015)	ECB bond purchases; ESM bailouts; fiscal rules suspension	Banking Union; reinforced Stability Pact; permanent ESM	Sovereign debt asymmetries; austerity fatigue	Fiscal capacity divergence; solidarity gap
Migration (2015–2016)	EU–Turkey deal; Frontex expansion; emergency relocation	Permanent EBCG; border securitisation	Governance fragmentation; contested solidarity	Emergency exceptionalism normalised
COVID-19 (2020–2021)	NextGenerationEU; SURE; ECB PEPP; joint procurement	€800 bn+ RRF; permanent borrowing precedent	Public debt accumulation; uneven recovery	First EU joint debt; fiscal divergence
Energy (2022–present)	LNG deployment; FSRUs; price caps; gas storage; REPowerEU	Fossil lock-in; LNG contracts to 2030s; €700 bn+ fiscal legacy	LNG dependence; fiscal asymmetries; stranded asset risk; social contestation	ALL prior patterns present

Source: Author's compilation based on Niemann and Speyer (2018), Hooghe and Marks (2001), Tagliapietra (2020), and IEA (2023).

As Table 3 illustrates, each crisis episode generated structural residues — institutional arrangements, fiscal legacies, or infrastructure commitments — that constrained subsequent governance choices. The eurozone crisis produced the Banking Union and expanded ECB mandate but left sovereign debt asymmetries and constrained peripheral fiscal space that deepened fragility during the COVID-19 crisis. The migration crisis institutionalised border securitisation through a permanent European Border and Coast Guard, while governance fragmentation and contested solidarity persisted. The COVID-19 pandemic produced the EU's first joint borrowing instrument — NextGenerationEU — creating a new institutional precedent but also a substantial debt legacy whose distributional effects are still unfolding (Tagliapietra, 2020).

The energy crisis of 2022 combines all four vulnerability trap dynamics identified across earlier episodes: the normalisation of emergency exceptionalism (migration crisis pattern); fiscal capacity divergence (eurozone pattern); institutional lock-in through emergency instruments (COVID-19 pattern); and procedural exclusion generating social contestation (migration crisis pattern). This convergence supports the theoretical proposition that the post-crisis vulnerability trap reflects a systemic feature of EU reactive integration rather than a sector-specific phenomenon. It also implies that resolving energy-specific vulnerabilities requires governance reforms that address the structural conditions of EU crisis management more broadly (Niemann and Speyer, 2018; Hooghe and Marks, 2001).

Two caveats guard against reading Table 3 as self-confirming. First, the comparison is heuristic rather than a formal test: because the vulnerability-trap categories were derived from the energy case, their recurrence elsewhere should be treated as suggestive corroboration rather than independent proof. Second, the fit across cases is uneven, and the differences are analytically informative. The COVID-19 episode fits only partially: NextGenerationEU created a genuinely novel and arguably positive-sum integrative capacity — joint borrowing and redistributive transfers — that expanded rather than merely constrained future policy choice, complicating any straightforward lock-in reading. The migration crisis, conversely, produced durable institutional residues in the form of a permanent border agency but far weaker fiscal-divergence effects than the energy or eurozone cases. Recognising these partial and disconfirming elements strengthens rather than weakens the central claim: the vulnerability-trap pattern is a recurring tendency of EU reactive integration, not a deterministic law, and its intensity varies with the fiscal and distributive stakes of the emergency instruments deployed.

CONCLUSION

9.1 The Post-Crisis Vulnerability Trap in EU Energy Governance

The preceding analysis confirms that the European Union's post-2022 energy strategy has generated a complex and ambivalent outcome. On the one hand, diversification, emergency governance, and rapid infrastructure deployment succeeded in neutralising an acute supply shock and reducing structural exposure to Russian leverage. On the other hand, these same measures have restructured Europe's energy system in ways that embed

new economic, infrastructural, and political constraints. The concept of a post-crisis vulnerability trap captures this condition: a situation in which short-term resilience masks the emergence of longer-term fragilities that narrow policy choice and complicate future adaptation.

The vulnerability trap is reinforced by interaction effects across domains. Economic fragility amplifies social contestation, which in turn constrains political willingness to withdraw support measures or pursue deeper reforms. Infrastructure lock-in increases fiscal exposure and intensifies distributional conflict. The demand-side governance gap sustains gas consumption at levels incompatible with decarbonisation targets. These feedback loops suggest that vulnerability is not episodic but cumulative, shaped by how emergency measures become embedded in normalised policy frameworks.

9.2 Alternative Interpretations and the Robustness of the Argument

The argument advanced here — that diversification has produced a post-crisis vulnerability trap — must be weighed against several plausible alternative interpretations, three of which merit explicit confrontation. The first holds that the fragilities identified are transitory frictions that market self-regulation will progressively resolve: as global liquefaction capacity expands through the mid-2020s, prices should soften and stabilise, eroding the volatility exposure emphasised above. This is a serious objection, and the partial price moderation observed after 2022 is consistent with it. Yet it speaks only to the price dimension; it does not dissolve the fiscal asymmetries, infrastructural commitments, or legitimacy deficits that operate through slower-moving institutional channels, and it presupposes a benign supply environment that the same global-market integration renders contingent on Asian demand and on geopolitical stability beyond EU control.

A second interpretation concedes the side-effects but maintains that diversification remains a substantial net security gain relative to pre-crisis dependence on a single coercive supplier. This article does not dispute that claim: its argument is not that diversification was mistaken but that its structural by-products are under-examined and cumulatively consequential. A net improvement in one dimension — reduced bilateral coercion — is fully compatible with the emergence of new vulnerabilities in others, and the concept of reconfigured dependence is designed precisely to capture this simultaneity. A third interpretation holds that new LNG infrastructure

need not entail carbon lock-in if assets are built 'hydrogen-ready' and later repurposed. This possibility is acknowledged, but the evidence for credible conversion at scale remains thin: hydrogen-readiness is frequently a design aspiration rather than a binding commitment, retrofit economics are uncertain, and the commercial incentive to maximise gas throughput persists across the assets' payback horizon. On balance, these alternatives qualify the severity of the trap in specific dimensions without displacing the central finding that emergency success has generated durable structural constraints.

9.3 Original Contributions

Three original contributions flow from this analysis. First, the concept of post-crisis vulnerability is established as a theoretically distinct analytical category — temporally differentiated from acute crisis and structurally differentiated from long-term transition risk. This conceptual advance fills a gap in energy security scholarship, which has tended to treat post-crisis periods as residual rather than analytically significant. Second, the article develops a five-dimensional framework for evaluating post-crisis energy governance — encompassing supply reconfiguration, fiscal fragility, infrastructural lock-in, demand-side governance, and social legitimacy — that provides a structured basis for future comparative research and extends existing frameworks (Cherp and Jewell, 2014; Sovacool and Mukherjee, 2011). Third, the concept of reconfigured dependence — specified in Section 1.7 and distinguished there from both strategic dependence and supply diversification — is introduced to capture the specific mechanism through which diversification generates new structural vulnerabilities. Rather than treating dependence as a quantity to be reduced, the concept reframes it as a structure that can be relocated: the EU lowered its bilateral exposure to Russian coercion while raising its systemic exposure to globally governed market risk. Positioning this mechanism within the complex- and weaponised-interdependence literatures (Keohane and Nye, 1977; Farrell and Newman, 2019) clarifies why diversification, though necessary, could not by itself restore energy autonomy. The comparative analysis of Table 3 further establishes that post-crisis vulnerability trap dynamics reflect a systemic pattern of EU reactive crisis governance, validating the broader theoretical claim.

9.4 Policy Implications

For policymakers, the analysis highlights three priorities. First, the EU should develop a systematic framework for managing infrastructure inheritance — the accumulated legacy of crisis-era investment — including clear asset retirement pathways, fiscal provisions for stranded assets, and regulatory norms that prevent emergency permitting precedents from becoming permanent features of energy governance. Concretely, this requires the Commission to publish quantified stranded-asset risk assessments for all FSRU deployments and LNG terminal expansions commissioned post-2022, with mandatory review gates aligned to 2026 and 2030 decarbonisation milestones.

Second, addressing fiscal asymmetry requires enhanced EU-level solidarity instruments that go beyond the current partial redistribution provided by the Recovery and Resilience Facility, ensuring that member states with lower fiscal capacity are not systematically disadvantaged in the post-crisis adjustment. A reformed Energy Solidarity Mechanism — modelled on the COVID-era SURE instrument but calibrated for energy transition costs — would address both the distributional challenge identified in Table 2 and the political legitimacy deficit documented in Section 7.

Third, demand-side governance must be elevated from supplemental to primary instrument status. The EU's post-crisis strategic framework should establish binding demand-reduction trajectories at the member-state level, with dedicated financing mechanisms for building renovation, industrial electrification, and digital demand management — measures that reduce long-term fossil exposure, generate employment, and address energy justice concerns simultaneously (Jenkins et al., 2016; von Malmborg, 2023).

9.5 Limitations and Future Research

Several limitations should be acknowledged. The empirical focus on 2022–2024 means that longer-term outcomes — particularly regarding LNG contract expiry, renewable energy integration, and fiscal consolidation — remain uncertain. The qualitative methodology does not permit precise attribution of causal weight across dimensions. The heterogeneity of member state contexts is compressed within an EU-level analysis, and future research would benefit from comparative national case studies tracing how post-crisis vulnerability manifests differently across varying institutional and economic settings. Quantitative assessment of the distributional

effects of EU energy transition funding on household-level energy poverty, and longitudinal tracking of stranded asset materialisation, represent particularly promising areas for future investigation.

For scholars of energy security and European integration, this article contributes a framework for understanding how successful crisis management can generate new constraints that shape future policy trajectories. By extending path dependence from institutional to infrastructural and fiscal domains, and by identifying demand-side governance as a systematically undertheorised dimension of post-crisis vulnerability, it advances conceptualisation of how short-term emergency decisions cumulate into medium-term structural conditions. As geopolitical uncertainty persists, the challenge for the EU will be not only to withstand shocks, but to ensure that the instruments of resilience do not themselves become sources of the vulnerability they were designed to eliminate.

REFERENCES

Aalto, P. (Ed.). (2008). The EU–Russian energy dialogue: Europe's future energy security. Aldershot: Ashgate.

ACER (Agency for the Cooperation of Energy Regulators). (2023). Annual report on the results of monitoring the internal electricity and natural gas markets. ACER.

Boersma, T. and Johnson, C. (2012). The shale gas revolution: US and EU policy and research agendas. In: Review of Policy Research. Vol. 29, No. 4, pp. 570–576.

Bouzarovski, S. (2018). Energy poverty: (Dis)assembling Europe's infrastructural divide. Cham: Palgrave Macmillan.

Bouzarovski, S. and Simcock, N. (2017). Spatializing energy justice. In: Energy Policy. Vol. 107, pp. 640–648.

Bruegel. (2023). Adjusting to the energy shock: The right policies for European industry, by G. Sgaravatti, S. Tagliapietra and G. Zachmann. Bruegel Policy Brief 11/2023. Brussels: Bruegel.

Bruegel. (2024). National fiscal policy responses to the energy crisis. Brussels: Bruegel. Available at: https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices [Accessed 10 Mar. 2025].

Centre for European Policy Studies (CEPS). (2024). A critical first response to Mario Draghi's competitiveness report, by J. Pelkmans. CEPS Explainer, 20 September 2024. Brussels: CEPS.

Cherp, A. and Jewell, J. (2014). The concept of energy security: Beyond the four As. In: Energy Policy. Vol. 75, pp. 415–421.

Chester, L. (2010). Conceptualising energy security and making explicit its polysemic nature. In: Energy Policy. Vol. 38, No. 2, pp. 887–895.

Correljé, A. and van der Linde, C. (2006). Energy supply security and geopolitics: A European perspective. In: Energy Policy. Vol. 34, No. 5, pp. 532–543.

European Commission. (2021). Fit for 55: Delivering the EU's 2030 climate target on the way to climate neutrality (COM(2021) 550 final). Brussels: European Commission.

European Commission. (2022). REPowerEU Plan (COM(2022) 230 final). Brussels: European Commission.

European Commission. (2023). Recovery and Resilience Facility: Implementation overview. Brussels: European Commission.

Eurostat. (2023). Energy prices and inflation statistics. Luxembourg:

Eurostat. Available at: https://ec.europa.eu/eurostat [Accessed 10 Mar. 2025].
Farrell, H. and Newman, A. L. (2019). Weaponized interdependence: How global economic networks shape state coercion. In: International Security. Vol. 44, No. 1, pp. 42–79.
George, A. L. and Bennett, A. (2005). Case studies and theory development in the social sciences. Cambridge, MA: MIT Press.
Giddens, A. (2009). The politics of climate change. Cambridge: Polity Press.
Goldthau, A. and Sitter, N. (2015). A liberal actor in a realist world: The European Union regulatory state and the global political economy of energy. Oxford: Oxford University Press.
Goldthau, A. and Witte, J. M. (2010). The role of rules and institutions in global energy: An introduction. In: Goldthau, A. and Witte, J. M. eds., Global energy governance: The new rules of the game. Washington, DC: Brookings Institution Press, pp. 1–24.
Goldthau, A. and Youngs, R. (2023). The EU energy crisis and a new geopolitics of climate transition. In: JCMS: Journal of Common Market Studies. Vol. 61, No. S1, pp. 115–124.
Helm, D. (2017). Burn out: The endgame for fossil fuels. New Haven: Yale University Press.
Hooghe, L. and Marks, G. (2001). Multi-level governance and European integration. Lanham: Rowman & Littlefield.
Institute for Energy Economics and Financial Analysis (IEEFA). (2023). Europe's LNG capacity buildout outpaces demand, by A. M. Jaller-Makarewicz. IEEFA.
International Energy Agency (IEA). (2021). Net zero by 2050: A roadmap for the global energy sector. Paris: IEA.
International Energy Agency (IEA). (2022a). World Energy Outlook 2022. Paris: IEA.
International Energy Agency (IEA). (2022b). Energy efficiency 2022. Paris: IEA.
International Energy Agency (IEA). (2023). Gas market report, Q1-2023. Paris: IEA.
International Energy Agency (IEA). (2024). World Energy Outlook 2024. Paris: IEA.
International Energy Agency (IEA). (2025). Gas market lessons from the 2022–2023 energy crisis. Paris: IEA.
International Monetary Fund (IMF). (2022). World economic outlook update: Gloomy and more uncertain. Washington, DC: IMF.

Jenkins, K., McCauley, D., Heffron, R., Stephan, H. and Rehner, R. (2016). Energy justice: A conceptual review. In: Energy Research & Social Science. Vol. 11, pp. 174–182.
Keohane, R. O. and Nye, J. S. (1977). Power and interdependence: World politics in transition. Boston: Little, Brown.
Lockwood, M. (2018). Right-wing populism and the climate change agenda: Exploring the linkages. In: Environmental Politics. Vol. 27, No. 4, pp. 712–732.
Markard, J., Raven, R. and Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. In: Research Policy. Vol. 41, No. 6, pp. 955–967.
Müller-Kraenner, S. (2008). Energy security: Re-measuring the world. London: Earthscan.
Natorski, M. and Herranz Surrallés, A. (2008). Securitizing moves to nowhere? The framing of the European Union's energy policy. In: Journal of Contemporary European Research. Vol. 4, No. 2, pp. 70–89.
Niemann, A. and Speyer, J. (2018). A neofunctionalist perspective on the 'European refugee crisis': The case of the European Border and Coast Guard. In: Journal of Common Market Studies. Vol. 56, No. 1, pp. 23–43.
Overland, I. (2019). The geopolitics of renewable energy: Debunking four emerging myths. In: Energy Research & Social Science. Vol. 49, pp. 36–40.
Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. In: American Political Science Review. Vol. 94, No. 2, pp. 251–267.
Scholten, D. (Ed.). (2018). The geopolitics of renewables. Cham: Springer.
Siddi, M. and Prandin, F. (2023). Governing the EU's energy crisis: The European Commission's geopolitical turn and its pitfalls. In: Politics and Governance. Vol. 11, No. 4, pp. 286–296.
Sovacool, B. K. and Dworkin, M. H. (2015). Energy justice: Conceptual insights and practical applications. In: Applied Energy. Vol. 142, pp. 435–444.
Sovacool, B. K. and Mukherjee, I. (2011). Conceptualizing and measuring energy security: A synthesized approach. In: Energy. Vol. 36, No. 8, pp. 5343–5355.
Tagliapietra, S. (2020). Global energy fundamentals: Economics, politics and technology. Cambridge: Cambridge University Press.
Unruh, G. C. (2000). Understanding carbon lock-in. In: Energy Policy. Vol. 28, No. 12, pp. 817–830.
Unruh, G. C. (2002). Escaping carbon lock-in. In: Energy Policy. Vol. 30, No. 4, pp. 317–325.

Vezzoni, R. (2023). Green growth for whom, how and why? The REPowerEU Plan and the inconsistencies of European Union energy policy. In: Energy Research & Social Science. Vol. 101, 103134.
von Malmborg, F. (2023). First and last and always: Politics of the 'energy efficiency first' principle in EU energy and climate policy. In: Energy Research & Social Science. Vol. 101, 103126.
Yergin, D. (2006). Ensuring energy security. In: Foreign Affairs. Vol. 85, No. 2, pp. 69–82.