

FEATURE ARTICLE:

FSRUs increasingly support global LNG expansion by connecting supply and demand

Between 2026 and 2030, the global LNG market is poised for significant growth, with 235 Mtpa of new liquefaction capacity expected to come online, adding to the existing 551 Mtpa. This expansion will enhance the liquidity and responsiveness of global energy markets, providing a strong foundation for sustained growth in global LNG trade. Successfully absorbing these volumes will depend on robust demand from mature and emerging markets and the continued expansion of gas use in the power and industrial sectors as a reliable, low-carbon energy source.

To bridge the new supply with global gas consumption centers, regasification infrastructure must scale proportionally. While traditional onshore terminals provide the high-capacity backbone of the industry, Floating Storage and Regasification Units (FSRUs) have emerged as the premier solution for agility. By consolidating storage and regasification into a single vessel with minimal shoreside requirements, FSRUs offer a modular, cost-effective pathway to market. This flexibility empowers the midstream sector to circumvent traditional infrastructure constraints, ensuring that incoming LNG supply is seamlessly diverted to high-demand markets with unmatched responsiveness.

When developing an LNG import project, the choice between an onshore terminal and an FSRU is dictated by a complex interplay of strategic and technical factors. Identifying the optimal solution requires a comprehensive assessment to ensure the infrastructure aligns with local demand, facilitates timely market entry, and supports long-term energy security goals. This evaluation centers on several critical pillars: project timelines, regasification capacity, operational flexibility, capital and operational expenditures, siting, storage capacity, and permitting processes. Balancing these variables allows developers to calibrate their investment to the specific needs of the target market.

Project timelines for FSRUs typically range from 12 to 24 months, whether through conversion of existing vessels or new builds, requiring minimal civil works beyond mooring and pipeline connections. In high-priority cases, deployment of existing FSRUs can be even faster; recent projects in Germany reached operational status in seven months, showcasing the technology's potential for rapid market entry. By comparison, onshore terminals take 4 to 7 years to complete, reflecting the scale and complexity of permanent infrastructure. FSRUs therefore provide a fast-track solution for markets seeking timely LNG access and enhanced energy security.

Regasification capacity for onshore terminals is designed for high-volume LNG imports, typically ranging from 3 to 12 Mtpa, with some mega-terminals exceeding 15 Mtpa. These facilities are ideally suited for mature gas demand centers with substantial long-term needs, providing the high throughput necessary to support stable, sustained consumption. In contrast, FSRUs offer more moderate capacity, generally between 0.5 and 5 Mtpa per vessel, making them the preferred choice for small-to-medium and decentralized markets or as bridge solutions for emerging markets.

Operational flexibility is a key strength of FSRUs, which are mobile and redeployable, enabling operators to respond swiftly to shifting market conditions, emerging demand centers, or the conclusion of local contracts. Their modular design allows rapid relocation, making them well-suited for dynamic and transitional markets. In contrast, onshore terminals are permanent, fixed infrastructure. While not relocatable, they provide long-term stability and can be expanded over time to deliver high-volume capacity for established, high-demand markets.

Capital expenditures for onshore regasification terminals are substantial, often exceeding \$1 billion due to land acquisition, civil works, storage tanks, and permitting. FSRUs offer a lower-cost alternative, with new-build projects typically costing \$400-500 million and vessel conversions requiring \$200-350 million. Crucially, total investment for both infrastructure types is heavily influenced by regasification capacity, with FSRUs providing a particularly cost-effective entry point for small-to-medium volumes. This financial profile makes floating solutions ideal for minimizing initial outlay while securing right-sized energy access.

Operational expenditures for onshore terminals are relatively lower, typically ranging from \$20–35 million annually due to fixed staffing, maintenance, and regasification costs. In contrast, FSRUs usually follow a leasing model where annual OPEX is significantly higher, often reaching \$40–65 million, because the costs are centered on daily charter rates that combine vessel hire, crew, and insurance. However, despite this higher annual operating burden, the FSRU model offers greater agility by converting what would be a massive upfront capital expenditure into predictable operating costs. This financial flexibility allows the industry to respond rapidly to market changes, making leased FSRUs a strategically efficient choice for smaller or emerging markets that prioritize speed and lower risk over long-term operating savings.

Siting is a critical factor in regasification deployment. FSRUs offer versatile positioning in shallow waters, restricted ports, or remote coastal regions, requiring minimal civil engineering beyond basic mooring and pipeline integration. This adaptable architecture enables vessels to serve as high-capacity energy hubs in locations where permanent construction is geographically unfeasible. This manoeuvrability allows for rapid setup and relocation as market dynamics or regional requirements evolve. In contrast, onshore terminals require expansive land, deepwater access, and substantial maritime infrastructure.

Storage capacity differs significantly between the two models. Onshore terminals are designed for large LNG reserves, typically relying on multiple tanks with capacities of 150,000 to 500,000 cubic meters each. This allows major hubs, such as Pyeongtaek in South Korea, to store more than 3 million cubic meters of LNG. By contrast, FSRUs are more compact, with an average storage capacity of 170,000 cubic meters per vessel, suited to handling cargoes from standard LNG carriers. Rather than increasing tank size, the floating model typically expands capacity by deploying additional vessels, allowing operators to match storage closely with local demand.

Permitting processes for FSRUs are generally simpler and faster, as these projects involve limited onshore construction and a smaller environmental footprint, often allowing approvals under existing maritime and port regulations with minimal additional bureaucracy. Onshore regasification terminals, in contrast, require expansive land use, civil works, and permanent facilities, typically involving stringent environmental impact assessments, complex zoning reclassifications, and oversight from multiple national and local construction authorities.

The history of the FSRU industry began in March 2005 with the commissioning of the *Excelsior*, a purpose-built vessel that served the Gulf Gateway Deepwater Port in the US Gulf of Mexico. This pioneering project proved that LNG could be regasified onboard a ship and discharged directly into subsea pipelines, offering a faster and more flexible alternative to traditional land-based terminals. The industry reached a second major milestone in 2008 with the *Golar Spirit* in Brazil, which became the first existing LNG carrier to be successfully converted into an FSRU. These projects collectively demonstrated the commercial viability of floating regasification, setting the stage for the rapid global expansion of the fleet.

Since its inception, the global FSRU fleet has undergone a remarkable transformation, evolving from a specialized niche into a central pillar of the international LNG landscape as energy markets prioritize rapid scalability and geographic flexibility. This shift is underscored by the fleet reaching a record 50 operational units by early 2026, representing a combined regasification capacity of 197 Mtpa (Figure i).

As a result of this rapid growth, FSRUs now account for approximately 20% of total global regasification capacity, while permanent onshore terminals maintain the remaining 80%. The floating infrastructure has become the primary tool for rapid-response energy security, particularly in Europe, which currently leads global capacity with 64 Mtpa. This is followed by Latin America and the Caribbean (LAC) at 50 Mtpa, Asia at 41 Mtpa, and the Middle East and Africa, which contribute 21 Mtpa each (Figure ii).

The scale of FSRU expansion is defined by a historic 100 Mtpa capacity surge between 2021 and 2025, which effectively doubled the global footprint in half a decade. This growth was largely catalysed by Europe’s urgent pivot toward LNG following the 2022 energy crisis. Because the immediate nature of the crisis precluded the multi-year construction of permanent onshore terminals, the region prioritized floating units to ensure energy security. Consequently, 46 Mtpa of FSRU capacity was brought online within 5 years to partially mitigate the loss of pipeline gas imports, led by Germany (13.2 Mtpa), Italy (7.4 Mtpa), and the Netherlands (6.7 Mtpa).

Figure i: Trend in FSRUs capacity and number of units

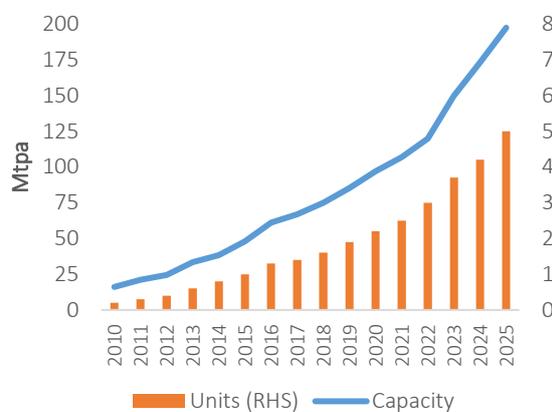
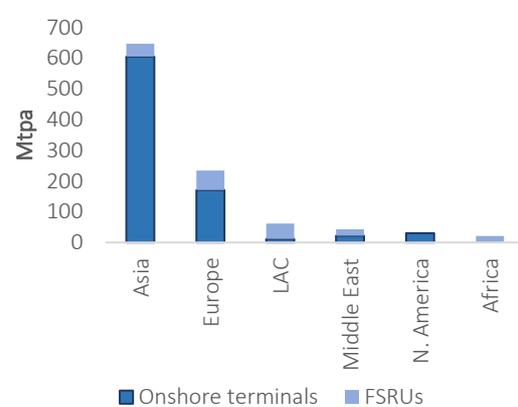


Figure ii: Regional LNG regasification capacity by type



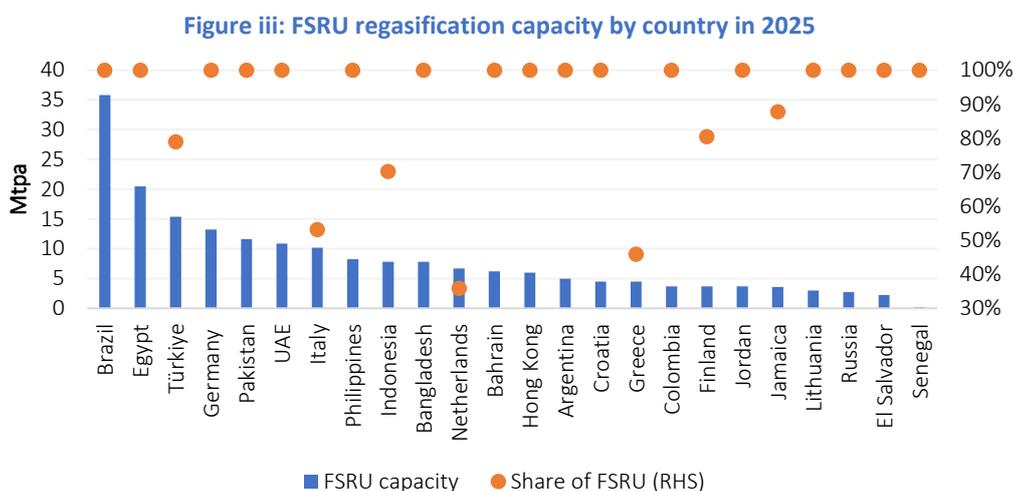
Source: GECF Secretariat based on data from ICIS and Argus

The FSRU has cemented its role as a strategic gateway for emerging gas importers to access the global gas market and meet surging energy demand. By bypassing the logistical hurdles and high capital costs of onshore terminals, this technology provides a permanent solution for markets with small-to-medium demand such as El Salvador, Croatia, and Bahrain, where a floating unit serves as the primary long-term infrastructure. For larger or transitioning markets like Jordan, Colombia, the Philippines, and Brazil, the FSRU acts as a strategic bridge that provides immediate energy security while allowing time to evaluate permanent onshore solutions based on evolving demand dynamics.

Furthermore, in gas-exporting nations such as Egypt, the UAE, and Indonesia, FSRUs serve as critical balancing tools for seasonal or short-term demand surges. This flexibility is essential for managing summer power peaks and drought-driven generation needs when domestic production falls short of localized spikes or unexpected supply deficits. In this capacity, FSRUs enable exporters to honour high-value long-term export contracts while simultaneously safeguarding domestic energy security and ensuring continuous grid stability.

Globally, 24 countries operate FSRU import terminals, with 17 relying exclusively on floating LNG import terminals and the remaining seven operating a mix of offshore and onshore facilities. Brazil, Egypt, Türkiye, Germany, Pakistan, and the UAE account for the largest shares of floating regasification capacity (Figure iii).

Reflecting this broad geographic footprint, LNG imports through FSRUs reached 70 Mt in 2025, accounting for 17% of global LNG imports. Despite massive capacity additions, the average utilization of the FSRU fleet stood at 35%, trailing the total global regasification average of 41%. This disparity reflects the role of FSRUs as strategic insurance across diverse markets, where capacity is held in reserve to manage seasonal volatility or sudden supply shocks.



Source: GECF Secretariat based on data from ICIS and project updates

Vessel scarcity has emerged as the primary bottleneck for further market expansion, with the FSRU sector currently facing unprecedented supply constraints. Most of the 50 operational units are locked into long-term charter agreements through 2030, leaving a negligible pool of vessels for prompt redeployment. This supply deficit was exacerbated by the European energy pivot, which absorbed nearly all uncommitted units and prompted the conversion of standard LNG carriers. With major shipyard slots now booked several years in advance, new-build delivery timelines have extended to approximately four years. Consequently, emerging markets must increasingly rely on vessel conversions, which still require 18 to 24 months, forcing new importers to either wait for charter expirations or navigate protracted shipyard schedules to secure market entry.

Remarkably, FSRUs hold significant potential to catalyse economic development and social progress across the developing world, particularly in Africa, by offering a financially accessible gateway to the global LNG market. In regions where energy poverty remains a primary barrier to economic growth, FSRUs can provide a vital alternative to the prohibitive capital required for permanent onshore infrastructure. By enabling the rapid deployment of LNG, FSRUs would allow emerging nations to fuel both gas-to-power solutions and heavy industrial sectors. This strategy would facilitate just energy transitions by displacing carbon-intensive coal and liquid fuels with natural gas, resolving chronic energy deficits while simultaneously transforming developing markets into new, long-term demand centers for the global LNG industry.