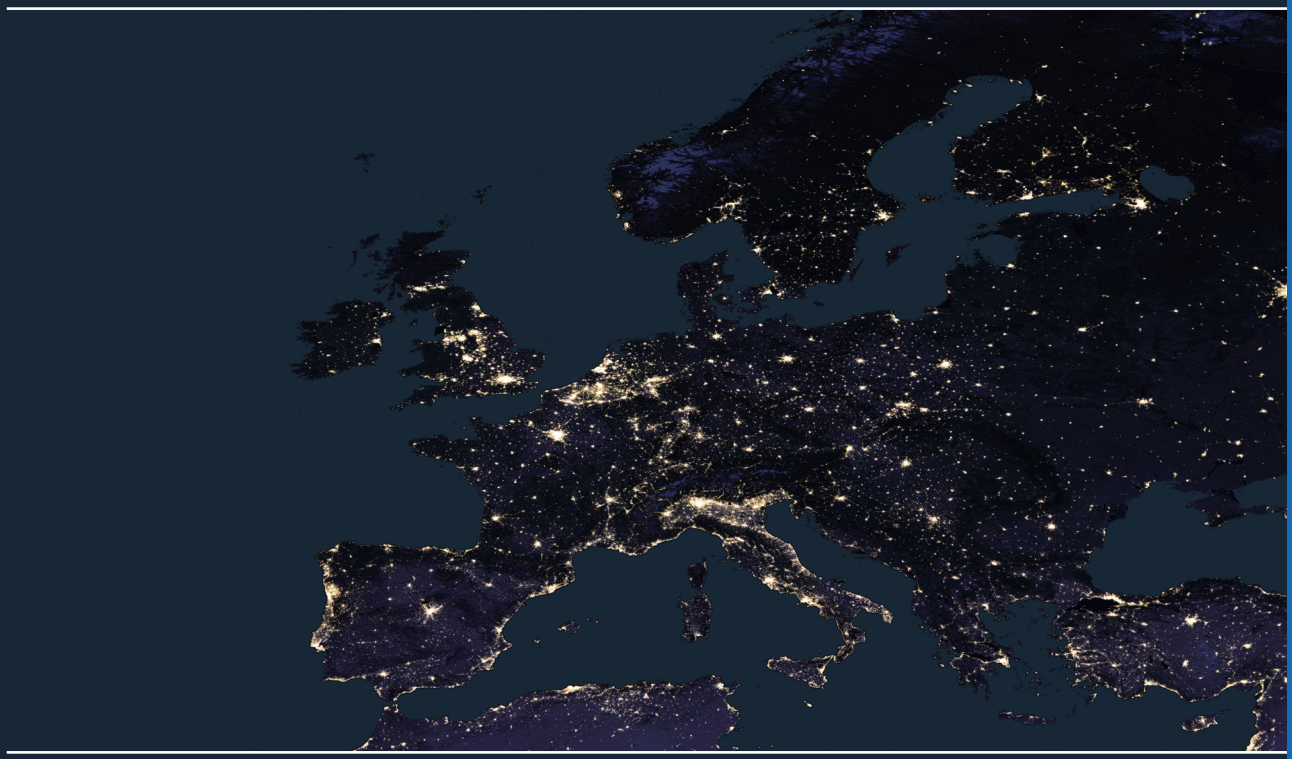
EMPOWERING EUROPE:

DEVELOPING A ROADMAP TO STRATEGIC AUTONOMY AND A COMPETITIVE ENERGY TRANSITION

December 2023



European Initiative *for* Energy Security

ENERGY SECURITY LEADERSHIP COUNCIL EUROPE

About EIES and the Imperative of Bolstering Europe's Energy Security

To de-risk and accomplish Europe's energy transition, the European Initiative for Energy Security (EIES) will develop innovative policy proposals, shape clear narratives, and build new pathways and coalitions of support centred on a comprehensive energy, economic and broader security agenda.

EIES brings together policymakers, business, and former military leaders to develop and advocate for policies that prioritize Europe's energy security and strategic autonomy in order to ensure secure and diverse supply chains, a resilient and clean European industrial base, and peace and prosperity. EIES seeks to bolster cooperation and collaboration across the Atlantic and between like-minded countries on these issues, to achieve shared goals in the face of global challenges.

With a growing on the ground presence across key European capitals and the support of a diverse Energy Security Leadership Council - composed of former senior European Union officials, national politicians, military leaders, NATO officials, and industry executives from across the continent – EIES will conduct in-depth research and high-impact education and advocacy campaigns aimed at informing decisionmakers and the public, and delivering joint action to deliver security and prosperity for all Europeans.

Executive Summary

From the end of the Cold War until the present day, concerns about energy security and supply chain resilience had moved down the priority list. These concerns are now high on the agenda for European policymakers, given the systemic shock of the COVID-19 pandemic, Russia's invasion of Ukraine and disruption of gas supplies, and the realisation that global supply chains have critical vulnerabilities and are highly dependent on China. Beijing in turn is aggressively and opaquely using state support to prop up its industry, is currently the global leader in key segments of energy and climate technology, and has, in its recent restrictions on gallium and germanium exports, demonstrated once again a willingness to flex its supply chain dominance. This polycrisis impacts Europe's ability to execute the energy transition so as to deliver benefits to Europeans (job creation, higher salaries, improved quality of life, etc.), while ending fossil fuel dependence. Additionally, the Inflation Reduction Act's approach to climate policy through industrial policy challenges Europe's approach to its energy transition.

Energy security, industrial policy, sluggish growth, and inflation have now moved to the core of European Union (EU) and national political debates. In addition to the European Green Deal, policymakers have been working on developing the policies and tools required to address existential challenges: implementing an EU economic security strategy; developing tools to assess trade-related risks; screening and potentially blocking inbound investment that threatens their technology; sanctioning states that attempt to coerce common trade policy or specific member states; developing a joint industrial policy (including defence) that sets concrete targets for mining, processing and manufacturing of critical materials and technology; building global climate and resource clubs with like-minded countries; accelerating the rollout of renewable energy to reduce dependence on volatile fossil fuel supplies and unreliable and hostile producers; expanding and securing energy transport infrastructure.

Efforts made to date are steps in the right direction, but the challenge will be to increase support and accelerate the pace over the next 5-10 years. Difficult trade-offs and decisions must be made to ensure Europe does not replace one dependency with another and reduces exposure to external influence and future shocks without slowing growth and damaging security. The objective is to 'derisk,' rather than 'decouple' from China, and other risky partners, to avoid escalation of disputes and negative consequences of invidious dependencies. Importantly, the risks of protectionist policies and actions, the potential for escalation, and the fact that it is impossible to completely decouple European economies and supply chains from China should not (1) lead Europe to underestimate the security threats it faces and be underprepared for them, and (2) impede Europe's efforts to both build domestic energy and industrial capacity, and diversify trade relations with countries that share European values and goals.

Europe must urgently consider how to improve the functioning of the single market - a pillar of the EU built on free movement of goods, services, and people – and rethink fiscal tools so that they better protect all European economies and do not result in a "two-speed Europe." We must better map and address our vulnerabilities, address them strategically, prepare contingency plans, and be ready to use new defensive trade tools. We must create and develop new long-term global collaboration frameworks with like-minded countries that allow Europe to transcend short-term political trends and mandates. This includes a renewing and "future-proofing" of the transatlantic alliance. We must devise and implement European and national energy and industrial transition

plans that work for all European member states to ensure energy and supply chain security, industrial competitiveness, and strategic autonomy. The EU must not allow past difficulties at crafting joint security policy to prevent meaningful progress on this front. In short, Europe must think about economic, energy transition, and security goals hand in hand, just as Europe's major global competitors do, to deliver shared security and prosperity to all Europeans.

The remainder of this decade will be the most challenging - and most critical - in setting Europe on the right track. Europe remains unarmed to facilitate the scale of manufacturing needed to deliver tangible economic benefits and counter rising social unrest. It faces persistently high energy prices and a constrained macro-economic environment, an ongoing war on European soil that we must win to ensure the stability and freedom of the whole continent, and geopolitical uncertainty and proxy conflicts in Europe's neighbourhood. The reverberations of these events are leading to political instability and a backlash against household budget impacts of energy transition and climate policies. Joint European vision, action and solidarity, as well as collaboration with like-minded global partners, will be critical to Europe's success.

The scarcity of natural resources in Europe has historically fostered invention, innovation, and technology in energy and industry across the continent – whether from research and development for nuclear technologies to a range of strategies for hydroelectric power. Historically, it also drove a legacy of pan-European coordination and integration of energy markets, through the establishment of the European Coal and Steel Community, the European Atomic Energy Community, and the move towards a single electricity market. In recent years, progress on energy market and infrastructure integration had been sluggish due to a lack of incentives for shared energy security. The war in Ukraine, however, and growing apprehension about Chinese actions, have triggered European policymakers and businesses to pursue deeper energy integration, improve interconnection and interdependence, and move faster towards a whole-supply chain approach to energy and industrial policy. Moving forward, we must return to the foundational principles of collaboration and solidarity, to achieve a transition towards a net-zero economy that protects and nurtures European competitiveness.

As a newly established European organisation focused on the critical challenges of energy and supply chains security, EIES will work to build political and societal support for meaningful and concrete actions to address these systemic challenges, as well as producing analyses and recommendations to support evidence-based policymaking. This position paper aims to provide a concise overview of Europe's vulnerabilities across the nexus of energy, industry, and supply chains, as well as present initial recommendations on how to address these vulnerabilities in the mid-transition period. These recommendations are summarised below and will serve as the basis for future EIES research and activities.

Strengthen European energy and industrial supply chains and cooperation

1. Make whole-supply-chain energy security a priority of European energy policy, with a focus on regional strengths and stronger coordination across European organizations and national governments to secure support for the transition.
2. Boost European capacity in mining, processing, and manufacturing of raw materials and clean energy technologies, prioritizing speed, innovation, industrial decarbonization, and circularity.
3. Expand all available forms of dispatchable low-emission energy, strengthen European energy transport infrastructure, and increase market integration within the EU and with its neighbours.
4. Develop tailored regional and national energy and industrial transition plans and improve EU-level coordination, guidance, and support, particularly for countries with more limited capacity.
5. Improve access to capital and reduce fragmentation by strengthening and simplifying funding mechanisms, shifting the focus to scaling up production and infrastructure, and prioritizing energy and industrial investments in the next EU multiannual financial framework.

Build Allied Global Supply Chains

6. Strengthen Europe's energy supply chains by building a club with like-minded countries, emphasizing clear incentives for Global South participation, along with prioritizing the implementation of new trade deals.
7. Form global, technology-specific alliances, strengthening collaboration with key clean energy technology producers and ensuring reciprocal market access through initiatives like the Clean Energy Incentives Dialogue.
8. Enhance the transatlantic relationship for energy security and technology cooperation, beginning with technology-specific alliances and leveraging successful examples like the consensus on diversifying chip manufacturing.
9. Counteract anticompetitive and antidemocratic behaviour by enforcing radical transparency, high human rights and environmental standards at borders, and establishing carbon pricing as a foundation of industrial output for Europe and its partners.

Introduction

During the period leading up to the start of Europe's polycrisis – the COVID-19 pandemic and Russia's war in Ukraine – relatively healthy economic conditions and political stability enabled policymakers to focus energy policy primarily on climate and sustainability goals. Concerns over security of energy supplies and affordability of energy were deprioritized in favour of making Europe the first net-zero continent by 2050.

Today, European economic prosperity, which was already challenged by demographic shifts (e.g., an ageing and shrinking working-age population) and exacerbated by the pandemic, has been further undermined by Russia's invasion of Ukraine and its weaponization of gas supplies. Europe is now drastically re-thinking its energy policy goals. While Europe has been forced to substantially cut its energy imports from Russia and diversify suppliers, its energy transition remains dangerously reliant on another unreliable partner, China, in a challenging context of global macroeconomic contraction and shifting global geopolitics.

China's chokehold over clean energy technologies and their associated supply chains — everything from rare earth minerals to wind turbines, to batteries and affordable electric vehicles — poses a significant risk to the competitiveness of European manufacturing. It also presents challenges to Europe's ability to expedite the energy transition in a way that maximizes opportunity for Europeans increasingly sceptical of the short-term costs of Brussels-driven and national climate policies, while upholding trust in democratic leadership to navigate this transition. Europe must now embrace a vision and strategy for a more integrated industrial, energy and trade policy, built with like-minded countries, that ensures broader security, strategic autonomy, and long-term prosperity for future generations.

Section I of this paper focuses on the causes and consequences of Europe's energy dependencies, Section II on challenges for Europe's energy transition, Section III on the domestic and foreign threats to European industrial competitiveness. Finally, Section IV lays out initial recommendations centred on a comprehensive approach to energy security and industrial policy through global allied supply chains and stronger European energy and industrial supply chains and cooperation.

I. Russia as a Catalyst

Europe's Love Affair with Cheap Russian Gas

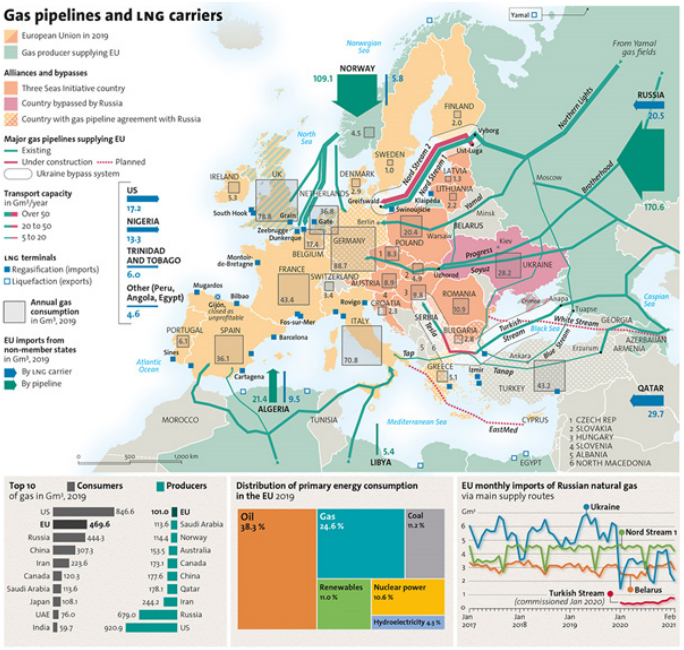
Prior to the COVID-19 pandemic and Russia's invasion of Ukraine, Europe benefited from two decades' worth of relatively healthy socio-economic conditions, driven by low interest rates, reliable economic growth, globalized supply chains, and importantly, abundant cheap energy powering its industry: pipeline gas from Russia. This enabled policymakers to prioritize sustainability and drive forward a net-zero agenda. Natural gas was touted as a cleaner, and in certain countries, safer alternative to coal and nuclear power. Policymakers and the energy sector sought to use natural gas to plug the gap in the clean energy transition, with gas serving as an interim solution ahead of widespread access to renewably generated electricity and alternative solutions for heating and industry.

The depletion of Europe's own gas supplies in the Netherlands and the North Sea, and the lack of a social license for "fracking", or extracting shale gas, suspected to have been aggravated by Russian disinformation operations,[1] meant that demand growth was largely met through imports via pipeline infrastructure.[2] Between 2013 and 2022, Norway met between 20 and 25 percent of the European Union (EU) and the United Kingdom's (U.K.) demand for gas.[3] Spain built pipeline and liquid natural gas (LNG) infrastructure to import gas from Algeria and further afield.[4]

Meanwhile, German, French, and Italian utility companies, as well as industrial buyers, entered into joint ventures and long-term supply arrangements with Gazprom, Russia's leading state-owned gas company.[5] These commercial arrangements, which built on a history of Cold War-era gas supply deals, had been backed by policymakers as an effort to foster diplomatic relations and economic integration with the former USSR.[6]

Gazprom and its European partners expanded capacity and constructed new pipelines routes – adding to the historical lines built during the Soviet era - through the Black Sea and Turkey, Ukraine and Belarus, as well as through the Baltic Sea, with the Nord Stream lines directly serving Germany.[7] A network of pipelines across Europe increased Russia's leverage, providing a certain level of destination flexibility which allowed for profit optimization and risk mitigation. Russia had long been Europe's primary gas provider, with Russian imports eclipsing domestic production in the EU and U.K. in 2016,[8] and supplying Europe with 40 percent of its natural gas in 2020.[9] Across Europe, gas continued to grow in importance, become the leading source of electricity generation, surpassing oil in 1992, hydro power in 2001, coal in 2017, and nuclear power in 2020.[10]

Gas pipelines and LNG Carriers [11]



Germany became Europe's largest importer of Russian gas, importing 55 billion cubic meters (bcm) of gas in 2021,[12] equivalent to 40 percent of the EU's total consumption,[13] and 55 percent of Germany's total consumption in 2022.[14] Despite the potential risks, Germany prioritized cheap power to support the growth of its vast industrial sector, while at the same time moving away from coal and nuclear power, following the Fukushima catastrophe in 2011. Although Germany was Europe's primary importer of Russian gas by volume, other European economies had far greater relative import dependencies on Russia. Central and Eastern European countries including Poland, Czechia, and Hungary had significant dependencies. Non-EU economies in the Balkans (North

1 Jones, S. and G. Chazan. (2014, June 19). Nato claims Moscow funding anti-fracking groups. *Financial Times.*
2 Górski, J. (2019, May 28). *Social License to Operate (SLO) in the shale Sector: A Contextual Study of the European Union.*
3 Donnarumma, H. (2022, June 28). *Trends in U.K. imports and exports of fuels - Office for National Statistics.*
4 Ibid
5 University of Cambridge. (2015). Markets and long-term contracts: The case of Russian gas supplies to Europe. *Energy Policy Research Group.*
6 Meyer, R. (2022, February 25). Why Europe can't shut off Russian gas. *The Atlantic.*
7 Abdelal, R. (2013). The profits of power: Commerce and real politik in Eurasia. *Review of International Political Economy*, 20(3), 421–456.
8 IEA. (2022a, February). *Europe relies primarily on imports to meet its natural gas needs.* EIA.
9 IEA. (2022b, March). *A 10-Point plan to reduce the European Union's reliance on Russian natural gas – analysis - IEA.*
10 IEA. (n.d.). *Europe – Countries & Regions - IEA.*
11 Gas pipelines and LNG carriers. (2021, May 1). *Le Monde Diplomatique.*
12 Statista. (2023a, September 20). *Russian natural gas imports in Europe 2021, by country.*
13 Statista. (2023b, November 28). *Extra-EU natural gas import share from Russia 2010-2022.*
14 Brookings. (2023, October 24). How did Germany fare without Russian gas?. *Brookings.*

Macedonia as well as Bosnia and Herzegovina, for example) as well as EU countries in Northern and Eastern Europe (i.e, Latvia and Finland) had import dependencies over 90 percent,[15] and in some cases, Russia was their sole supplier in 2019.[16]

Oil Dependence

In addition to its gas dependence, Europe continues to rely heavily on oil to fuel its transportation sector.[17] Despite the EU's Green Deal objectives to reduce vehicle kilometres travelled[18] and foster transportation electrification and the transition to cleaner fuels, 92 percent of the transportation sector in Europe is still fuelled by oil.[19] With transportation expenditures being the second largest household cost in the EU,[20] Europe's ongoing oil dependence keeps industry and consumers hostage to a high degree of price volatility.

Rapid price fluctuations are the result of oil being priced on a global market which is susceptible to price manipulation and geopolitical disruptions. Although oil is traded in open and liquid markets, the functioning of the oil market in general is far removed from any free market ideal. The Organization of the Petroleum Exporting Countries (OPEC), an oil producing cartel that has no European members or influence, represents a significant deviation from normal market structure. National oil companies within OPEC, which controlled nearly three quarters of global proven oil reserves in 2022, have historically withheld supplies and under-produced, reflecting non-economic priorities and anti-competitive behaviour.[21] These disruptions – both upwards and downwards - pose significant national and economic security concerns.[22] Coercive behaviour in energy markets has historically contributed to deep recessions and distorted investment environments, disrupting economic stability, and driving inflation and higher costs-of-living in Europe.

In a resource-poor continent, imports make up 92 percent of the EU's oil consumption.[23] Although these imports are more diversified and flexible than gas,[24] 57 percent of oil imports into the EU originate in OPEC and OPEC+ countries,[25] including a quarter from Russia. This quarter represented €83 billion over the single-year period following Russia's invasion of Ukraine, 50 percent more than the EU's expenditure on Russian gas—both of which are significant drivers of revenue that continue to fund Russia's war.[26]

Europe: Divided Approaches to Energy Security

With markets and policymakers prioritising affordability, diversity and security of supply fell down the agenda of energy policy, despite recurring events that clearly demonstrated the risk of dependence on Russia for fuel. Russia had shut off gas supplies through Ukraine four times over the last two decades,[27] and in 2009, Gazprom withheld gas from Moldova, Bulgaria, and Romania for nearly two weeks in the depths of winter.[28] Post-Soviet states were acutely attuned to the risks posed by Russia and took costly steps to diversify gas supplies. Lithuania constructed an LNG terminal in 2014, and Latvia expanded its underground gas storage capacity.[29] Since joining the EU in 2004, Poland had long been warning Europe – and Germany specifically – about the growing threat posed by a resurgent Russia[30] and beginning in 2007 issued gas exploration licenses to reduce Russian dependence.[31] These over-dependence concerns were reiterated on security grounds – including by the United States – with the expansion of the Nord Stream pipeline (II).[32]

With Member States being responsible for managing and choosing their respective energy mix,[33] the EU progressively developed a shared energy policy and market, although these efforts were limited by the lack of interconnectivity between countries and regions. The European Commission also intervened in an effort to coordinate the EU's energy supply diversification and security efforts, with varying degrees of success. Early efforts to curb the dominance of state-owned energy companies, through gas market liberalization, inadvertently played a role in deepening Russia's dominance over Europe's gas supplies. In the 2000s the European Commission's gas market liberalization moved the market from long-term contracts towards dynamic pricing.[34] Spot pricing - originally opposed by Russia – forced Russia to compete

15 Buchholz, K. (2022, February 24). Which European countries depend on Russian gas? *Statista Daily Data*.
16 Statista. (2023b, September 20). *Russian natural gas imports in Europe 2021, by country*.
17 Agora Energiewende. (2019). *European Energy Transition 2030: The Big Picture*.
18 Such as fuel taxes, shared and public transportation policies.
19 13,213,287 TJ/ 14,432,552TJ Total in 2020, IEA. (2022c). Energy Statistics Data Browser – Data Tools [Dataset]. In *IEA*.
20 Eurostat. (2020, January 8). Transport costs E.U. households over €1.1 trillion. *Eurostat*.
21 OPEC. (2023). OPEC : OPEC share of world crude oil reserves [Dataset].
22 SAFE. (2016). *A National Strategy for Energy Security*.
23 Eurostat. (2023). *Oil and petroleum products - a statistical overview* [Dataset].
24 Only 20 percent of oil into Europe are imported via pipeline, compared to 89 percent of gas prior to the War in Ukraine, European Parliament. (2019, March 4). *Gas imports: new rules for pipelines from non-EU countries* [Press release].
25 Eurostat. (2023, September 25). E.U. imports of energy products continued to drop in Q2 2023. *Eurostat*.
26 Bruegel. (2023c, November 14). How much will the EU pay Russia for fossil fuels over the next 12 months? *Bruegel*.
27 Colgan, A. G. M. H. a. J. D. (2023, August 23). The missed opportunity of Europe's energy crisis: Putin's aggression should speed the shift away from fossil fuels. *Foreign Affairs*.
28 European Parliament. (2020). Energy security in the EU's external policy. *European Parliamentary Research Service*.
29 Ibid
30 Hansberry, C. (2023, October 16). How to strike a grand bargain on E.U. nuclear energy policy. *Atlantic Council*.
31 Craig, J., Gerali, F., Macaulay, F., & Sorkhabi, R. (2018). The history of the European oil and gas industry (1600s–2000s). *Geological Society*, London, Special Publications, 465(1), 1–24.
32 Nord Stream 2 – Symbol of failed German bet on Russian gas. (2023, March 8). *Clean Energy Wire*.
33 European Parliament. (2020). Energy security in the EU's external policy. *European Parliamentary Research Service*.
34 Chyong, C. K., Reiner, D., & Aggarwal, D. (n.d.). Market Power and Long-term Gas Contracts: The Case of Gazprom in Central and Eastern European Gas Markets. *The Energy Journal*.

Crude oil tankers at anchor near Nakhodka, Russia, December 4, 2022, © REUTERS

with emerging liquefied natural gas alternatives in new terminals in the U.K., Spain, and France, among others, bringing Russian gas prices down.[35] These efforts, however, ultimately made it easier for European utility companies to import more Russian gas,[36] and gave Russia more leverage to manipulate pricing by withholding supply.[37]

In 2004, the Commission introduced a Directive "concerning measures to safeguard security of natural gas supplies" which sought to encourage the construction of emergency supply infrastructure.[38] In the absence of a real mandate, the Directive did not drive meaningful change,[39] particularly when the costs of developing storage infrastructure were astronomical,[40] making them economically inefficient in the absence of sufficient public funding. Since Russia's invasion of Ukraine, however, the EU has been more assertive in securing the resilience of its energy supplies. For example, the EU's 2022 gas storage mandate ensured that Member States replenish their reserves for the winter months. Likewise, the U.K. released its own Energy Security Strategy in 2022 and 'Powering up Britain' Plan in March 2023 to achieve the joint objectives of net zero emissions and energy security.[41] National-level differences, the limitations of the toolkit for intervention at the European Union level, and the lack of any U.K. – EU – E.E.A coordinated agreements on energy security to complement operational agreements, still make a more comprehensive pan-European strategy challenging.

The International Energy Agency's efforts to establish emergency oil stocks to mitigate the risk of major shocks has resulted in a more coordinated approach to oil security in Europe. Recent sanctions on Russian oil, however, have not significantly hindered Moscow's ability to wage war,[42] while boosting the role of other unreliable energy producers. Albeit at a discount, Russia continues to export growing volumes of oil to India and China instead of its traditional European markets,[43] undermining the U.S. and Europe's efforts to isolate the Kremlin. At the same time, aided by sanctions-evasion and opaque supply chains, the EU is importing 70 percent more refined oil products from China than in 2022 – largely originating in Russia.[44] Meanwhile, Europe is now importing more oil from Saudi Arabia, hardly a predictable supplier.[45] The challenge of managing unreliable and hostile energy producers reinforces the need for Europe's energy transition away from fossil fuels, and for

35 Henderson, J., & Stern, J. (2023, October 17). *Reflecting on 20 Years of OIES Gas Programme.*
36 Ibid
37 Terzi, A., Sherwood, M., & Singh, A. (2023). European industrial policy for the green and digital revolution. *Science and Public Policy,* 50(5), 842–857.
38 EU Council. (2004). *Council Directive 2004/67/EC of 26 April 2004 concerning measures to safeguard security of natural gas supply.*
39 Finon, D., & Locatelli, C. (2008). Russian and European gas interdependence: Could contractual trade channel geopolitics? *Energy Policy*, 36(1), 423–442.
40 Paltsev, S. (2015). Economics and geopolitics of natural gas: Pipelines versus LNG, *12th International Conference on the European Energy Market (EEM)*, Lisbon, Portugal, 2015, pp. 1-5.
41 Department for Energy Security and Net Zero. (2023, March 29). Stakeholders respond to the government's Energy Security Plan. *GOV.UK.*
42 Bloomberg. (2023, August 11). Russia's war economy is on course to recover from sanctions hit. *Bloomberg.com.*
43 The Economist. (2023a, February 1). Why the West's oil sanctions on Russia are proving to be underwhelming. *The Economist.*
44 Transport & Environment. (2023b). *New Oil Map.*
45 Transport & Environment. (2023b). *New Oil Map.*

significantly increasing the production of low-emission energy within its own borders.

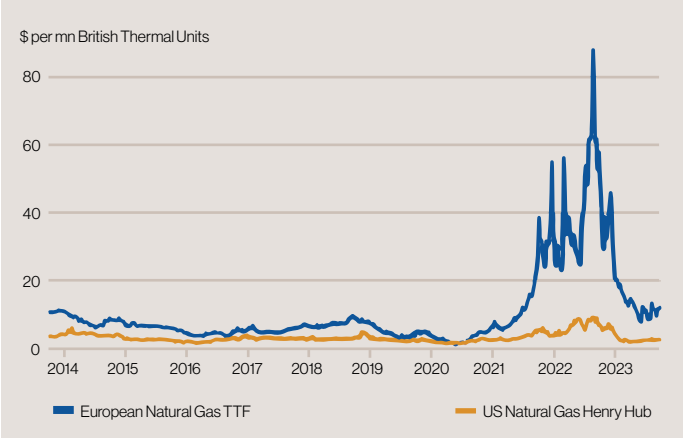
Economic Security

Russia's invasion of Ukraine and the broader rise of geopolitical tensions have forced Europe to re-evaluate its energy policy priorities. Russia's war and its ongoing efforts to destabilise the EU and NATO have driven up energy prices, challenged Europe's future economic prosperity, and highlighted the risks of depending on autocratic adversaries and strategic competitors.

Russia's gradual suspension of pipeline gas deliveries into Germany via Nord Stream I during the summer of 2022 revealed Europe's energy vulnerability when faced with adversarial state actors.[46] After Russia's brutal invasion of Ukraine, energy prices across Europe peaked at ten times the pre-War average,[47] curbing economic growth, and exacerbating an existing European energy supply crisis. These costs are still felt throughout public, commercial, and household budgets, insofar as natural gas is used for domestic heating, in industry, and for the production of electricity. During a time when public budgets were already stretched from the COVID-19 pandemic, Europe spent over €1 trillion offsetting the impacts of price shocks through windfall taxes and levies for corporate aid and bailouts, and to shield end consumers from rising energy costs.[48] Even then, impacts on household budgets were significant.

Domestic electricity prices across Europe were up 69 percent in 2022 compared to two years earlier,[49] and these prices were even higher in countries with a large share of gas in their electricity mix. For example, in Germany, in September 2022, electricity was trading at €400MWh, eight times its price two years prior.[50] Due to their shared and open nature, price peaks impacted Europe's entire gas and electricity markets, including countries with relatively low import dependencies.[51]

European gas price rose more than in the U.S.[52]



European industry – which accounts for more than a third of EU demand for electricity and natural gas – has suffered from gas price volatility and sustained high prices, accelerating its erosion,[53] which has been ongoing for the past three decades.[54] Energy-intensive industry, including basic metals, non-metallic-minerals, paper, pulp and printing, and chemicals, have suffered the most from high and volatile prices. In some cases, layoffs and temporary shut-downs of factories were required to avoid outages during peak demand periods, while in extreme cases companies have had to permanently downsize or shut down.[55]

The loss of cheap Russian gas in Germany has been detrimental to the economy as a whole – which is largely supported by its industrial sector – whose GDP is due to shrink by 0.4 percent in 2023.[56] Energy intensive industries have downstream impacts on inputs and costs that feed into automotive and clean technology manufacturing, posing a risk to Europe's ability to manufacture the goods needed for the energy transition.

Europe's dependence on Russia has highlighted the economic security implications – across households, businesses and public budgets – of relying on autocrats for critical energy supplies, forcing Europe to re-prioritize affordability and reliability of supply in the multiple goals of energy policy.

46 Colgan, J. D., Gard Murray, A., & Hinthorn, M. (2023b). Quantifying the value of energy security: How Russia's invasion of Ukraine exploded Europe's fossil fuel costs. *Energy Research & Social Science*, 103, 103201.
47 The Economist. (2022, September 8). Europe scrambles to protect citizens from sky-high energy prices. *The Economist*.
48 Colgan, J. D., Gard Murray, A., & Hinthorn, M. (2023b). Quantifying the value of energy security: How Russia's invasion of Ukraine exploded Europe's fossil fuel costs. *Energy Research & Social Science*, 103, 103201.
49 The Economist. (2023b, May 12). Expensive energy may have killed more Europeans than covid-19 last winter. *The Economist*.
50 Minimizing the economic pain of European industrial gas rationing | Rhodium Group. (2022, September 13). *Rhodium Group*.
51 Donnarumma, H. (2022, June 28). *Trends in U.K. imports and exports of fuels - Office for National Statistics*.
52 Romei, V., & Smith, C. (2023, October 19). How is the US economy managing to power ahead of Europe? *Financial Times*.
53 Bruegel. (2023a, May 17). Adjusting to the energy shock: the right policies for European industry. *Bruegel*.
54 Deutsche Bank Research. (2020). *Industrial policy in times of COVID-19 and its aftermath*.
55 Arnold, M., Nilsson, P., & Pitel, L. (2023, September 14). 'Everything is tired here': gloom spreads through German manufacturing. *Financial Times*. and Dempsey, H. (2023, October 29). Norsk Hydro warns flood of Chinese electric vehicles threatens aluminium demand in Europe. *Financial Times*.
56 Kinkartz, S. (2023, November 4). German industry: Can the backbone of the economy be saved? *dw.com*.

II. Europe's Energy Transition at Risk

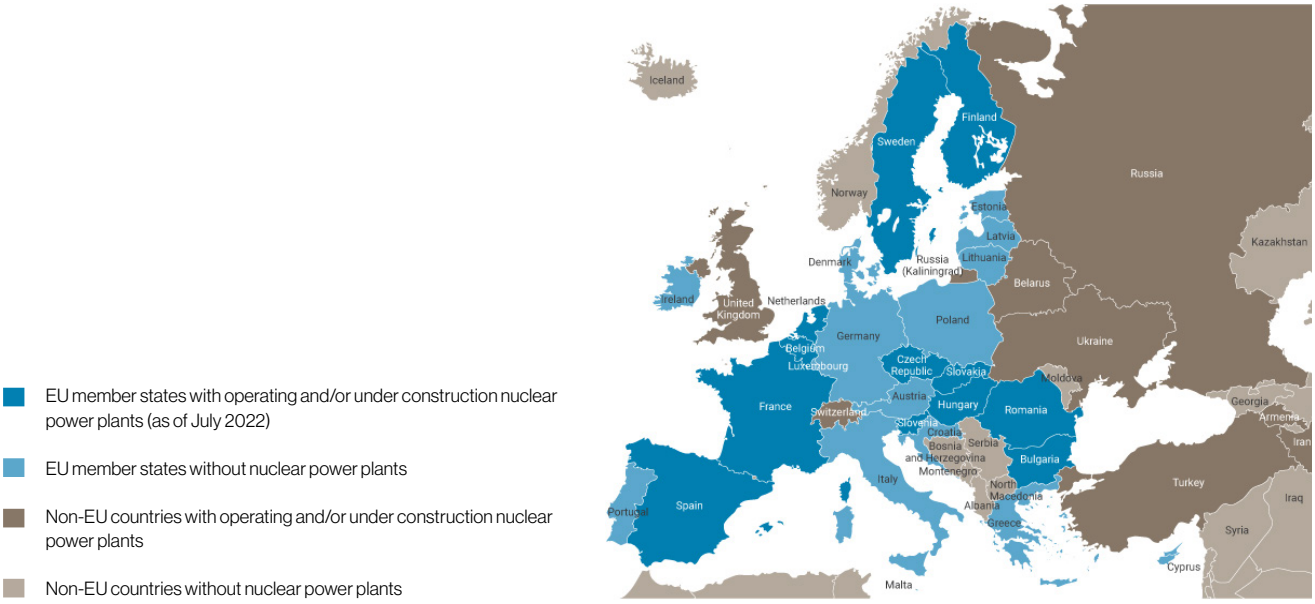
LNG terminal at Zeebrugge, Belgium, © Kurt Desplenter

Russia's aggression has undermined Europe's energy transition and, having long been a leader in global climate actionof the energy transition, Europe now runs the risk of falling behind both the United States and China, despite recently pushing through dozens of new initiatives as part of the Green Deal.[57] Europe mustered an unprecedented level of coordinated mobilization to manage the loss of the majority of Russian gas supply – through demand-side reductions, the expedited rollout of LNG import infrastructure, joint LNG purchasing agreements for EU imports, and mandatory gas storage requirements.

Despite these measures, Europe still had to resort to burning dirtier fuels such as coal and diesel when gas prices reached record levels,[58] and is still importing Russian gas, primarily in the form of LNG.[59] In a knock-on effect, Europe's rush to procure LNG and its relatively higher purchasing power has priced out developing countries, such as India and Pakistan, with a combined population of over 1.5 billion, which have resorted to burning coal as a substitute.[60] Economists and climate scientists have raised concerns that construction of new LNG infrastructure will inadvertently create lock-in effects that could delay Europe's energy transition, as firms look to maximize return on their capital infrastructure investments.

Europe's ability to remain at the helm of global climate leadership will be largely determined by its ability to efficiently navigate the period in which the coexistence of hydrocarbons and renewables in the energy mix is necessary. In the absence of widespread and scalable solutions for energy storage, and the intermittent nature of wind and solar energy, there is a continued need for both dispatchable backup power as well as greater cross-border grid interconnectivity. Backup power and interconnectivity allow the new distributions of energy production to be accomodated, while simultaneously decommissioning hydrocarbon-based power in an orderly manner. Europe's geopolitical, political, and geographical differences pose challenges but also opportunities to leverage and inform a comprehensive, cohesive, and competitive 'mid-transition' plan that can be tailored to national specificities.

57 Jacques Delors Centre. (2023). *Turning challenges to E.U. competitiveness into opportunities.*
58 Jones, D. (2023, November 15). *European Electricity Review 2023*. Ember.
59 Hancock, A. (2023, November 29). EU ports help sell on over 20% of LNG imports from Russia. *Financial Times*.
60 Maulia, E. (2023, July 6). LNG 'inequality' bites as Europe takes supply from Asia. *Financial Times*.



Europe's Divided Stance on Nuclear Power ©World Nuclear Association

Power Up

In addition to developing storage, maintaining baseload, dispatchable power sources is essential to ensuring backup in the absence of inherently intermittent wind and/ or solar. Nuclear power – which generates a quarter of Europe's electricity[61] – is necessarily a critical component of reliable base-load power,[62] and the development of Small Modular Reactors (SMRs) has an important role in providing low-carbon energy, with improved safety and a reduced footprint.[63] However nuclear energy remains controversial. Europe's stance is divided between nuclear proponents and expanders (Sweden France, Finland, and Slovakia), decommissioners (Spain), nonnuclear (Germany, Norway, and Austria), and new entrants (Poland).

Ironically, nuclear power was once a uniting issue for Europe.[64] Following the Suez Crisis, Western Europe, under the 1958 Euratom Treaty, sought to collaborate on nuclear power to secure its energy independence. France led the charge for deploying nuclear projects, through the Messmer Plan, and its efforts were intensified following Algeria's independence in 1962 and the 1973 oil shock.[65] These efforts also recognized the limitations of European natural resources including water (for hydropower), coal, and natural gas.

However, the Three Mile Island and Chernobyl disasters divided Europe. Protests, and the rise of the Green Party in Germany, initiated the start of a highly active polarised anti-nuclear movement lobby in Europe. This acrimony persists, at a time when long-term alternatives to Russian energy supplies are needed. Decisions to decommission in one or more countries may unbalance existing intra-European arrangements in the absence of feasible and dispatchable alternatives. The recent inclusion of nuclear fission to the European Commission's Net Zero Industry Act (NZIA),[66] was an important step in recognizing nuclear as a crucial part of Europe's energy mix, driving a more technologically neutral and inclusive clean energy industrial policy for the EU. Overcoming politically divergent national-level approaches while ramping up support for nuclear research and development will be key to Europe's secure energy transition, given the high potential of nuclear power.[67] Additionally, nuclear energy has historically been an area of close EU-US cooperation, and a furthering of this agenda on the issue of SMRs is desirable.[68]

Renewable technologies will create new geographical concentrations of energy generation, with implications for industry and manufacturing. Historically, localized patterns of energy generation and industrial development, notably the co-location of steel production with coal reserves, evolved to more geographically diversified industry through the reduction of transportation costs and greater mobility of energy resources. Today, the pendulum is swinging back, as meteorological advantages (sun and wind) drive a return to more geographically limited energy production. But these have not yet been comprehensively thought through, in terms of capital allocation and the opportunity to address longstanding asymmetries across Europe.

61 Hansberry, C. (2023, October 16). How to strike a grand bargain on E.U. nuclear energy policy. *Atlantic Council.*
62 IEA. (2022b, March). *A 10-Point plan to reduce the European Union's reliance on Russian natural gas – analysis - IEA.*
63 European Commission. (n.d.). *Small Modular reactors.* European Commission.
64 Chyong, C. (2019, August 1). *European Natural Gas Markets: Taking Stock and Looking Forward.*
65 Hansberry, C. (2023, October 16). How to strike a grand bargain on E.U. nuclear energy policy. *Atlantic Council.*
66 European Parliament. (2023, November). *MEPs back plans to boost Europe's Net-Zero technology production | News* [Press release].
67 IEA. (2022e). Is the European Union on track to meet its REPowerEU goals? – Analysis. In IEA.
68 European Commission. (n.d.). *Small Modular reactors.* European Commission.

Spain and Italy, for instance, have high potential for photovoltaic deployment, while countries near the North Sea are better situated to benefit from offshore wind.[69] These geographical advantages will make it beneficial to co-locate energy-intensive industries with energy production, and to improve energy interconnections between different regions. Research has indicated that producing green hydrogen in Germany, for example, could cost 20 percent more than importing it from Spain.[70] The European Union, however, remains ill-prepared to allocate capital to less developed economies for clean energy technologies and deliver upward economic convergence across Europe.

The high variability of renewable energy production requires a greater degree of interconnectivity and coordination with neighbouring grids as well as increased energy storage capacities.[71] In Germany, for instance, the connections between wind power generation in the north and industrial clusters in the south remain limited, restricting the ability to balance the grid.[72] Britain, which relies heavily on gas and wind for energy, remains reliant on its interconnection with France when the wind drops to avoid high costs to consumers.[73]

Across Europe, the ongoing Electricity Market Reform, as well as the recently published 'Grids Package' seek to provide new market tools and expand infrastructure to support the rollout of new electricity generation capacity, improve interconnectivity, and be better prepared and shielded from supply shocks and price volatility. The implementation of reforms, and the further integration of Europe's energy markets over the next few years, will be critical to increase interdependencies and solidarity, reduce the occurrence of conflicting policies, and ultimately achieve shared energy security. The lack of coordination combined with free rider behaviour risks undermining the benefits of renewable energy technology deployments, which will rely on a resilient, efficient, and interconnected transmission network.

A number of recent EU policy initiatives have aimed at cutting red tape and fast tracking permitting across generation and transmission networks. Planning and permitting for new transmission lines in Europe typically takes six to seven years, while the construction takes two to three.[74] However, the European Union's powers on this front remain relatively limited, and further decisive action is required from national and local administrations.

69 Cavina, T., Milanesi, L. M., Samandari, H., Tai, H., & Winter, R. (2023, August 8). Five key action areas to put Europe's energy transition on a more orderly path. *McKinsey & Company.*

70 including cost of transmission, Ibid.

71 Štreimikienė, D., Siksnelyte-Butkiene, I., & Lekavičius, V. (2023). Energy Diversification and Security in the EU: Comparative assessment in different E.U. regions. *Economies*, 11(3), 83.

72 Bruegel. (2023b, November 8). A new economic geography of decarbonisation? *Bruegel.*

73 Ibid

74 IEA. (2019). *Energy Technology Perspectives 2023.*

Power Down

The decommissioning of traditional fuel burners and associated transport infrastructure raises new challenges to managing the timing of phase outs and subsequent downstream impacts. In simple terms, all energy is not created equal, and replacing a consistent baseline energy supply for say, a smelter with an intermittent power source is not a solution without some form of backup. The transition will create conditions for even greater volatility and disruption in the energy sector, both in terms of pricing and the availability of supplies. This will be exacerbated by the ongoing impacts of the conflict in Ukraine and the possibility of other conflicts or disruption involving energy powers. When the decommissioning of old infrastructure is not well-aligned with commissioning of new infrastructure, the resulting shortages may drive up prices and even cause economic and political instability. Such misalignments may result from a variety of factors, from failure of different segments of the energy sector to coordinate, conflicting interests, or broader economic or systemic factors.

Although most of Europe is set on phasing out coal by 2030, a concentration of reserves in Northern and Eastern Europe has delayed the timetable in those regions, with Poland now targeting 2049.[75] Earlier plans for the decommissioning of European coal plants assumed that inexpensive Russian natural gas would replace their energy contribution.[76] When Russian gas became unavailable in the wake of the war in Ukraine, this required Europeans to recommission some coal plants to meet demand for electricity.[77] Likewise, the prospect of declining demand for gasoline over the long term might reduce incentives to maintain or increase refining capacity – even though the global economy will continue to rely on petroleum as a transportation fuel for many years to come.

It is therefore critical that European countries, as part of their national transition plans and with the input and support of business, devise detailed scenarios for the rollout of new clean infrastructure and the phaseout or repurposing of legacy fossil fuel infrastructure. This is particularly required for natural gas, whose timeline for phaseout will vary across countries. A successful transition will depend on the rollout speed of clean generation and transmission assets, which themselves require enormous amounts time and public and private investment. EU-wide assessment and coordination of these plans will be essential to ensure national plans are coherent and complementary. These plans should be made in coordination with the EU's neighbouring countries, including the U.K., Norway, Ukraine, Moldova, Balkans, Turkey and North African nations.

75 IEA. (2022c, December). *Hard coal mining phase out 2049 – Policies - IEA.*

76 Mathiesen, K. (2019, January 23). Coal phase-out will increase German need for gas, says Merkel. *Climate Home News.*

77 Connolly, K. (2022, September 5). Germany to reactivate coal power plants as Russia curbs gas flow. *The Guardian.*

Power Switch

In moving to clean fuels, planning and scenario-building exercises are especially critical to navigate uncertainties around the timetable and level of future supply, demand and market share of clean hydrogen and biomethane, as well as other clean fuels that can help displace fossil fuels. The EU has made hydrogen and biomethane central elements of its energy transition strategy,[78] in the hope of decarbonising energy intensive industries, storing and transporting electricity, and replacing natural gas. The ability to scale up production and demand for clean hydrogen, biomethane and other clean fuels will be highly dependent on production costs and competitive advantages. Today, low carbon gas is currently at least three times more expensive than conventional natural gas,[79] which means that reaching the desired volume and price levels is likely to take significant time.[80] Supporting the development of large-scale strategic clean fuel projects , such as through the EU's Important Projects of Common European Interest[81] scheme or the new EU Hydrogen Bank,[82] should support cross-country and regional cooperation, fast-track innovative projects and the scaling up of the clean fuel industry, albeit at significant cost. This illustrates the need for careful supply and demand projections as well as the development of new funding mechanisms, at both the European and national levels, which can provide additional support to regions with more limited financial firepower.

Clean technology supply chains, including electric vehicle batteries, also require new capital inputs. The supply chains for clean technologies are overwhelmingly dominated by China, leaving Europe's energy transition potentially hostage to Beijing. This includes nearly all aspects of the critical mineral and industrial materials supply chains from mining and mineral processing to advanced component production, manufacturing, and recycling. Many of these materials are also needed to meet Europe's defence and aerospace needs.

At the same time, Europe's own available domestic natural resources are extremely limited by the lack of mining and processing capacity. This includes raw materials needed to manufacture batteries, wind turbines, photovoltaic (PV) products, electrolysers and heat pumps, with the EU's global production share of individual raw materials not exceeding seven percent.[83]

As a strategic competitor, China thus enjoys substantial leverage over Europe's energy transition and indeed entire modern economy. Chinese-owned companies have strategically

Lithium Battery Factory in China © STR/AFP/Getty Images

purchased stakes in major mineral deposits around the world, control anywhere from 60 to 100 percent of processing (depending on the mineral), and produce upwards of 70 to 90 percent of the world's battery components.[84] China supplies the EU with 95 percent of its rare earth elements, used across a range of clean energy, defence, and technology applications,[85] areas where scenario modelling predicts Europe will face significant shortages by 2030.[86] European regulatory barriers, such as long permitting times, the lack of a social license to operate, and macroeconomic factors, including high interest rates, pose a major barrier to developing more mining capacity for some time.

China's ability to exercise leverage over its competitors is not merely theoretical. Beijing has already blocked exports of materials to punish nations for actions or policies China does not like and to disadvantage its competitors. In 2010, for instance, after a dispute with Japan, Beijing placed limits on rare-earth exports that severely harmed competitors in Japan, the U.S. and EU and sparked an international trade dispute.[87] In 2022, China limited graphite exports to Sweden while Chinese-owned companies were investing $8b into battery manufacturing plants in Hungary and Poland that imported $230m worth of Chinese graphite.[88] This action strategically handicapped competitors in Sweden, most notably Northvolt, a European leader in battery manufacturing. Europe's dependence on China for critical materials presents a major risk to Europe's security. Most recently, in response to U.S. controls on advanced semiconductor technology exports to China, Beijing restricted exports of gallium and germanium, critical for products including night-vision goggles and semiconductor production.

78 European Commission. (n.d.) REPowerEU at a glance. European Commission
79 ACER. (n.d.). *Gas factsheet.*
80 IEA. (2019). *Energy Technology Perspectives 2023.*
81 Ibid
82 European Parliament (2023). European Hydrogen Bank. *Legislative Train Schedule.*
83 European Commission. (2023). Supply chain analysis and material demand forecast in strategic technologies and sectors in the E.U. – A foresight study (ISSN 1831-9424). *JRC Science for Policy Report.*
84 SAFE, Commanding Heights of Global Transportation, September 2022, at paged 40 to 45; and SAFE analysis based on data from Benchmark Minerals Intelligence.
85 Onstad, E., & Chee, F. Y. (2023, March 7). E.U. to set up central buying agency for critical minerals-draft law. *Reuters.*
86 IEA. (2021, May). *The Role of Critical Minerals in Clean Energy Transitions.*
87 Schmid, M. Rare Earths in the Trade Dispute Between the US and China: A Déjà Vu. *Intereconomics* 54, 378–384 (2019).
88 The Economist. (2023c, June 22). Why is China blocking graphite exports to Sweden? *The Economist.*

III. Decline of Industrial Competitiveness

The challenges facing European industry are impacting Europe's ability to execute the energy transition in such a way that delivers benefits to Europeans (e.g., job creation, higher salaries, and improved quality of life), while at the same time ending fossil fuel dependence. Delivering tangible economic benefits is essential to pulling Europe out of its period of economic stagnation, rebuilding support for the energy transition, and countering rising social unrest that anti-establishment and extremist political groups have capitalized on.[89] Although the European Commission has announced its ambition to raise the industrial share of GDP, it remains unarmed to facilitate the scale of manufacturing needed to retain jobs and a healthy economy.

Once an industrial powerhouse with a world-leading manufacturing sector,[90] Europe is losing its competitive edge, posing a major threat to European prosperity. European industry faces numerous home-grown challenges, including labour issues, and high labour costs. Perhaps most salient are Europe's persistently high energy prices which make manufacturing, especially of upstream inputs, uncompetitive. Europe also faces massive and systemic unfair competition from China.

Europe's automotive sector is a major economic powerhouse for the continent, with economic and cultural significance, representing European innovation and craftsmanship – and therefore offers an excellent case study of the challenges the continent faces. Three of the world's top five largest auto manufacturers are European, and Europe produces a quarter of the world's electric vehicles (EVs).[91] In the EU, the automotive sector at large accounts for 13.8 million jobs, roughly six percent of total employment,[92] and yields an annual trade surplus of $85 billion.[93] In Germany alone, the automotive sector is by some distance the nation's strongest industrial sector, generating 24 percent of all domestic industry revenue[94] and accounting for 5 percent of the economy.[95]

Although electrification has accelerated, through subsidies and tax benefits, affordability remains a key concern. Production in Germany, however, currently remains 10 percent lower than in 2019, before the pandemic and subsequent supply chain chaos.[96] Britain's auto sector is also in crisis ahead of that country's 2035 internal combustion engine ban, with vehicle production having nosedived to new lows not seen since the 1950s.[97] Chinese brands' market share for battery-electric sales in the EU – while still relatively small – has increased significantly from 0.4 percent in 2019 to almost 4 percent in 2022, while the market share of European brand sales in China has fallen from 28.5 percent to 24 percent over the same time period.[98]

Automotive manufacturing plant in U.K. © Owen Humphreys/PA

Operating Inputs: Energy

Although energy prices have come down from tenfold peaks in 2022, the loss of pipeline gas, aggravated by the de-nuclearization of certain parts of Europe, means that Europe is now paying two to three times more for energy than in other parts of the world.[99] Sustained high energy prices pose a major threat to the competitiveness of both clean technology and automotive manufacturing sectors, as well as upstream energy-intensive sectors. For instance, prior to Europe's energy crisis, the cost of energy per vehicle was relatively inconsequential, estimated at around €50.[100] In October 2022, these costs were estimated to have risen to between €687 - €773.[101] High energy prices pose a risk to Europe's production output of electric vehicles, industry's ability to innovate, and address affordability concerns.[102]

89 Henley, J. (2023, September 22). Revealed: one in three Europeans now vote anti-establishment. *The Guardian.*
90 Centre for European Reform. (2023, June 12). Europe can withstand American and Chinese subsidies for green tech. *Centre for European Reform.*
91 IEA. (2023a). Global EV Outlook 2023. *In IEA.*
92 European Commission. (n.d.). *Automotive industry.*
93 ACEA. (2022a, September 30). The state of the E.U. auto industry. *ACEA - European Automobile Manufacturers' Association.*
94 See for example VDA. (2022, June 28). *Significance of automotive industry for Germany.*
95 Dmitracova, O. (2023, August 7). Germany risks falling back into recession as car industry sputters. *CNN Business.*
96 Ibid
97 Lea, R. (2023, January 26). Car industry in reverse as output crashes to lowest level in 70 years. *The Times.*
98 ACEA. (2023). *Fact sheet: EU-China vehicle trade.*
99 Foy, H., & Arnold, M. (2023, November 8). Mario Draghi delivers downbeat outlook for E.U. economic growth. *Financial Times.*
100 S&P Global. (2022, October 11). *Winter is Coming* [Press release].
101 Ibid
102 Ibid

Upstream industries – particularly metals processing – that feed into both automotive and clean technology manufacturing are proportionally more energy-intensive than component and vehicle assembly itself. Energy is the largest cost in primary aluminium production, for example, accounting for 40 percent of the cost, and therefore critically determines the profitability of smelters.[103] Metals pressing, welding or extrusion business prices were one and a half times those in vehicle assembly in October 2022, during peak pricing.[104] Basic metals industries saw a decline of five percent in production output, respectively, between 2021 and 2022, when gas prices peaked.[105] This reduction was more pronounced in countries with greater use of natural gas in their energy mixes, such as Italy, whose production fell by 15 percent. Manufacturers of solar-grade polysilicon for PV panels, which requires a lot of energy, have also struggled to remain competitive, and have called for regulators' support with regard to the cost of energy.[106]

The automotive, and tangential sectors are beginning to take steps to replace natural gas-fuelled combined heat and power plants with green electricity, piloting electrically-operated heating stations for aluminium smelting, and aiming to deploy solar and replace gas with hydrogen at production plants.[107] Nevertheless, the multitude of challenges facing the automotive sector – requiring innovation and digitalization – calls for an integrated approach to both energy and industrial policy.

Transitioning Europe's Automotive Industry

The automotive industry faces numerous obstacles which put Europe's energy transition and plans to phase out of internal combustion engine (ICE) vehicles at risk. Above all, the swift deployment of electric vehicles across Europe is essential to reducing its dependence on oil. As the global shift towards electric vehicles intensifies, with roughly a quarter of the global car market subject to a 2035 ICE ban,[108] the sector's role in shaping the energy, economic, and industrial futures of Europe and its allies becomes even more pivotal.

In contrast to internal combustion engine vehicle manufacturing, Europe does not have a competitive advantage across the value chain of electric vehicles, particularly in relation to the upstream materials necessary for electric vehicle batteries.[109] Despite recent political progress in the passage of the Critical Raw Materials Act proposal, in the short to medium term, Europe as a bloc both lacks sufficient strategic reserves of minerals to mitigate supply shocks,[110] and faces significant challenges to quickly scaling up either domestic mining or partnerships with other suppliers such as Australia, Brazil, Argentina, Uruguay and Paraguay.[111] Significant infrastructure investments will be needed when partnering with countries in Central Asia, for example, with significant supplies of rare earth metals . Furthermore, despite the Commission's push to spur investment in the battery industry through the European Battery Alliance – a public-private alliance launched in 2017 to build up European battery capacity – and subsequent 50 planned gigafactories as of March 2023, two thirds of these may be at risk of being delayed, scaled down or cancelled.[112]

The challenges of transitioning Europe's automotive sector away from ICE vehicle manufacturing towards the production of battery electric vehicles have hindered EU legislative efforts to pass a 2035 ban on ICE vehicle sales, and revise bloc-wide vehicle emission standards. These legislative efforts are important parts of the EU's collective effort to reduce oil use in the transport sector and create greater investor certainty. This year, the proposal to phase out ICE sales by the middle of next decade backed by major European business,[113] was blocked by Germany, supported by other major European car manufacturing nations such as Italy and Czechia, until they secured the continued sale of ICE cars that run on e-fuels. The goal of Germany and its supporters was to maintain a future for ICE vehicles and protect the hundred-years plus of competitive advantage and supply chains associated with them.[114]

China's Commanding Heights

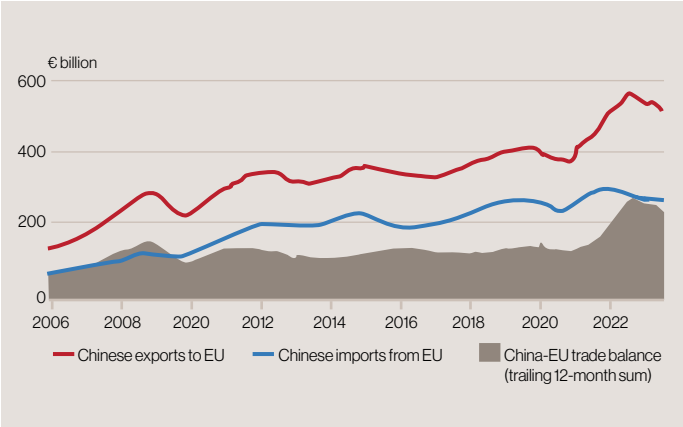
China's strategic manufacturing capacity continues to vastly exceed its own consumption and needs, and its share of low carbon technology exports as a share of global exports have grown from 23 percent in 2019 to 34 percent in 2022, largely driven by batteries, EVs, and solar panels.[115] This commanding position reflects a well-funded, planned, and coordinated national strategy from the ruling Chinese Communist Party (CCP) to accelerate its dominance in the transportation, energy, and technology sectors.[116] These industrial plans have seen billions of dollars in subsidies poured into strategic industries, allowing China to become the world's largest manufacturer of EVs and clean

103 OECD. (2018). *Measuring distortions in international markets: The aluminium value chain.*
104 S&P Global. (2022, October 11). *Winter is Coming* [Press release].
105 Bruegel. (2023a, May 17). Adjusting to the energy shock: the right policies for European industry. *Bruegel.*
106 Yeh, A. (2023, August 25). Clean energy's dirty secret: how can solar cut its dependence on Xinjiang forced labour?. *China Strategic Risks Institute.*
107 ACEA. (2022b, October 25). *Energy crisis: Automakers' plans to cut gas consumption* [Press release].
108 IEA. (2023b). *World Energy Outlook 2023.*
109 ACEA. (2023, February 8). *E.U. auto industry chief calls for ambitious automotive industrial policy* [Press release].
110 IRIS. (2023). Les stocks stratégiques de métaux critiques | *IRIS.*
111 Zimmermann, A., & Gijs, C. (2023, November 15). Portugal's corruption scandal spells trouble for EU's critical minerals hunt. *POLITICO.*
112 Transport & Environment. (2023a, March 13). Two-thirds of European battery production at risk – analysis. *Transport & Environment.*
113 EV100. (2023, March 20). Subject: Businesses call for a swift adoption of the Regulation on CO2 emission standards for cars and vans. *Climate Group.*
114 Posaner, J. (2022, September 22). The death of Das Auto: Can German cars survive the end of the engine? *POLITICO.*
115 Centre for European Reform. (2023, June 12). Europe can withstand American and Chinese subsidies for green tech. *Centre for European Reform.*
116 SAFE. (2023). *A Global Race to the Top.*

energy technology, and dominant supplier of their components.[117] China's first mover advantage, scale of production, and low production costs — enabled by minimal labour, human rights and environmental standards — combine to drive persistently low prices that substantially undercut producers that have to meet more demanding standards. The CCP's non-competitive trade practices are increasing its trade surplus (and Europe's deficit) – particularly across clean energy technology and automotive sectors.

The CCP's execution of a strategy to 'dump' PV modules is an important reminder of the potential impact such policies could have on Europe's automotive, and emerging clean energy technology manufacturing more broadly. In 2012, Chinese-owned companies flooded the European market with solar panels priced significantly below European-manufactured panels. This price undercutting was detrimental to European production, leading to the loss of 80,000 jobs and several Germany PV companies filing for bankruptcy.[118] PV panels in Europe are estimated to cost a third more to produce than in China,[119] where the majority are produced in the Xinjiang region, in which forced labour is state policy.[120]

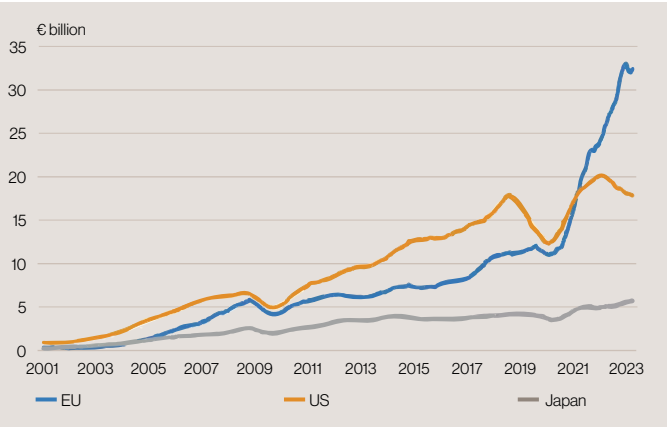
Europe's Trade Deficit with China has Soared[121]



Despite the European Commission's subsidy investigation, and imposition of tariffs on Chinese imports in 2013,[122] 89 percent of the EU's PV module imports (or 72 percent of total demand), still come from China.[123] China's dominance of PV modules continues to grow, and the country is expected to supply the entire global market in 2030.[124] Europe's failure to address both the ethical conflict and strategic risk posed by China's PV industry puts other European manufacturing, and its energy transition at risk.

The risk facing the automotive sector and its 13.8 million EU jobs[125] is even more stark. In 2022, China surpassed both Germany and Japan to become the largest vehicle exporter in the world.[126] In the first seven months of 2023, China exported €12.1bn of EVs to Europe, compared with €14.3bn in the whole of the previous year, according to Chinese customs data.[127] The EU has since launched a subsidy investigation into Chinese EV 'dumping' in Europe, but remains largely disarmed when faced with China's non-market behaviour. Specifically, national subsidies to encourage EV purchases are not limited to European-manufactured vehicles, as they are in the United States , and trade policy is not reciprocal: Chinese vehicles entering the EU are subject to a 10 percent tariff, while European vehicles imported into China are subject to a 15 to 25 percent tariff.[128] China's rapid dominance of EV manufacturing and supply chains poses a major and looming threat to one of Europe's most strategic industries.

Chinese Exports of Vehicles and Parts[129]



In the EU, trade policy is mostly decided in Brussels and foreign and national security decisions are made in national capitals,[130] and the current Commission has been taking a more active stance on giving the EU's trade policy more teeth. A spectrum of proposed defensive trade tools exists to level the playing field within the EU, promote the fight against climate change, and bolster European social and economic values. These tools are bound by the EU's interpretation of the World Trade Organization's rules on global trade. They include:

- The proposed Corporate Sustainability Due Diligence

117 Shih, W. C. (2023, August 21). The new era of industrial policy is here. *Harvard Business Review.*
118 Terzi, A., Sherwood, M., & Singh, A. (2023). European industrial policy for the green and digital revolution. *Science and Public Policy*, 50(5), 842–857.
119 Agora Industry & Agora Energiewende. (2023). *Ensuring resilience in Europe's energy transition.*
120 Yeh, A. (2023, August 25). Clean energy's dirty secret: how can solar cut its dependence on Xinjiang forced labour?. *China Strategic Risks Institute.*
121 Nardelli, A., & Jacobs, J. (2023, October 13). US, E.U. will use summit to align strategies on Russia and China. *BNN Bloomberg.*; data adjusted by EIES
122 Terzi, A., Sherwood, M., & Singh, A. (2023). European industrial policy for the green and digital revolution. *Science and Public Policy,* 50(5), 842–857.
123 Agora Industry & Agora Energiewende. (2023). *Ensuring resilience in Europe's energy transition.*
124 IEA. (2019). *Energy Technology Perspectives 2023.*
125 European Commission. (n.d.). *Automotive industry.*
126 Confidential market research analysis, Nov 2023 [email communication]
127 Dempsey, H. (2023, October 29). Norsk Hydro warns flood of Chinese electric vehicles threatens aluminium demand in Europe. *Financial Times.*
128 Setser, B. W. (2023, November 29). How the U.S. and E.U. Could Harmonize Their Approaches to Trade in EVs and Steel. *Council on Foreign Relations.*
129 Ibid
130 Steinberg, F., & Benson, E. (2023, July 13). Evaluating Europe's Economic Security Strategy. *CSIS.*

Directive which seeks to address poor corporate behaviour such as human rights abuses,[131] should be strengthened with minimum standards of supply chain disclosure.

- An anti-coercion instrument was designed during the Trump administration as a defensive trade capability for the EU.[132]
- The Carbon Border Adjustment Mechanism seeks to tackle excess capacity and carbon emissions in specific materials entering the EU.[133]
- The investment screening mechanism seeks to redress a broader market failure of opaque supply chains to properly account for the true cost of mineral extraction that includes the toll on workers and the environment.[134]
- The Anti-Dumping/Anti-Subsidy Instrument, which has been used on a number of occasions, including most recently in September 2023 to investigate China's trade practices vis-à-vis electric vehicle exports to the European Union.[135]

Recent trade disputes reflect divergent national-level trade relationships with China across the continent, and differing levels of willingness to manage the associated risks. The Netherlands, for instance, was the first European country to follow the United States with export controls on semiconductor technology to China. France, whose auto sector has been less successful in China than Germany's, was a prime mover of the European Commission's recently announced EV anti-dumping investigation. France has been a longtime supporter of stronger trade defence measures and plans to introduce tariffs on Chinese vehicles in December 2023. German car manufacturers, on the other hand, remain highly reliant on China as a market for their vehicle exports. German auto manufacturers sell 22 percent of their vehicles to China, making up 15 percent of income,[136] though this number is rapidly falling. Germany thus remains highly critical of the European Commission's investigation, out of fear of retaliation.[137] Nevertheless, Germany is introducing a rigorous Supply Chain Due Diligence Law that would penalise companies that fail to remedy forced labour abuses from their supply chains. Hungary has enabled a lot of foreign direct investment in batteries and automotive manufacturing through Chinese companies.[138]

These different approaches often result in EU law being the lowest common denominator of foreign trade policy and run the risk of diluting ambition at the national level. A higher degree of coordination across Europe is desirable to ensure that EU tools can be effectively used to address market failures and ensure that EU rules can be suitably implemented and enforced at national level. Likewise, coherent, bloc-wide integrated energy and industrial policy is needed to better mitigate the impacts of non-competitive market behaviour on European manufacturers. Without it, Europe's ability to act geopolitically to protect its members' interests and achieve its climate-related ambitions will remain limited.

Overcoming Transatlantic Differences

In spite of shared transatlantic goals of driving competitiveness while managing the risk of China, Europe continues to navigate an uneven relationship with the United States. This relationship was soured by Trump-era tariffs, and the trade implications of the 2022 Inflation Reduction Act that have made it more challenging for European car manufacturers to benefit from U.S. EV tax credits. Ongoing negotiations over carbon pricing and steel and aluminium remain unresolved, the result of diverging interpretation of World Trade Organization rules, and a major source of acrimony. Underlining this tension is an increasingly imbalanced dependence – on defence, technology, and energy – and fears of another Trump presidency.

Overcoming different national in approaches is crucial to upholding democratic, and competitive market values while protecting strategic European and American industry in ways that adhere to high social and environmental standards. Although the United States' Inflation Reduction Act saw some investments shift from Europe to the United States,[139] the ramifications on the European clean technology industries appear to be less severe than had been previously anticipated.[140] The more important threat to European industry remains China, and neither Europe nor the United States can compete with China alone. As negotiations remain underway to ensure continuity and harmony in U.S.-European trade, European and American policymakers should consider a deeper level of integration and harmonization between transatlantic allies as being key to managing China more effectively. In a positive development, U.S. and European views on the challenge posed by China are becoming increasingly aligned, reflecting Europe's reaction to Beijing's support for Putin's brutal and illegal invasion of Ukraine, China's predatory trade policies, and Chinese actions on human rights, the environment, and the rule of law.

131 Yeh, A. (2023, August 25). Clean energy's dirty secret: how can solar cut its dependence on Xinjiang forced labour?. *China Strategic Risks Institute*.
132 European Parliament. (2023a, October 3). *MEPs adopt new trade tool to defend EU from economic blackmail*.
133 Steinberg, F., & Benson, E. (2023, July 13). Evaluating Europe's Economic Security Strategy. *CSIS*.
134 European Commission. (2023a). *FDI screening*.
135 EUR-Lex. (2020, October 16). *Anti-dumping measures*.
136 Bourgery-Gonse, T. (2023, September 26). France rolls out new cash incentives for electric cars, takes aim at China. *Euractiv*.
137 Chinese retaliation could have major financial implications, such as Beijing's September 2023 iPhone ban, which caused Apple's market capitalization to fall almost $200b in two days; see Ibid. and Vallance, B. M. O. & C. (2023, September 8). Apple shares slide after China government iPhone ban reports. *BBC News*.
138 Companies include CATL, BYD, and Nio
139 Total Energies, BMW, and Northvolt are among the companies that announced investment shifts as a result of the IRA. Financial Times. (2022, November). European industry pivots to US as Biden subsidy sends 'dangerous signal.' *Financial Times*.
140 European Commission. (2023c, October). *Commission reports on EU policy initiatives to promote investments in clean technologies* [Press release].

Industrial Policy Underdelivering

The COVID-19 pandemic and subsequent shortages of critical equipment highlighted the risks of supply chains starting in China. These, combined with concerns over the impact of globalism on domestic manufacturing, unleashed a new era of state intervention in globalized markets. Those risks included the fact that market forces alone were insufficient to address path dependencies, that control over supply chains held the potential to shift global economic and geopolitical balances, and that changes would be needed to mitigate climate change, requiring a concerted socio-economic transformation.[141] Perhaps most important was the recognition that free market rules provided little protection where one key player with massive economic leverage was more interested in manipulating the rules than following them.

While the EU has dedicated significant resources to supporting businesses through the energy transition, this funding remains very fragmented and insufficiently focused on downstream deployment and practical outcomes. Energy technology funding currently represents 32.6 percent of the EU's budget, or €579 billion, in addition to national subsidies and tax credits granted by under EU member states.[142] Despite fears that Europe would not be able to compete with the United States' Inflation Reduction Act (IRA), the monetary amounts are not dissimilar. The major difference is that European funding is regulation-based – with carbon pricing, binding targets, performance standards, and grants – rather than incentive-based. Funding is tied to specific mechanisms, and its distribution is rather opaque and unintegrated. This is in contrast to the IRA, under which funding is more directed and targeted on specific outcomes. In the EU, businesses do not have certainty of obtaining funding when making their application. Furthermore, EU funding has traditionally been focused on basic research and development and innovation, rather than being tied to scaling businesses to produce intermediate or end-user products. More centralized approaches to funding, such as those proposed through the EU Sovereignty Fund, have so far proven to be politically unpalatable.

The European Commission has typically taken a sector-neutral approach to fostering innovation, which has caused Europe to lag in strategic sectors.[143] The 2022 European Chips Act, and Net Zero Industry Act – which specifically identifies clean tech sectors to support - represent the beginning of a European shift on strategically-targeted industrial policy.[144] The Chips Act aims to increase Europe's share of global production in semiconductors by 2030, reinforcing research and development, supporting startups, and luring foreign manufacturers to the EU through subsidies by Member States.[145] The EU has sought to expand upon the strategic industry approach, through the Clean Tech Manufacturing Fund and the Strategic Technologies for Europe Platform (STEP), though these fell short of initial grand ambitions. Instead of providing new, consolidated funding for strategic industrial sectors, the fund only serves as a top-up, with just €10 billion available.[146]

National-level spending and support for businesses is greater than at the European Union level, by nature of countries' ability to raise capital debt. Although national-level spending is rigorously regulated to ensure a level playing field, the COVID-19 pandemic and the war in Ukraine prompted European policymakers to increase member state's flexibility to intervene through the State Aid Temporary Framework. As such, EU state aid expenditure rose from €102.8bn in 2015 to €334.54bn in 2021, and between March 2022 and August this year, Europe approved €733bn in state support.[147]

As national governments' ability and scope to intervene depends on their fiscal firepower, richer states have benefitted most from the relaxation of limits on state aid.[148] Germany, in particular, spent significantly more on cushioning COVID impacts than any other country,[149] through windfall taxes and levies for corporate aid and bailouts, as well as on supporting energy-intensive industries.[150] Germany and France have poured large subsidies into jump starting clean technology manufacturing, including for battery manufacturing and recycling facilities. The ending of EU oversight of debts and deficits distorted the single market, and created tensions across the EU, particularly insofar as some of the spending was business-specific.[151] The EU is now seeking to regain control over national-level spending and support,[152] requiring member states to "phase out the remaining energy measures as soon as possible." Germany's Finance Ministry froze virtually all new spending authorizations further to a court ruling that cast doubt over the country's entire financing plans.[153] The over-reliance on individual state aid demonstrates the need for a more comprehensive approach to industrial policy that reinforces and plays to the strengths of the single market.

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142 Keating, D. (2023, October 25). The E.U. is offering as much green funding as the US IRA. So why aren't innovators getting it? *Energy Monitor*.

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150 Colgan, J. D., Gard Murray, A., & Hinthorn, M. (2023b). Quantifying the value of energy security: How Russia's invasion of Ukraine exploded Europe's fossil fuel costs. *Energy Research & Social Science*, 103, 103201.

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153 Ibid

IV. OVERCOMING THESE CHALLENGES

Europe needs a coordinated, whole-supply chain strategy for energy security to ensure collective autonomy, improve the competitiveness of European industry across all countries and gather support for the energy transition. Energy, industrial, trade and foreign policy must be thought of together to design a plan, to re-energize Europeans around a joint project and strengthen trust in democracy through a pathway that creates prosperity for all Europeans. A comprehensive transition plan will avoid abrupt action and the risk of jolting economies and societies and engendering political backlash from businesses and consumers.

This strategy must be made a central part of EU policy over the next five years, in close cooperation with its neighbours in the U.K., Norway, Eastern Europe and the Balkans, and with other 'friendly countries' with whom healthy economic cooperation and competition is possible. Combining foreign and trade policy with domestic energy and industrial policy - much like the United States, and other actors such as China and Russia – is possible within a free-market framework and will help achieve shared goals and prosperity.

Strengthen European energy and industrial supply chains and cooperation

1. **Develop a joint, whole-supply-chain energy security approach.** Clean and affordable energy is unfeasible without tackling supply security challenges. Collective action must focus on the further integration of European energy markets and infrastructure to increase interconnectivity, interdependence, and hence solidarity and resilience. To do so, a stronger coordination of energy policy at the European level is needed, built on a whole-supply-chain approach that encompasses the production, transportation, and consumption of critical resources and technologies. In-depth assessment of regional and national strengths and weaknesses as well as scenario building for the coordinated phase-in of new sources and the phaseout of old ones will be required. This can be achieved by extending the remit or remodelling existing European administrations and agencies or creating a new one, and should increase cross-country coordination and cut bureaucracy and red tape.
2. **Strengthen European capacity in mining, processing, manufacturing, and recycling of raw materials and clean technology.** Europe must be able to mine and process available critical materials and manufacture technologies, with speed and social licence. Europe should focus on cutting red tape and fast-tracking critical projects, while continuing to hold its industry to high social, environmental, and governance standards through regulation that incentivises transparency and distinguishes it from other geographies whose opaque supply chains undermine such standards. Regulation and incentives should continue to promote innovation and digitalization, efficiency, circularity, and industrial decarbonization. High performing products will continue to create long-term demand for European manufacturing, not purely based on cost, paving the way for more resilient and sustainable supply chains, and improving the attractiveness of the continent as a location for investment. On the demand side, European and national administrations have an important role in creating the market through public procurement. These policies will require significant financial firepower and

increase some costs in the short term, but they are necessary for a race to the top that respects European values.

3. **Expand dispatchable low-emission energy and the enabling infrastructure.** Absent a revolutionary breakthrough in energy technology, nuclear power is crucial to meeting Europe's ambitious emissions targets and to reducing the long-term cost of electricity as demand increases. It is also key to maintaining a balanced grid, and reducing price fluctuations caused by intermittent renewable technologies in the absence of widespread capacity for energy storage. As such, Europe should work towards providing regulatory certainty and investor confidence in nuclear, address concerns of anti-nuclear countries on waste management, double down on research and innovation, and scale up SMRs. Additionally, Europe should have an 'all of the above' approach to the transition and support the scale up of alternative fuels such as clean hydrogen and biofuels where they provide energy security and are economically competitive, to push out fossil fuels and reduce dependencies on strategic competitors and unreliable suppliers. This must be coordinated with the planning and expansion of transport infrastructure, including continental power grid development and EV charging, in combination with demand-side efficiency and flexibility. Significant investments are needed to ensure that countries with lower renewable generation capacity can benefit from production in better-suited geographies, and to reduce the long-term cost of electricity.
4. **Produce and coordinate tailored regional and national energy and industrial transition plans.** European countries must use the blueprint and framework of the EU's National Energy and Climate Plans (NECPs) to integrate other sector-specific plans – such as national hydrogen strategies – and produce energy and industry strategies for planning and implementation. EU institutions and agencies must ensure coherence, check on progress, check on progress, and provide guidance and support where needed, particularly to those countries with smaller capabilities on Europe's Eastern and Southern flanks. Regional cooperation that responds to specific needs of the region's clusters and avoids a two-speed Europe should be promoted. These plans will be critical to create visibility and confidence with investors and improve access to capital for the energy transition.
5. **Improve access to capital.** In the absence of greater private capital and public funding to close capital and operating expenditure gaps, Europe will fall short of meeting its objectives. EU funds and grants are currently scattered across multiple portfolios and an assessment and reallocation of available funds are required. Funding needs to shift from research and development to scaling up energy and materials production, infrastructure, and the downstream scaling up of clean technologies. A better form of centralized funding mechanism for energy and industrial projects could reduce uncertainty for investors, reinforce the single market and leverage regional strengths. This idea is debated but preferable to the atomised, state aid-heavy approach currently favoured by large European economies – which other member states cannot afford. A new funding and capital investment mechanism must be underpinned by security imperatives, interconnectivity, and solidarity. Additionally, energy and industrial investments should be prioritized during negotiations on the next EU multiannual financial framework and underpinned by EU fiscal policy reforms aimed at reducing fragmentation across the continent.

Build Allied Global Supply Chains

6. **Europe must follow up on recent efforts to strengthen its multilateral approach to securing energy transition supply chains** by building new partnerships with likeminded countries, partnering with raw material suppliers from a diversified set of exporting countries. This should take the shape of a broader 'club' including countries with which Europe shares democratic and market values. It is essential to provide partners, particularly those from the Global South, with clear economic incentives to join such initiatives. Similarly, the EU should focus on delivering on new trade deals (such as with Chile, Australia, and Mercosur), building on recent but limited successes, such as the new free trade agreement with New Zealand.
7. **Build technology-specific alliances within Europe and internationally,** such as at the G7 level, or between major producers such as the United States, South Korea, Germany, and Japan. Europe is not well positioned to manufacture all clean energy technologies competitively, such as photovoltaic manufacturing, and should therefore focus its production – specializing across countries and regions – and work with global allies to ensure reciprocal market access. Supply security fora such as the Clean Energy Incentives Dialogue should be leveraged to facilitate investment and build on prior progress around EV charging.
8. **Strengthen and stabilize the transatlantic relationship.** In the face of economic challenges posed by the Inflation Reduction Act and the uncertainty of the upcoming U.S. election, Europe must remain engaged with U.S. partners on energy security and technology cooperation. This remains true even as political swings in both Europe and the United States may at times challenge transatlantic understanding and alignment. This can be achieved through technology-specific alliances bringing together policymakers, businesses, and scientists from across the Atlantic to continue to develop sector-specific cooperation. The transatlantic consensus to diversify chip manufacturing, which seeks to tackle monopolistic or oligopolistic structures at a global level, is a good example to build upon. A rapid agreement on steel and aluminium will clear the path for further collaboration.
9. **Counter anticompetitive, antidemocratic market behaviour through radically transparent supply chains, making carbon pricing the foundation of allied clean supplied chains.** Alliances should enforce high democratic, social, and environmental standards at borders. This would allow Europe to maintain support for a multilateral rules-based order and augment its capacity for geopolitical action leading to a more decisive Union, more effective sanctions and strategic partnerships. The latter can play a key role in protecting European industry from unfair competition and will induce coupling to non-EU markets with different carbon pricing schemes. European policymakers should prioritize managing global carbon price disparity and volatility to make carbon pricing a core differentiator of industrial output for Europe and its partners. Europe should also work to strengthen human rights standards for imported goods through modern slavery legislation, to penalize companies who fail to remove products made through forced labour from supply chains.

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