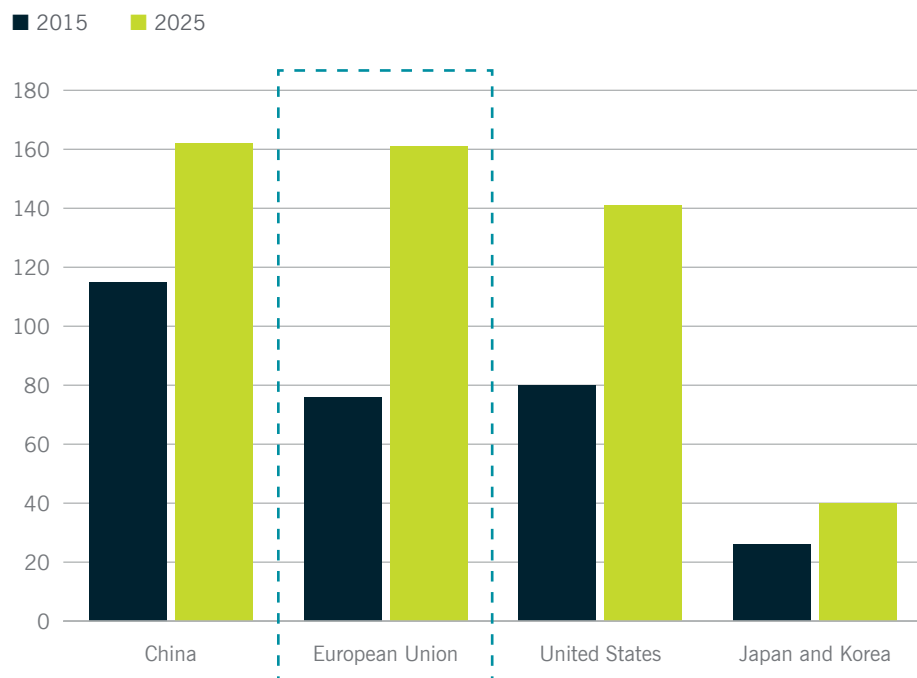


Europe's energy & power realignment: Energy efficiency, electrification, industrial decarbonization, and the LNG quandary



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Figure 1: Investment in energy efficiency, electrification and renewables for end uses, by region (\$B)



Source: International Energy Agency: Energy Efficiency 2025

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Key takeaways

- **The Iran conflict induced energy crisis is acting as a structural accelerant for European electrification:** The closure of the Strait of Hormuz has exposed deep vulnerabilities in Europe's hydrocarbon dependency, with over 80% of E.U. (European Union) end-use hydrocarbon consumption sourced from imports, creating powerful new momentum for the electrification of industry, buildings, and transport
- **Corporate electrification ambitions are outpacing policy frameworks, even as technology economics rapidly improve:** A survey of nearly 2,000 executives across 18 European countries found that 91% believe electrification improves energy security and three-quarters expect to replace most hydrocarbon-powered equipment by 2030 — yet 72% report that government policies are lagging and actively hindering the shift. Non-financial barriers, grid bottlenecks, and upfront cost structures continue to suppress deployment
- **E.U. power demand is entering a multi-year growth super-cycle:** European power demand is projected to grow by up to nearly 5% per year by the end of the decade in an electrification forward scenario driven by AI, industrial conversion, EVs, and heat pump adoption
- **Europe has won the argument on industrial decarbonization but now faces the harder test of delivery:** Europe stands alone as the global leader in industrial decarbonization, globally accounting for effectively all grant funding flowing to industrial projects today and the largest committed pool of any region
- **Europe's gas market is more dependent, more expensive, and potentially soon overbuilt:** Europe's pivot away from Russian pipeline gas has created a deep and growing reliance on U.S. LNG, which now supplies 63% of European LNG imports. At the same time, Europe is building LNG import capacity at a pace that may potentially exceed total gas demand by 2030, creating the potential for stranded asset risk as the underlying energy transition accelerates

The electrification imperative: How the Iran conflict induced energy crisis creates powerful new momentum for E.U. electrification^{1,2,3}

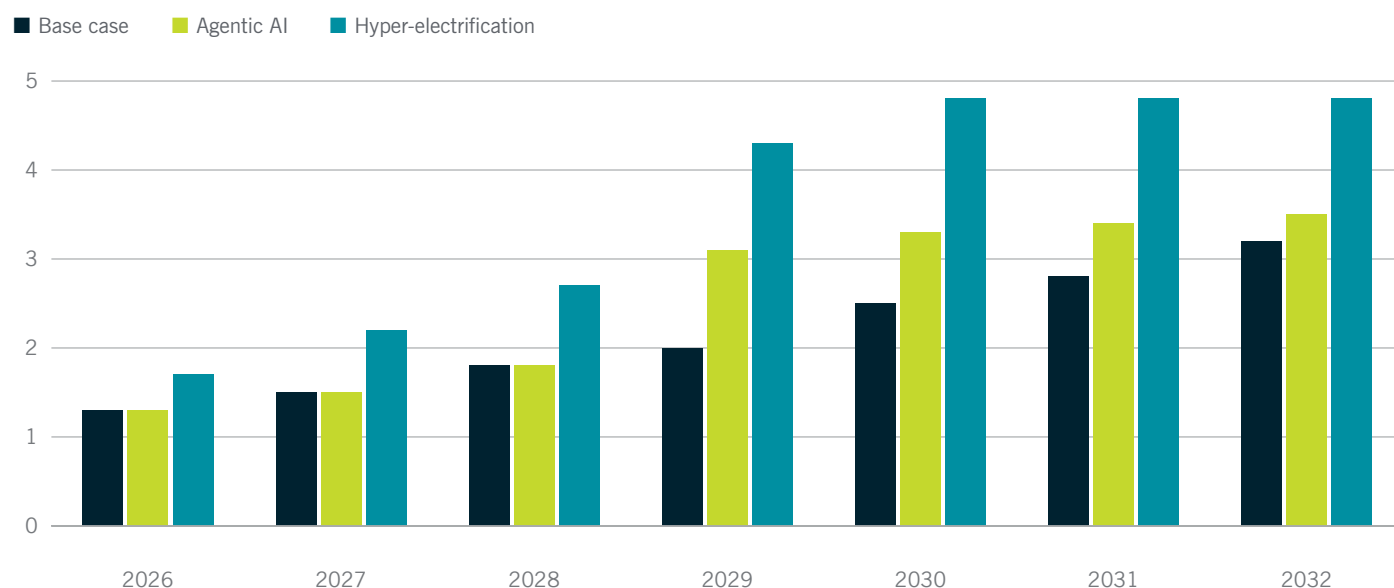
The closure of the Strait of Hormuz crystallized Europe's structural vulnerability to hydrocarbon imports and placed electrification at the center of the continent's energy security, competitiveness, and decarbonization agenda. About two-thirds of E.U. end-use energy still comes from hydrocarbons, and more than 80% of those fuels are imported. By contrast, roughly 70% of E.U. electricity already comes from domestic, low-carbon sources. That gap is the core reason why shifting homes, factories, and vehicles to electricity makes strategic sense for Europe. **The crisis is also widening the gap between European countries.** In markets where gas plants set the price of electricity — including the U.K. Italy,

and Germany — forward power prices have jumped sharply since the Middle East conflict began. In countries with more renewables and nuclear — such as Spain, France, and the Nordics — prices have remained comparatively stable. This contrast underscores the long-term price stability benefit of moving away from hydrocarbon-based generation.

E.U. power demand is projected to grow 1.3–2.2% per year in 2026–2027, picking up to 2.5–4.8% annually starting in the 2030s, with the upper bound corresponding to a scenario where AI adoption accelerates and the pace of electrification increases to enable Europe to meet its 2030 climate targets. This would require roughly €2 trillion in power generation investment over the next decade — about three times the investment pace of the past ten years — plus an additional €1.5 trillion in grid upgrades.

Figure 2: E.U. power demand forecast scenarios

Estimated annual increase in power demand (%)



Source: Goldman Sachs Research

Electrification technologies are already cost-competitive across a wide range of E.U. applications, but good economics alone are not enough to drive adoption. The main barriers are not financial — they are practical: grid connection delays, high upfront costs, limited awareness, and regulatory gaps that make switching harder than it needs to be.

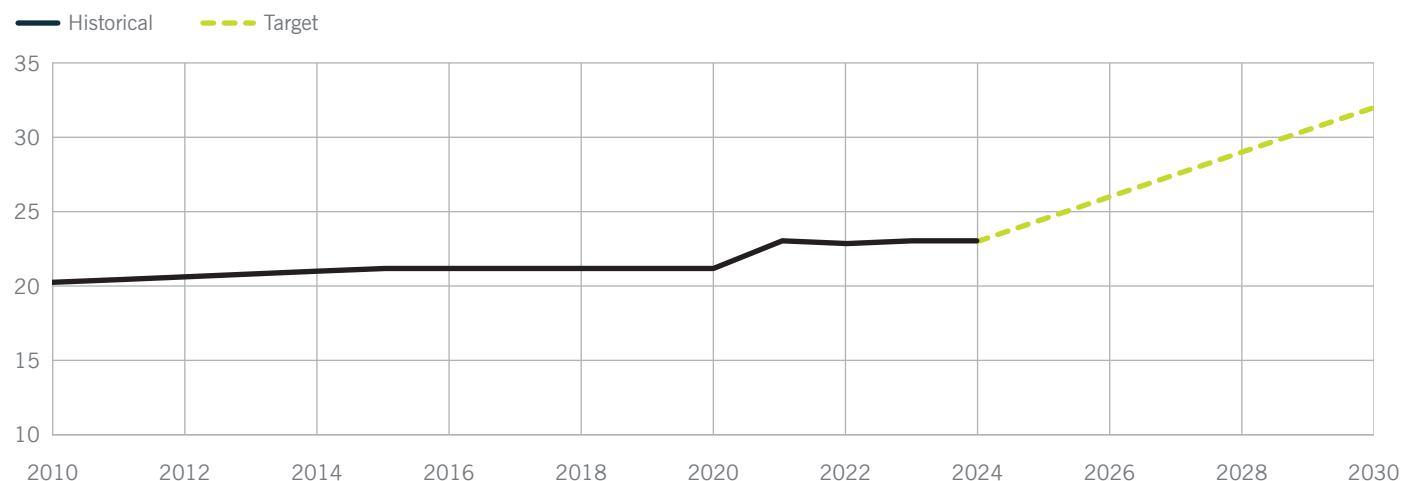
For industrial heating, heat pumps already cost less over their lifetime than gas boilers in 17 E.U. countries, covering 40% of low-temperature industrial heat demand. A further 35% of demand falls in countries where the cost difference is within 5% — meaning modest policy support could tip the balance. The challenge is that many smaller factories lack the technical know-how or capital to make the switch, and grid connection queues for medium-sized users create further delays even where the financial case is clear.

In 11 out of 27 E.U. countries, an EV pays back its higher purchase price within eight years at 2025 prices — without any subsidy. In Germany and France,

Electrification technologies are already cost-competitive across a wide range of E.U. applications, but good economics alone are not enough to drive adoption.

roughly €4,000 in available support reduces that payback period roughly in half. The average price gap between an EV and a comparable internal combustion car in the E.U. is around €10,000, and about 10 more affordable EV models are now available in the E.U. at starting prices around €25,000. That gap is expected to keep narrowing as battery costs fall and the E.U.'s Automotive Package incentivizes production of smaller models.

Figure 3: Electricity as a share of total final energy consumption in the E.U.
2010-2030, in (%)



Source: Eurostat ECFR — ecfr.eu

Reducing consumption & dependency – The strategic case for E.U. energy efficiency and industrial decarbonization^{4,5}

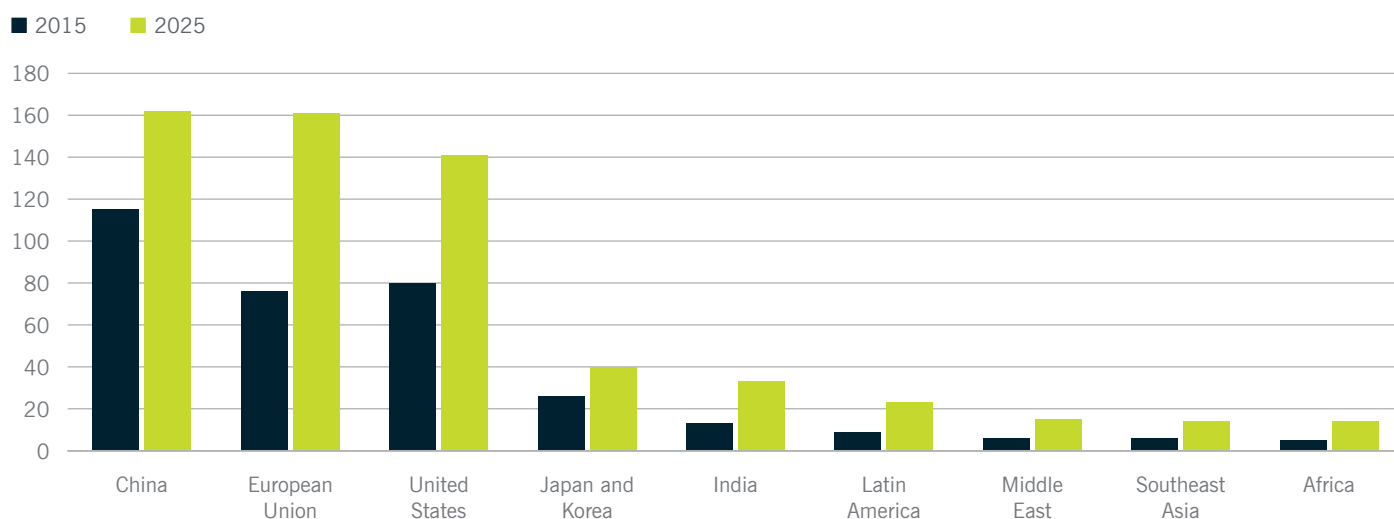
Europe enters this period of geopolitical stress with one of the world's deepest and most capable energy efficiency platforms, and a wave of fresh policy commitments is positioning the bloc to convert that strength into accelerated progress. Europe's industrial efficiency is a genuine success story. The E.U. manufacturing sector now generates approximately 50% more value while consuming 25% less energy than two decades ago. Most strikingly, E.U. industrial energy intensity improved at nearly 3% per year between 2019 and 2023 — roughly double the global average and a sharp contrast to the stagnation seen in the United States. This demonstrates that when the incentives are right, European industry responds faster and more effectively than almost any other economy in the world.

The E.U. remains one of the largest and most dynamic concentrations of energy efficiency investment globally, and the policy pipeline is expanding rapidly. E.U. end-use efficiency investment was estimated to be approximately \$160 billion in 2025. The bloc introduced over 70 new or updated energy efficiency policies in 2025 — more than any other region — spanning buildings, appliances, industry, and transport. **The strategic case for treating**

energy efficiency as Europe's "first fuel" has rarely been stronger or more widely embraced. Demand flexibility has increased in value by approximately 78% across 13 European countries since 2015, creating new revenue streams and grid benefits as price volatility and renewable penetration rise. Every unit of efficiency is simultaneously a unit of reduced hydrocarbon import dependency, a lower household bill, and a competitiveness gain for European industry. With energy security, affordability, and industrial competitiveness objectives all converging on the same solution — and with policymakers, businesses, and capital providers increasingly aligned behind it — European efficiency investment is structurally more valuable and poised to accelerate.

Europe has established itself as the clear global leader in industrial decarbonization, yet the same energy shock that is reinforcing its policy ambition is also exposing the limits of what that ambition can deliver in the heaviest-emitting sectors. While governments worldwide are stepping up support for clean industry, Europe accounts for effectively all of the grant funding actually flowing to industrial decarbonization projects today, and has committed by far the largest pool of long-term funding of any region. The story of the past six months is therefore not one of momentum versus retreat, but of a continent doubling down on its leadership even as the practical economics of the transition grow harder.

Figure 4: Investment in energy efficiency, electrification and renewables for end uses, by region (\$B)



Source: International Energy Agency: Energy Efficiency 2025

The defining shift in European policy has been a move from one-off capital grants toward sustained operational support, reflecting a recognition that high and volatile energy prices – intensified by the Iran conflict – are the central threat to industrial competitiveness. Rather than simply helping companies build clean facilities, governments are increasingly designing schemes that keep those facilities economically viable over their lifetimes, pairing electricity-price relief with long-term revenue guarantees. The unifying logic is that affordability and decarbonization must be solved together: support is tied to commitments to modernize and electrify, turning short-term price relief into a lever for longer-term structural change. This represents a maturing of European industrial policy from stimulus toward something closer to a durable market framework.

Carbon pricing has become Europe's signature tool for reshaping not just domestic behavior but global trade flows. With its carbon border mechanism now fully operational in the E.U., and the U.K. preparing its own version, Europe is using the cost of carbon to reward cleaner producers – including those abroad – and to protect its industry from higher-emitting competition. The approach is powerful in principle: it makes verified, lower-emissions production a commercial advantage for anyone wishing to sell into the European market. But it remains a work in progress, with key rules unsettled and political pushback intensifying.

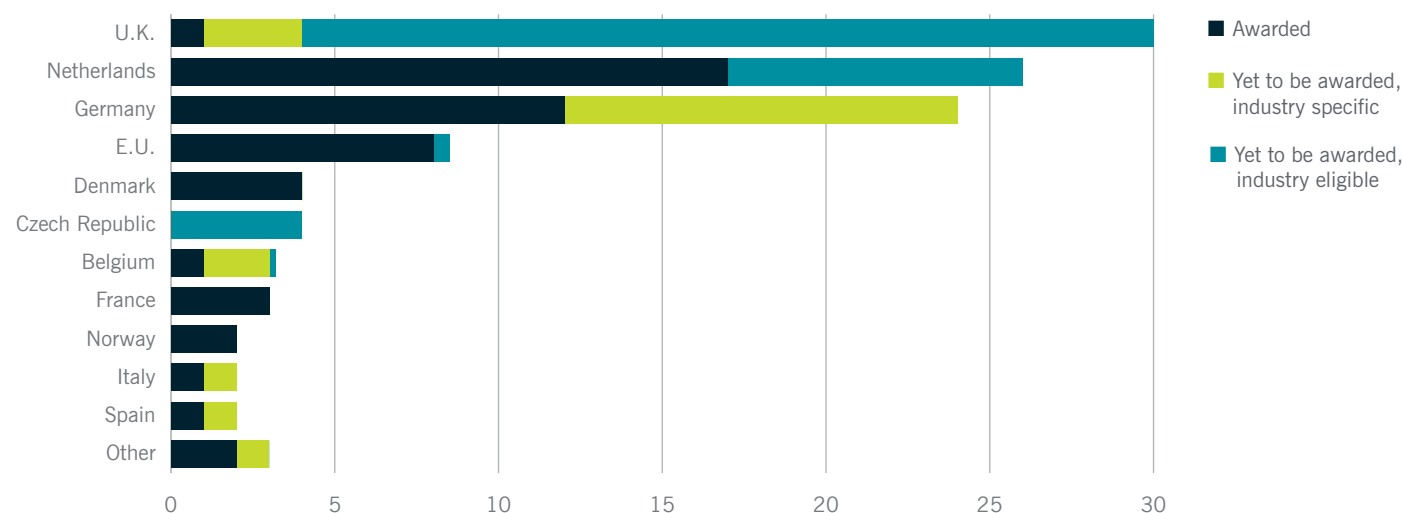
In cement, Europe stands alone as the only market where policy support is strong enough to make carbon capture viable at scale. The constraint is less about money than about coordination: capture, transport, and storage must all be built in concert, and the difficulty of financing one without the others remains the central obstacle to turning a large project pipeline into operating infrastructure.

Across petrochemicals and aluminum, the European response has been more incremental – centered on securing clean power, electrifying heat, and expanding recycling rather than wholesale transformation. These sectors illustrate the broader European pattern: meaningful, security-driven progress on the more achievable steps, paired with continued difficulty in scaling the deeper, more capital-intensive changes. The struggle to fully subscribe even dedicated industrial-heat funding underscores how hard electrification remains in practice, despite its strategic importance to reducing the continent's gas dependence.

The overarching theme is a Europe that is committed to industrial decarbonization but now faces the harder task of execution. Its policy ambition, funding commitments, and carbon-pricing architecture are without peer globally. The open question – sharpened rather than resolved by the energy crisis – is whether that leadership can translate into delivered capacity fast enough, or whether cost pressures and infrastructure gaps will continue to push the hardest-to-abate sectors further out into the decade.

Figure 5: Funding for European industrial decarbonization projects

Jan 2021 – May 2026 (€B)



Source: BloombergNEF (2026 Jun 15): Industrial Decarbonization Market Outlook 1H 2026

Europe's gas market — More dependent, more expensive, and potentially overbuilt LNG capacity⁶

Europe's pivot away from Russian pipeline gas has not produced energy independence — it has produced a different and, in some respects, more concentrated dependency on U.S. LNG. European imports of U.S. LNG more than tripled between 2021 and 2025, and the U.S. supplied 63% of Europe's LNG in Q1 2026, up from 57% a year earlier. The concentration at the country level is striking: Germany sourced 89% of its LNG from the U.S., followed by Croatia (87%), the U.K. (81%), and the Netherlands (77%). Prior to the Iran conflict, the Institute for Energy Economics and Financial Analysis ("IEEFA") had forecast that the U.S. could supply 75–80% of the EU's LNG by 2030; at current growth rates, that level could be reached as early as 2028 or 2029. E.U. countries spent around €131.5 billion on U.S. LNG between 2022 and 2025, and U.S. cargoes are, on average, the most expensive for E.U. buyers.

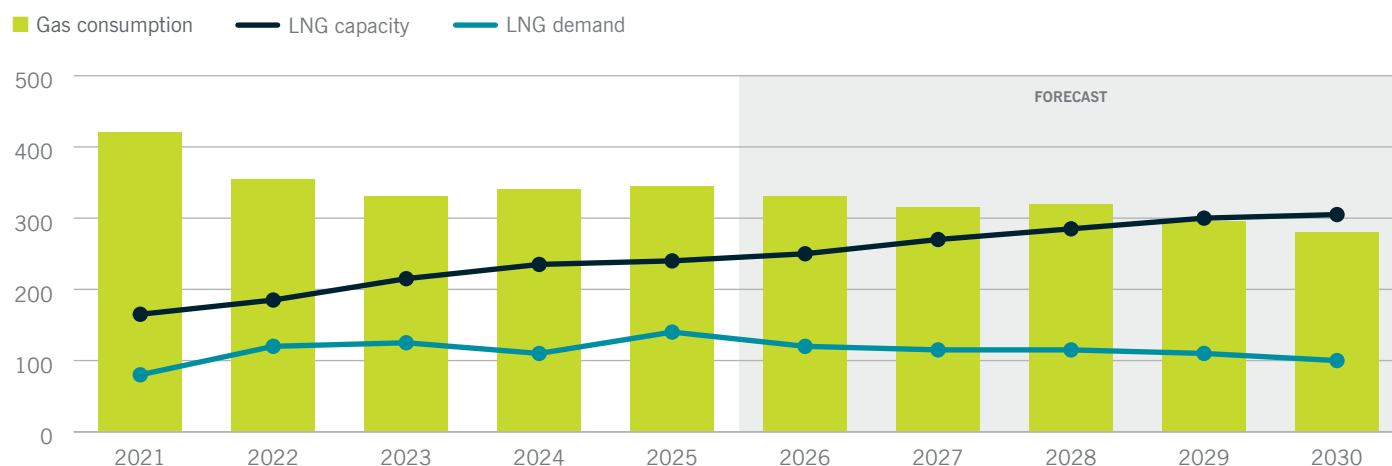
Against this backdrop of rising import dependency and price volatility, Europe is simultaneously building LNG import infrastructure at a pace that will massively overshoot projected demand. European gas consumption dropped 19% between 2021 and 2024. It rose 3% in 2025 due to cold weather and weaker renewable output, but IEEFA projects a further 14% decline between 2025 and 2030, with LNG demand falling approximately 23% over the same period. Despite this, Europe is on track to grow LNG import capacity by 24% by 2030 — and by 32% for the E.U. specifically — meaning that 2030 capacity will exceed total gas demand and be approximately three times larger than projected LNG demand.

The divergence between Europe's gas infrastructure buildout and its stated energy restructuring ambitions raises serious questions about capital allocation and long-term asset

viability. The rationale that justifies investments in electrification, efficiency, and renewable generation simultaneously undermines the demand basis for new LNG infrastructure. Each heat pump installed, each industrial process electrified, and each building retrofitted reduces the structural gas demand that new LNG terminals are being built to serve. European policymakers and capital allocators are in effect making two contradictory bets simultaneously: that electrification will succeed rapidly enough to justify the restructuring investment, and that gas demand will remain sufficiently elevated to justify the LNG infrastructure investment.

Europe's power generation mix is already shifting heavily toward renewables, with solar and wind together projected to account for approximately 60% of generation by 2030, compared to roughly 30% in 2016. Gas generation's share is projected to remain broadly flat or decline modestly over this period, even as total power demand grows — meaning that new LNG import capacity will face both declining utilization from the demand side and increasing competition from domestic clean energy on the supply side.

The real question for European policymakers, capital providers, and industrial users is no longer how to secure more LNG — it is whether the current buildout matches the energy system Europe actually needs. The Hormuz shock has made the energy security case for accelerating electrification and efficiency stronger than at any point since the 2022 gas crisis. It has simultaneously revealed that the approach of replacing Russian pipeline gas with diversified LNG supply does not resolve the underlying vulnerability to concentrated global supply chains. The most durable response to the current crisis is not the construction of additional regasification terminals that may operate at 20–30% utilization for their commercial lives, but the acceleration of the demand-side shift that makes those terminals structurally unnecessary.

Figure 6: E.U. LNG regasification capacity and demand outlook

Source: Gas Infrastructure Europe, Kpler, Eurostate, IEEFA. Includes EU27. IL. Türkiye, Norway.

	2021	2022	2023	2024	2025	Q1 2026
U.S.	28	44	47	47	58	63
Russia	17	12	12	16	12	13
Qatar	21	15	12	11	7	6
Algeria	14	7	10	11	7	5
Nigeria	12	7	6	4	5	7
Trinidad and Tobago	2	2	3	2	2	1
Norway	0	2	3	4	2	3
Angola	1	2	2	1	2	1
Other	5	8	6	3	4	2

Source: Kpler

Europe LNG
import mix (%)

Potential role of infrastructure credit in Europe over the next decade

Meeting Europe's electrification-forward scenario requires roughly €2 trillion in power generation investment over the next decade — about three times the pace of the past ten years — plus an additional €1.5 trillion in grid upgrades. Public budgets and Basel III/IV bound-bank balance sheets alone are unlikely to supply capital at this scale and speed. This gap is precisely the kind of opportunity our Energy Infrastructure Credit (“EIC”) platform was built to address: providing the flexible, long-duration financing that these themes demand, while generating attractive risk-adjusted returns for our investors.

On the hardest-to-abate industrial sectors, we view the challenge as one of execution rather than ambition. In cement, Europe stands alone as the only market where policy support makes carbon capture viable at scale, but the central obstacle is coordination — financing capture, transport, and storage in concert, the difficulty of funding one without the others. We believe this sector may take another five years before private credit emerges as a significant credit provider.

Conversely, electrification and energy efficiency, particularly for commercial power customers, is one of EIC's primary investing themes when considering European opportunities — as they are squarely addressable through an Energy-as-a-Service model,

which is already a core investing theme of our Energy & Power Infrastructure Credit (EPIC) strategy. E.U. end-use efficiency investment reached roughly \$160 billion in 2025, a total investments amount which doubled since 2015, and which stands as larger than the U.S. and effectively the same size as China's.

Rather than asking commercial users to finance and own this infrastructure outright, Energy-as-a-service platforms deploy improvements on their behalf, generating returns through long-term service contracts tied to energy savings. Individual projects are typically between 1/100th and

1/10th the size of utility-scale projects, but the levelized profit margins are often 5X to 10X higher — this business dynamic creates a financing opportunity for the bespoke solutions best suited for private credit, and the improved economics that allow EIC to yield attractive risk-adjusted returns. The EPIC strategy is purpose-built to sit at this intersection, providing the patient, structured capital that traditional lenders are less suited to deploy. As policy alignment, technological readiness, and capital demand converge across Europe, we see a clear window to generate differentiated returns while accelerating the E.U.'s commitment to the energy transition at scale.

For more information about investing in Energy Infrastructure Credit, please visit nuveen.com/EIC.

Endnotes

- 1 Salmon, N., Alsaukas, O., Harmsen, S., & Bouckaert, S. (2026, June 9). The energy crisis creates even stronger impetus for EU electrification. International Energy Agency.
- 2 Gandolfi, A. (2026, May 5). The energy crunch could accelerate Europe's shift to electrification. Goldman Sachs.
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- 4 International Energy Agency. (2025, November). Energy efficiency 2025.
- 5 BloombergNEF. (2026, June 15). Decarbonization Market Outlook 1H 2026. Bloomberg Finance L.P.
- 6 IEEFA, European LNG Tracker, May 2026 update and Data Summary.

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