EY Infrastructure Compass 2025

October 2025

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EY Infrastructure Compass 2025

Infrastructure Compass is an annual report that analyses the evolution and outlook of the infrastructure sector. The inaugural edition was prepared by EY Spain's Strategy and Transactions team, drawing on data collected throughout 2023 and 2024.

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Introduction

What are the key trends in infrastructure investment?

Investing in infrastructure has never been easy. But it is also true that it is an area with great opportunities where it is possible to grow and generate solid value. Given the complexity of the sector and its exposure to such diverse factors and risks, it is essential to understand the context and have up-to-date information that allows us to move forward with confidence.

To help understand the key factors for infrastructure investment, we are now launching the second edition of *EY Infrastructure Compass*.

This EY initiative is designed to support investors and professionals across the infrastructure sector, from industry experts to company executives. Our goal is to provide timely, relevant information on key issues and to identify trends that help stakeholders navigate an increasingly complex environment.

In this second edition, we present an analysis of the global infrastructure market, covering fundraising and other key topics. Once again, we include the EY Infrastructure Barometer, based on a survey of more than 115 infrastructure investment professionals and experts in Spain. The study highlights trends, preferences, and characteristics of a sector in constant evolution.

To provide a comprehensive perspective, we present two in-depth analyses of emerging sectors attracting significant investor interest in Spain. The chapter "Trends and Opportunities for FiberCos in Spain" explores investment in new companies specializing in fiber networks, which is now an emerging area set to become central to telecommunications infrastructure.

The section "The Development of Battery Energy Storage Systems in Spain: Why Now?" examines the electricity storage sector, a critical component for meeting decarbonization targets that is already creating numerous opportunities.

As in previous editions, we address four key issues in this report to offer a broad overview of the present and future of infrastructure investment in Spain. By analysing the most recent data, gathering insights from investors and experts, and examining the latest industry trends, we aim to clarify the direction of this vital sector for Spanish business.

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Summary

1. Global Trends Shaping Infrastructure Investment

1.1. Fundraising: Strategies and Deployment

Navigating a Prolonged Slowdown

After over a decade of sustained growth, the infrastructure sector experienced its second consecutive challenging year in 2024, the most prolonged slowdown since 2015. Infrastructure funds took longer to raise capital, reflecting lingering investor caution and tighter liquidity conditions. Preliminary data from Q1 2025 indicates a possible shift in sentiment. Fundraising activity has already reached over half of the total capital raised in 2024, suggesting that conditions may be stabilizing relative to the previous two years.

$100bn

In 2024, fundraising activity remained restrained, with total capital raised falling just under $100bn.

Infrastructure Fundraising

a. Infrastructure Fundraising in Transition: Assessing 2024 Challenges and Early 2025 Developments

The share of dry powder as a percentage of total Assets Under Management (AUM) continued its multi-year decline, falling from around 26.6% to 23.9%, even though overall deal activity in the infrastructure space remained subdued. Since infrastructure fundraising has been facing a sustained downturn over the past two years with limited inflows of new capital, fund managers have increasingly turned to their existing reserves to pursue select opportunities.

In 2024, fundraising activity remained restrained, with total capital raised falling just under $100bn. Liquidity constraints continue to be a major headwind, limiting the flow of capital into new investments. Slow deal-making and fewer exits across private markets have delayed capital recycling, making it more difficult for managers to secure new commitments.

Despite current headwinds, market expectations remain optimistic. The largest funds currently in the market are forecasted to raise over $140bn, signalling potential momentum in the year ahead. In 2024, capital-raising trends showed notable changes across different investment strategies. This growth suggests investors focused on assets requiring repositioning or improvement, likely due to market conditions creating opportunities in sectors like infrastructure, real estate and transportation projects.

b. The Big Picture: Macroeconomic Influences on the Infrastructure Investment Climate

In 2025, inflation across major economies is expected to stabilize further, with rates converging towards 2-3%, in line with central bank targets. This moderation reflects ongoing supply chain recoveries after the pandemic, the full impact of tighter monetary policies, and reduced energy price volatility, provided there are no major geopolitical shocks. For infrastructure markets, this environment signals a shift from the uncertainty of recent years toward a more predictable landscape for costs and financing. However, ongoing geopolitical tensions have led many countries, especially in Europe, to increase defence spending, diverting public funds that might otherwise support infrastructure investment.

c. Evolving Equity Returns: A Closer Look at Risk-Free Rates and Equity Risk Premium (ERP) Adjustments

While rising interest rates increased the appeal and returns of infrastructure debt, more stable and less volatile global equity markets led to reduced equity risk premia, resulting in no significant growth in returns on infrastructure equities. The total required return for global equity investors, which saw a moderate increase in 2022, has now stabilized. This overall stability, however, masks some underlying trends: long-term government bond yields have continued to rise through 2024, albeit more slowly than in previous years, while implied equity risk premia have gradually declined across Europe, Spain, and the U.S.

1. Global Trends Shaping Infrastructure Investment

d. Adapting Strategies for LPs and Infrastructure Funds Amid Economic Shifts

LPs have consistently expanded their allocation to infrastructure funds driven by the attractiveness of infrastructure investments, which offer long-term, dependable returns that resonate with the investment goals of numerous investors. Infrastructure funds have continued to lead the charge in real asset fundraising since 2016, and the trend persists going into 2025.

LP Investment Strategies in High Risk-Free Rate Environments

As LPs seek higher returns in a shifting market environment, many are demonstrating a growing appetite for risk-adjusted strategies. This is most evident in the increased investment appetite for value-added infrastructure, which has emerged as the most attractive strategy heading into 2025. Overall, LPs appear to be prioritizing infrastructure sectors aligned with energy transition and digitalization trends, while maintaining a more cautious approach toward traditional infrastructure segments.

Key Strategies Driving Infrastructure Funds Forward

With fundraising being the lowest in 2015, LPs remain liquidity-constrained due to the denominator effect and fewer exits across private markets. Selling stakes in existing infrastructure funds allows LPs to free up capital and rebalance portfolios, enabling them to recommit to new infrastructure funds. This creates a "recycling loop," where secondary sales directly unlock primary fundraising for GPs launching new vehicles. Mergers and acquisitions are becoming an important strategic lever for infrastructure fund managers aiming to strengthen their market position. At the same time, to attract a broader pool of LPs and address evolving investor preferences, infrastructure funds are actively diversifying their offerings.

Infrastructure Funds Deployment

a. Closing the Gap: Overcoming Economic Hurdles and Valuation Challenges

Infrastructure deal-making in 2024 concluded on a strong note, with total global investment in infrastructure and energy assets reaching $1.1tn. This marked a 15% year-over-year increase in value, a sign of market resilience despite persistent macroeconomic headwinds, including volatile bond yields, elevated interest rates, and ongoing geopolitical uncertainties.

The total value of M&A transactions rose by 12% over the previous year, even as the number of deals fell by 14%. Looking at the prospects for 2025, the valuation gap is expected to narrow as private market valuations decline, likely boosting transaction activity. Amid economic uncertainty and high interest rates, infrastructure assets, which are supported by regulatory and contractual protections, continue to offer investors risk mitigation and collateral.

b. Infrastructure Investment Landscape: Sectoral Overviews

The sector breakdown displays a relatively balanced distribution, with digital infrastructure and transport sectors being the largest movers.

Energy – Recent election outcomes in the U.S., Germany and other countries focused investors' minds on energy policies and favoured types of energy investment.

Transport – Transport infrastructure continues to benefit from stable mobility trends, with traffic volumes linked to economic growth rates.

Digital Infrastructure - Digital infrastructure dealmaking saw a notable rise from 2023 to 2024, driven by the rapid advancement and adoption of generative AI technologies like DeepSeek R1.

Social Infrastructure - Social infrastructure has a consistently low share across all years, with minimal change, as it often offers lower returns and longer payback periods, making it less attractive amid rising risk premia.

Environment – This sector remains the one with the smallest share overall, but is increasing slightly, as growing climate concerns and ESG mandates from institutional investors are driving some capital into environmental projects.

Infrastructure Secondaries

a. Unlocking Liquidity: Growth and Potential in Infrastructure Secondary Transactions

The secondary market, once primarily an exit route for underperforming assets, has evolved over the past decade into a sophisticated tool for portfolio management and liquidity generation. As many infrastructure funds approach the end of their life cycles, GP-led solutions and LP-driven sales are becoming more common. Infrastructure secondaries offer distinct advantages, including inflation hedging, resilient cash flows, and downside protection: these qualities are particularly attractive in uncertain macroeconomic conditions. Early secondary transactions were mainly motivated by valuations: new investors typically entered at a discount to market prices, providing liquidity to stalled investments, taking advantage of market timing, or addressing the illiquidity of underperforming assets.

b. Continuation Vehicles: Aligning GP Objectives and LP Optionality

The appeal of continuation funds for investors is evident. First, they provide immediate exposure to identified assets, unlike primary funds, where capital is committed while waiting to identify and acquire the assets that will form the fund's portfolio. Secondly, the liquidity timeline for a continuation fund is shorter, with an average cycle of 3-5 years compared to around 10 years for a primary fund. The rise of continuation funds reflects broader trends: longer holding periods, increased asset concentration, and greater scrutiny on distributions. While some skepticism remains, particularly around potential conflicts of interest or concerns about recycling underperforming assets, continuation funds have reached maturity.

c. Cautious Turn: Infrastructure Secondary Deal Intentions in 2025

In 2024, a relatively low percentage of respondents (47%) planned to neither buy nor sell, suggesting an active secondary market. This was accompanied by a high proportion of sellers (22%) and buyers (27%), reflecting a dynamic environment where LPs/GPs were actively rebalancing portfolios, possibly due to liquidity needs, valuation adjustments, or strategic shifts. However, in 2025, the landscape changed dramatically.

Conclusions

The infrastructure sector enters 2025 navigating a cautious but gradually improving macroeconomic and financial environment. After two years of slowdown marked by inflationary pressures, tighter monetary conditions, and subdued investor sentiment, early signs in 2025 suggest stabilization may be underway.

In the first quarter of 2025, global infrastructure fundraising reached approximately $48 billion, nearly half the total capital raised in all of 2024, signalling a stabilization after the declines seen in 2023 and early 2024. LPs are showing growing interest in assets with embedded growth potential or those that can benefit from operational improvements.

From a sectoral perspective, digital infrastructure and renewable energy remain central themes in infrastructure portfolios. Regionally, investor appetite remains strongest in North America and Western Europe, supported by economic stability, developed capital markets, and relatively transparent regulatory regimes.

Mergers and acquisitions among infrastructure managers are also shaping the landscape. Consolidation is enabling firms to offer a wider spectrum of strategies and scale, while targeted acquisitions are helping to build niche capabilities in priority sectors or regions. The infrastructure secondaries market remains small but is expanding rapidly.

Overall, infrastructure in 2025 is defined by cautious optimism. As capital markets adjust to a post-tightening cycle, infrastructure is well-positioned to benefit from improving conditions, policy support, and the growing imperative for resilient, low-carbon, and technology-enabled systems.

1.2.
EY Infraestructure Barometrer

The *EY Infrastructure Barometer*, annual survey of senior executives from large corporates, infrastructure investors, financial institutions, and private equity houses around the world, assess the status and investment confidence in the infrastructure sector in Spain. In this second edition, the respondent community comprises an independent panel of 114 professionals who have given us their vision, as well as their expectations for the coming years.

Main Conclusions

- Spain remains a pivotal market for institutional and corporate infrastructure investors in the EU, owing to the high quality of its assets. While the country's leadership in renewable energy and its central role in the Eurozone remain primary draws, investors are increasingly attracted by the prospect of higher returns.
- Macroeconomic and geopolitical risks remain a key concern. Regulatory uncertainty, while still the most cited external risk, has declined in perceived impact, with investors increasingly focused on emerging risks such as technological disruption and global economic conflict.
- Expectations of interest rate cuts have tempered, while fears of sharp increases have eased. Investors anticipate steady deal flow in the year ahead, buoyed by more balanced return expectations and greater market confidence.
- ESG remains embedded in investment strategies but appears to be losing momentum as a top-tier priority and the share of investors rating ESG as highly important has fallen significantly.
- Investors continue to favor the energy sector, with renewables maintaining a leading position and energy transition driving increasing allocations, particularly in core-plus/value-add strategies.
- Technology is increasingly becoming an area of interest and a potential core segment in the next years, in particular for energy, transportation and TMT sectors.
- More than half of the investors surveyed have contemplated investments in energy storage/BESS over the past year or are considering such investments in the forthcoming year.
- Fundraising sentiment remains cautious amid constrained capital markets, yet a meaningful portion of investors anticipate improved conditions over the next 12 months. Secondary strategies and continuation funds are gaining traction, particularly among non-corporate players.
- Most investors see their Spanish infrastructure investments performing in line with portfolio averages, while the share reporting above-average performance has grown. Greenfield investments face increasing scrutiny, with a rising number of investors expressing concern.

92%

With over 92% of homes passed and more than 86% connected, Spain leads all major EU markets.

2. Trends and Opportunities for FiberCos in Spain

Fiber infrastructure as a strategic backbone of Spain's digital economy

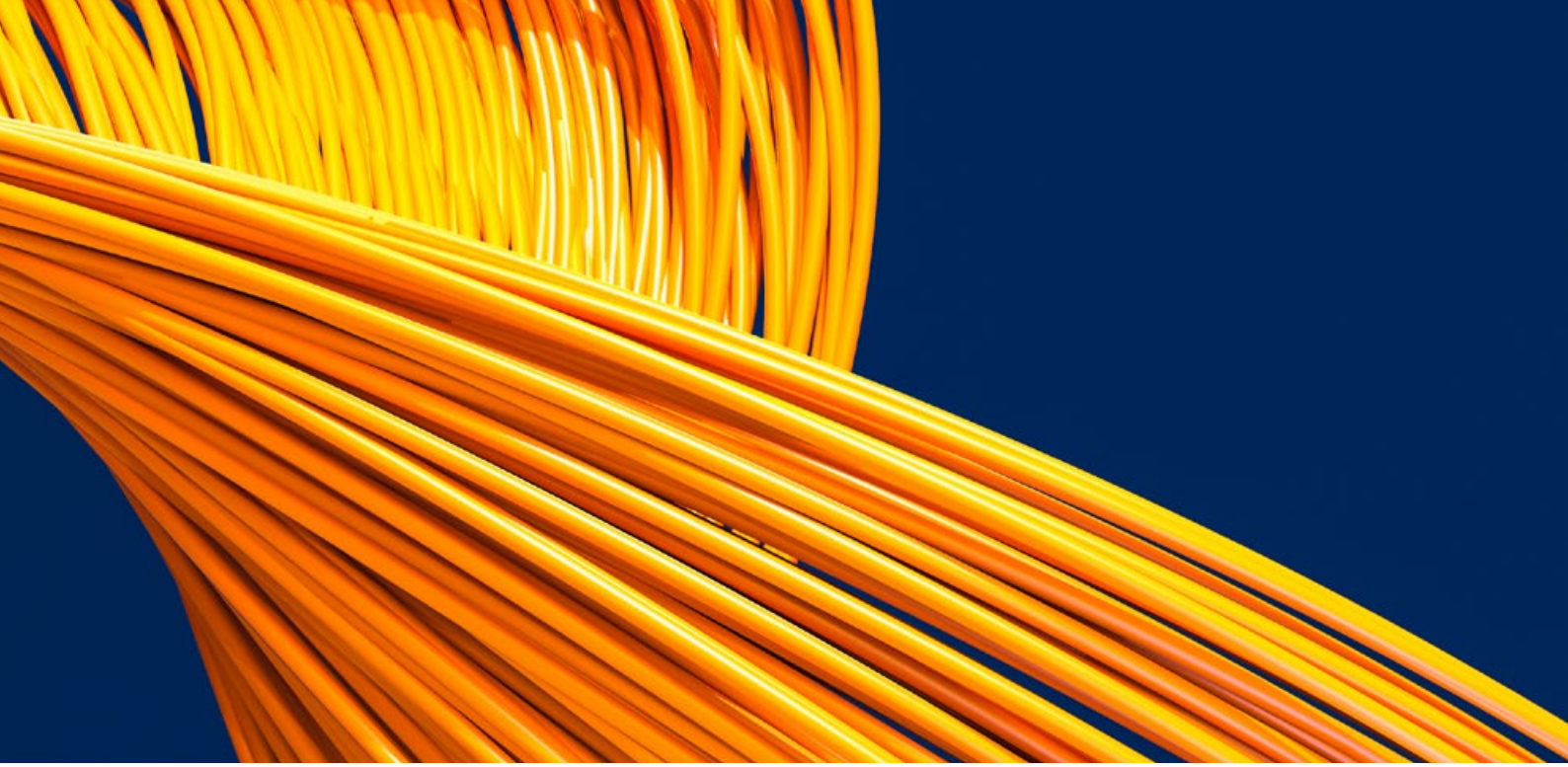
Over the past decade, Spain has emerged as a European leader in fiber-to-the-home (FTTH) deployment. Beneath this apparent maturity lies a profound transformation: the progressive separation of infrastructure ownership from service provision. This transition is giving rise to a new class of highly specialized entities known as FiberCos, companies that focus solely on building, owning, and leasing fiber infrastructure. These firms are now central to the next wave of digital infrastructure.

2.1. FiberCos trends: Dynamics shaping the emergence of a disaggregated fiber infrastructure market

The rise of FiberCos in Spain is the result of multiple converging trends—technological, regulatory, financial, and strategic. While the concept of disaggregated telecom infrastructure is not new, Spain is the first major European market where it is becoming the dominant paradigm for fixed networks.

a. **Spain's outstanding penetration of fiber**
Spain stands out in Europe for the speed and depth of its FTTH rollout. With over 92% of homes passed and more than 86% connected, Spain leads all major EU markets. This overbuild has had a dual impact: it benefited consumers with lower prices and faster speeds but led to significant capex inefficiencies.

b. **Creation of FiberCos**
From 2020 onward, Spain has witnessed an unprecedented wave of FiberCo creation, fueled by private equity and infrastructure funds. In parallel, the sector has begun to consolidate, with platforms acquiring regional players and assets being carved out from integrated telcos.



c. Rise of wholesale and open-access models
A defining trend in Spain has been the shift from vertically integrated models to multi-tenant, open-access platforms. FiberCos increasingly lease capacity to several operators simultaneously, creating a more capital-efficient and competitive market.

d. Rural expansion benefiting FiberCos
While early fiber buildouts prioritized profitable urban areas, rural zones are now becoming the next frontier for FiberCos, backed by Next Generation EU and *Plan de Recuperación*.

e. Wholesale deregulation and market liberalization benefiting FiberCos
Spain's regulatory framework has been a key enabler of FiberCo growth. The Comisión Nacional de los Mercados y la Competencia (CNMC), the telecommunications regulator in Spain, has gradually liberalized last-mile access, removed wholesale price caps in competitive zones, and promoted passive infrastructure sharing.

f. New technologies pushing for network development and FiberCos' importance
Spain's FiberCos are increasingly seen not just as providers of last-mile connectivity, but as enablers of a broader digital infrastructure ecosystem. Edge computing, cloud-native workloads, artificial intelligence, and IoT applications are accelerating demand for robust, low-latency fiber backbones.

2.2. Strategic integration: Market consolidation as the next step for FiberCos

As the Spanish fiber market matures, the emergence of FiberCos is entering a new phase—one defined not just by infrastructure expansion, but by consolidation and strategic integration. The rapid proliferation of platforms, combined with growing cost pressures and the need for scale, is pushing the industry toward a more concentrated, efficient, and sustainable configuration.

a. Drivers of consolidation in the Spanish FiberCo market
Several key factors are poised to drive a new wave of consolidation within the Spanish FiberCo market: market saturation, financial constraints for small players, pressure from rising costs, operator strategies to optimize portfolio, and M&A appetite from infrastructure investors.

b. Operational and commercial synergies
Beyond strategic necessity, market consolidation among Spanish FiberCos presents a clear pathway to unlock operational and commercial synergies. These synergies not only reduce costs but also enhance service delivery, customer retention, and revenue growth, laying the foundation for more robust and future-ready platforms.

2.3. Investment opportunities: FiberCos as a mature and strategic infrastructure asset class

The rise of FiberCos in Spain is the result of multiple converging trends—technological, regulatory, financial, and strategic.

a. **A focused and predictable business model for FiberCos**
At their core, FiberCos operate a pure-play infrastructure model. They deploy and manage passive fiber networks and lease them to telecom operators through long-term contracts, often indexed to inflation (CPI).

b. **Robust valuations and transaction multiples**
The FiberCo model has proven highly attractive on the transaction market. In Spain, recent M&A activity reveals EV/EBITDA multiples ranging from 15x to 25x, depending on asset maturity, contract duration, and geographic coverage.

c. **Infrastructure resilience and long-term growth**
Fiber is a high-durability infrastructure with an expected lifespan of over 30 years and minimal technological obsolescence. Unlike copper or mobile spectrum, fiber's passive components—ducts, strands—are future-proof and require little upgrade once installed.

d. **A combination of private capital, industrial discipline and policy alignment**
Spain offers a uniquely favorable environment, where the three pillars of infrastructure maturity converge: private capital, industrial execution and public policy alignment.

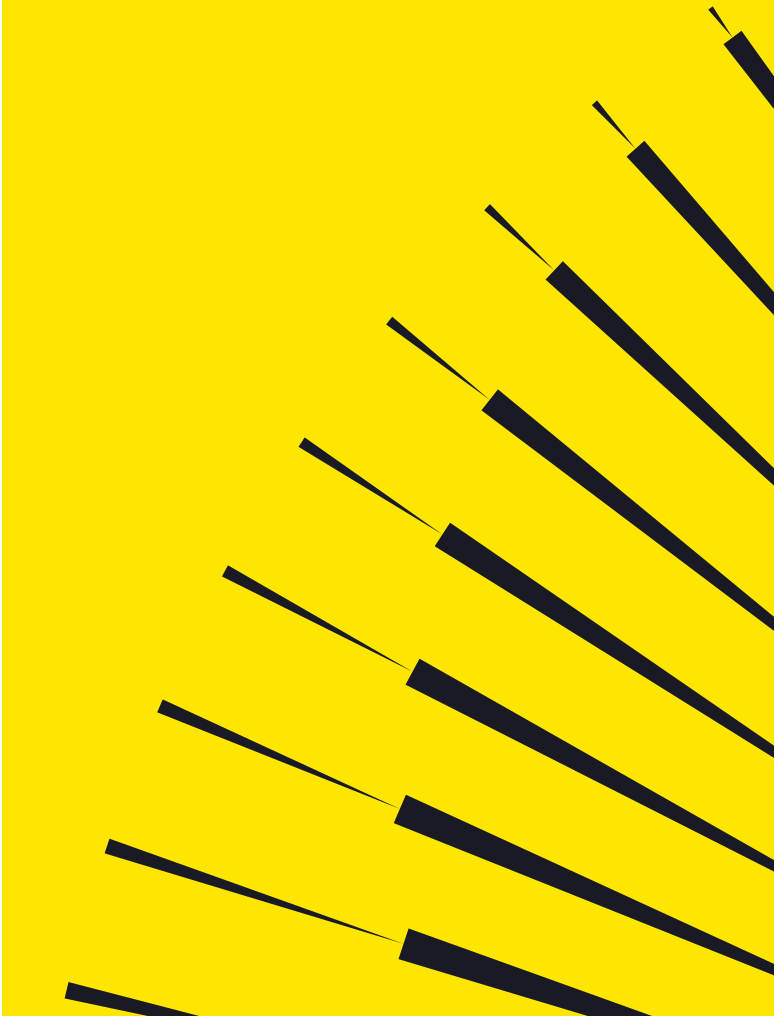
e. **Targeted growth strategies for investors**
While FiberCos are attractive as yield platforms, they also offer clear growth levers for infrastructure investors looking to scale or optimize returns.
In Spain, FiberCos have evolved from a tactical offshoot of telecom restructuring into a fully recognized infrastructure asset class.

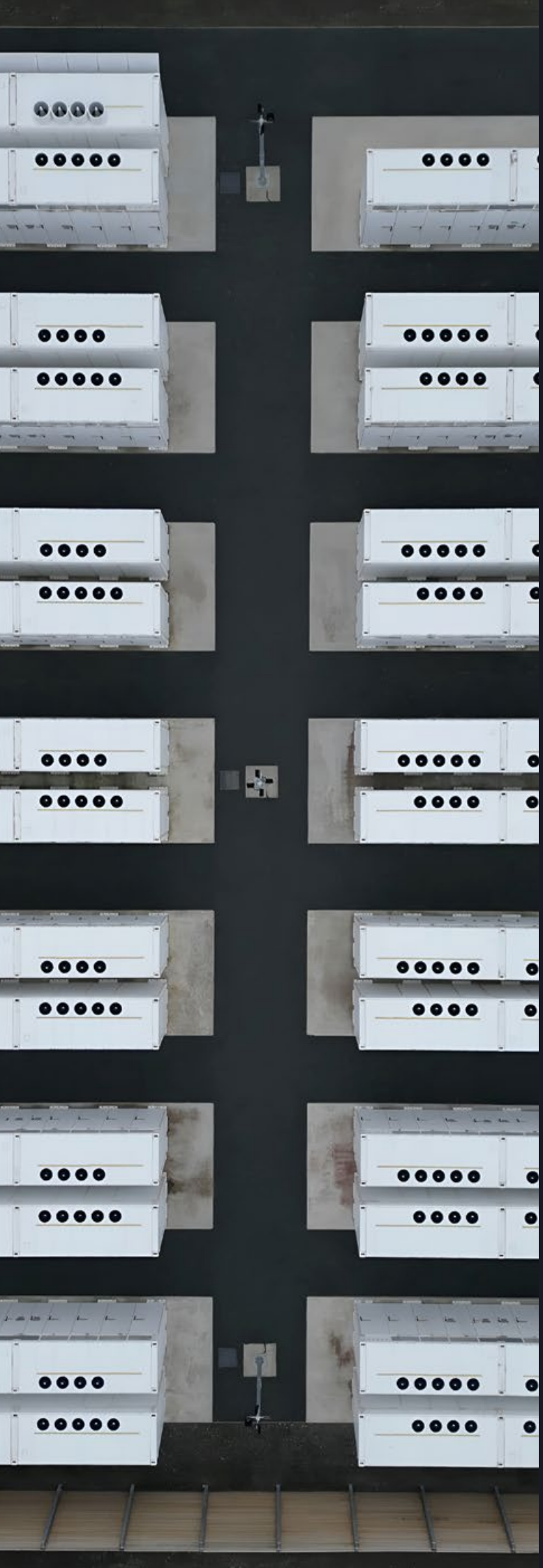
Conclusions

FiberCos at the core of Spain's digital leap

Spain's transformation of its fiber infrastructure model is not a mere industry evolution—it is a structural leap forward in how telecom networks are financed, deployed, and managed.

Spain's approach offers a blueprint for other countries grappling with similar challenges. For investors, FiberCos offer a rare combination of long-term visibility, inflation protection, and digital relevance. For operators, they represent a path to asset-light growth, commercial focus, and agile innovation. For governments, they unlock rural inclusion, tech sovereignty, and sustainable infrastructure deployment. For society, they deliver the connectivity foundations for education, health, AI, smart cities, and beyond.





3.
The Development of Battery and Other Energy Storage Systems in Spain: Why Now?

3.1. Introduction

The ongoing energy transition is transforming the global energy landscape. With an increased focus on cleaner, more localized, and secure energy sources, renewables are projected to dominate power generation, making up 38% of the mix by 2030 and rising to 62% by 2050. This shift brings key challenges, including large-scale grid connections, system adequacy, and the management of decentralized resources. Battery Energy Storage Systems (BESS) are emerging as a critical solution, enabling excess energy produced at peak times to be stored and released during periods of high demand, thereby helping to balance supply and demand. As the sector evolves, batteries are expected to deliver substantial growth in system flexibility from 2030 to 2050, with a projected compound annual growth rate of 15%.

BESS offer the flexibility needed to balance real-time supply and demand, absorb surplus generation, and maintain system reliability. They also open up new commercial opportunities through participation in energy and ancillary service markets—from renewable energy firming and frequency regulation to peak shaving, energy arbitrage, and capacity market participation. These capabilities make BESS well-suited to address both the operational and economic challenges of a grid increasingly reliant on renewables.

3.2. Global Battery Energy Storage Market: Entering a phase of strategic expansion

The global BESS market is entering a phase of rapid and strategic expansion, with notable growth in key markets including the United States, United Kingdom, Italy, Germany, Spain, and Australia. This momentum is underpinned by a combination of improving commercial fundamentals, accelerating renewable energy deployment, and robust policy support. Importantly, as the share of variable renewable energy continues to rise globally, so too does the need for system operators to secure firm, dispatchable capacity. This has prompted regulators across several jurisdictions to either introduce or reform capacity market mechanisms.

3.3. Spain BESS market

Current context

Spain has one of the highest share of variable renewable energy: over 50% of electricity generation was renewable in 2023, with around 40% of the total coming from wind and solar energy. This signifies that Spain has already reached the level that the IEA wants to achieve globally by 2030. The Spanish market is showing potential for continued growth, driven by the integration of renewable energy sources, supportive government policies, declining technology costs, and ambitious decarbonization goals.

According to Bloomberg NEF, Spain's current BESS capacity remains limited, but 14 GW is in the pipeline and expected to come online between 2025 and 2030. The market value of BESS in Spain has risen steadily, from USD 417 million in 2019 to an estimated USD 919 million in 2024, with projections suggesting it could reach approximately USD 2.1 billion by 2029.

Drivers of growth – Spain

Spain's BESS market is expanding rapidly, driven by several factors that are making energy storage solutions more attractive and viable. Key contributors include falling capital costs, clearer regulation, improved cost efficiencies through customized technical design, enhanced optimization beyond standard compliance, and rising levels of investment.

The reduction in capital expenditures, especially in lithium-ion battery technologies, has been one of the most important catalysts for growth. Over the past decade, technological advances have significantly lowered the cost of batteries. Supportive policy and strong market demand also underpin this expansion, but strategic technical decisions at the design and engineering stage play a crucial role. Developers who adopt tailored, use-case-driven designs and robust optimization frameworks are better positioned to succeed in Spain's evolving energy landscape.

Spain is actively strengthening its regulatory framework to position itself as a leader in grid-scale energy storage. This strategic push is reflected in the 2023 update of the National Energy and Climate Plan (NECP), which raises the ambition to 22.5 GW, encompassing a mix of technologies such as BESS, pumped hydro, and thermal storage integrated with solar thermal plants.

Spain's commitment to advancing BESS is evident through its regulatory initiatives and ambitious targets. Despite these efforts, several challenges persist that could impede the seamless integration and profitability of BESS projects, such as grid integration, market dynamics and revenue diversification or regulatory and permitting hurdles.

Conclusion

The growth of Battery Energy Storage Systems (BESS) in Spain is emblematic of the broader global transition towards a decarbonized energy landscape. With over 50% of its energy currently sourced from renewables, the country is on track to add an impressive 14 GW of battery capacity between 2024 and 2030, underscoring its commitment to a sustainable energy future.

A significant driver of BESS growth in Spain is the reduction in capital costs associated with battery technologies. Optimization through tailored technical design and system-level innovation is emerging as a vital future driver for BESS growth. Developers are increasingly moving away from a one-size-fits-all approach, instead focusing on customized system designs that align with specific use cases such as frequency regulation, capacity firming, and renewable integration. Regulatory visibility enhancement is another factor influencing the growth of BESS.

Spain's proactive approach to BESS growth serves as a model for other regions aiming to secure a resilient and sustainable energy future. By addressing the identified challenges and leveraging its strengths, Spain can maximize the potential of BESS in supporting global renewable energy initiatives.

1 Global Trends Shaping Infrastructure Investment

1.1 **Fundraising:** Strategies and Deployment

Navigating a Prolonged Slowdown

2024

After over a decade of sustained growth, the infrastructure sector experienced its second consecutive challenging year in 2024, the most prolonged slowdown since 2015. Infrastructure funds took longer to raise capital, reflecting lingering investor caution and tighter liquidity conditions. The primary driver of this underperformance has been the decline in Limited Partner (LP) commitments, particularly from institutional investors, which has forced General Partners (GPs) to seek capital from a broader and more fragmented investor base. To bridge the resulting funding gap, General Partners (GPs) have increasingly turned to alternative capital sources, including private banks, wealth management platforms, and family offices, expanding their reach to a more fragmented investor base. This in turn slowed down the entire fundraising process. To navigate the tough environment, GPs increasingly drew on their reserves to meet existing obligations and sustain operations.

Preliminary data from Q1 2025 indicates a possible shift in sentiment. Fundraising activity has already reached over half of the total capital raised in 2024, suggesting that conditions may be stabilizing relative to the previous two years. Should this trajectory persist, it may reflect cautious optimism among investors; however, ongoing geopolitical uncertainty could temper the pace of recovery.

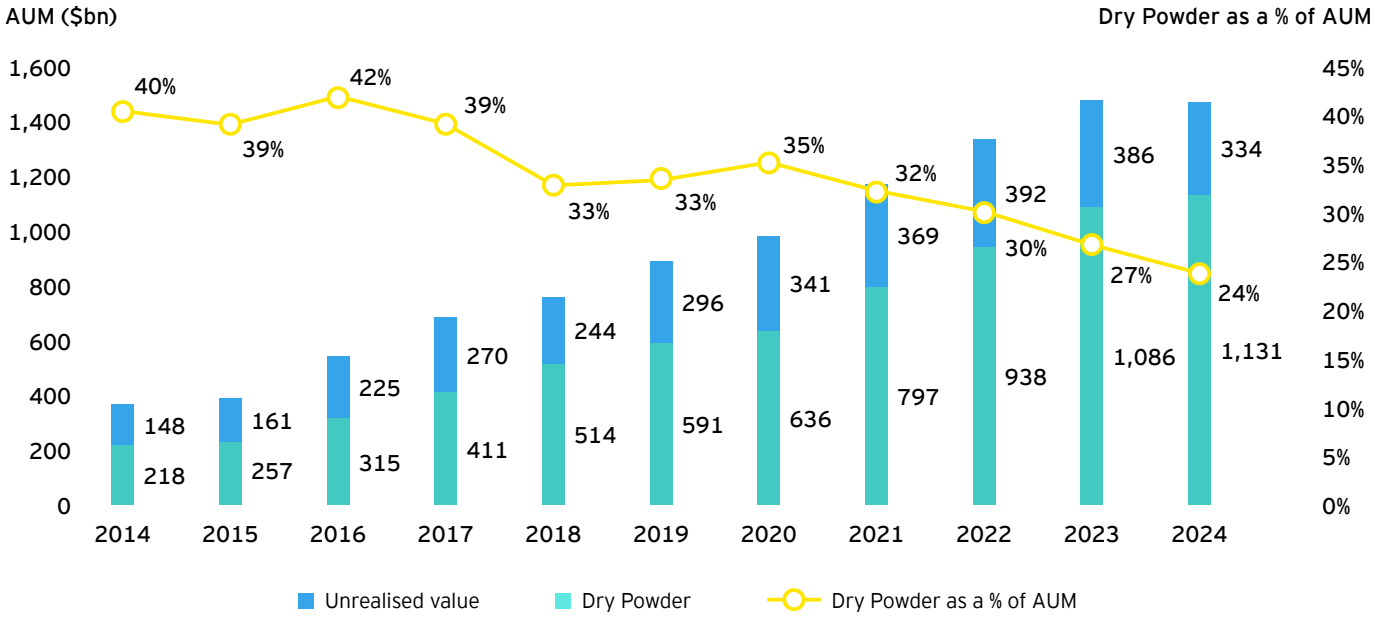
Considering these data and the evolution of the economy in recent months, this report examines the macroeconomic landscape, provides insights into infrastructure fundraising and investment patterns, and highlights sectoral and regional developments.

Fundraising activity has already reached over half of the total capital raised in 2024, suggesting that conditions may be stabilizing relative to the previous two years.

Infrastructure Fundraising

1. Infrastructure Fundraising in Transition: Assessing 2024 Challenges and Early 2025 Developments

Figure 1 **Assets Under Management**



Source: Preqin, Data as of Jan 2025.

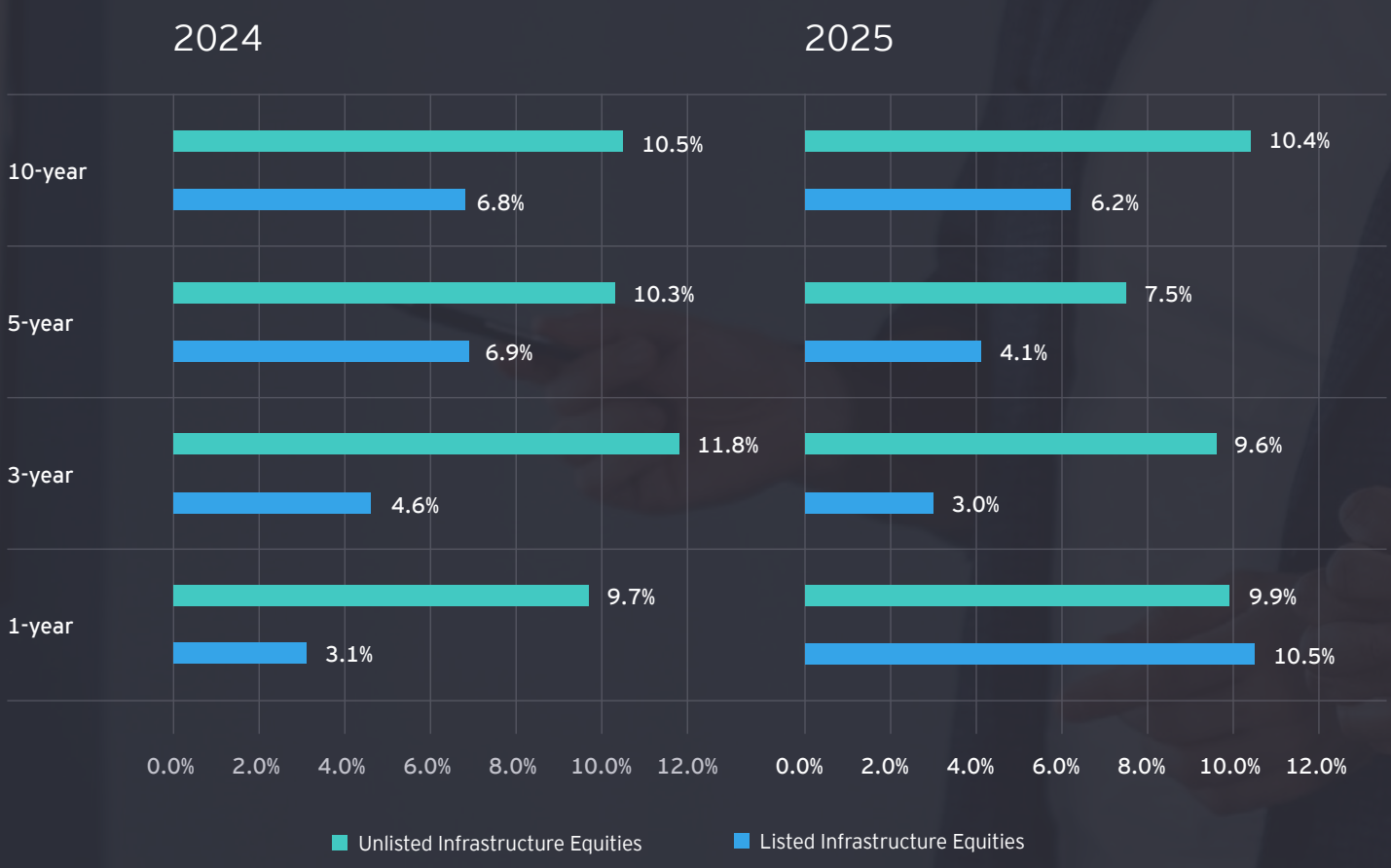
The share of dry powder as a percentage of total Assets Under Management (AUM) continued its multi-year decline, falling from around 26.6% to 23.9%, even though overall deal activity in the infrastructure space remained subdued. Since infrastructure fundraising has been facing a sustained downturn over the past two years with limited inflows of new capital, fund managers have increasingly turned to their existing reserves to pursue select opportunities. The shrinking proportion of dry powder in the AUM base, therefore, does not imply aggressive deployment, but rather a drawdown of previously committed capital in the absence of fresh fundraising.

The dry powder portion of AUM dropped to a historic low from $386bn in 2023 to $334bn in 2024, due to a weak fundraising environment, as high interest rates and prior overallocation by LPs limited new inflows, while GPs continued deploying capital within fund timelines despite subdued deal activity. The unrealized value of AUM increased from $1,086bn in 2023 to $1,131bn in 2024 as fund managers delayed exits due to economic uncertainty, while capital raised during peak years like 2022 was actively deployed, boosting the value of held assets despite the slowdown in new fundraising. As a result, increased capital deployment alongside postponed exits led to a notable decline in the share of dry powder relative to total Assets Under Management (AUM).

The post-2022 period saw elevated interest rates, inflationary pressures, and macroeconomic uncertainty, all of which dampened investor enthusiasm and extended fundraising cycles. As a result, total AUM growth slowed sharply, with 2024 recording a marginal decline of -0.5%, the weakest annual change since the 10.1% increase in 2020. This reflects both reduced capital inflows and a decline in unrealized asset values amid rising discount rates.

The reduced dry powder ratio also signals lower competition for deals, as fewer managers are flush with unallocated capital. This may benefit existing players, allowing for more disciplined pricing and stronger deal terms. It also points to a potential inflection point for the sector: capital remains scarce at a time when infrastructure investment needs—particularly in energy transition, digital infrastructure, and transport—are intensifying. For long-term investors, this dynamic could represent an opportunity to deploy into a market where valuations have softened, and competitive pressures have eased.

Figure 2 **Annualized Returns by Type of Equity (%)[1] (2024 vs 2025)**



Source: CBRE Q1 Infrastructure Quarterly Report (Mar'24 and '25) Annualized Returns by Type of Equity (%).

[1] Listed infrastructure: FTSE Global Core Infrastructure 50/50 index in USD as of Q4 2024. Unlisted infrastructure: MSCI Global Private Infrastructure in USD as of Q3 2024.

4.25% - 4.50%

Listed and unlisted infrastructure indices saw a notable improvement in their 1-year average performance compared to the previous year, supported by continued interest rate reductions. While unlisted infrastructure indices maintained their characteristic stability and lower sensitivity to market volatility, the recent uptick is primarily reflected in the 1-year returns rather than longer-term averages, indicating a short-term recovery rather than a broader performance shift.

However, geopolitical risk remains elevated as armed conflicts continue to destabilise key regions, most notably the war in Ukraine and ongoing tensions in the Middle East involving Israel, Iran, and the United States. Rising global political frictions, compounded by President Donald Trump's unpredictable trade policies and defense spending demands, have further disrupted supply chains and heightened market uncertainty. For the infrastructure sector, which depends on stable supply chains and long-term investment horizons, these dynamics are particularly acute. In response, corporates are accelerating supply chain diversification and near-shoring strategies to mitigate disruption risks.

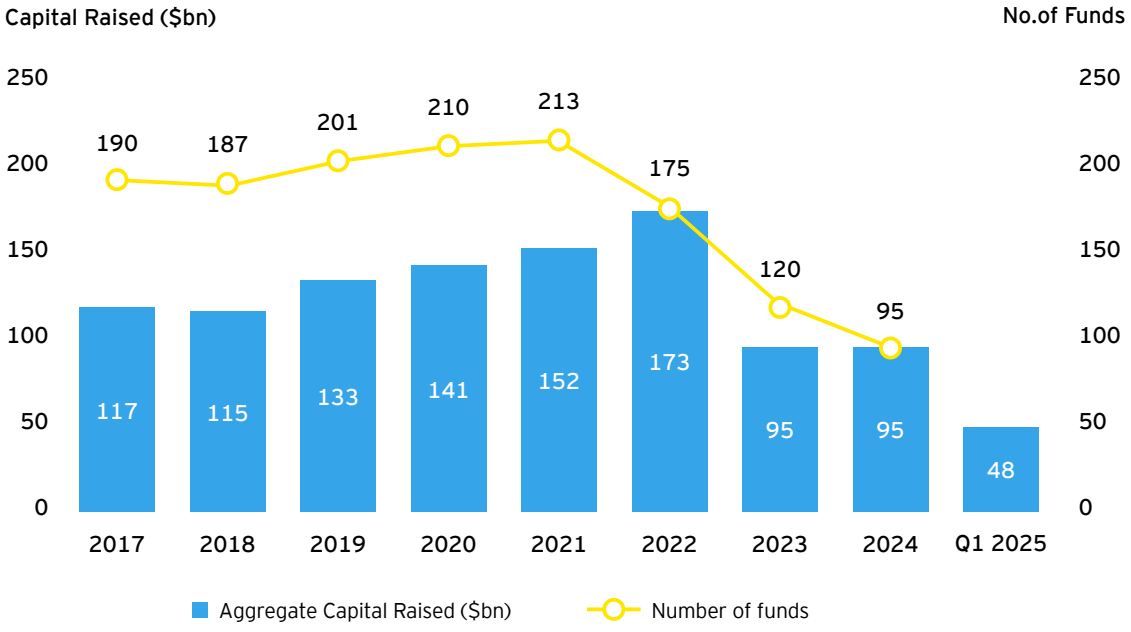
While the Federal Reserve has indicated a measured approach to rate cuts in 2025, stubborn inflation, renewed shipping disruptions in the Red Sea, and persistent supply chain realignment are complicating the macroeconomic landscape. A resurgence in trade tensions may fuel inflationary pressures, distort pricing dynamics, and challenge central banks' ability to navigate a soft landing.

The Federal Reserve has adopted a cautious stance on monetary easing for 2025, maintaining interest rates at 4.25%–4.50% as inflation remains above target and revising its core inflation forecast for 2025 to 2.3%. For infrastructure investors, persistently high rates are elevating financing costs and adding complexity to deal structuring. Meanwhile, ongoing trade tensions and supply chain adjustments are amplifying input cost volatility, particularly for materials and equipment essential to infrastructure projects.

The Federal Reserve has adopted a cautious stance on monetary easing for 2025, maintaining interest rates at 4.25%–4.50%.

Historically, high geopolitical risk has been linked to weaker equity returns. However, infrastructure—particularly unlisted infrastructure—tends to behave differently. In times of global uncertainty, such as during the global financial crisis, the COVID-19 pandemic, or periods of aggressive interest rate hikes, unlisted infrastructure indices have shown brief declines followed by relatively quick recoveries.

Figure 3 **Global Infrastructure Fundraising**

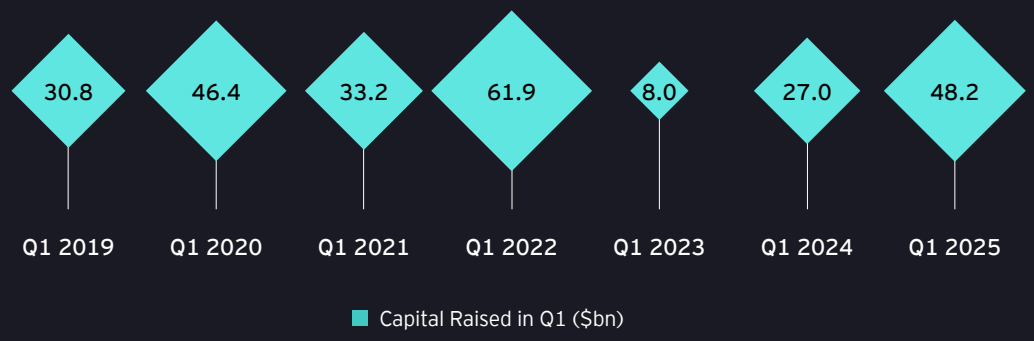


Source: CBRE Q1 Infrastructure Quarterly Report (Mar'25) and Infrastructure Investor Q1 2025 (Apr'25).

In 2024, fundraising activity remained restrained, with total capital raised falling just under $100bn. Liquidity constraints continue to be a major headwind, limiting the flow of capital into new investments. Slow deal-making and fewer exits across private markets have delayed capital recycling, making it more difficult for managers to secure new commitments.

Despite current headwinds, market expectations still remain optimistic. According to the *Preqin Global Report: Infrastructure 2025*, the largest funds currently in the market are forecasted to raise over $140bn, signaling potential momentum in the year ahead. With greater clarity on how infrastructure assets respond to elevated interest rates, which can challenge asset valuations and income forecasts, investors are approaching the asset class with renewed caution but improved insight.

Figure 4 **Global Infrastructure Fundraising**



Source: Infrastructure Investor Q1 2024 (Apr'24) and Infrastructure Investor Q1 2025 (Apr'25).

Global infrastructure fundraising remained under pressure in early 2024, continuing a downward trend that began in 2023. In Q1 2024, capital raised stood at approximately $27bn, marking a moderate recovery from the $8bn raised in Q1 2023, which was the lowest quarterly fundraising figure in recent years. However, this rebound still falls short of the high fundraising levels seen between 2019 and 2022, when Q1 inflows regularly exceeded $30-60bn.

In Q1 2025, global infrastructure fundraising showed tentative signs of stabilization, with approximately $48bn raised during the quarter. This marked a significant improvement over Q1 2024 and Q1 2023, reflecting renewed investor interest and momentum in the asset class. As observed in 2024, despite a rise in infrastructure fundraising during Q1 2024, the annual figures ultimately declined.

fundra

Multiregional funds continue to lead the fundraising landscape, attracting the largest share of capital as investors prioritize diversified geographic exposure and allocation flexibility.

Europe retained its position as the second-largest destination for capital in 2024, underscoring its renewed appeal. The region's resurgence is driven by strong interest in energy transition, transport, and digital infrastructure sectors.

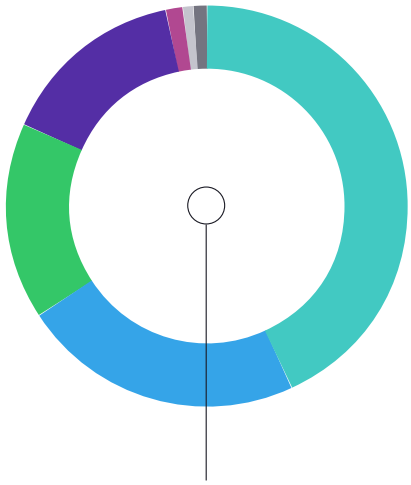
It is worth noting that energy transition, digital infrastructure, and transport are all designated in the EU Taxonomy as sectors making a "substantial contribution" to the Green Deal's climate mitigation and adaptation goals. This classification is particularly attractive to GPs managing funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR), as they seek to align capital with environmentally sustainable investments. The EU Taxonomy ultimately aims to channel investment towards projects that drive environmental sustainability.

Asia-Pacific was at fourth position, following a temporary rise in recent years. Despite the region's long-term growth potential, investor caution amid regulatory and macroeconomic uncertainty appears to have moderated capital flows into Asia-Pacific-focused vehicles.

North America maintained a steady mid-tier position, while Middle East/North Africa and Sub-Saharan Africa remained relatively minor destinations for capital, together representing only a small fraction of overall commitments. These regions continue to face challenges around scale, regulatory frameworks, and risk perceptions, limiting their share of global infrastructure capital.

Overall, the 2024 fundraising landscape shows a consolidation around global and European strategies, with varying levels of interest for other regions depending on fund manager track records and sector-specific opportunities.

Figure 5 **Capital Raised Per Region Focus (2024)**

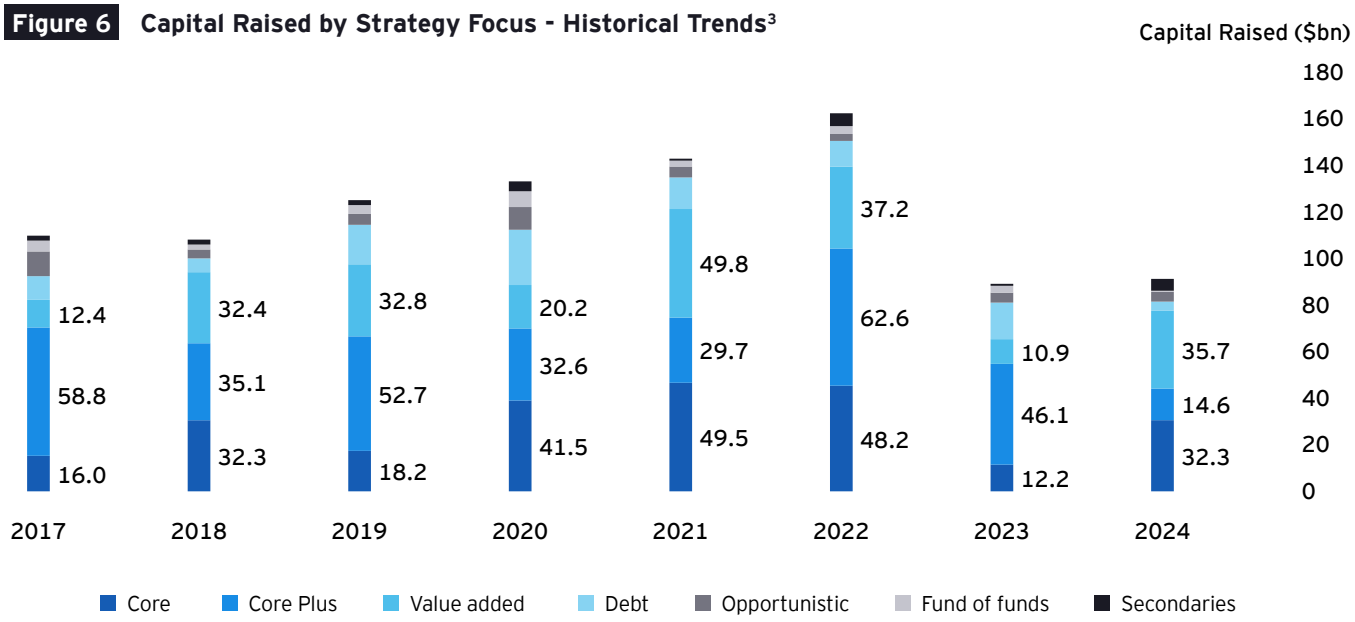


- Multi-Region **43.7%**
- Middle East/North Africa **1.3%**
- Europe **22.8%**
- Sub-Saharan Africa **0.9%**
- North America **16.1%**
- LATAM **> 1%**
- Asia-Pacific **15.1%**

Source: Infrastructure Investor. Fundraising Report Full Year 2024.[2]

[2] Infrastructure Investor. Fundraising Report Full Year 2024.

Figure 6 **Capital Raised by Strategy Focus - Historical Trends[3]**



Source: CBRE Q1 Infrastructure Quarterly Report (Mar'25) and Infrastructure Investor Q1 2025 (Apr'25).

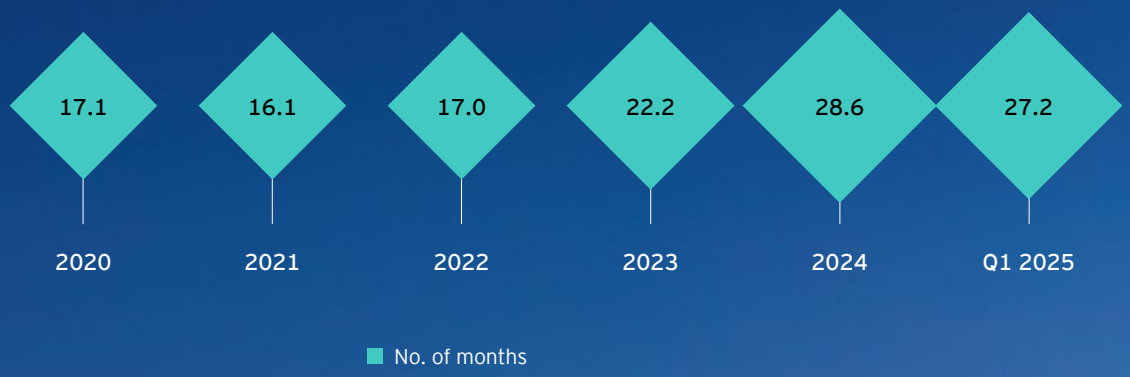
In 2024, capital-raising trends showed notable changes across different investment strategies. Value-added strategies saw a significant increase, rising from $10.9bn in 2023 to $35.7bn. This growth suggests investors focused on assets requiring repositioning or improvement, likely due to market conditions creating opportunities in sectors like infrastructure and real estate. Core strategies also experienced growth, with capital raised increasing from $12.2bn to $32.3bn, as investors continued to favor stable, income-producing assets such as utilities and transportation projects.

Core-plus strategies experienced a decline, with capital raised falling from $46.1 billion to $14.6 billion, signaling waning appetite for moderate-risk investments. Debt strategies also contracted significantly, from $17.0 billion to $3.9 billion, as higher interest rates increased financing costs. Opportunistic strategies registered only a marginal decrease, from $4.5 billion to $4.3 billion, indicating stable risk appetite for development projects. In contrast, secondaries surged from $1.0 billion to $5.3 billion, reflecting increased investor demand for liquidity amid slower transaction activity.

These movements highlight how infrastructure investments remain contracyclical—attracting capital even in uncertain economic conditions. Higher interest rates and market uncertainty led investors to focus on either stable core assets or value-added opportunities, while reducing interest in middle-ground strategies. The data shows a clear preference for investments offering either reliable income or potential for asset improvement, with less capital allocated to higher-risk or debt-focused approaches.

[3] Strategies:
- Core: Focuses on stable, low-risk assets with predictable income, e.g., established toll roads.
- Core Plus: Involves slightly improved assets for enhanced performance, e.g., utility companies with operational efficiencies.
- Value Added: Targets assets needing significant upgrades, e.g., underperforming renewable energy facilities.
- Debt: Invests in infrastructure debt for income through interest, e.g., green bonds for renewable projects.
- Opportunistic: Seeks high-risk, high-return opportunities, e.g., new airport developments.
- Fund of Funds: Diversifies investments across various infrastructure funds, e.g., a fund focusing on renewable energy and transportation.
- Secondaries: Acquires stakes in existing funds from investors looking to liquidate, e.g., shares in mature infrastructure funds.

Figure 7 **Average Time on the Road for Funds Closed (Months)**



Source: Infrastructure Investor. Fundraising Report Full Year 2024 (Jan'25).

Funds that closed in 2024 spent an average of 28.6 months on the road, representing the longest fundraising period over the past six years. This is significantly higher than the 2019–2023 average of 17.6 months, which highlights the increasingly prolonged timelines required to reach final close.

In the first quarter of 2025, the average time to close improved slightly to just over 27 months but still remains well above historical norms. These figures indicate that while some progress is being made in 2025, fundraising continues to operate in a slower and more deliberate environment. The extended fundraising periods reflect continued macroeconomic uncertainty, more cautious LP allocation strategies, and heightened competition in the market.

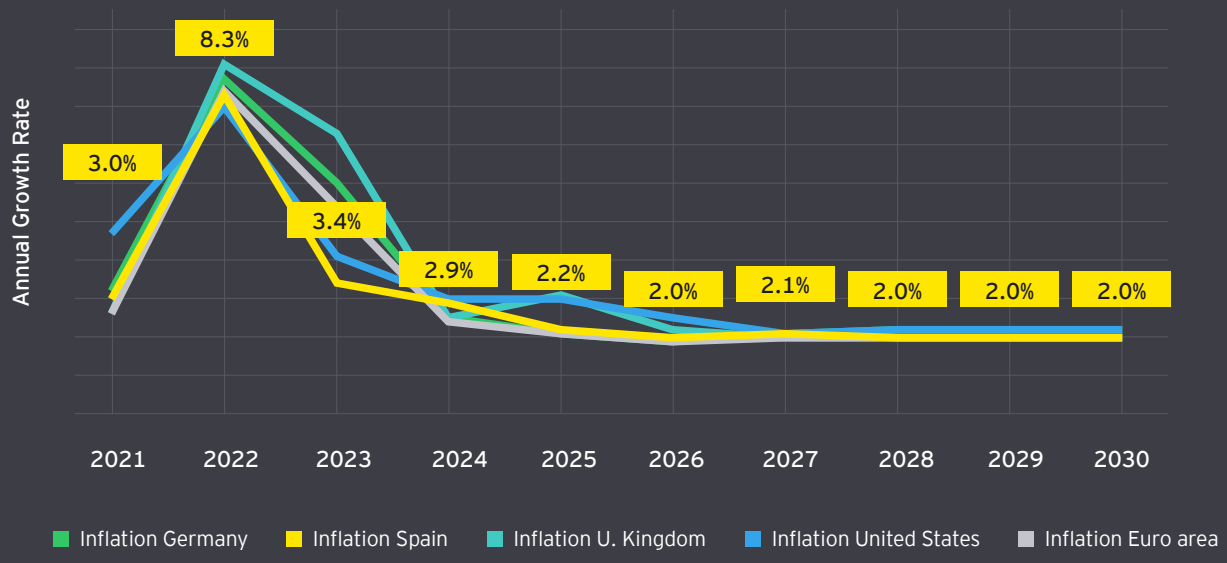
2. The Big Picture: Macroeconomic Influences on the Infrastructure Investment Climate

In 2025, inflation across major economies is forecasted to stabilize further, with rates converging toward 2-3%, aligning closely with central bank targets. This moderation reflects the culmination of post-pandemic supply chain recoveries, tighter monetary policies taking full effect, and easing energy price volatility, on the assumption of no major geopolitical disruptions. For infrastructure markets, this environment marks a critical shift from the uncertainty of previous years toward a more predictable cost and financing landscape.

The decline in inflation is expected to coincide with a gradual reduction in interest rates, as central banks in advanced economies transition from restrictive to neutral monetary policies. Lower borrowing costs will likely improve the viability of long-term infrastructure projects, particularly those reliant on debt financing, such as public-private partnerships (PPPs), large-scale transportation upgrades, and renewable energy developments. Sectors with inflation-linked revenue mechanisms, such as toll roads and utilities, may also benefit from stabilized input costs while maintaining pricing power, supporting steady cash flows for investors.

Nonetheless, significant challenges remain for infrastructure investment. Geopolitical tensions have prompted many countries, particularly in Europe, to boost defense spending, diverting public resources away from infrastructure. Although inflationary pressures appear to be easing, risks persist due to ongoing tariff disputes, while structural labor shortages in construction and engineering continue to threaten project timelines and costs, especially in regions facing demographic headwinds or restrictive immigration policies. Furthermore, the evolving impact of climate-related regulations and decarbonization targets may add new cost pressures, notably for projects dependent on sustainable materials or carbon-neutral technologies.

Figure 8 **Inflation Forecast, Annual Growth Rate (%)**



Source: EY analysis based on IMF and Oxford Economics.

Looking ahead, the 2–3% inflation range projected for 2025 is likely to create a balanced environment for infrastructure investment, neither high enough to erode returns nor so low as to signal weak demand. Investors and policymakers may find opportunities in adaptive strategies, such as modular project designs to mitigate labor risks or blended financing models to leverage falling interest rates. This year could represent a year of recalibration, where infrastructure planning aligns with a "new normal" of moderate inflation and cautiously optimistic capital deployment.

Furthermore, Europe is increasingly being perceived as a safe-haven asset, as ongoing political uncertainty and policy volatility linked to President Donald Trump continue to undermine the U.S. dollar's traditional role as the world's primary safe currency. Furthermore, Europe appears to have more monetary policy flexibility: after recent interest rate cuts and with further reductions anticipated, the region may benefit from more favorable financing conditions compared to the United States, where rates remain high.

As noted earlier, the EU Taxonomy aims to channel investment toward environmentally sustainable infrastructure, enhancing the appeal of qualifying sectors for GPs managing equity or debt funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR). European banks are also required to disclose the proportion of their assets allocated to Taxonomy-aligned activities, further increasing the attractiveness of energy transition, digital infrastructure, and transport projects for lenders.

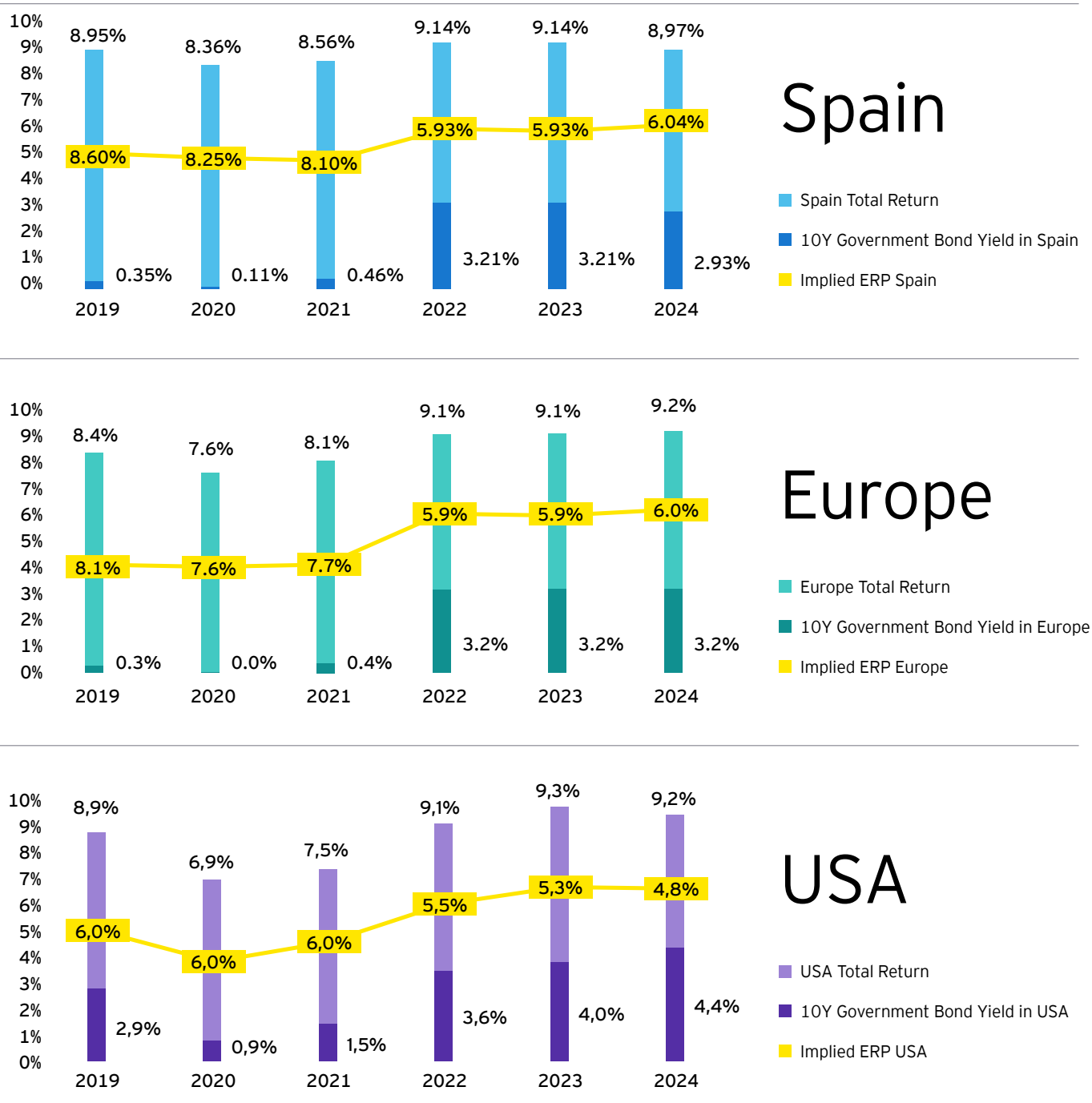
2-3%

The 2–3% inflation range projected for 2025 is likely to create a balanced environment for infrastructure investment.

3. Evolving Equity Returns: A Closer Look at Risk-Free Rates and Equity Risk Premium (ERP) Adjustments

While rising interest rates boosted the appeal and returns of infrastructure debt, the reduction in equity risk premia, driven by increased stability and lower volatility in global equity markets, meant that returns on infrastructure equities saw no significant growth.

Figure 9 **Total Required Return Breakdown by Geography**[4]



[4] Europe has been calculated as the weighted average of Germany, UK, France, Italy and Spain, which are the top 5 European countries.

The total required return for global equity investors, which rose moderately in 2022, has since stabilized. However, this apparent stability conceals important underlying trends: long-term government bond yields have continued to increase through 2024, albeit at a slower pace than in previous years, while implied equity risk premia (ERP) have gradually declined across Europe, Spain, and the United States, at least prior to the market response to policies introduced by the new US president.

This compression in equity risk premia (ERP) has not resulted in outperformance for infrastructure equities, as sector returns remain range-bound with limited upside. Spain's market mirrors wider Eurozone patterns, where infrastructure debt continues to offer attractive yields, while equity strategies face ongoing headwinds. Looking forward, a neutral outlook suggests that debt investments will likely keep benefiting from higher interest rates, whereas equity investors may need to selectively target subsectors such as digital infrastructure or energy transition projects to achieve meaningful returns. Overall, current conditions do not support broad-based gains in infrastructure equities, despite improved risk sentiment in public markets.

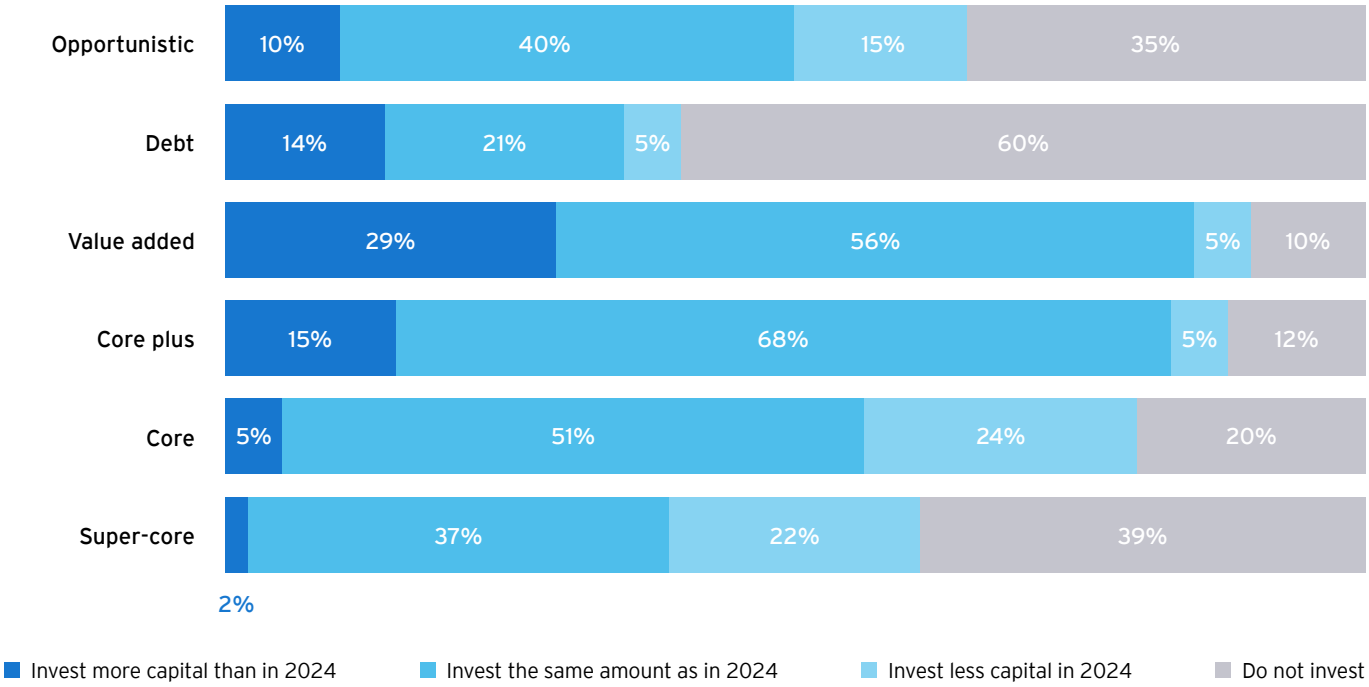
4. Adapting Strategies for LPs and Infrastructure Funds Amid Economic Shifts

Over time, LPs have consistently expanded their allocation to infrastructure funds driven by the attractiveness of infrastructure investments, which offer long-term, dependable returns that resonate with the investment goals of numerous investors.

Infrastructure funds have continued to lead the charge in real asset fundraising since 2016, and the trend persists going into 2025.

4.1. LP Investment Strategies in High Risk-Free Rate Environments: Trends, Sectoral and Regional Preferences for 2025

Figure 10 **LP Strategic Infrastructure Investment Appetite for 2025 (% of Respondents)**



Source: Infrastructure Investor Report 2024 (Jan '25).

As limited partners (LPs) look for higher returns amid changing market conditions, there is a noticeable shift toward risk-adjusted strategies. This trend is particularly evident in the rising interest in value-added infrastructure, which stands out as the preferred strategy heading into 2025. Survey results show that 29% of LPs intend to allocate more capital to value-added infrastructure compared to 2024—the highest percentage among all strategies—indicating a significant pivot toward approaches that offer higher return potential through active asset management, development opportunities, or operational improvements.

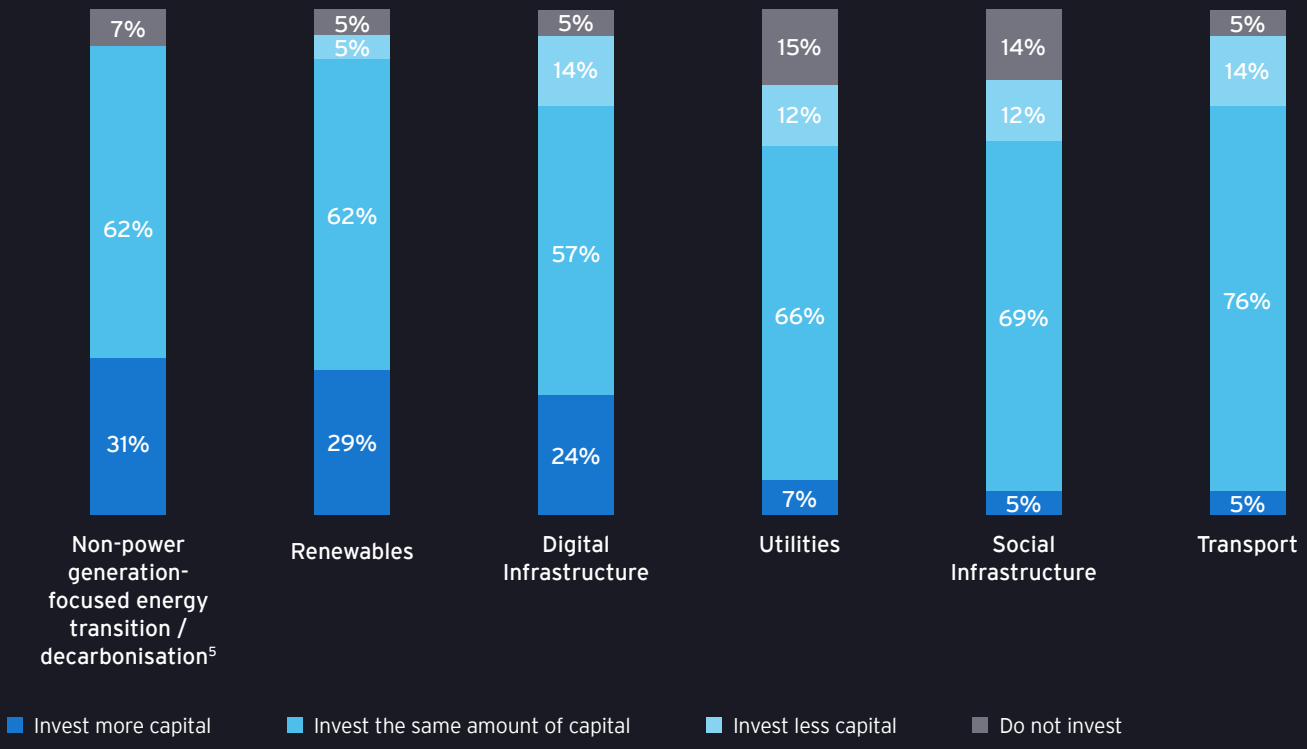
After value-added, core-plus infrastructure ranks as the second most preferred strategy for additional capital allocation in 2025. However, the gap between the two is significant, underscoring that growth expectations are strongly concentrated around value-added approaches.

Stability remains important, with 56% of LPs expecting to maintain their capital allocation to value-added strategies at current levels. Even more notable is the 68% of LPs who plan to invest the same amount in core-plus, reflecting a consistent commitment to moderately riskier assets, even if new capital inflows may be limited.

Conversely, LPs appear increasingly cautious about core and super-core strategies, which are typically characterized by lower risk and more predictable, but limited, returns. These categories are anticipated to receive less focus in 2025, with more LPs planning to scale back their investments or exit these segments entirely. This reflects a broader move away from ultra-conservative strategies in favor of those that offer better potential for inflation protection and enhanced long-term yields. The increased attention on core-plus infrastructure suggests that LPs are cautiously pursuing higher returns, while the modest reduction in core allocations may simply indicate a rebalancing after a period of peak investment.

In contrast, opportunistic and debt strategies show a more divided outlook, with no single direction dominating. While some LPs intend to allocate more to debt, a significant portion also reports a desire to reduce or exit such exposures, highlighting the mixed sentiment surrounding riskier or more complex investment structures in the current macroeconomic climate.

Figure 11 **LPs' Infrastructure Sector Appetite for 2025 (% of Respondents)**



Source: Infrastructure Investor's Investor Report 2024 (Jan'25).

Survey results by Infrastructure Investor suggest that investor interest in clean energy and digital infrastructure will remain strong in 2025. Around 30% of LPs surveyed intend to allocate more capital to renewables and non-power generation-focused energy transition or decarbonization strategies. Similarly, 24% plan to increase their investments in digital infrastructure compared to the previous year.

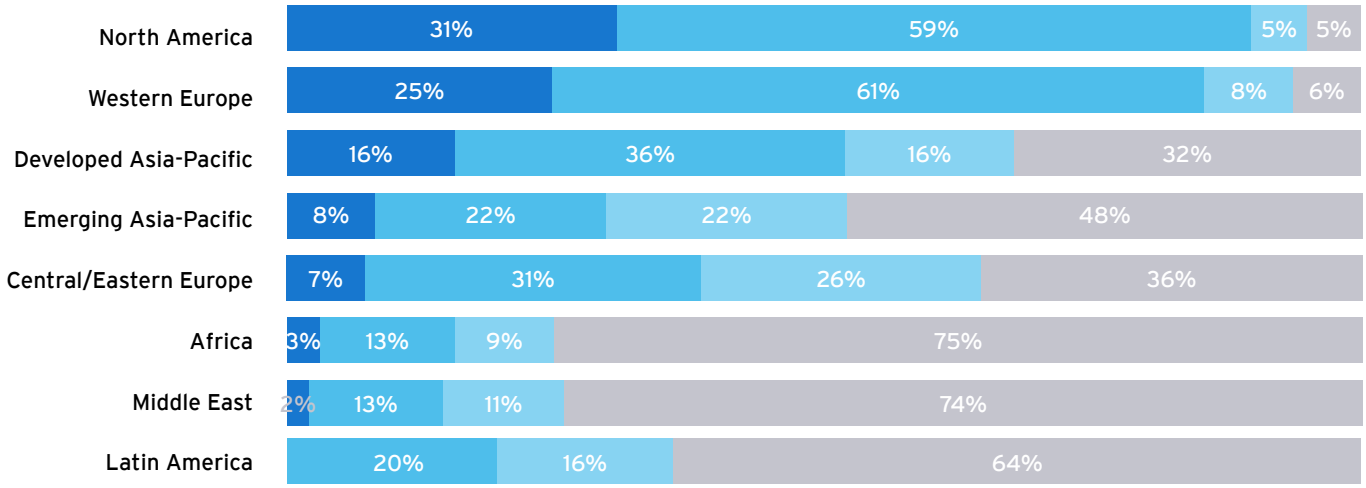
For each of these sectors, the majority of respondents plan to maintain current investment levels, reflecting steady confidence. Digital infrastructure, renewables, and decarbonization themes are set to remain central pillars of infrastructure portfolios.

In contrast, sectors such as utilities, social infrastructure, and transport show lower levels of planned capital increases. Only a small proportion of LPs plan to invest more in these areas, with most indicating they will either maintain or reduce their capital commitments.

Overall, LPs appear to be prioritizing infrastructure sectors aligned with energy transition and digitalization trends, while maintaining a more cautious approach toward traditional infrastructure segments.

5 "Non-power generation-focused energy transition or decarbonization" means reducing pollution from sources other than electricity production. For e.g. transportation: moving from gasoline and diesel vehicles to electric cars, buses, and trains; and industry: making factories more energy-efficient or using cleaner fuels in cement, steel, and chemical production.

Figure 12 **LPs' Regional Preference For 2025 (% of Respondents)**



Source: Infrastructure Investor Report 2024 (Jan '25).

Investor sentiment towards different geographic regions in 2025 continues to reflect a cautious approach, especially toward emerging markets.

North America and Western Europe remain the most stable regions in terms of LP interest. Approximately half of respondents indicated they plan to maintain their 2024 investment levels, while around 25–30% expressed an intention to increase allocations in these areas. Very few LPs signaled no interest, indicating that these markets are still viewed as core components of infrastructure portfolios.

In contrast, developed Asia-Pacific shows more mixed sentiment. While some LPs anticipate increasing exposure, the proportion planning to reduce investment or expressing no interest has grown, suggesting some reassessment of opportunities in the region.

Emerging Asia-Pacific and Central/Eastern Europe received more cautious responses. A relatively small share of LPs plan to increase investments, while a significant number intend to maintain or reduce exposure. Nearly 30–40% expressed no interest in these regions, highlighting the risk considerations and uncertainties often associated with emerging markets.

The Middle East, Africa, and Latin America saw the highest levels of disinterest. In 2024:

- 74% of LPs reported no interest in the Middle East.
- 75% said they had no interest in Africa.
- 64% expressed no interest in Latin America.

These figures suggest a growing reluctance among LPs to allocate capital to regions perceived as having higher political, economic, or regulatory volatility. Overall, the data indicates that, in an environment of uncertainty, investor preferences tend to remain focused on more established and familiar markets.

74%
of LPs reported no interest in the Middle East.

75%
said they had no interest in Africa.

64%
expressed no interest in Latin America.

4.2.
Key Strategies Driving Infrastructure Funds Forward

4.2.1 Recycling Assets

With fundraising being the lowest in 2015, LPs remain liquidity-constrained due to the denominator effect and fewer exits across private markets. Selling stakes in existing infrastructure funds allows LPs to free up capital and rebalance portfolios, enabling them to recommit to new infrastructure funds.

This creates a "recycling loop", where secondary sales directly unlock primary fundraising for GPs launching new vehicles.

1

November 2024

STAFFORD CAPITAL PARTNERS

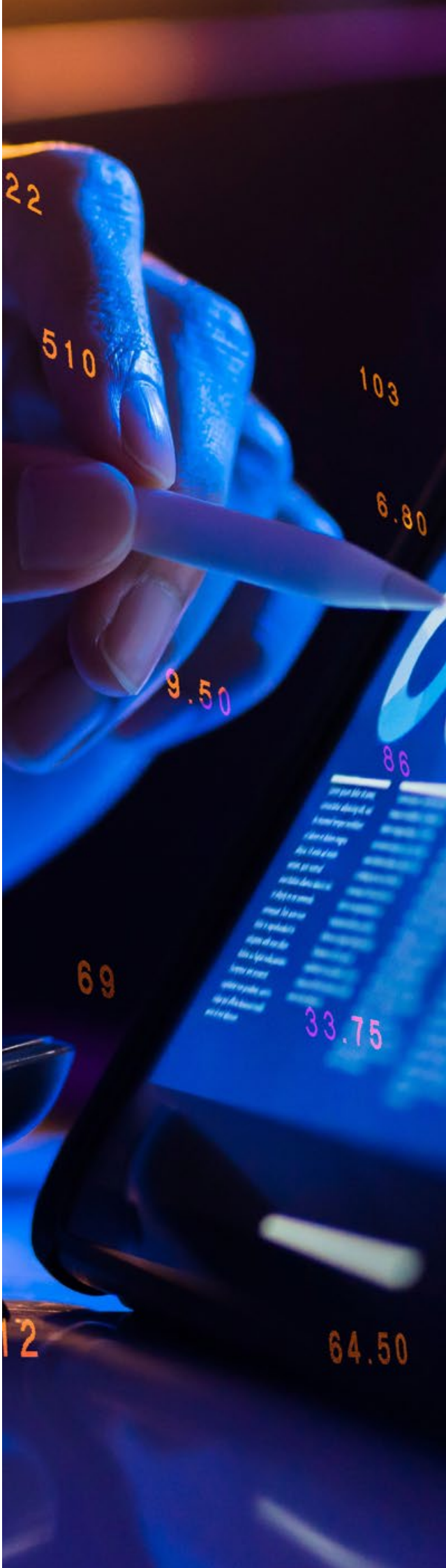
Stafford Capital Partners' fifth infrastructure secondaries fund, SISF V, had raised over €400 million from 13 institutional investors as of late 2024, with a final close expected in mid-2025. The fund has already deployed more than €100 million across four transactions, with a strategic focus on digital infrastructure (36%), renewable energy (32%), and social infrastructure (15%).

2

January 2024

PANTHEON

Pantheon closed its Pantheon Global Infrastructure Fund IV at $5.3 billion, marking the largest-ever raise for an infrastructure secondaries fund. The fund targets LP- and GP-led secondary deals, addressing growing liquidity needs and supporting capital recycling in the infrastructure market.



4.2.2 Industry Consolidation

Mergers and acquisitions are increasingly becoming a strategic lever for infrastructure fund managers seeking to strengthen their market position. Some GPs are engaging in consolidation to evolve into comprehensive "one-stop-shops" that can offer diversified exposure across the full spectrum of infrastructure assets from core to value-added and opportunistic strategies. These larger platforms aim to serve institutional investors seeking scale, diversification, and seamless capital deployment.

On the other hand, some fund managers are selectively acquiring or merging with firms that enhance their expertise in specific sectors (e.g., renewables, digital infrastructure) or geographies, allowing them to double down on specialized strategies and create differentiated deal flow.

1

October 2024

Global Infrastructure Partners → BlackRock

BlackRock's acquisition of Global Infrastructure Partners is designed to position the firm to capitalize on long-term structural trends, expanding its ability to deliver new investment opportunities for clients.

2

May 2024

ECP → Atlantica Sustainable Infrastructure

Energy Capital Partners, along with co-investors, acquired 100% of Atlantica Sustainable Infrastructure for $22 per share in cash to support its growth trajectory.

3

October 2024

General Atlantic → actis

General Atlantic acquired Actis, a sustainable infrastructure investor. This transaction reinforces both firms' collective commitment to sustainability and the energy transition to deliver a broader set of investment solutions for investors.

4.2.3 Expanding Investment Mandates

To attract a broader pool of LPs and meet evolving investor preferences, infrastructure funds are increasingly diversifying their offerings. This includes expanding beyond traditional core infrastructure into adjacent areas, such as energy transition, digital infrastructure, and social infrastructure sectors, which are closely aligned with the UN's 2030 Agenda for Sustainable Development. The growing emphasis on ESG-compliant investments reflects global commitments to sustainability, though political shifts such as the Trump administration's focus on deregulation and fossil fuel investments have at times redirected capital toward conventional energy assets.

Many GPs are now launching multi-strategy platforms that cater to varying risk-return profiles, including open-ended vehicles, core-plus funds, and opportunistic strategies. This flexibility allows investors to tailor their infrastructure exposure based on capital allocation goals, liquidity needs, and long-term outlook. However, the US political landscape under the second Trump administration will influence domestic infrastructure priorities, with the removal of public subsidies for clean energy infrastructure projects, for example.

1 May 2025

TPG

TPG has recently expanded its infrastructure platform with new funds such as TPG Rise Climate II and the Climate Transition Infrastructure Fund, targeting clean energy and sustainability-focused assets. Additionally, its Global South Initiative focuses on high-growth markets in Asia and Africa, supporting the energy transition and digital infrastructure development in emerging economies.

2 February 2024

Brookfield

Brookfield committed €20 billion to AI infrastructure in France, including data centers and networks. The firm also raised $2.4 billion for its Catalytic Transition Fund, focusing on climate finance in emerging markets.

3 January 2025

Goldman Sachs

Goldman Sachs Alternatives launched "G-INFRA," an open-ended global infrastructure strategy targeting core-plus and value-add private infrastructure investments in the mid-market, as well as secondaries and liquid assets. This strategy broadens investor access, including qualified individuals and private wealth clients, offering flexibility and exposure to sectors such as energy transition, digital infrastructure, transportation, and circular economy.

4 Octuber 2024

Hamilton Lane

Hamilton Lane added two new funds—HLPIF and HLGPI—to its Evergreen Platform, which now includes five funds across multiple strategies serving a broad investor base globally. These vehicles provide diversified access across infrastructure sectors, asset types, and geographies, focusing on themes like energy transition and AI-driven infrastructure rollout.

4.2.4 Exploring New Fund Structures

Infrastructure GPs are increasingly innovating with fund structures to provide LPs with greater flexibility, alignment, and access. Continuation vehicles are being used to extend ownership of high-performing assets beyond the typical fund life, allowing GPs to unlock additional value and offer liquidity options to existing investors. Co-investments are also on the rise, giving LPs the ability to deploy more capital into select deals at lower fees.

1 September 2024

BlackRock

Blackrock partnered with Global Infrastructure Partners before it was acquired for Microsoft and MGX to invest in data centers and supporting power infrastructure. GIP was in the process of being acquired by BlackRock when this partnership was announced.

2 April 2024

cdp

EIF (part of the European Investment Bank Group) and CDP Real Asset SGR (Italy) launched a €300 million co-investment program focused on social housing infrastructure in Italy.

3 April 2025

Morgan Stanley

Morgan Stanley closed its third co-investment fund, which was over-subscribed at its hard cap with approximately $2.3bn in total commitments, targeting lower middle-market companies through co-investments alongside top buyout managers, with a focus on fundamental growth over leverage.

4 March 2025

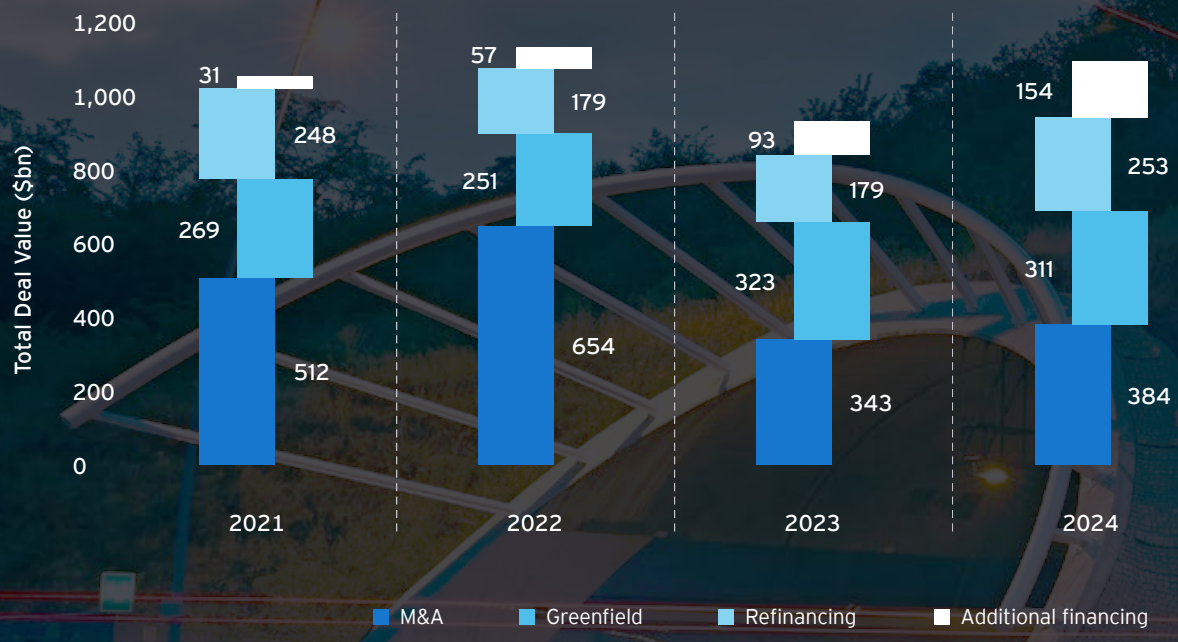
PATRIA

The Asian Infrastructure Investment Bank (AIIB) approved a co-investment project with Patria Infrastructure Fund V to finance a desalination plant in Chile's drought-prone central region.

Infrastructure Funds Deployment

1. Closing the Gap:
Overcoming Economic Hurdles and Valuation Challenges

Figure 13 **Private Infrastructure Dealmaking ($bn)**



Source: Infralogic Ranking report, FY 2024.

$1.1tn

Infrastructure dealmaking in 2024 concluded on a strong note, with total global investment in infrastructure and energy assets reaching $1.1tn. This marked a 15% year-over-year increase in value, a sign of market resilience despite persistent macroeconomic headwinds, including volatile bond yields, elevated interest rates, and ongoing geopolitical uncertainties.

The rebound in deal activity was driven in part by a more balanced distribution across transaction types, indicating a maturing and adaptive market environment. Among the standout developments, refinancing volumes surged significantly, with a 41% year-on-year rise in total deal value. This jump reflects both the pressing need for issuers to navigate a higher interest rate landscape and the proactive steps taken by sponsors to lock in more favorable financing terms amid shifting market conditions, though some LPs are pulling liquidity out of longer-duration assets to reallocate capital elsewhere.

M&A also contributed to the uptick in activity. The total value of M&A transactions grew by 12% compared to the previous year, signaling renewed strategic interest from both financial and strategic buyers. However, this growth in value was not mirrored in deal count, as the number of M&A transactions actually declined by 14%. This indicates that, while fewer deals were completed, those that did close were larger and more complex, possibly reflecting consolidation trends or a preference for high-quality, platform-type assets.

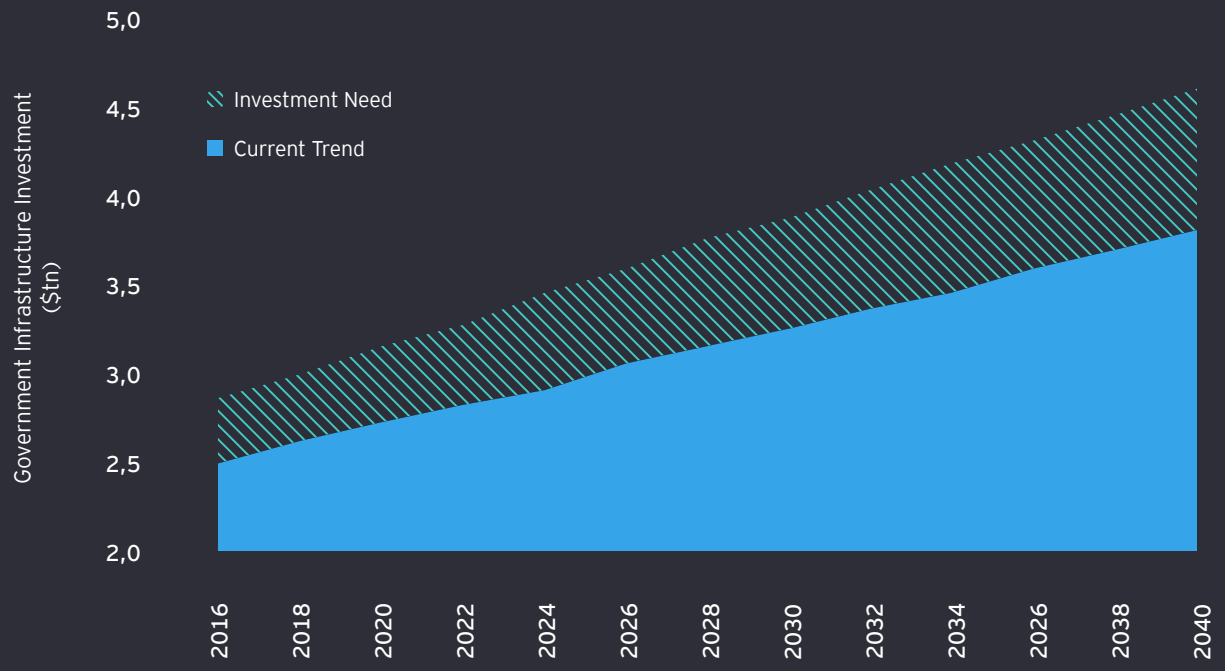
Investors appear to be navigating uncertainty with greater confidence, seizing opportunities in refinancing and selectively targeting large-scale M&A opportunities. The improved balance across transaction types signals a broader recovery and a potential shift toward more diversified and strategic deployment of capital across the infrastructure spectrum.

Infrastructure dealmaking in 2024 concluded on a strong note, with total global investment in infrastructure and energy assets reaching $1.1tn.

Looking into 2025, the valuation gap is expected to narrow as private market valuations adjust downward, resulting in an increase in transaction activity. In the context of economic uncertainty and high interest rates, infrastructure assets which enjoy numerous regulatory and contractual protections offer the investor risk mitigation and collateralization, reducing risk exposure aligned with high growth potentials. This is already evident in 2024, with global infrastructure deal activity rising 15% year-over-year, despite a slight 0.5% decline in total AUM. The data suggests investors are deploying capital more decisively, favoring high-conviction opportunities over capital accumulation.

The main driver pointing toward long-term growth in the infrastructure sector is the global need for infrastructure investment. According to Global Infrastructure Hub (GIB)'s estimates, the gap between government infrastructure spending and infrastructure investment needs will continue to widen, which points to a need for private infrastructure investment.

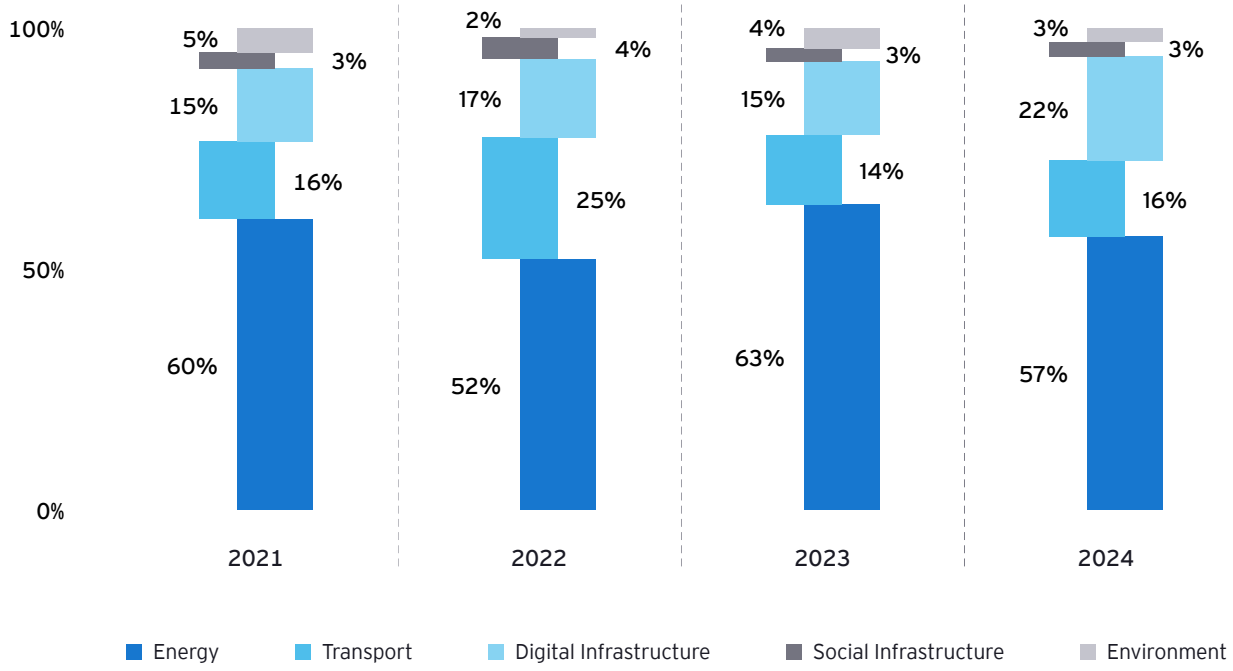
Figure 14 **Gap between Government Infrastructure Investment at Current Trends and Society's Needs**



Source: Global Infrastructure Hub (GIB).

2. Infrastructure Investment Landscape: Sectoral Overviews

Figure 15 **Infrastructure Investment by Sector (%)**



Source: CBRE, Infralogic Ranking report, FY 2024.

The sector breakdown displays a relatively balanced distribution, with digital infrastructure and transport sectors being the largest movers. A breakdown of infrastructure investment into sub-sectors reveals several key drivers that are shaping the landscape and directing capital flows.

Energy

Recent election outcomes in the US, Germany and other countries focused investors' minds on energy policies and favored types of energy investment. While policies and incentives are important to set the direction and pace, the drivers of energy growth remain the same. Globally, data centers, onshoring of manufacturing and electric vehicles are competing for connections to the power grid.

In 2024, investment in clean energy globally hit $2.1tn, with 11% growth compared to the previous year, according to Bloomberg New Energy Finance (BNEF). Growth is slowing, with investment momentum shifting from renewable energy to electrified transport. Meanwhile, energy storage has emerged rapidly, driven by significant declines in lithium-ion battery costs and improvements in energy density.

A widening policy gap is emerging between the United States and Europe on clean energy. The European Union has reinforced its commitment, with recent updates to the Renewable Energy Directive accelerating progress on energy security and climate objectives—developments likely to drive increased deal activity. In contrast, the U.S. outlook is clouded by post-election uncertainty: although clean energy and transport sectors continue to expand, the Trump administration's intention to roll back Inflation Reduction Act tax incentives and refocus on fossil fuels could dampen investment momentum. Nonetheless, storage and electrified transport may remain resilient, supported by state-level mandates and declining battery costs.

Transport

Transport infrastructure continues to benefit from steady mobility trends, with traffic volumes closely tied to economic growth. As noted earlier, investment is increasingly shifting from renewable energy to electrified transport.

Geopolitical tensions and global trade barriers typically impact transport segments exposed to cross-border movements of passengers and cargo, such as international air travel, ports and rail. Similarly, global events can affect international travel patterns in the short term.
Despite elevated geopolitical risks, recent growth in passenger volumes indicates a strengthening demand for international travel.

In 2024, investment in clean energy globally hit $2.1tn, with 11% growth compared to the previous year, according to Bloomberg New Energy Finance (BNEF).

AI tech

Digital Infrastructure

Digital infrastructure dealmaking saw a notable rise from 2023 to 2024, driven by the rapid advancement and adoption of generative AI technologies like DeepSeek R1. This LLM's low power consumption and efficient training capabilities have driven increased demand for AI inferencing capacity, spurring investment in data centres and related infrastructure. This AI-driven momentum, alongside rising cloud migration and computational requirements, has intensified M&A activity and capital allocation across global digital infrastructure assets.

Social Infrastructure

Social infrastructure has consistently low share across all years with minimal change, as it often offers lower returns and longer payback periods, making it less attractive amid rising risk premiums.

Environment

Though still the sector's smallest segment, environmental infrastructure is expanding as heightened climate concerns and ESG mandates attract more capital. Investment is rising in areas such as waste management, water treatment, climate resilience, and emerging technologies like direct air capture, which removes and permanently stores CO_2 underground.

Digital infrastructure dealmaking saw a notable rise from 2023 to 2024, driven by the rapid advancement and adoption of generative AI technologies like DeepSeek R1.

Infrastructure Secondaries

1. **Unlocking Liquidity:** Growth and Potential in Infrastructure Secondary Transactions

The secondary market, originally conceived as an exit route for underperforming assets, has evolved over the last decade into a sophisticated tool for portfolio management and liquidity generation. Since 2017, global secondary transaction volume has grown from USD 58bn to USD 100bn in 2023, according to Jefferies, solidifying its role as a strategic component of Private Equity.

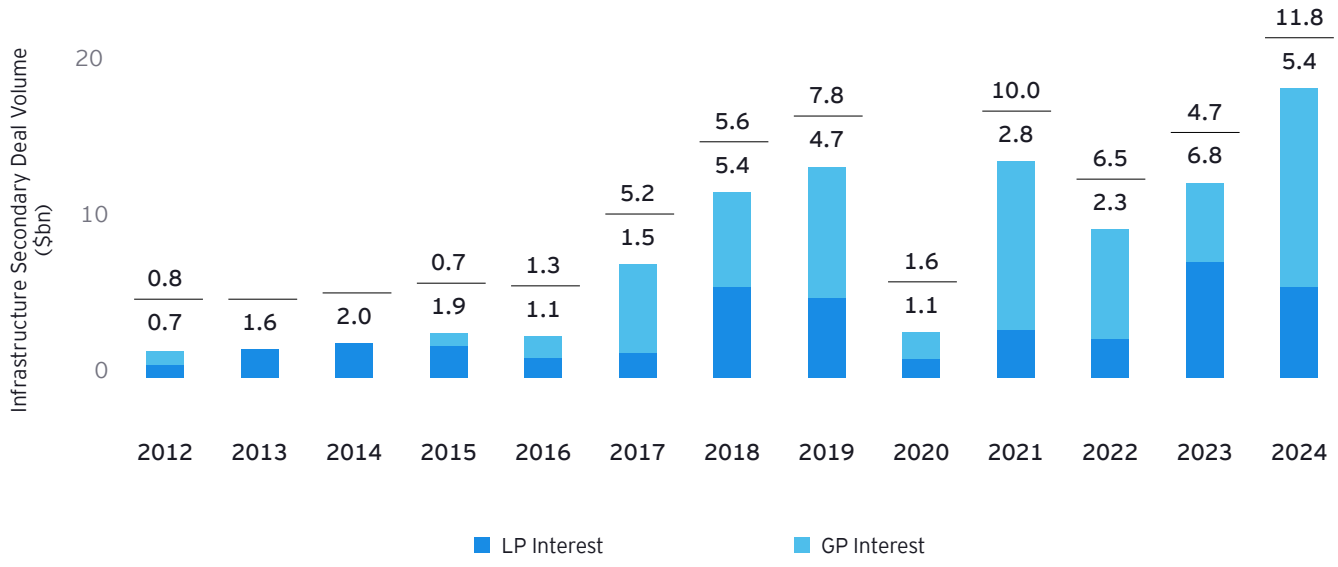
Secondaries transactions involve the purchase and sale of existing investor interests in private market funds—including private equity, infrastructure, real estate, and venture capital. Unlike primary investors, who commit capital at a fund's inception, secondary buyers acquire stakes from current LPs seeking earlier liquidity.

This market provides LPs with a powerful tool for liquidity, portfolio rebalancing, and meeting regulatory or strategic constraints. For buyers, secondaries offer exposure to mature, cash-generating assets with lower blind-pool risk, often at discounts to net asset value (NAV). Importantly, pricing is typically based on historical reference dates, resulting in effective discounts that may exceed the headline figures—especially in volatile or buyer-friendly market environments.

Through these transactions, GPs can offer their investors the option to sell their stake in an asset and obtain liquidity, reinvest in the new vehicle, or a combination of both options. This means that the GP retains management of the investment but "migrates" it to a new vehicle, creating a liquidity window for those LPs who wish to sell while also allowing others to remain invested by reinvesting in the new vehicle. This dynamic is reinforced by new investors acquiring existing stakes and injecting fresh capital for future development. Such transitions create opportunities for value creation: while primary funds may be tapped out, new investors can finance further expansion—be it through acquisitions, international growth, or diversification.

Over the past decade, the secondary market has significantly evolved, expanding from simple LP stake sales to more complex structures, including GP-led transactions and continuation funds. These continuation funds allow GPs to transfer one or more assets from their portfolios to a new vehicle, enabling them to manage their most profitable assets and those with greater value creation potential during an "additional investment cycle." This evolution reflects the market's increasing sophistication and its critical role in the private equity landscape.

Figure 16 **Infrastructure Secondary Deal Volume**



Source: Preqin Update: Campbell Lutyens, StepStone Group analysis (Mar '25).

As infrastructure matures as an institutional asset class, the market for infrastructure secondaries is coming of age. Many infrastructure funds are reaching the end of their lives, prompting a rise in GP-led solutions and LP-driven sales. Infrastructure secondaries offer unique advantages such as inflation hedging, resilient cash flows, and downside protection traits that are especially valuable in uncertain macroeconomic environments.

1.1%

Infrastructure secondaries currently represent only 1.1% of total infrastructure AUM, with deal volume projected to reach $27 billion by 2027.

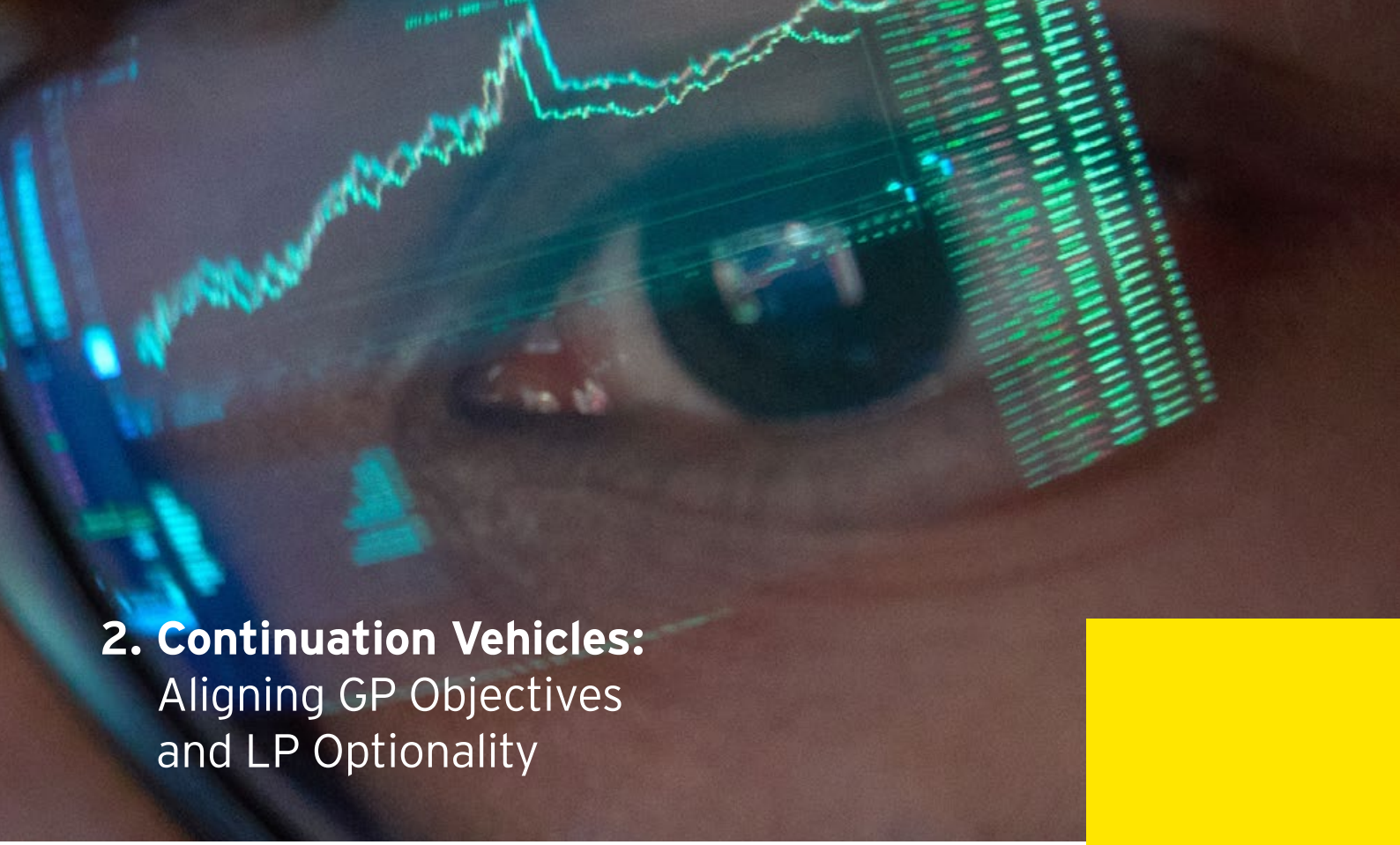
Secondaries offer investors several portfolio advantages, including greater diversification across managers and vintages, potential mitigation of the J-curve effect, attractive risk-adjusted returns, and enhanced liquidity and portfolio management.

Although activity is increasing, infrastructure secondaries currently represent only 1.1% of total infrastructure AUM, with LP-led transactions accounting for approximately 0.3%. The segment remains relatively underdeveloped, though volumes appear to be gradually increasing as the market evolves. Market participants expect this share to grow significantly, with deal volume projected to reach $27 billion by 2027.

The main motivation for early secondary transactions was valuation, as new investors entered at a discount relative to market valuations, often to provide liquidity to stagnant investments, due to market timing, or because the asset had limited liquidity due to underperformance. However, as the market has become more sophisticated, particularly regarding continuation funds, these discounts have generally decreased. The current secondaries environment is considered highly favorable for buyers, with average discounts reaching 7% in 2023, marking a notable softening after years of relatively narrow discounts on assets.

This reduction in discounts can be attributed to several factors: (i) the ability to conduct more thorough due diligence and build a better equity story around a single company, (ii) GPs presenting some of their best assets as candidates for continuation funds, and (iii) the implementation of structures by investors in continuation funds to align their interests with the GPs who will continue managing the asset in the next phase. Additionally, discounts are enhanced through tools such as deferred payments and pricing based on stale NAVs. Buyers now have access to high-quality, seasoned infrastructure assets at prices and terms that are no longer available in traditional M&A markets.

This trend also points to a structural gap in the market: namely, the limited pool of capital currently allocated to infrastructure secondaries. As more high-quality assets transact through the secondary market rather than traditional direct sales, investors without exposure to this segment may face reduced access to a growing portion of infrastructure deal flow.



2. Continuation Vehicles: Aligning GP Objectives and LP Optionality

Continuation funds hold clear advantages for investors. They offer immediate exposure to known assets, in contrast to primary funds, where capital is committed before assets are selected. Additionally, continuation funds typically have a shorter investment horizon, averaging three to five years versus about ten years for primary funds.

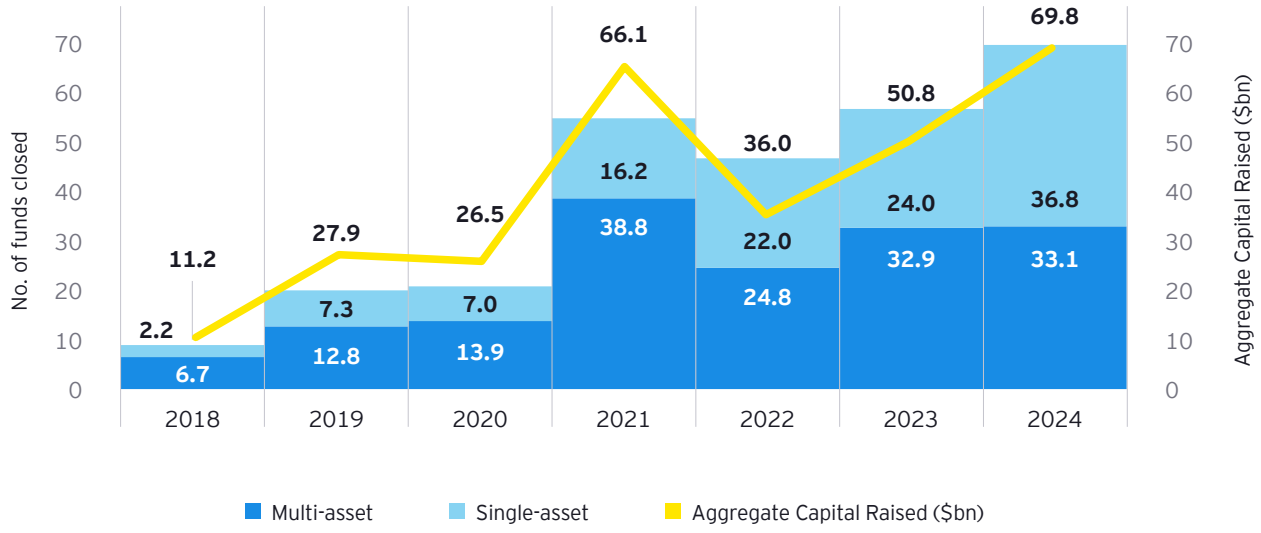
However, secondary investments are not without disadvantages. These vehicles can concentrate risk in a smaller number of assets and may carry an additional level of fees for investors. A growing part of the GP-led secondaries market, continuation funds allow General Partners (GPs) to transfer one or more portfolio companies, typically from funds nearing the end of their term, into a new vehicle. These structures give GPs more time and capital to maximize value while offering existing Limited Partners (LPs) the choice to roll forward or sell for liquidity. New secondary investors are invited into the new vehicle, often acquiring high-quality, de-risked assets.

The rise of continuation funds reflects broader trends: longer holding periods, increased asset concentration, and greater scrutiny on distributions. These vehicles help GPs maintain control over top-performing assets while providing LPs with optionality and enhanced DPI (Distributed to Paid-In Capital) consistency.

Another fundamental aspect of this type of operation is the alignment between the GP and the new sponsors. The new investors in the continuation vehicle expect the GPs to take on a significant commitment in this new phase, which is structured by requiring them to take a stake in the new vehicle that includes the reinvestment of the "carried interest" generated by the sale of this asset, in accordance with the agreements made in the primary fund.

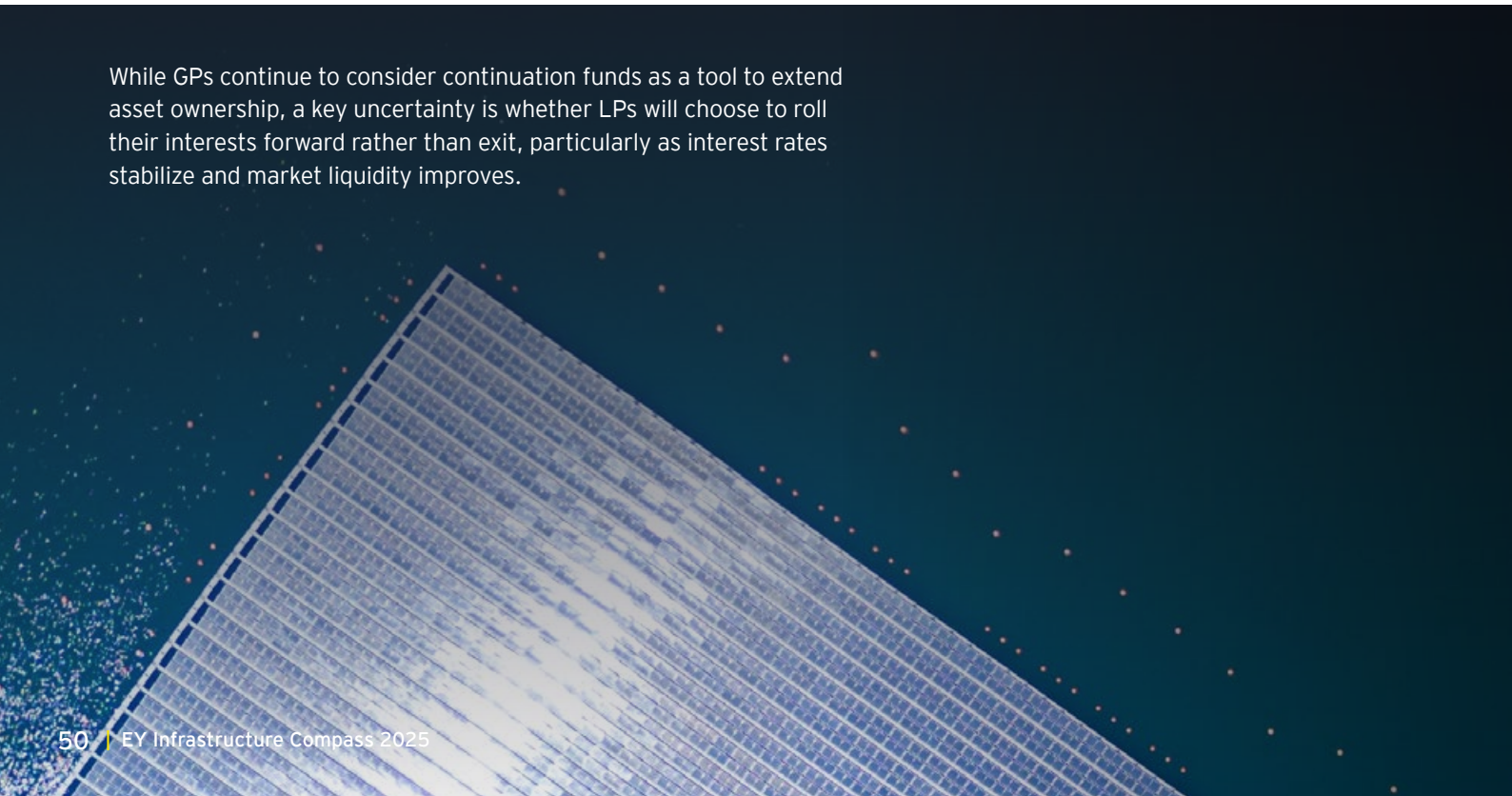
Despite lingering skepticism—particularly regarding conflicts of interest and the recycling of underperforming assets—continuation funds have evolved. While specific data for infrastructure is lacking, broader figures indicate that continuation funds became a more popular strategy among GPs in 2024. They serve as tools for managing liquidity and extending holding periods, addressing the challenges of fewer exit opportunities and lengthening fund lifecycles.

Figure 17 **Continuation Funds Closed and Capital Raised**



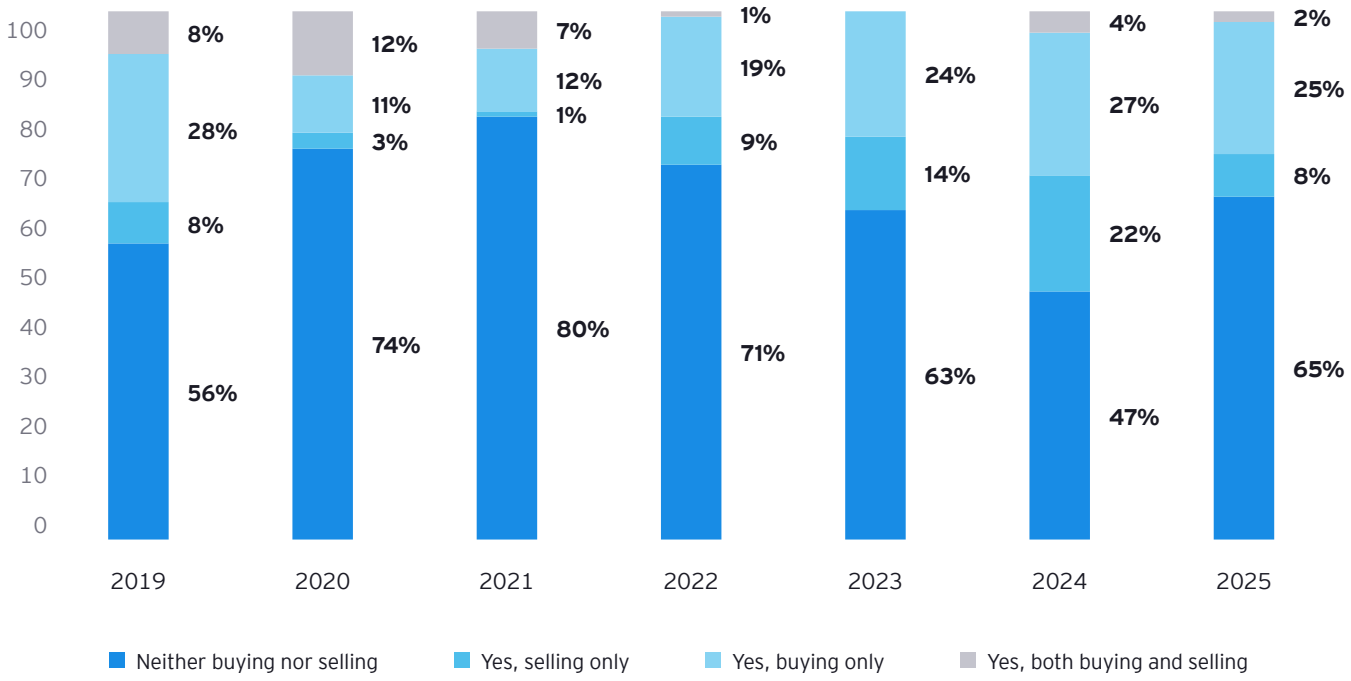
Source: Preqin Update: Data as of March 18, 2025.

While GPs continue to consider continuation funds as a tool to extend asset ownership, a key uncertainty is whether LPs will choose to roll their interests forward rather than exit, particularly as interest rates stabilize and market liquidity improves.



3. Cautious Turn: Infrastructure Secondary Deal Intentions in 2025

Figure 18 **LP/GP Plan to Buy/Sell Funds Stakes on the Secondary Market in Infrastructure in the Next 12 Months**



Source: Infrastructure Investor (Feb'25).

In 2024, a relatively low percentage of respondents (47%) planned to neither buy nor sell, suggesting an active secondary market. This was accompanied by a high proportion of sellers (22%) and buyers (27%), reflecting a dynamic environment where LPs/GPs were actively rebalancing portfolios, possibly due to liquidity needs, valuation adjustments, or strategic shifts. However, in 2025, the landscape changed dramatically. The share of participants choosing to neither buy nor sell surged to 65%, an 18-point increase, signaling a retreat to caution. This could stem from macroeconomic uncertainty, higher financing costs, or a lack of compelling investment opportunities.

Meanwhile, the percentage of those planning to sell dropped sharply from 22% in 2024 to just 8% in 2025, a 14-point decline. This suggests reduced distress selling, potentially because market conditions stabilized or because sellers were waiting for better pricing. Buyers also saw a slight dip, from 27% to 25%, but remained elevated compared to pre-2024 levels, indicating continued interest in infrastructure assets, albeit with more selectivity. The share of participants engaging in both buying and selling also declined slightly, reinforcing the trend toward reduced activity.

Overall, the data suggests that 2024 was a year of heightened secondary market transactions, while 2025 marks a return to caution, with more investors opting to hold rather than trade. This shift may reflect broader market dynamics, such as interest rate impacts, valuation pressures, or a wait-and-see approach amid economic uncertainty.

Conclusions

The infrastructure sector enters 2025 navigating a cautious but gradually improving macroeconomic and financial environment. After two years of slowdown marked by inflationary pressures, tighter monetary conditions, and subdued investor sentiment, early signs in 2025 suggest stabilization may be underway. Inflation is forecasted to settle at moderate levels in most advanced economies, and interest rates have begun to ease from their peaks, reducing the cost of capital and improving conditions for both fundraising and project delivery. However, the outlook remains subject to change, as unexpected macroeconomic or geopolitical developments could still reshape market conditions over the course of the year.

While the effects of past volatility have not entirely dissipated, recent data indicates a more balanced outlook. In the first quarter of 2025, around $48 billion was raised for infrastructure globally—nearly half the total capital raised in all of 2024. This suggests the market is stabilizing after the declines recorded in 2023 and early 2024. Should this trajectory persist, it may reflect cautious optimism among investors. Nonetheless, given the persistent uncertainty in global markets, it remains difficult to predict with confidence how the rest of the year will unfold.

The report highlights a notable shift in LP strategy preferences and investment appetite for 2025, with value-added and core-plus approaches expected to gain momentum. This reflects LPs' increasing interest in assets that offer embedded growth opportunities or can be enhanced through operational efficiencies. In the current environment, such strategies are becoming more attractive to LPs, as traditional core strategies—centered on stable yields—struggle to deliver due to weaker pricing power and limited flexibility in managing rising costs.

From a sectoral perspective, digital infrastructure and renewable energy remain central themes in infrastructure portfolios. Digital infrastructure has seen increased capital allocation due to sustained demand for data capacity, cloud computing, and AI applications, all of which drive continued investment in data centers, fiber networks, and related assets. Meanwhile, the transition to net-zero emissions continues to influence investment in renewable power generation, storage, and grid connectivity. The report also notes the rising role of energy storage, particularly as battery technologies become more cost-competitive.

Conversely, sectors such as **social infrastructure and utilities have attracted comparatively limited new capital**, as their longer investment horizons and modest return profiles are less suited to a high-cost-of-capital environment. **Transportation infrastructure has seen mixed outcomes**—stable in core markets but exposed to geopolitical risks and supply chain disruptions.

Regionally, investor appetite remains strongest in North America and Western Europe, supported by economic stability, developed capital markets, and relatively transparent regulatory regimes. The EU Taxonomy provides additional incentives for European infrastructure assets. Developed Asia-Pacific shows more mixed sentiment, while LPs continue to express limited interest in emerging markets due to elevated perceived risks, including political instability and regulatory unpredictability. In many cases, these concerns outweigh the potential for higher returns.

Infrastructure fund managers are adjusting through several strategic levers. These include expanding investment mandates into adjacent and thematic areas such as energy transition and digitalization, offering multi-strategy and open-ended vehicles, and using continuation funds to extend asset hold periods. Additionally, operational value creation has become a focal point, with managers increasingly employing digital tools, efficiency improvements, and ESG integration strategies including EU Taxonomy alignment to enhance asset performance and align with investor expectations.

Mergers and acquisitions among infrastructure managers are also shaping the landscape. Consolidation is enabling firms to offer a wider spectrum of strategies and scale, while targeted acquisitions are helping build niche capabilities in priority sectors or regions. The rise of infrastructure secondaries is another notable trend, helping unlock liquidity and recycle capital in a constrained fundraising environment.

Finally, while macroeconomic uncertainty and geopolitical risks persist, the long-term drivers of infrastructure investment remain intact. The structural gap between infrastructure demand and government financing capacity continues to widen globally. In this context, private capital remains essential to bridge this shortfall, particularly in areas such as sustainable energy, digital access, climate resilience, and transportation upgrades.

The infrastructure secondaries market remains small but is expanding rapidly. It has proven itself as a strategic liquidity tool for LPs, an attractive entry point for buyers, and a value-maximizing extension strategy for GPs. With expectations of $27 billion in annual volume by 2027, the market is set to become a central pillar of infrastructure investing.

As private markets mature and infrastructure assumes a larger role in institutional portfolios, **secondaries**—particularly infrastructure-focused vehicles and continuation funds—**are poised to become a core strategy for sophisticated investors.** These instruments offer greater diversification, lower J-curve risk, and access to established assets.

Overall, the infrastructure landscape in 2025 is defined by cautious optimism. As capital markets adjust to a post-tightening cycle, infrastructure is well-positioned to benefit from improving conditions, policy support, and the growing imperative for resilient, low-carbon, and technology-enabled systems. The path forward will likely require greater flexibility, more active asset management, and a closer alignment between investor strategies and long-term infrastructure needs.

1.2 EY Infrastructure Barometer 2025

The *EY Infrastructure Compass* initiative includes *EY Infrastructure Barometer*, an annual survey of senior executives from large corporates, infrastructure investors, financial institutions, and private equity houses around the world, conducted by the EY Strategy and Transactions team in Spain to assess the status and investment confidence in the infrastructure sector in Spain.

In this second edition, the respondent community comprises an independent panel of senior executives and selected EY clients and contacts, including leaders of the infrastructure ecosystem's most relevant stakeholders. In this edition we have had the collaboration of 114 experts and professionals who have given us their vision of the present of the infrastructure sector, as well as their expectations for the coming years[6].

[6] Survey carried out by anonymous questionnaire during May and June 2025.

Main conclusions

Spain remains a pivotal market for institutional and corporate infrastructure investors in the EU, owing to the high quality of its assets. While the country's leadership in renewable energy and its central role in the Eurozone remain primary draws, investors are increasingly attracted by the prospect of higher returns relative to other European markets.

Macroeconomic and geopolitical risks remain a key concern. Regulatory uncertainty, while still the most cited external risk, has declined in perceived impact, with investors increasingly focused on emerging risks such as technological disruption and global economic conflict. The constraints most associated with greenfield projects, such as regulatory delays and administrative hurdles, continue to weigh on performance expectations.

Expectations of interest rate cuts have tempered, while fears of sharp increases have eased. Investors anticipate steady deal flow in the year ahead, buoyed by more balanced return expectations and greater market confidence. Nonetheless, concerns about asset valuations, heightened competition, and global instability continue to influence investment decisions.

ESG remains embedded in investment strategies but appears to be losing momentum as a top-tier priority. The share of investors rating ESG as highly important has fallen significantly, though the average importance rating suggests it remains a core consideration rather than a differentiator.

Investors continue to favor the energy sector, with renewables maintaining a leading position and energy transition driving increasing allocations, particularly in core-plus/value-add strategies. Meanwhile, sector preferences are diversifying, with growing interest in specialized logistics and data centers. Portfolio optimization efforts are increasingly focusing on organic growth and operational improvements, but interest in consolidation through external growth is also rising.

Technology is increasingly becoming an area of interest and a potential core segment in the next years, in particular for energy, transportation and TMT sectors. Technology adoption is becoming more central to infrastructure investment strategies, with artificial intelligence and data analytics seen as high-potential tools.

In response to market dynamics and the notable interest from a significant number of investors, we have conducted targeted sector analyses on optic fiber and the energy storage/BESS industries in Spain for the Infrastructure Compass 2025 edition. We recognize the substantial potential and the investment appeal of these two industries as critical drivers for advancing digitalization and decarbonization efforts within the broader industry. We observed how more than half of the investors surveyed have contemplated investments in energy storage/BESS over the past year or are considering such investments in the forthcoming year. However, appetite for investment in fiber-optic infrastructure remains limited, as the sector is now mature and offers modest returns. Consolidation is seen as the most viable path forward.

Fundraising sentiment remains cautious amid constrained capital markets, yet a meaningful portion of investors anticipate improved conditions over the next 12 months. At the same time, secondary strategies and continuation funds are gaining traction, particularly among non-corporate players seeking liquidity and portfolio rebalancing options.

Most investors see their Spanish infrastructure investments performing in line with portfolio averages, while the share reporting above-average performance has grown. However, greenfield investments face increasing scrutiny, with a rising number of investors indicating that outcomes have fallen short of expectations.

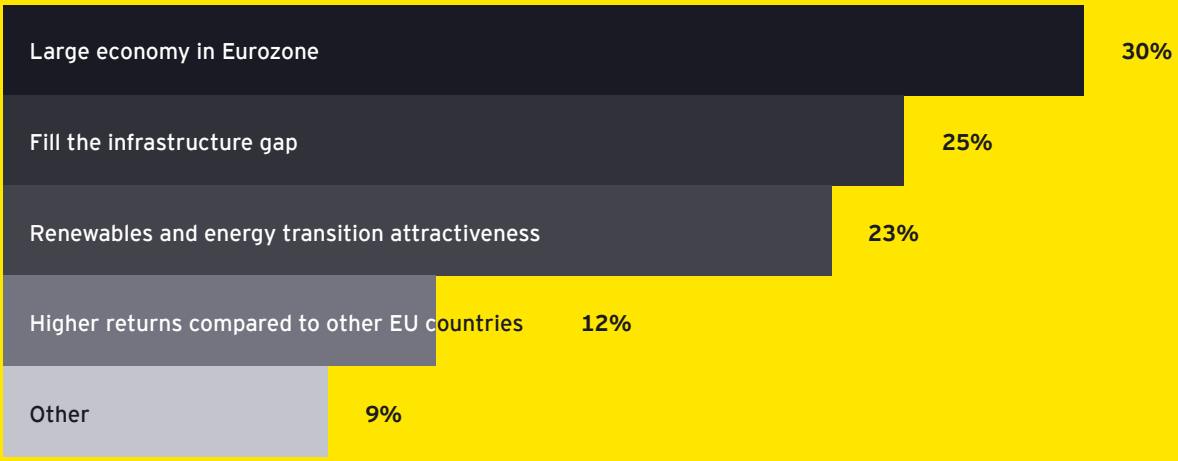
Technology adoption is becoming more central to infrastructure investment strategies, with artificial intelligence and data analytics seen as high-potential tools.

Technology adoption

Key Insights from the Survey

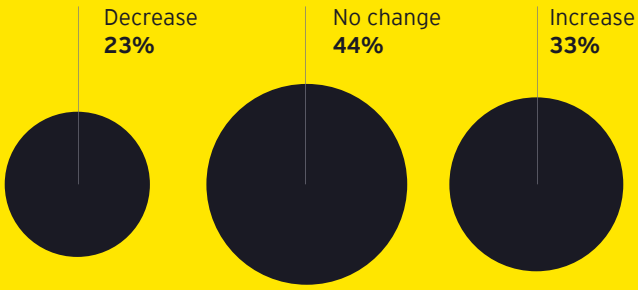
1. **Spanish Infrastructure Sector.** Over the past four years, 85% of surveyed investors have been active in the Spanish infrastructure sector, attracted by Spain's economic weight within the EU, its infrastructure gap, and the appeal of renewables and the energy transition. Other factors cited include familiarity with the market, opportunities for asset rotation and integration, and the country's high infrastructure needs. Most investors (62%) have no plans to divest their Spanish holdings. However, competition is expected to intensify, with 48% of respondents anticipating greater rivalry for investments and financing over the next 12 months, though this is down from 62% in last year's survey. At the same time, the proportion of investors planning to divest has increased from 26% to 38%, likely reflecting a more active market and greater confidence in current valuations.

Figure 19 **Key reasons for investors to invest in the Spanish infrastructure sector**



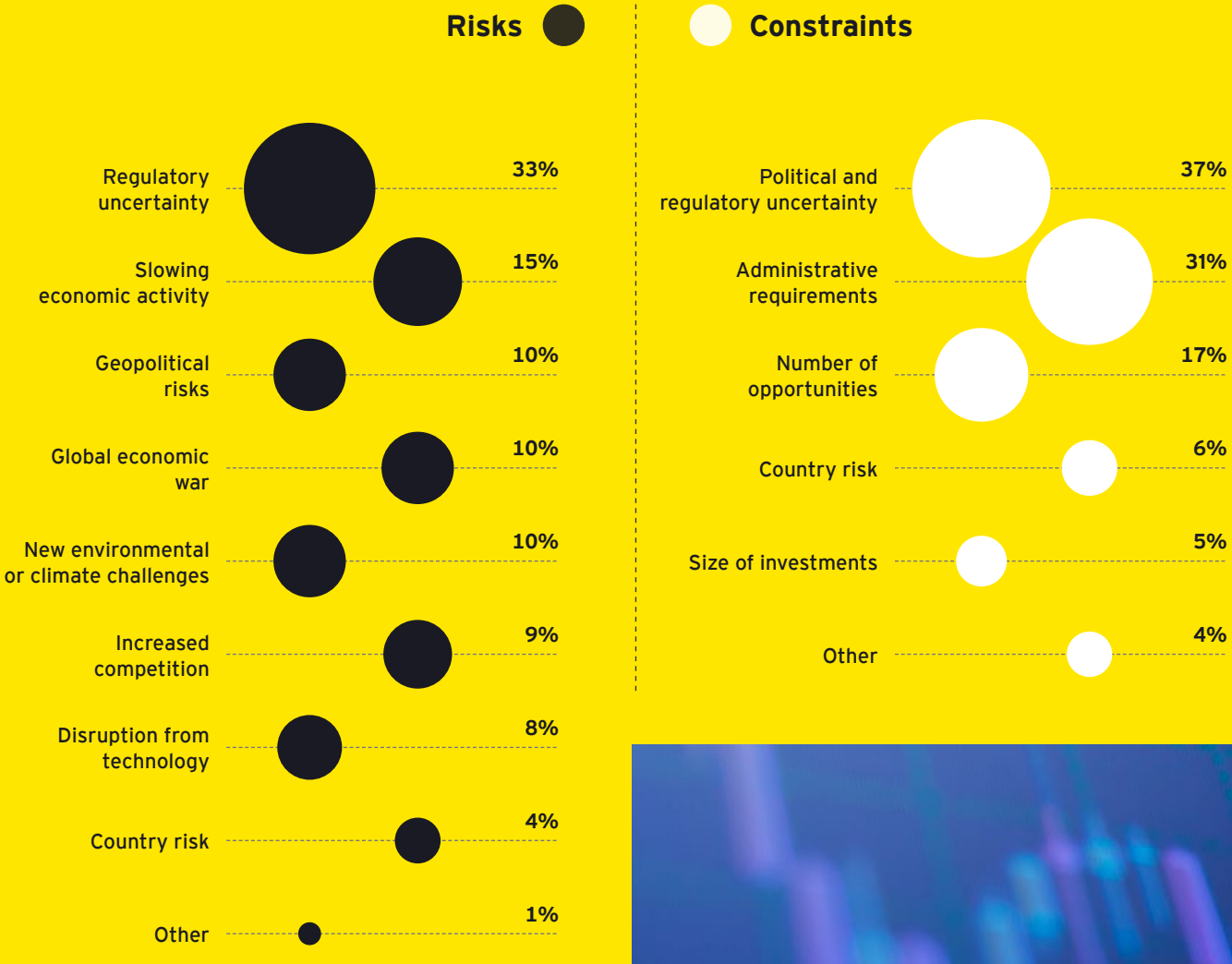
33% of consulted experts expect to increase the number of deals in Spain over the next 12 months, up from 28% in last year's survey.

Figure 20 **Expectation of number of deals completed over the next 12 months**



2. **Risks and Constraints.** Regulatory uncertainty is still viewed as the most significant external risk for the Spanish infrastructure sector, cited by 33% of respondents (though this is down sharply from 62% last year), followed by concerns over slowing economic activity (15%). Uncertainty is also the leading constraint on investing in or financing greenfield projects, highlighted by 37% of investors, ahead of administrative hurdles (31%) and the limited number of opportunities (17%). Compared with the previous year, concerns about regulatory risk have clearly diminished, with respondents now placing greater emphasis on threats such as economic conflict and technological disruption.

Figure 21 **Main constraints and risks in investing or financing the Spanish infrastructure sector**



3. **Interest Rates and Risk/Return Balance.** Sentiment around interest rate expectations has become markedly more moderate, with no respondents now projecting a significant increase. Instead, 46% anticipate a slight decrease, while 43% foresee little or no change. The proportion expecting no or only a minimal rise has grown from 8% to 18%. Notably, the share of investors expecting balanced returns—either partial or full—has more than doubled, rising from 14% to 29% this year.

Figure 22 **Expectation of interest rates decrease in the next 24 months**

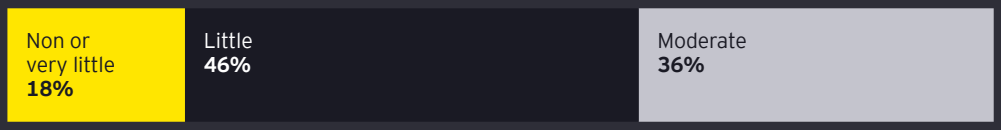
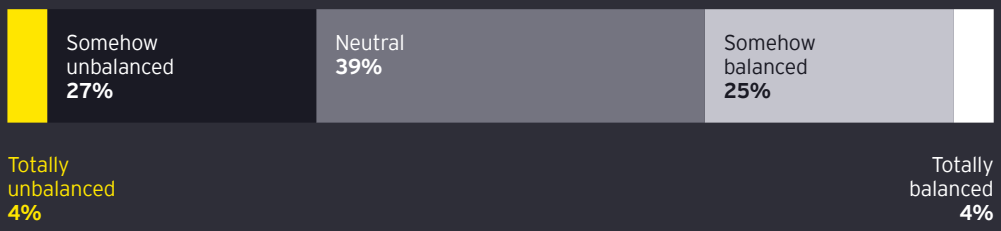
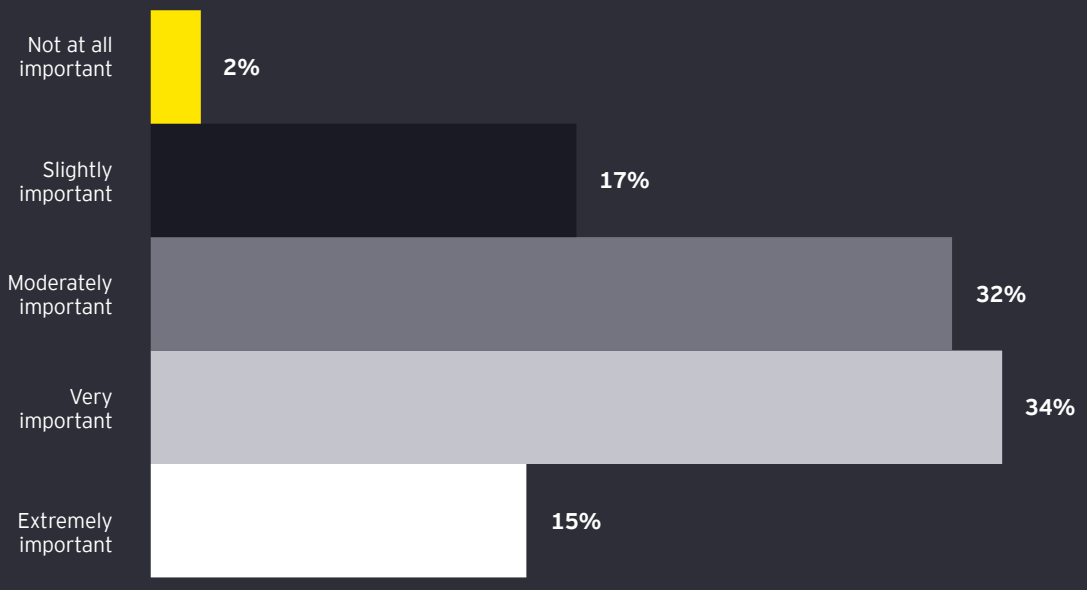


Figure 23 **View on risk / return balance**



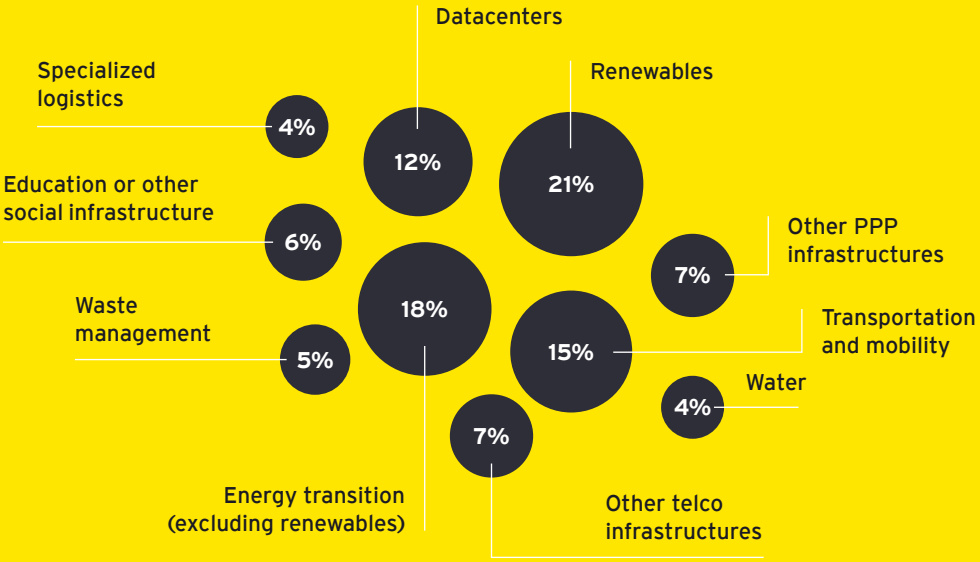
4. **ESG Criteria.** The proportion of investors who view Environmental, Social, and Governance (ESG) criteria as very or extremely important has fallen markedly, from 72% to 49%. Nevertheless, average importance ratings suggest that ESG considerations remain central for infrastructure investors in Spain, serving as a baseline rather than a distinguishing factor in asset evaluation. Moreover, nearly all infrastructure sub-sectors are classified as "eligible activities" under the EU Taxonomy and are therefore considered sustainable investments by definition. For some investors, achieving Taxonomy alignment during the holding period has become a strategy for financial value creation through ESG.

Figure 24 **Importance of ESG criteria in investment strategy**



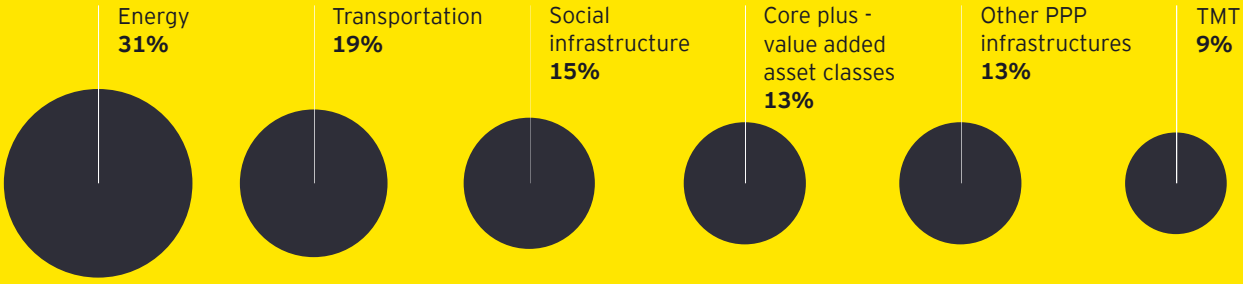
5. **Sector Focus.** Renewables remain the leading sector, holding steady at 21% of reported investments over the past year. Interest in the energy transition (excluding renewables) has gained momentum, now accounting for 18% of allocations and overtaking transport and mobility, which has slipped from 23% to 15%. Data centers have also attracted increased attention, with allocations rising to 12%, up from 5% last year. Water infrastructure remains a less prominent sector, hampered by a scarcity of investable opportunities.

Figure 25 **Areas of Sector Focus**



Looking ahead, 31% of investors identify the broader energy sector as a key focus area over the next 12 months. Energy transition remains the top core-plus asset class, though its share has seen a slight decline from 44% to 37% compared to last year. This shift comes alongside a notable rise in interest in specialized logistics, which increased from 3% to 13%, indicating growing appetite for sector-specific infrastructure opportunities.

Figure 26 **Expected investment in the Spanish infrastructure sector during the following year by sector**



6. **Portfolio Optimization.** Infrastructure investors continue to prioritize internal development, with 34% identifying organic growth as the main lever for enhancing investment performance. Operational turnaround also remains a key focus, cited by nearly a quarter of respondents. Notably, the weight given to consolidation potential through external growth has increased, rising from 16% to 23%, reflecting growing interest in buy-and-build strategies and market integration opportunities, which are more typical in mature businesses.

7. **Technology Investments.** Technology investments are part of the strategy for just 41% of consulted investors rising from 29% showing increased concern on technology, with artificial intelligence (38%) and data analytics (20%) seen as having the greatest potential benefit to the infrastructure sector. The subsectors that are believed to benefit most from technology investment are Energy (34%), Transportation (23%) and TMT (16%) showing no relevant change from past year.

Figure 27 **Investors' preferences for portfolio performance improvement**

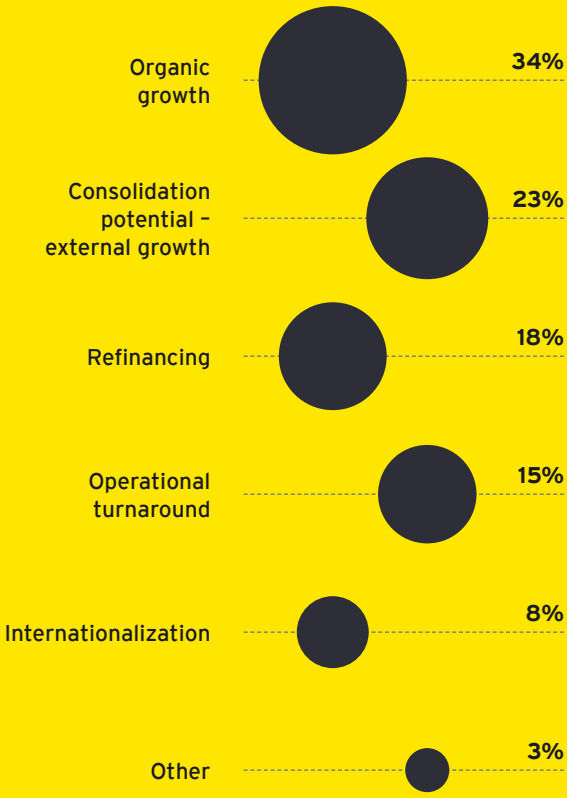
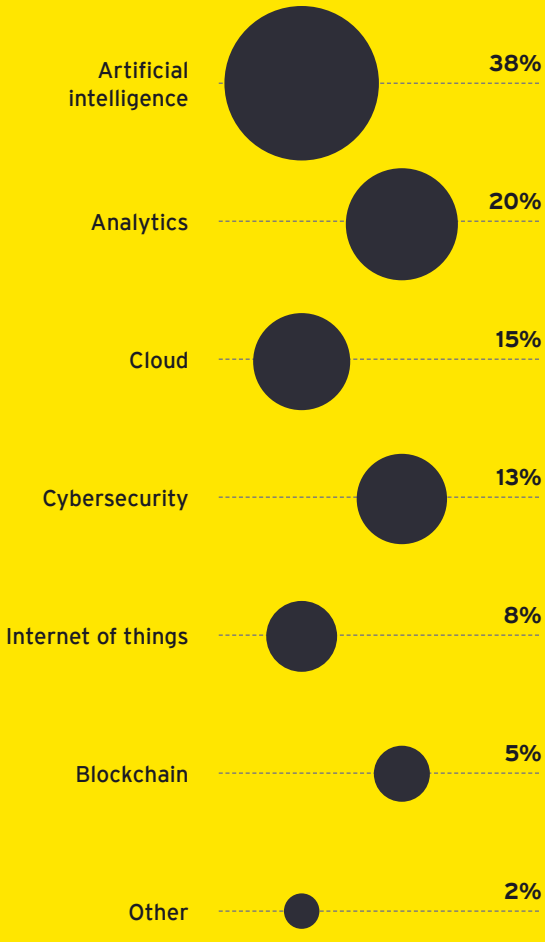
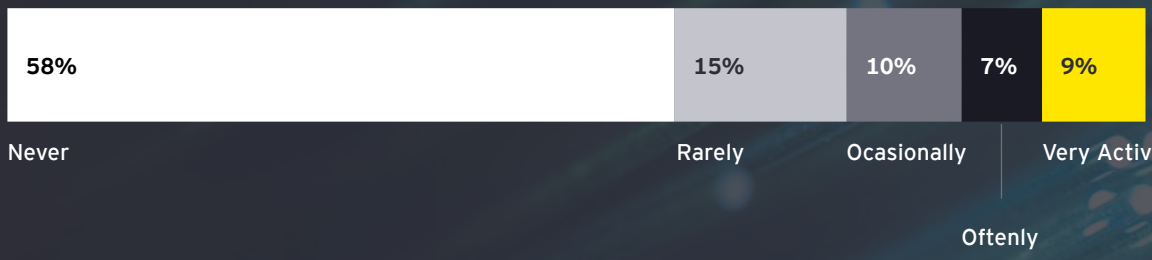


Figure 28 **Technological applications expected to bring the greatest benefits to the infrastructure sector**



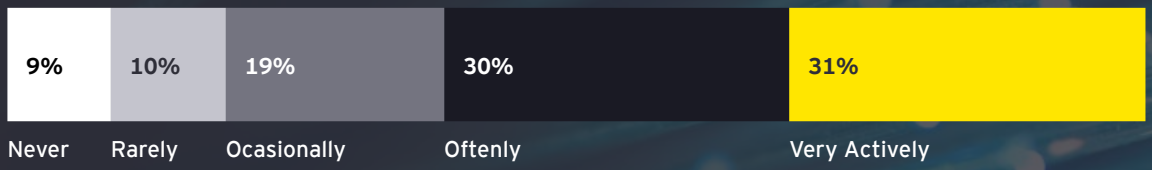
8. **Optic Fiber Focus.** Investor appetite for fiber-optic infrastructure over the next year appears limited: just 9% plan to invest actively, and 7% expect to do so occasionally. Among those focused on Spain, 58% have never considered fiber, while 15% plan to invest rarely, citing the sector's maturity and modest returns.

Figure 29 **Investment perspective in optic fiber in the next 12 months**



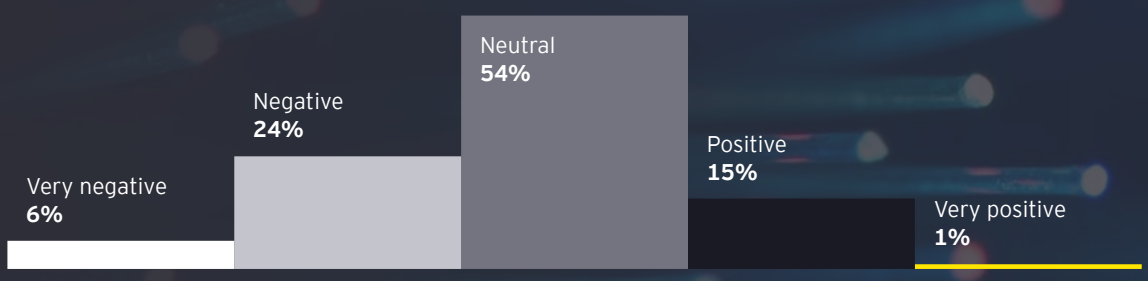
9. **Energy Storage/BESS Focus.** Investor interest in energy storage and battery energy storage systems (BESS) looks moderate for the coming year. Some 31% plan to invest actively, and a further 30% intend to do so regularly. Overall, 80% of respondents have considered or are planning at least occasional investment in BESS.

Figure 30 **Investment perspective in energy storage/BESS in the next 12 months**



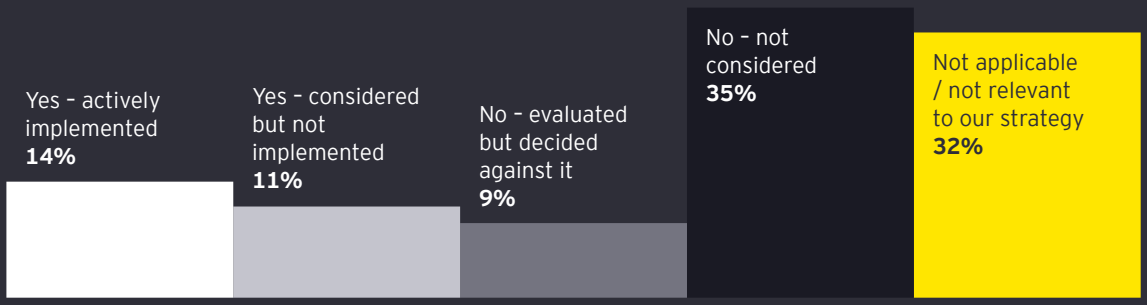
10. **Fundraising.** The outlook for infrastructure fundraising over the next 12 months remains largely cautious, with 84% of respondents expressing neutral (54%) to negative sentiment. Market participants continue to face headwinds such as macroeconomic uncertainty, elevated interest rates, and constrained capital flows. However, there is still room for optimism, as 36% of respondents expect a slight improvement in access to capital over the coming year compared to the past 12 months.

Figure 31 **Fundraising outlook in the next 12 months**



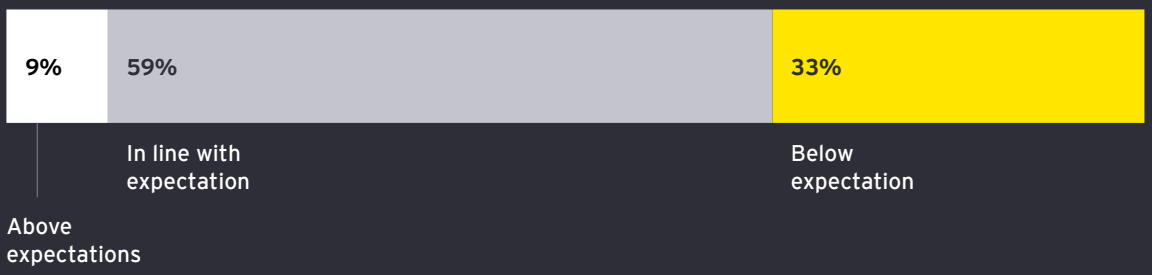
11. **Continuation/Secondaries Funds.** While a significant portion of respondents (32%) indicated that continuation funds or secondaries were not applicable to their strategy primarily driven by corporate respondents not engaged in such investment models, there is notable interest among the remaining respondents. Disregarding those for whom the question was not relevant, 50% have considered secondaries as part of their strategy in the past 12 months, and 20% have already implemented them as part of their growing openness towards alternative liquidity and portfolio management tools.

Figure 32 **Use of continuation funds and secondaries in the past 12 months**



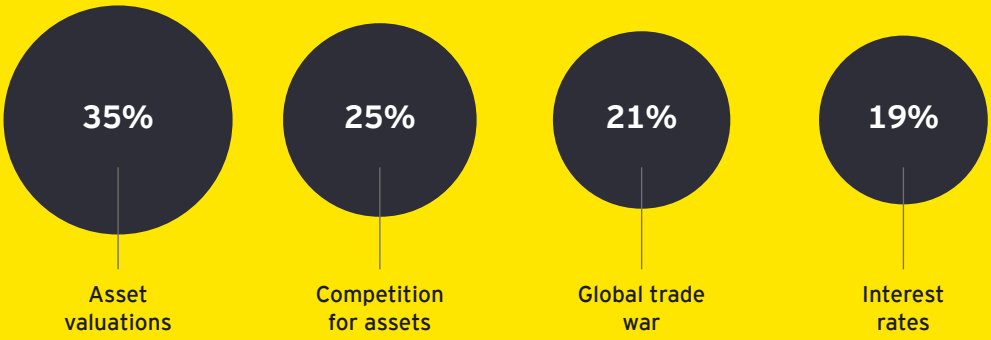
12. **Current and Future Portfolio Performance.** When asked about the performance of their investments in the Spanish infrastructure sector, 62% of respondents stated that it was in line with their overall portfolio average. 27% reported that their Spanish infrastructure investments performed above the portfolio average, an increase from 15% last year, which indicates a growing perception of outperformance within the sector. However, the share of investors reporting performance below expectations for Spanish greenfield initiatives rose from 16% to 33%.

Figure 33 **Investment performance of greenfield initiatives in Spain**



Asset valuations remain the leading challenge to achieving returns over the next year, cited by 35% of respondents and underscoring persistent caution over pricing. Competition for assets (25%) and the risk of global trade wars (21%) are also prominent concerns, despite infrastructure's reputation for resilience to geopolitical shocks. Interest rates worry 19% of respondents, even though significant shifts are not widely expected in the near term.

Figure 34 **Key challenges for returns over the next 12 months**



Core-plus and value-add strategies are increasingly seen as a means to enhance returns through active management and moderate risk. At present, 39% of investors allocate over 30% of their Spanish infrastructure portfolios to these assets. Meanwhile, the proportion allocating between 10% and 30% has also risen, reflecting growing interest and confidence in the Spanish market.

Figure 35 **Current portfolio allocation to core plus/value add assets**

Technical Survey Datasheet

- **Methodology:** Quantitative survey.
- **Sample Size:** 114 respondents, comprising senior executives from infrastructure funds, institutional investors, and financial institutions.
- **Survey Technique:** Online questionnaire distributed via email and professional networking platforms. Data collected and analyzed by EY Insights Spain.
- **Data Collection Period:** May 27 to June 26, 2025.

2 Trends and Opportunities for FiberCos in Spain

Introduction

Fiber infrastructure as a strategic backbone of Spain's digital economy

Over the past decade, Spain has emerged as a European leader in fiber-to-the-home (FTTH) deployment. With over 92% of households passed and more than 86% connected to fiber networks, the country has built a robust and resilient digital foundation that supports its rapidly evolving economy, public services, and innovation ecosystem.

Figure 36 **FTTH main facts in spain**

Country ID card

Population	47.3m
Population/km^3	96/km^3
GDP per capita	€30.6k/hab.
Households	18.3m

FTTH facts 2023

September 2023

Households Passed	16.9m
Subcribers	14.5m
Coverage rate	91.9%
Take-up rate	85.8%
Penetration rate	78.9%

Last 3 Years

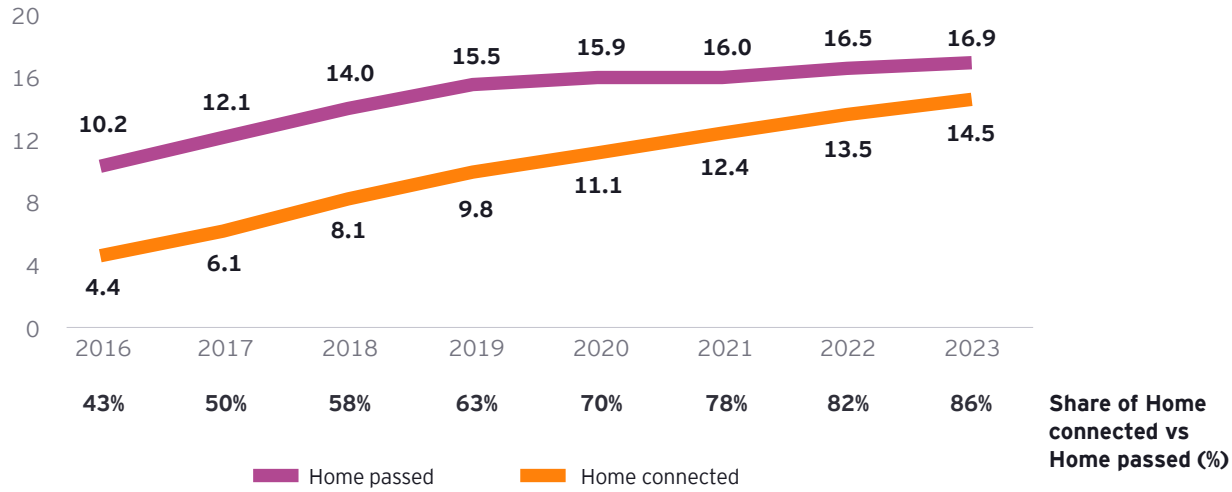
Home Passed growth rate	+5.2%
Subscribers growth rate	+16.3%

Source: FTTH Council, EY-Parthenon analysis.

Yet, beneath this apparent maturity lies a profound transformation: the progressive separation of infrastructure ownership from service provision. This transition is giving rise to a new class of highly specialized entities known as FiberCos, companies that focus solely on building, owning, and leasing fiber infrastructure. These firms are now central to the next wave of digital infrastructure investment, offering a combination of operational efficiency, long-term visibility, and utility-like predictability.

Figure 37 **Evolution of homes passed vs homes connected**

(2016-2023, Spain, m of household)



Source: FTTH Council, EY-Parthenon analysis.

Spain's strong foundation in fiber was built on a combination of proactive regulation, intense competition among telecom operators, and bold early investments by both incumbents and new entrants. In doing so, Spain has not only leapfrogged legacy copper infrastructure but has also created the conditions for an open-access, wholesale-driven digital economy. However, this success has also brought challenges—such as network duplication in urban areas and under-coverage in rural regions—that the FiberCo model now seeks to address through rationalized deployment and shared infrastructure models.

As this structural transition unfolds, Spain is increasingly becoming a benchmark for the evolution of telecom infrastructure in Europe. Two main dynamics are shaping this transformation:

- A wave of consolidation, as both financial and industrial investors scale up infrastructure platforms and streamline the fiber landscape.
- A progressive transfer of infrastructure assets from traditional operators to dedicated FiberCos, leading to a fully disaggregated market structure by 2030.

Further underpinning this evolution is the inclusion of data processing, hosting and related activities in the EU Taxonomy. These related activities, which include "interchange and transmission of data," are listed as economic activities that can provide a "substantial contribution" to the EU Green Deal objectives of climate mitigation and/or climate adaptation, making these sectors especially attractive to GPs who have registered their funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR). The objective of the EU Taxonomy is to help direct investment to environmentally sustainable projects.

Figure 38 **Comparison of fiber penetration in EU contries**

Country	Fiber Penetration	Main FiberCos / Infra Sponsor	Notable Dynamics
Spain	92%	adamo, elanta, ONIVIA, fiberpass, Bluevía Fibra de Telefónica	• Active carve-outs • Rural co-investment • Scaling neutral infrastructure
France	84%	altitude infrastructure, XpFibre, Orange Concessions	• Strong presence • Regional concessions • Rural leadership
Germany	40%	Deutsche Glasfaser, DNSNET	• PE-backed Altnets scaling rapidly • Fragmentation persists
UK	57%	CityFibre, hyperoptic, ZZOOMM	• >100 Altnets • Consolidation wave underway
Italy	59%	open fiber, FiberCop	• State-led backbone • Operator ownership still dominant

Source: FTTH Council, expert calls, EY-Parthenon analysis.

FiberCos Trends: Dynamics Shaping the Emergence of a Disaggregated Fiber Infrastructure Market

The rise of FiberCos in Spain is the result of multiple converging trends—technological, regulatory, financial, and strategic. While the concept of disaggregated telecom infrastructure is not new, Spain is the first major European market where it is becoming the dominant paradigm for fixed networks.

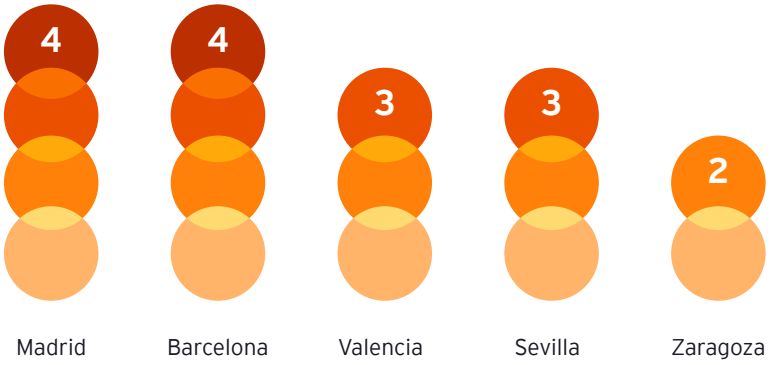
This section explores the six key dynamics underpinning the transformation of the Spanish fiber landscape and the growing centrality of FiberCos in that ecosystem.

1. The outstanding penetration of fiber of Spain

Spain stands out in Europe for the speed and depth of its FTTH rollout. With over 92% of homes passed and more than 86% connected, it leads all major EU markets. This expansion was fueled by early liberalization of the last mile, competitive pressure, and aggressive deployment strategies from both incumbents (Telefónica, Orange, Vodafone) and challengers (Digi, MásMóvil, now part of Orange).

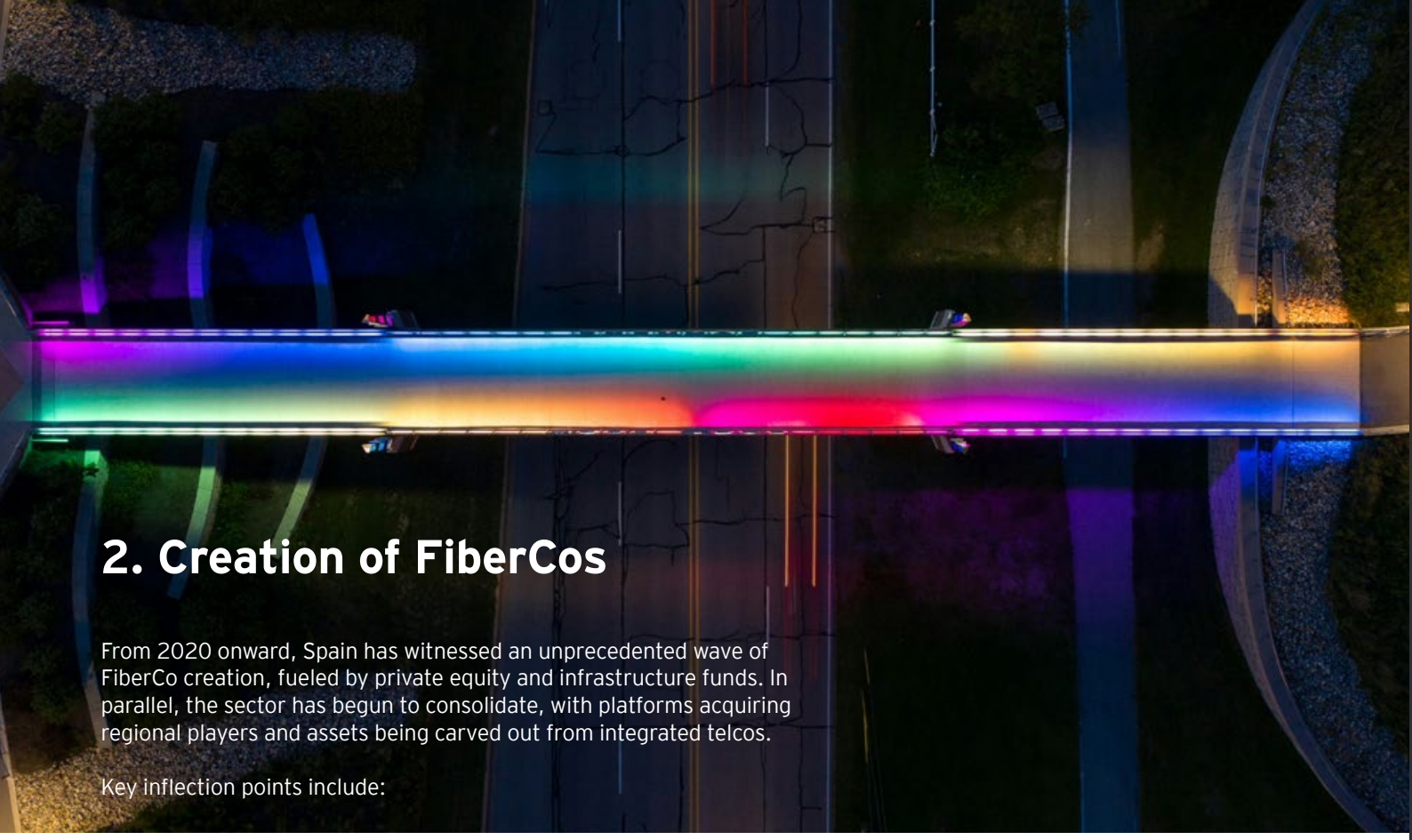
Figure 39 **Nework duplication in spanish tier 1 cities**

(2024, Spain, # of operators with own network)



Source: Expert calls, EY-Parthenon analysis.

This overbuild has had a dual impact: it benefited consumers with lower prices and faster speeds but led to significant capex inefficiencies. In some dense urban areas, three overlapping networks coexist—an unsustainable configuration from a capital perspective. It also left many rural areas underserved, laying the groundwork for a transition to shared, open-access models.



2. Creation of FiberCos

From 2020 onward, Spain has witnessed an unprecedented wave of FiberCo creation, fueled by private equity and infrastructure funds. In parallel, the sector has begun to consolidate, with platforms acquiring regional players and assets being carved out from integrated telcos.

Key inflection points include:

- Axa, Swiss Life and Morrison & Co acquisition and integration of Lynthia into a national open-access Platform.
- Onivia's multi-region deployment supported by Macquarie, Aberdeen, and Arjun, now covering over 3 million homes.
- Adamo's acquisition by Ardian, with a focus on rural connectivity through public-private co-financing.
- Bluevía is a joint initiative between Telefónica, Crédit Agricole Assurances, and Vauban Infrastructure Partners, created to deploy and operate a fiber optic (FTTH) network in rural and less populated areas of Spain.
- Fiberpass: this joint venture between Telefónica and Vodafone aims to improve the coverage and quality of broadband services.
- Surf: the joint venture between MasOrange and Vodafone, expected to become one of Spain's largest wholesale FiberCos, currently looking for a minority investor for a 40% stake.

Figure 40 Fiberco main players

FiberCos segment & example of players			FiberCos segment description	FiberCos segment dynamic
	Telco	Neutral		
		Light Fiber / Dark Fiber		
Very Large FiberCo	Telefónica, vodafone	JV Vodafone & MasOrange, ONIVIA / reintel, lyntia	▸ Companies with **extensive national coverage and a large customer base (>10m HP for Light Fiber or >100,000 km for dark fiber)**, typically leading the **Spanish telecommunications market.**	▸ **Extensive Coverage:** These companies offer services nationwide, ensuring strong market presence. ▸ **Vertical Integration:** They control various stages of the value chain, from network infrastructure to customer-facing services.
Large FiberCo	DIGI	fiberpass, elanta., Bluevía, inveready, AVATEL, adamo	▸ **Companies with strong regional presence (with [3m;10m] HP for Light Fiber or [30,000-100,000] km for dark fiber)** or those that have achieved notable national growth.	▸ **Regional Focus:** Some operators dominate specific regions where they maintain strong market positions. ▸ **Strategic Expansion:** These companies aim to broaden their footprint through acquisitions or partnerships.
Medium FiberCo	Olin Group, excom, grupo aire	Correos Telecom, colt, xarxaoberta, adif, axent	▸ Companies with **solid regional presence (with [1m;3m[HP for Light Fiber or [3,000-30,000[km for dark fiber)** or those **operating in niche fiber markets.**	▸ **Market Segmentation:** They target underserved areas or specific geographic regions to differentiate. ▸ **Innovation & Flexibility:** Without legacy infrastructure constraints, they can quickly adapt to market demands and innovate.
Small FiberCo		tricêleris, asteo, REDE ABERTA, LOCAL.com	▸ Local or emerging operators **serving specific communities** or **highly specialized market niches (with <3m HP for Light Fiber or <3,000 km for dark fiber).**	▸ **Customer Proximity:** Their localized approach allows them to offer personalized services tailored to community needs. ▸ **Price Competitiveness:** They often compete through lower pricing or by offering specialized services not available from major operators.

Source: Desk research, EY-Parthenon analysis.

3. Rise of wholesale and open-access models

A defining trend in Spain has been the shift from vertically integrated models to multi-tenant, open-access platforms. FiberCos increasingly lease capacity to several operators simultaneously, creating a more capital-efficient and competitive market.

This transition is not only driven by economics—it also reflects an ideological shift in how infrastructure should be used. In a country where overlapping networks once led to inefficiencies and stranded assets, open-access networks are emerging as a more rational, inclusive, and scalable solution.

Benefits of this model include:

1

Higher utilization rates: By enabling more tenants on a single infrastructure layer, FiberCos increase the return on invested capital and reduce duplication.

2

Enhanced service competition: Operators compete on price, speed, and quality of service, rather than infrastructure reach.

3

Lower barriers to entry: Smaller or regional ISPs gain wholesale access without needing massive capex, which promotes market diversity.

Spain's model is being closely watched by European regulators and telecom ministries. The country is often cited in BEREC (Body of European Regulators for Electronic Communications) reports as a case study in successful open-access deployment at scale.

4. Rural expansion benefiting FiberCos

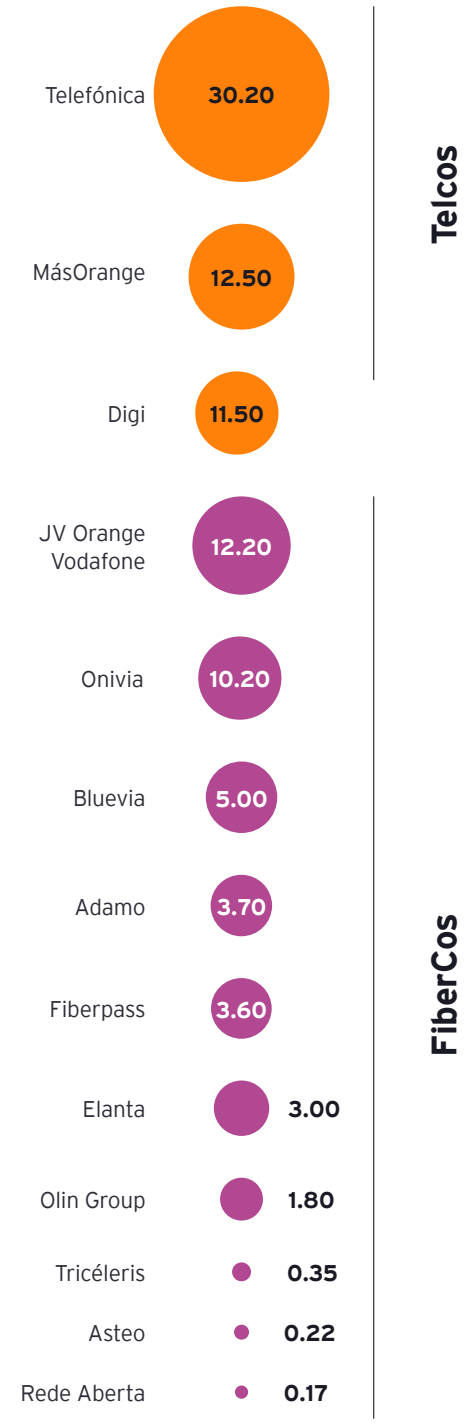
While early fiber buildouts prioritized profitable urban areas, rural zones are now becoming the next frontier for FiberCos. Backed by Next Generation EU and Plan de Recuperación funding, operators like Adamo, Lyntia, Olin Infra, Excom, Asteo or Triceleris are expanding fiber to hundreds of thousands of homes in remote areas.

Spain's public-private co-investment schemes typically offer:

- Long-term access contracts with municipalities or government agencies.
- Grant support or capex subsidies (up to 80% in some provinces).
- Preferred rights-of-way and simplified permitting.

Figure 41 **Homes passed by telco-fiberco company**

(2025, Spain, m households)



Source: Public sources, EY-Parthenon analysis.

5. Wholesale deregulation and market liberalization benefiting FiberCos

Spain's regulatory framework has been a key enabler of FiberCo growth. The Comisión Nacional de los Mercados y la Competencia (CNMC), the telecommunications regulator in Spain, has progressively liberalized last-mile access, removed wholesale price caps in competitive zones, and promoted passive infrastructure sharing.

Major regulatory advances include:

ZND (Zones Not Dominated): 66% of Spanish households now live in deregulated zones, enabling free pricing and open-access development.

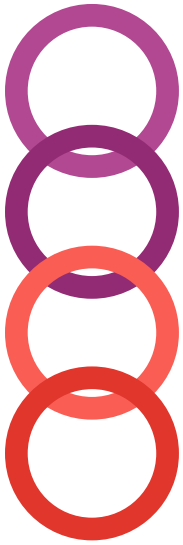
Access to ducts and poles: Spain has one of the most advanced passive access frameworks in Europe.

Simplified permitting and subsidies: For rural and strategic deployments, local authorities offer fast-track approvals.

6. New technologies pushing for network development and FiberCos' importance

Spain's FiberCos are increasingly seen not just as providers of last-mile connectivity, but as enablers of a broader digital infrastructure ecosystem. Edge computing, cloud-native workloads, artificial intelligence, and IoT applications are accelerating demand for robust, low-latency fiber backbones.

Technology trends driving demand for FiberCos include:

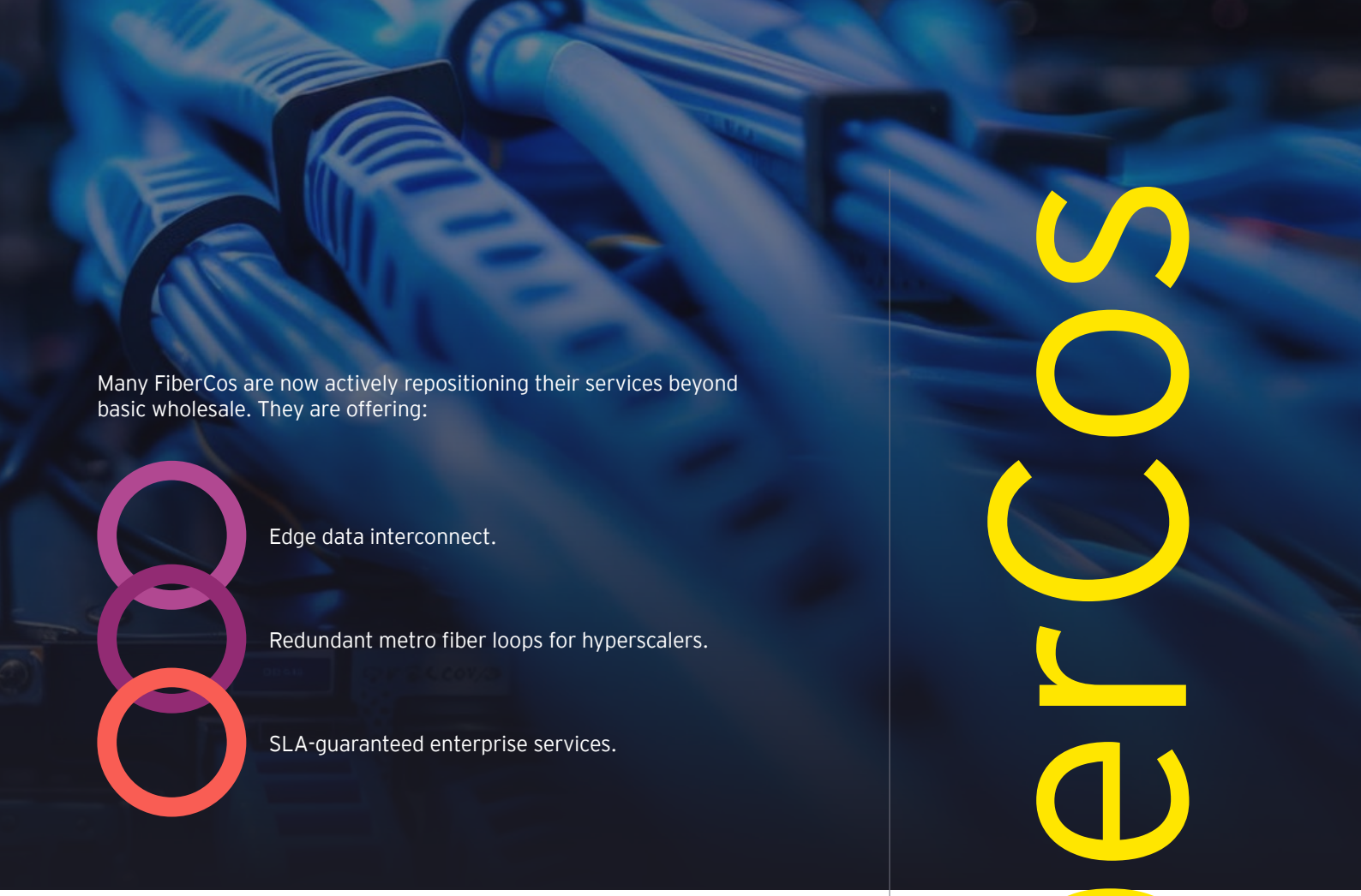


AI & machine learning workloads: Requiring fast data transfer between endpoints, data centers, and user devices.

5G densification: Thousands of small cells across urban corridors depend on fiber backhaul for reliability and performance.

Data center growth: Spain's positioning as a Mediterranean data hub is bringing hyperscaler demand for dark fiber and metro rings.

Smart city platforms: Municipal IoT networks (for lighting, traffic, waste, etc.) require carrier-neutral fiber backbones.



FiberCos

Many FiberCos are now actively repositioning their services beyond basic wholesale. They are offering:

- Edge data interconnect.
- Redundant metro fiber loops for hyperscalers.
- SLA-guaranteed enterprise services.

This evolution strengthens their strategic value: not only are they stable infrastructure platforms, but they are also becoming integral to the digital transformation of cities, industries, and national infrastructure. As mentioned earlier, data processing, hosting and related activities are specifically included in the EU Taxonomy. These related activities include "interchange and transmission of data through datacenters including edge computing." FiberCos, therefore, are an economic activity that can provide a "substantial contribution" to the EU Green Deal objectives of climate mitigation and/or climate adaptation, making these sectors especially attractive to GPs who have registered their funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR). The objective of the EU Taxonomy is to help direct investment to environmentally sustainable projects.

Together, these six dynamics illustrate why Spain's FiberCo transition is not merely a tactical or financial adjustment—it is a structural evolution. From dense cities to remote villages, from mobile backhaul to edge computing, FiberCos are establishing themselves as the foundational layer of Spain's digital future.

What began as an operational convenience is now an industrial strategy: deploy once, share many, scale endlessly. Spain has combined competitive pressure, forward-looking policy, and a deep capital market to build one of Europe's most advanced disaggregated fiber ecosystems. In doing so, it has positioned itself not only as a national success story, but as a benchmark for other markets seeking resilient, inclusive, and high-performance telecom infrastructure.

FiberCos are establishing themselves as the foundational layer of Spain's digital future.

Strategic Integration: Market Consolidation as the Next Step for FiberCos

As the Spanish fiber market matures, the emergence of FiberCos is entering a new phase—one defined not just by infrastructure expansion, but by consolidation and strategic integration. The rapid proliferation of platforms, combined with growing cost pressures and the need for scale, is pushing the industry toward a more concentrated, efficient, and sustainable configuration.

This wave of consolidation is not a short-term financial maneuver—it marks a structural evolution. FiberCos are increasingly realizing that integration is the key to unlocking industrial-level efficiencies, achieving operational resilience, and sustaining long-term competitiveness. In this chapter, we explore the forces driving this consolidation trend and the value-creation levers it enables.

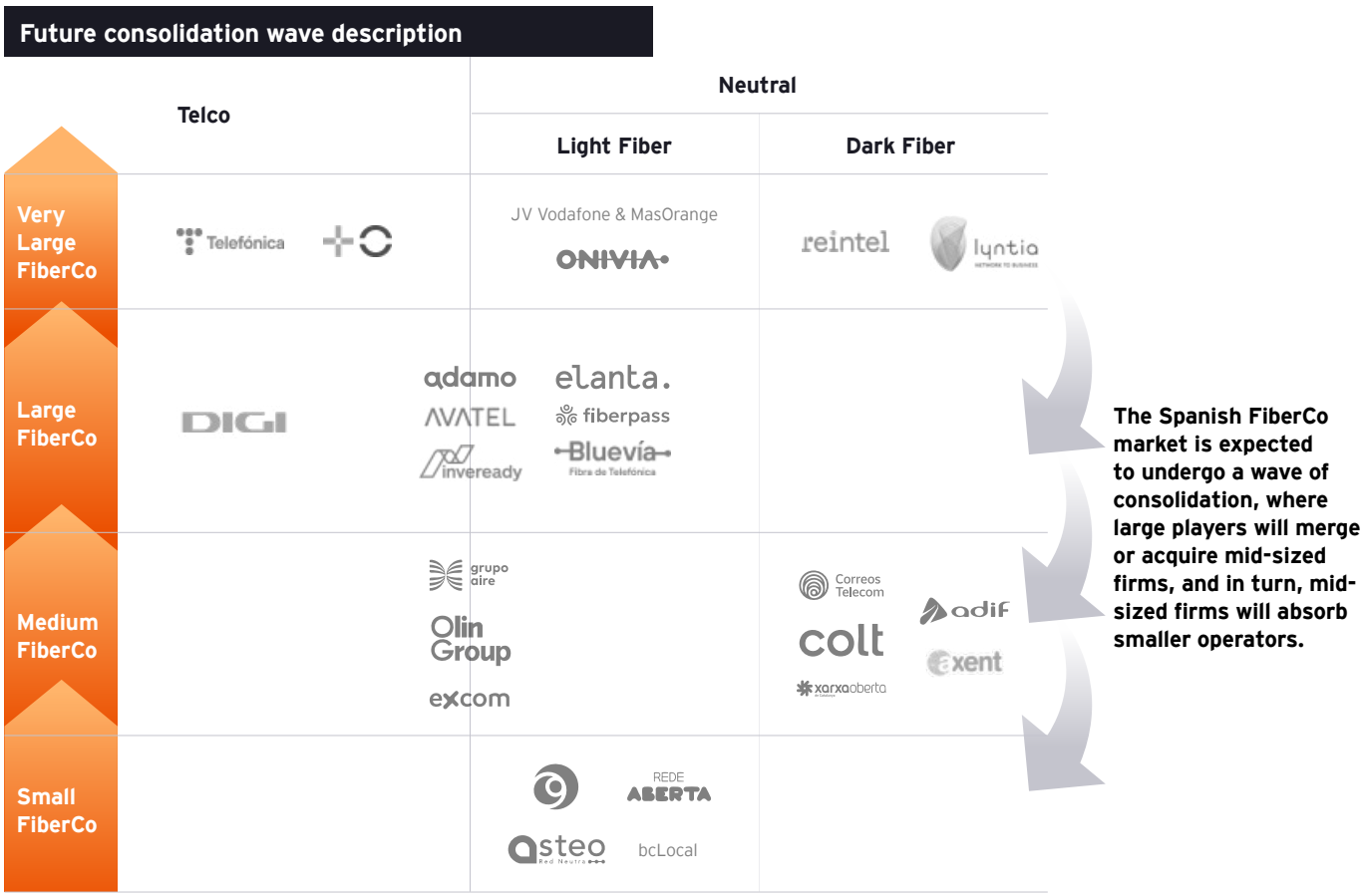
1. Drivers of consolidation in the Spanish FiberCo market

Several key factors are poised to drive a new wave of consolidation within the Spanish FiberCo market.

- **Market saturation:** Large players need to consolidate assets to maintain profitability and increase efficiency.
- **Financial constraints for small players:** Mid-tier players struggle to maintain competitive wholesale pricing, pushing them to seek M&A to survive.
- **Pressure from rising costs:** The cost of maintaining and upgrading networks is rising and consolidation can create strong and more resilient networks.
- **Operator strategies to optimize their portfolios:** Large telcos are focusing on their core business and may divest additional fiber assets to specialized FiberCos, enabling consolidation.
- **M&A appetite from Infra Investors:** Some investment funds are seeking buy-and-build strategies in Spain; with decreasing greenfield opportunities, acquiring existing assets is the way.

Taken together, these forces are likely to accelerate consolidation activity, reshaping the competitive and operational landscape of the Spanish FiberCo market in the near future.

Figure 42 **Potential evolution of Fiberco landscape**



2. Operational and commercial synergies

Beyond strategic necessity, market consolidation among Spanish FiberCos presents a clear pathway to unlock operational and commercial synergies. These synergies not only reduce costs but also enhance service delivery, customer retention, and revenue growth, laying the foundation for more robust and future-ready platforms.

Growth opportunities.

1 Customer Management Optimization

- Centralized CRM to unify customer data.
- Proactive network monitoring, personalized offers, and flexible pricing to boost retention.
- Increase ARPU through offer upgrades, premium solutions, and value-added services.

2 Joint Expansion Strategies in High-Profit Areas

- Prioritize high-density urban areas and underserved regions with strong fiber demand.
- Optimize network deployment through shared infrastructure, partnerships, and smart rollout sequencing.

3 Expansion of Value-Added Service Offerings

- Use customer insights to introduce tailored service packages.
- Upsell premium offerings and bundled services to maximize revenue.

Costs improvements.

4 Infrastructure Sharing and Divestiture

- Reductions in capital and operational costs.
- Reducing asset redundancy.
- Optimized network utilization.
- Reallocating resources.
- Increase wholesale bargaining power.

5 Procurement strategy

- Combination of:
  - i. Suppliers review.
  - ii. Higher purchasing power due to identified synergies.

6 O&M efficiency improvement

- Shared infrastructure.
- Maintenance costs to be spread across multiple stakeholders.

7 Reduction of Administrative Costs

- Consolidate administrative structures to reduce management costs, such as HR and systems.

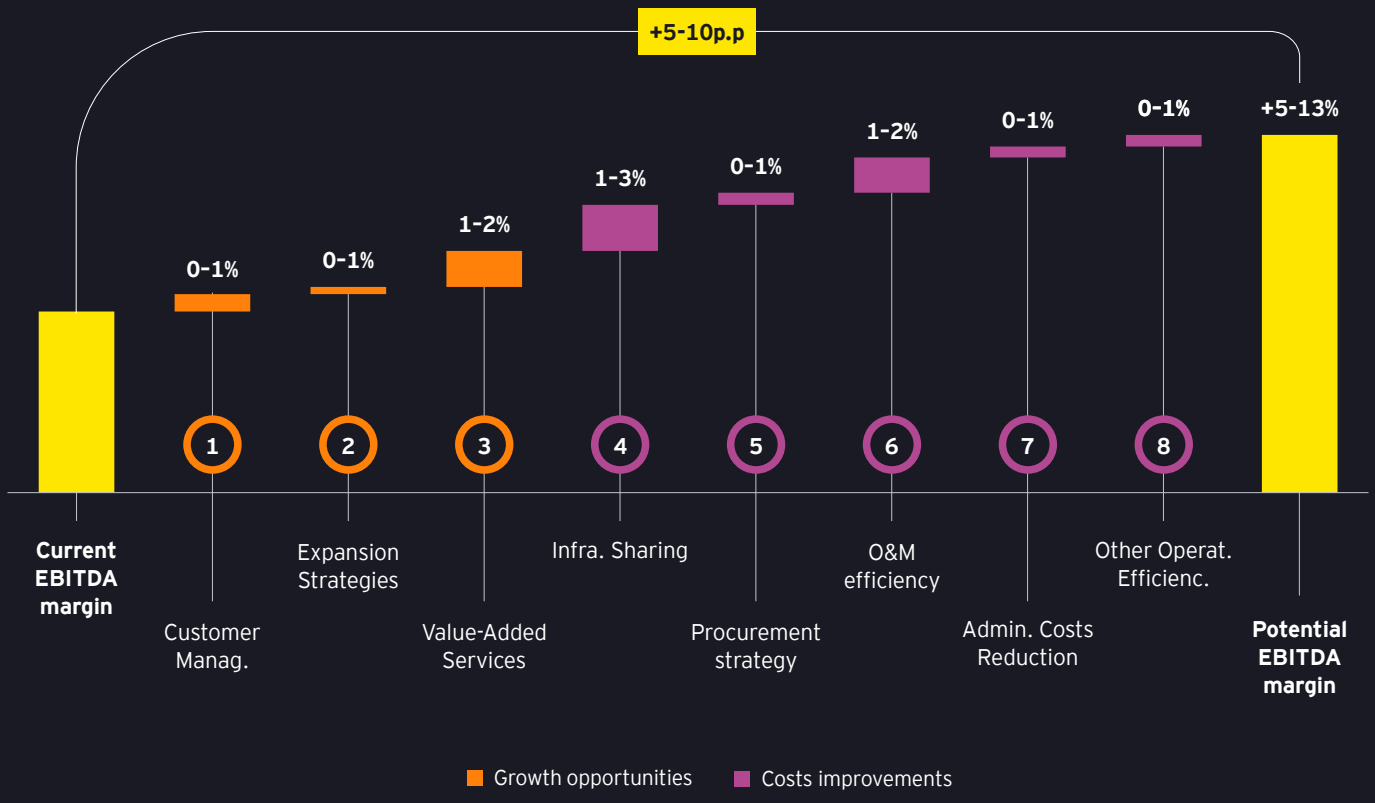
8 Other Operational Efficiencies

- Eliminate operational and process duplications post-consolidation.

Taken together, these synergies position integrated FiberCos to operate not just with greater efficiency, but with the strategic flexibility needed to thrive in a capital-intensive, digitally driven future.

Figure 43 **Potential synergies in fiberco consolidation**

Value creation levers



Source: EY-Parthenon analysis.

Investment Opportunities: FiberCos as a Mature and Strategic Infrastructure Asset Class

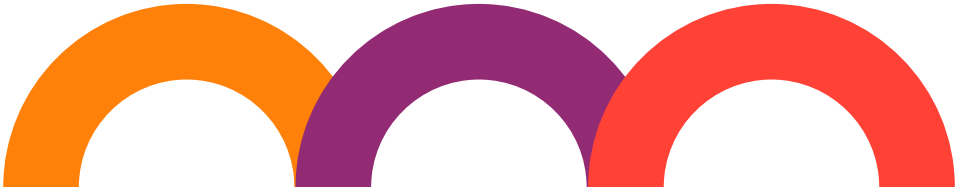
The rise of FiberCos in Spain is the result of multiple converging trends—technological, regulatory, financial, and strategic. While the concept of disaggregated telecom infrastructure is not new, Spain is the first major European market where it is becoming the dominant paradigm for fixed networks.

The EU Taxonomy supports the rise of FiberCos because they are an economic activity that can provide a "substantial contribution" to the EU Green Deal objectives of climate mitigation and/or climate adaptation. This makes the sector especially attractive to debt and equity investors who have registered their funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR). The objective of the EU Taxonomy is to help direct investment to environmentally sustainable projects.

1. A focused and predictable business model for FiberCos

At their core, FiberCos operate a pure-play infrastructure model. They deploy and manage passive fiber networks and lease them to telecom operators through long-term contracts, often indexed to inflation (CPI).

Revenue sources include:



Long-term wholesale access contracts with national telcos and MVNOs (10–20 years).

Dark fiber leasing to enterprises, hyperscalers, and local governments.

Public-private co-investment models in rural zones, often with anchor tenants secured.

The operational model is capital-intensive upfront, but low-cost to maintain once deployed. Maintenance, energy, and monitoring represent more than 10% of revenue, supporting EBITDA margins of 50–60%.

2. Robust valuations and transaction multiples

The FiberCo model has proven highly attractive on the transaction market. In Spain, recent M&A activity reveals EV/EBITDA multiples ranging from 15x to 25x, depending on asset maturity, contract duration, and geographic coverage.

Figure 44 **Investment multiples for digital InfraCos**

Asset class	Typical EBITDA Margin	Typical EV/EBITDA Multiple	Cash Flow Profile
FiberCo	50-60%	15-25x	▸ Long-term, indexed
TowerCo	55-70%	18-30x	▸ Long-term, inflation-linked
Data Centers	40-60%	20-35x	▸ Growth and annuity blend

Source: Expert calls, EY-Parthenon analysis.

3. Infrastructure resilience and long-term growth

Fiber is a high-durability infrastructure with an expected lifespan of over 30 years and minimal technological obsolescence. Unlike copper or mobile spectrum, fiber's passive components—ducts, strands—are future-proof and require little upgrade once installed.

What makes FiberCos especially resilient:

- Tenants are operators, not end-consumers: revenue is shielded from churn and retail pricing volatility.
- Contracts are inflation-indexed, often with minimum revenue guarantees or volume floors.
- Incremental expansion is modular, meaning new deployments only occur when commercialized, which preserves capital efficiency.

4. A combination of private capital, industrial discipline and policy alignment

Spain offers a uniquely favorable environment where the three pillars of infrastructure maturity converge:

- **Private capital:** Top-tier infra funds have been active acquirers and builders, often in joint ventures with banks and pension funds.
- **Industrial execution:** FiberCos now operate with precision engineering standards, using real-time monitoring, predictive maintenance, and AI-based capacity planning.
- **Public policy alignment:** Spain's recovery plan (*Plan de recuperación, transformación y resiliencia of the Government of Spain*) earmarks over €3 billion for broadband and connectivity, and the CNMC (competition supervisor) promotes structural separation and open-access wholesale models, as well as eligibility under the EU Taxonomy.

This triangulation de-risks the investment case and allows for both scale and sustainability.

Moreover, Spain's geographic position as a southern European hub (connecting Europe, LatAm, and Africa) is enhancing its strategic relevance for pan-regional fiber routing and cloud services.

5. Targeted growth strategies for investors

While FiberCos are attractive as yield platforms, they also offer clear growth levers for infrastructure investors looking to scale or optimize returns.

Figure 45 **FiberCos investment platforms**

Growth Lever	Description	Investment Profile
Regional M&A	▸ Consolidation of smaller players	Low-medium risk, immediate
Rural network co-investment	▸ Joint deployment with public actors	Medium risk, subsidized
Service diversification	▸ Dark fiber, enterprise access, smart city infrastructure	Medium-high risk, scalable
Infrastructure building / integration	▸ Cross-platform synergies (Towers, DCs, etc.)	Medium risk, strategic

Source: Expert calls, EY-Parthenon analysis.

In Spain, FiberCos have evolved from a tactical offshoot of telecom restructuring into a fully recognized infrastructure asset class. Their combination of predictable returns, operational efficiency, and structural relevance to the digital economy positions them as an ideal long-term hold for both core and growth-oriented infrastructure investors.

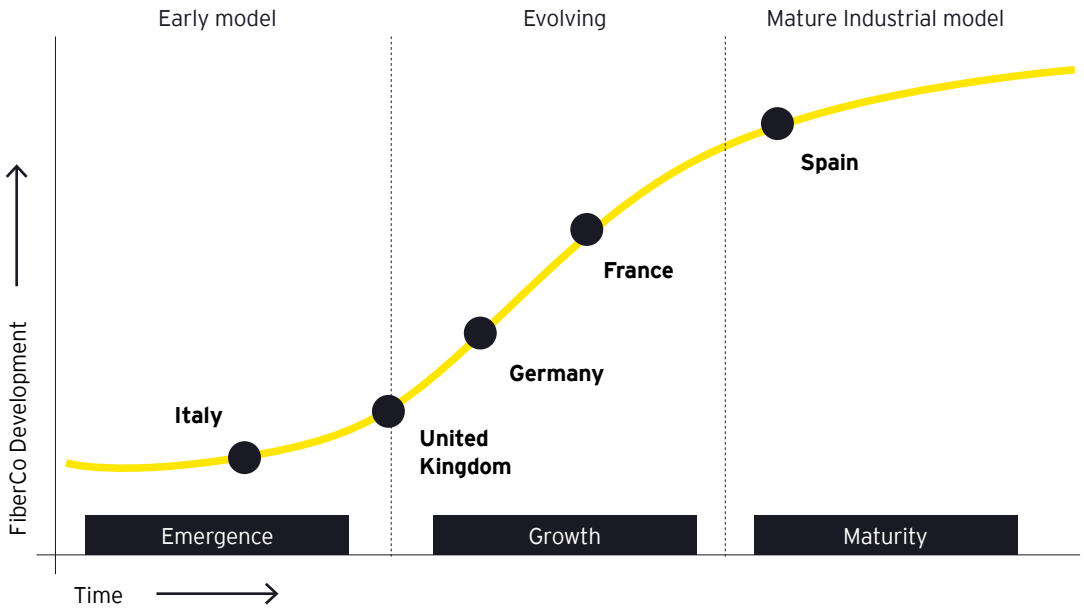
As global capital continues to flow toward real assets with digital exposure, Spain's FiberCos offer a blueprint for what modern connectivity platforms can look like: resilient, scalable, and future-proof.

Conclusion

FiberCos at the core of Spain's digital leap

Spain's transformation of its fiber infrastructure model is not a mere industry evolution—it is a structural leap forward in how telecom networks are financed, deployed, and managed. Through the rise of FiberCos, the country has pioneered a new infrastructure paradigm where scale, neutrality, and efficiency converge to deliver lasting digital resilience.

Figure 46 **Fiberco maturity assessment**



Source: FTTH Council; Analysys Mason; EY-Parthenon analysis.

Where once operators owned and controlled end-to-end infrastructure, today we are witnessing the full emergence of specialized, professionally run fiber platforms. These FiberCos now form the backbone of Spain's digital economy—linking homes, businesses, mobile networks, data centers, and public services through high-performance, open-access connectivity.

Spain's approach offers a blueprint for other countries grappling with similar challenges:

For investors, FiberCos offer a rare combination of long-term visibility, inflation protection, and digital relevance.

For operators, they represent a path to asset-light growth, commercial focus, and agile innovation.

For governments, they unlock rural inclusion, tech sovereignty, and sustainable infrastructure deployment.

For society, they deliver the connectivity foundations for education, health, AI, smart cities, and beyond.

As infrastructure capital seeks safe, scalable exposure to digital transformation, Spain's FiberCos stand as a benchmark. They are no longer an emerging story—but a proven, mature asset class, ready to anchor the next generation of infrastructure portfolios.

3 The Development of Battery and Other Energy Storage Systems in Spain: Why Now?

Introduction

1. The need for a flexible energy system

The ongoing energy transition is reshaping the global energy landscape, driven by efforts to reduce emissions and meet the 1.5°C target, championed by organizations like the United Nations. This transformation has underscored the necessity for flexible energy systems that can effectively manage the challenges of renewable energy supply and demand dynamics. As the world moves towards more localized and decarbonized energy solutions, the demand for reliability and resilience in energy systems has never been more pressing.

Driven by a focus on greener, localized, and secure energy, renewables are expected to dominate the power mix—accounting for 38%[7] of the mix by 2030 and 62% by 2050, according to EY's Energy and Resources Transition Acceleration (ERTA) model. At the same time, swift electrification across industry and households is set to push electricity demand nearly 1.7x higher by 2050.

The integration of high renewable energy introduces variability in production, leading to reliability risks or a mismatch between resource additions, load growth, and the necessary infrastructure to support them. Key challenges include industrial-scale connections, system adequacy, and the management of decentralized energy resources.

Storage technologies and battery energy storage systems (BESS) are emerging as a solution to these challenges. By storing excess energy generated during peak production times and releasing it during periods of high demand, these technologies effectively balance supply and demand dynamics. As the energy landscape evolves, batteries are expected to show significant growth in flexibility supply from 2030 to 2050, at a CAGR of 15%[8]. This growth will be essential in meeting the projected fivefold increase in flexibility requirements, particularly in key markets such as the US, EU, China, and India. To this end, the EU Taxonomy includes Storage—of electricity, thermal energy and hydrogen—as economic activities making a "substantial contribution" to the environmental objectives of Climate Change Mitigation and Climate Change Adaptation, making these sectors especially attractive to GPs who have registered their funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR). The objective of the EU Taxonomy is to help direct investment to environmentally sustainable projects.

38%-62%

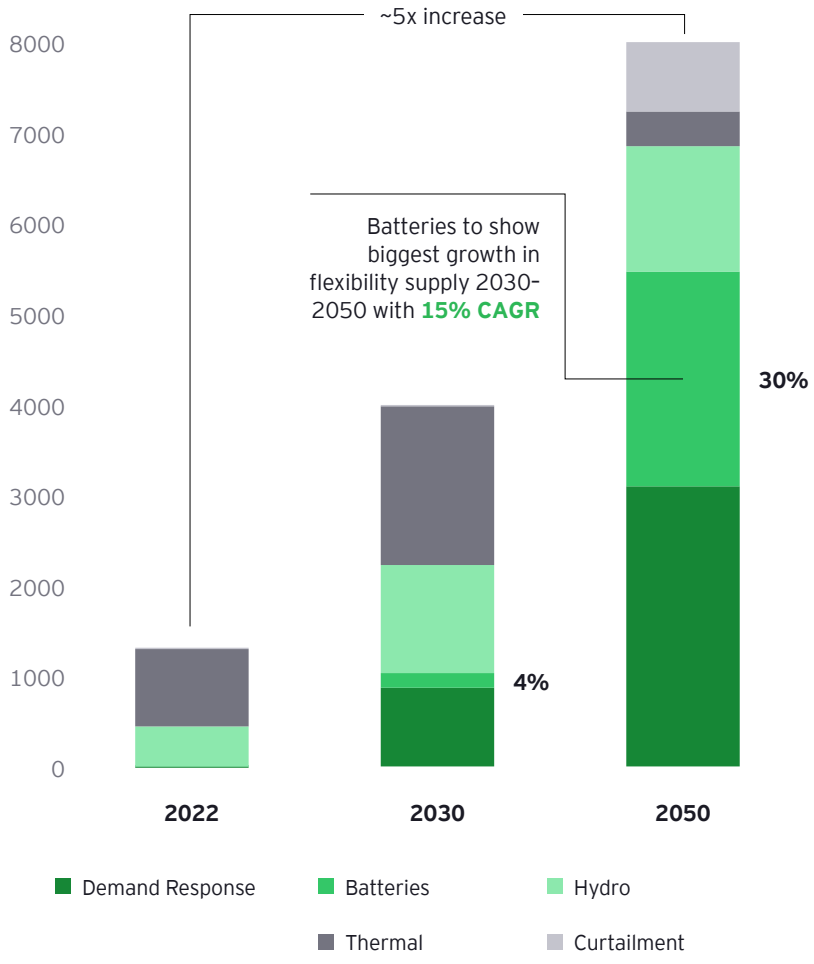
Renewables are expected to dominate the power mix—accounting for 38% of the mix by 2030 and 62% by 2050, according to EY's Energy and Resources Transition Acceleration (ERTA) model.

7 EY analysis of data from Energy and Resources Transition Acceleration (ERTA) model

8 https://iea.blob.core.windows.net/assets/86ede39e-4436-42d7-ba2a-edf61467e070/WorldEnergyOutlook2023.pdf

The recent blackout in Spain has highlighted the strategic value of storage—not just for managing the intermittency of wind and solar, but also for bolstering system resilience. Storage can stabilize the grid with fast frequency response, voltage support, and reserve capacity, especially in grid-forming applications. It also offers a solution to rising solar curtailment risk: recent decisions by Red Eléctrica (REE) have limited real-time PV injection, particularly during peak hours. BESS may prove essential for capturing excess generation, easing system stress, and supporting a more reliable, decarbonized grid.

Figure 47 **Global power flexibility supply (TWh), 2022-2050**



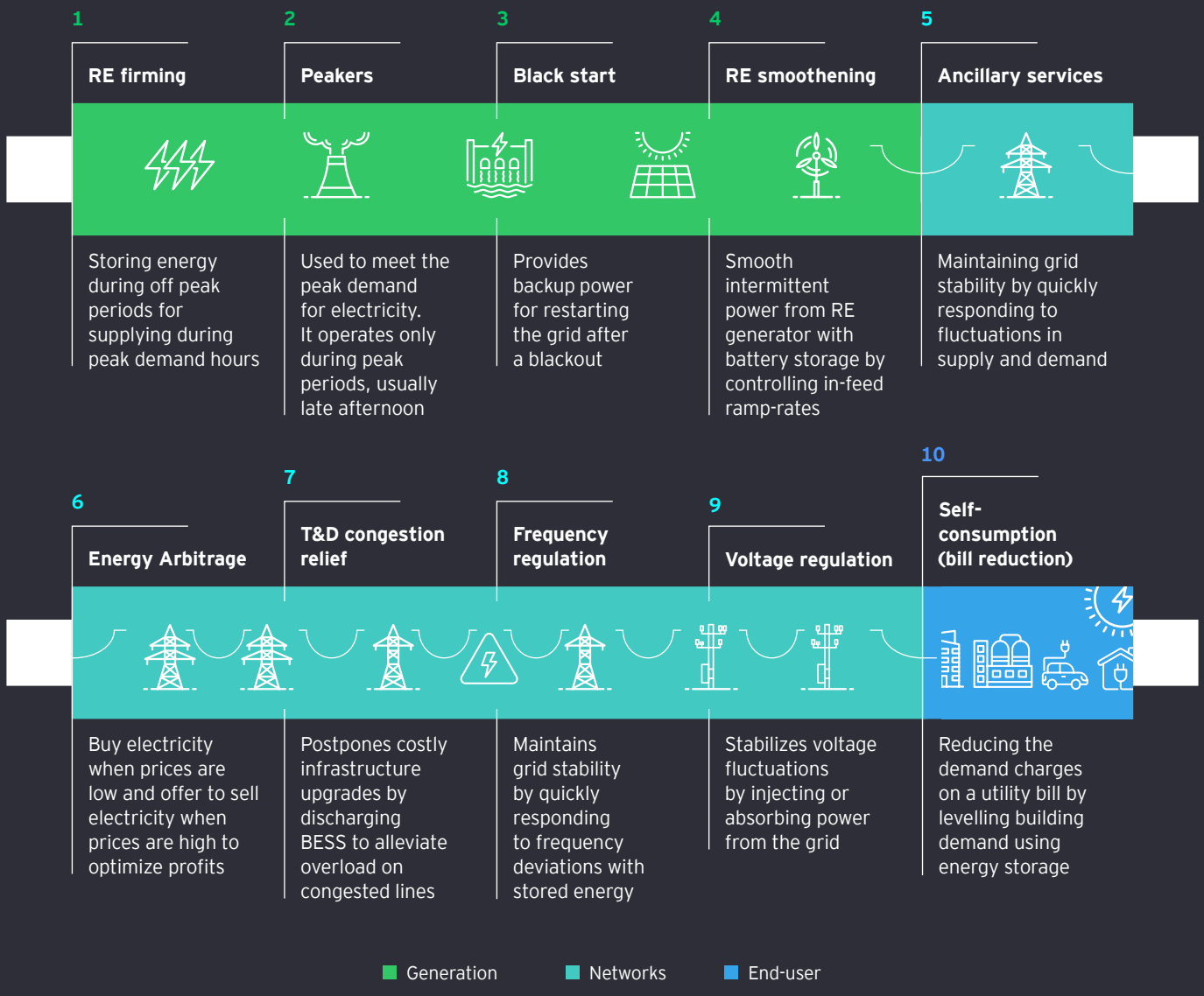
Source: EY Insights analysis of data from ERTA-current trajectory scenario, IEA.

In conclusion, the need for flexible energy systems is paramount as the world transitions to a low-carbon energy future. BESS and storage technologies may play a crucial role in this transformation, providing essential support for renewable energy integration, grid stability, and economic efficiency. As governments and organizations commit to ambitious climate goals, prioritizing investments in flexible energy systems and storage technologies will be key to achieving a sustainable and resilient energy landscape.

2. Why BESS: Unlocking the backbone of a flexible, decarbonized power system

BESS offers the flexibility needed to balance supply and demand in real time, soak up excess generation, and keep the system reliable. By participating in energy and ancillary service markets—from firming renewables and regulating frequency to peak shaving, energy arbitrage, and capacity markets—BESS is well placed to tackle both the operational and economic challenges of a renewables-heavy grid.

Figure 48 **Applications of battery storage systems across the grid**



Source: EY-Parthenon analysis.

BESS offers numerous benefits, including significant environmental gains by reducing reliance on fossil fuels, lower energy costs through the storage of inexpensive energy during off-peak hours, and enhanced grid resilience by providing backup power. Falling technology costs, improved policy visibility, and maturing business models are accelerating global adoption. For instance, installed BESS stationary power system capacity is expected to grow more than tenfold this decade—from around 160 GWh today to nearly 1,800 GWh by 2030 globally[9]—underscoring the technology's central role in achieving net-zero targets.

In essence, BESS is no longer an optional add-on—it is a strategic pillar of the energy transition. Its ability to deliver firm capacity, defer grid investments, and unlock new revenue streams makes it indispensable for utilities, developers, and policymakers navigating the complexities of tomorrow's power markets.

Global Battery Energy Storage Market: Entering a Phase of Strategic Expansion

The global BESS market is entering a phase of rapid and strategic expansion, with notable growth in key markets including the United States, United Kingdom, Italy, Germany, Spain, and Australia. This momentum is underpinned by a combination of improving commercial fundamentals, accelerating renewable energy deployment, and robust policy support.

Importantly, as the share of variable renewable energy continues to rise globally, so too does the need for system operators to secure firm, dispatchable capacity. This has prompted regulators across several jurisdictions to either introduce or reform capacity market mechanisms. These developments are enhancing the bankability of BESS investments and encouraging broader participation from institutional capital.

Seven strategic levers that will determine the future growth potential of BESS across markets are as follows.

[9] New battery storage capacity to surpass 400 GWh per year by 2030 (rystadenergy.com).

Seven strategic levers that will determine the future growth potential of BESS across markets are as follows.

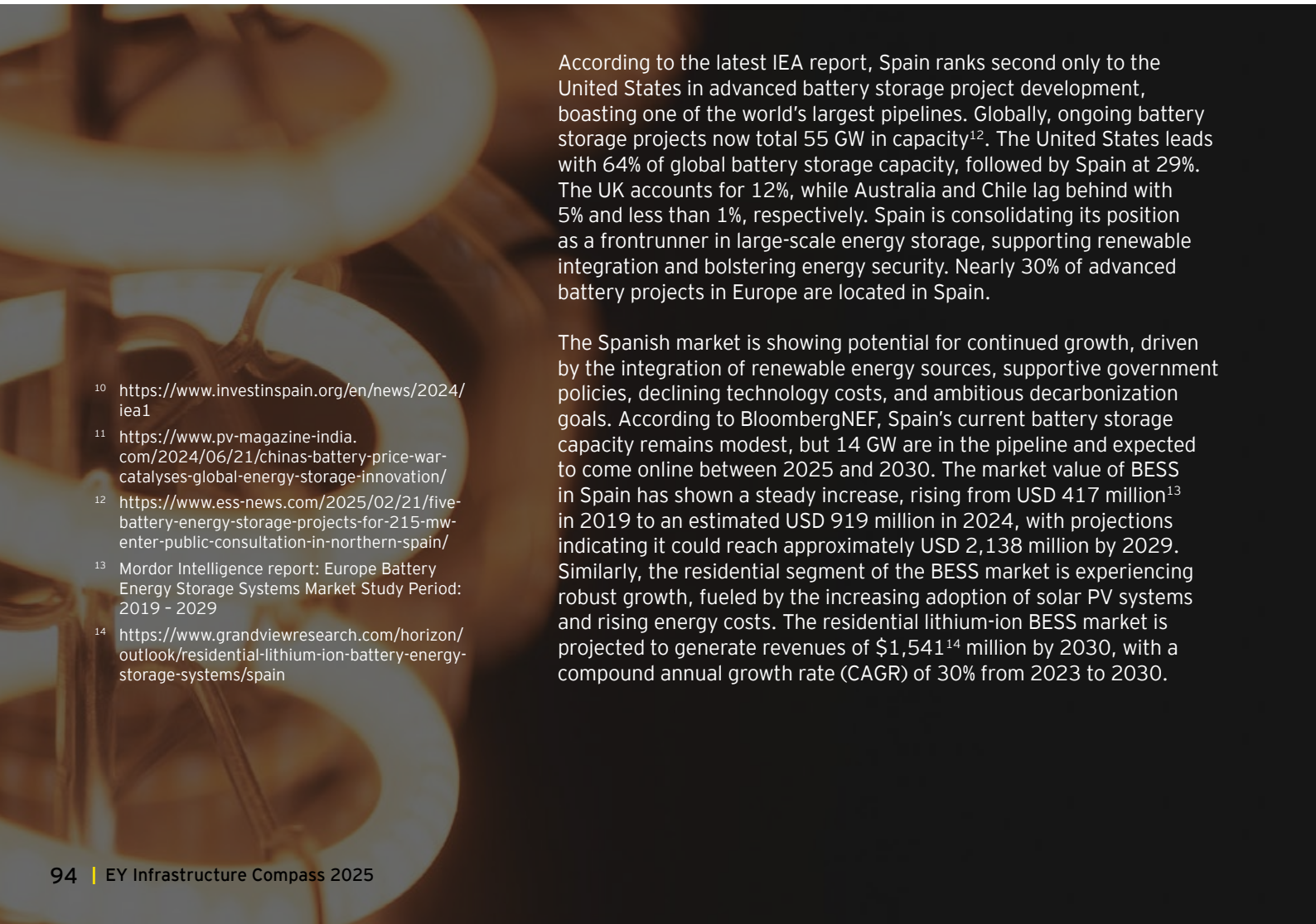
Revenue certainty	1	BESS investors will need to factor volatility in commodity prices into their investment case analysis as there is rising correlation between battery system revenues and gas prices
Effective regulatory mechanism	2	Current capacity market mechanisms and reliability concerns are failing to maximize the potential for batteries; this calls for additional reforms to make the market more effective
CAPEX reduction	3	High capital expenditure characterizes BESS projects, with sensitivity analysis demonstrating substantial CAPEX sensitivity to fluctuations in battery cell prices
Location analysis	4	Determining optimal location can increase profit margins by positioning closer to areas with higher grid congestion and RE concentration
Connection at scale and on time	5	Longstanding permitting procedures leading to grid interconnection delays; lack of regulatory framework along with grid concern
Supply chain redefinition	6	BESS growth will depend highly on a robust supply chain, as nearly 70% of European battery cell capacity is at risk, primarily due to rising dependency on China and lithium's price volatility
New technology maturity evolution	7	Vanadium Flow will compete with Li-ion in future, providing a better business case for LDES; hydrogen storage to emerge as a new alternative as it becomes more cost-effective

The BESS market in Spain

1. Current context in Spain

The latest IEA Renewables 2024 report projects that renewables will supply nearly half the world's electricity by 2030, thanks to strong growth and a robust project pipeline. Spain is already ahead of the curve: more than 50% of its generation was renewable in 2023, with around 40% from wind and solar, matching the IEA's global 2030 target years early. Despite such high penetration, Spain has kept technical curtailment relatively low. According to ICEX's 'Invest in Spain'[10], wind accounted for about 60% of all curtailed variable output in 2023, while solar curtailment spikes in summer as production rises.

Storage is now taking its place alongside renewables, as the global energy storage market surges. Deployments in 2023[11] jumped to 44 GW/96 GWh, nearly triple the previous year's levels. BloombergNEF expects another 67 GW/155 GWh to be added in 2024, a 61% rise in terms of gigawatt-hours. Falling costs, driven in part by fierce competition in China, are making storage more affordable and accelerating global adoption.



According to the latest IEA report, Spain ranks second only to the United States in advanced battery storage project development, boasting one of the world's largest pipelines. Globally, ongoing battery storage projects now total 55 GW in capacity[12]. The United States leads with 64% of global battery storage capacity, followed by Spain at 29%. The UK accounts for 12%, while Australia and Chile lag behind with 5% and less than 1%, respectively. Spain is consolidating its position as a frontrunner in large-scale energy storage, supporting renewable integration and bolstering energy security. Nearly 30% of advanced battery projects in Europe are located in Spain.

The Spanish market is showing potential for continued growth, driven by the integration of renewable energy sources, supportive government policies, declining technology costs, and ambitious decarbonization goals. According to BloombergNEF, Spain's current battery storage capacity remains modest, but 14 GW are in the pipeline and expected to come online between 2025 and 2030. The market value of BESS in Spain has shown a steady increase, rising from USD 417 million[13] in 2019 to an estimated USD 919 million in 2024, with projections indicating it could reach approximately USD 2,138 million by 2029. Similarly, the residential segment of the BESS market is experiencing robust growth, fueled by the increasing adoption of solar PV systems and rising energy costs. The residential lithium-ion BESS market is projected to generate revenues of $1,541[14] million by 2030, with a compound annual growth rate (CAGR) of 30% from 2023 to 2030.

10 https://www.investinspain.org/en/news/2024/iea1

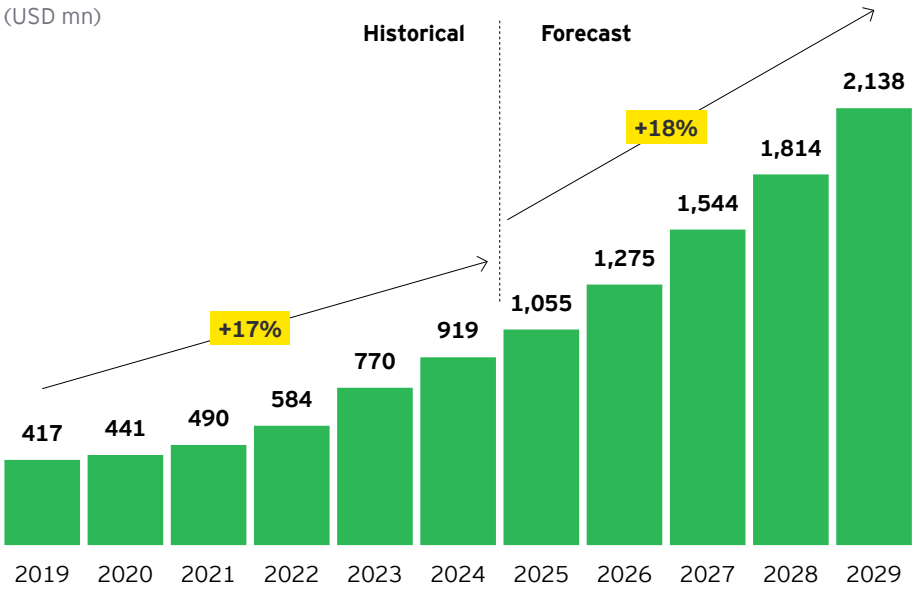
11 https://www.pv-magazine-india.com/2024/06/21/chinas-battery-price-war-catalyses-global-energy-storage-innovation/

12 https://www.ess-news.com/2025/02/21/five-battery-energy-storage-projects-for-215-mw-enter-public-consultation-in-northern-spain/

13 Mordor Intelligence report: Europe Battery Energy Storage Systems Market Study Period: 2019 - 2029

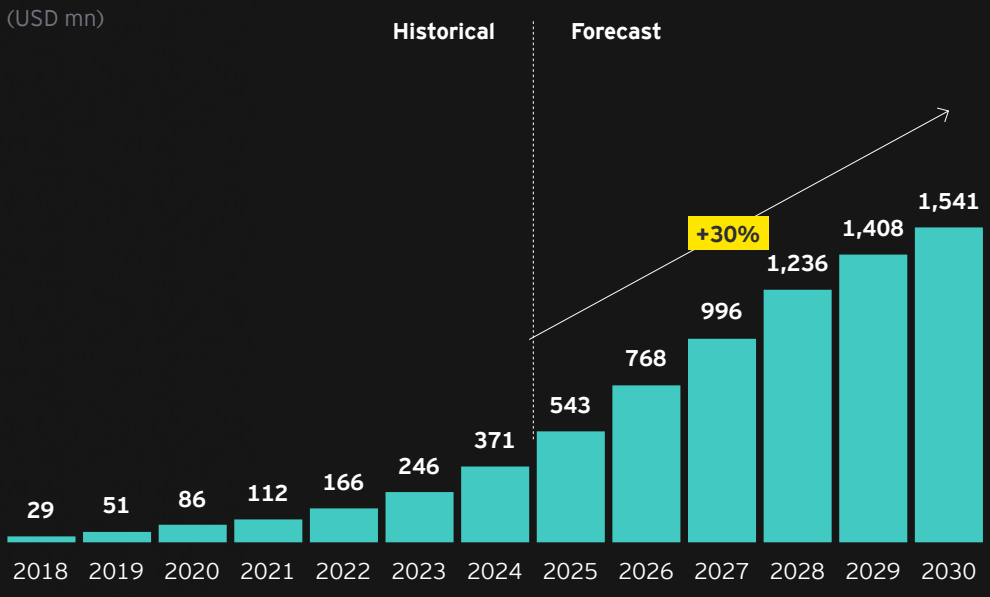
14 https://www.grandviewresearch.com/horizon/outlook/residential-lithium-ion-battery-energy-storage-systems/spain

Figure 49 **Spain BESS market value**



Source: Mordor Intelligence.

Figure 50 **Residential lithium-ion BESS market, Spain**



Source: Grand view reseach.

This growth trajectory positions Spain as a key player in the European BESS landscape, highlighting the importance of strategic investments in energy storage solutions.

2. Drivers of growth: Spain

Spain's growing share of intermittent renewables (targeting 81% share in generation by 2030 from current 56%) requires a major increase in flexibility, both through energy storage systems and flexible demand management systems. These tools help the system absorb solar/wind peaks without wasting energy or destabilizing prices, making them essential to a cost-effective and reliable energy transition. The BESS market in Spain is experiencing rapid growth, driven by several key factors that collectively enhance the attractiveness and viability of energy storage solutions. This growth is primarily attributed to capex reductions, regulatory clarity, cost efficiencies through tailored technical design, optimization beyond standard compliance, and increasing market investments.

2.1. Reducing capital expenditure

One of the most significant drivers of BESS growth in Spain is the reduction in capital expenditure (capex) associated with battery technologies. Over the past decade, advancements in battery technology, particularly lithium-ion batteries, have led to a substantial decrease in costs. According to various industry reports, the cost of lithium-ion batteries has fallen by nearly 90% since 2010, making energy storage systems more accessible and economically viable for a broader range of applications.

Based on the National Renewable Energy Laboratory (NREL) forecasts, the capex cost of utility-scale battery storage will decrease from USD 525/kWh[15] in 2022 to USD 428/kWh in 2025, ultimately reaching USD 259/kWh by 2050. For commercial battery storage, costs are expected to decline from USD 576/kWh[16] in 2022 to USD 488/kWh in 2025, and to USD 300/kWh by 2050.

Recent data indicates that global average turnkey (turnkey systems include all project equipment - DC-side battery system, power conversion system and related installation, excluding EPC and grid connection) energy storage system prices have fallen significantly, from USD 614/kWh[17] in 2017 to USD 275/kWh in 2023, and further reducing by 40% to USD 165/kWh in 2024. This represents the largest reduction since BloombergNEF's survey in 2017.

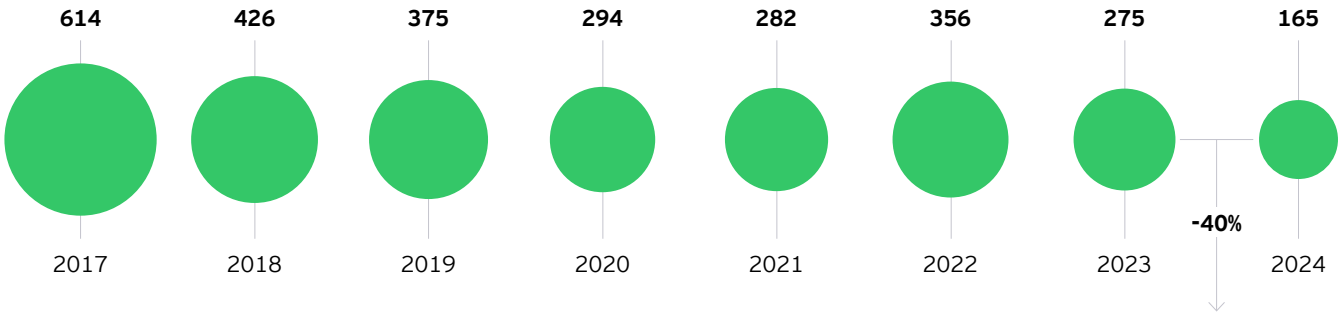
[15] https://atb.nrel.gov/electricity/2024/utility-scale_battery_storage

[16] https://atb.nrel.gov/electricity/2024/commercial_battery_storage

[17] https://www.energy-storage.news/behind-the-numbers-bnef-finds-40-year-on-year-drop-in-bess-costs/

Figure 51 **Historical prices for turnkey energy storage systems**

Real 2024 $/kWh, usable



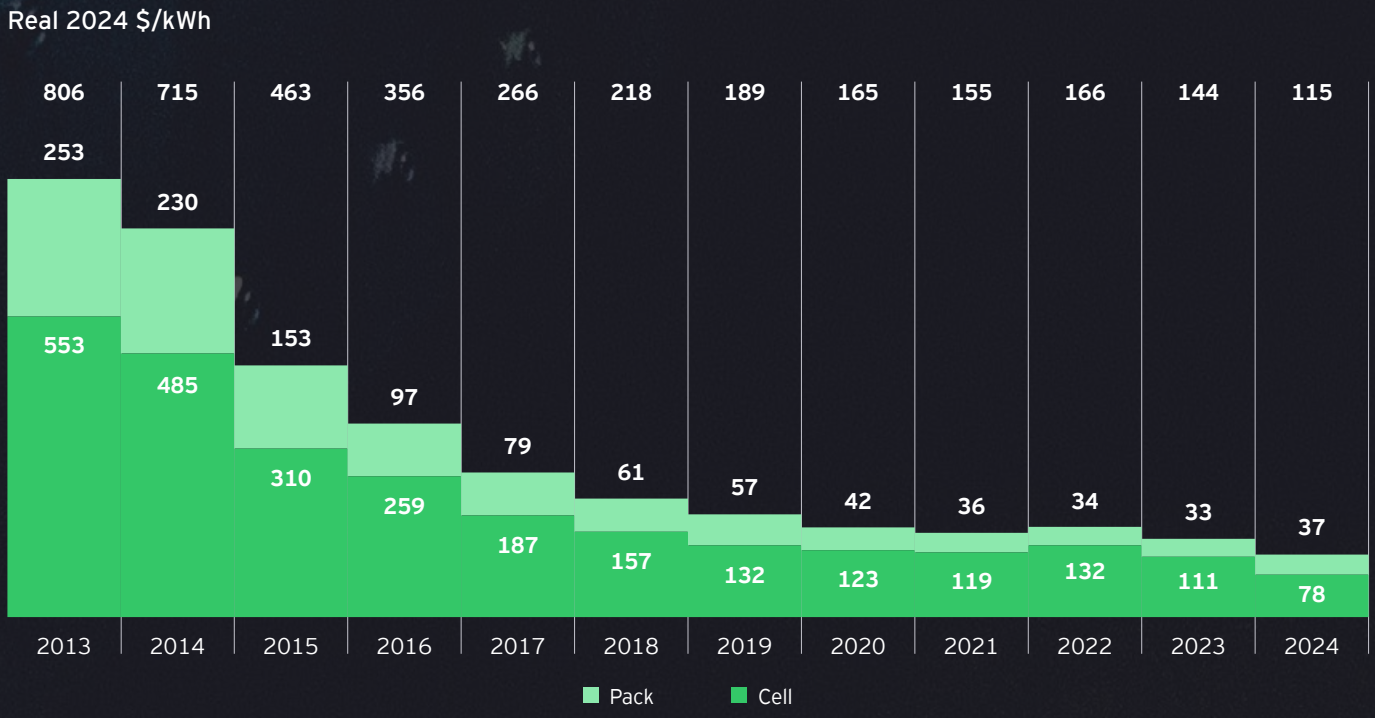
Source: BloombergNEF. Note: Turnkey systems include all project equipment (DC-side battery system, power conversion system and related installation) excluding EPC and grid connection. Pricing based on usable capacity. Prices in 2023 and 2024 show all durations and are global volume-weighted averages of survey pricing data based on BNEF's annual regional installation forecast (2023 price was updated this year). Prices for 2017–2022 are only for four-hour systems. Historical prices have been adjusted using June to June inflation rates based on US Consumer Price Index (CPI) and converted using exchange rates in the end of October each year.

Turnkey systems, excluding EPC and grid connection costs, saw their biggest reduction since BNEF's survey began in 2017.

This decline in costs is driven by several factors, including economies of scale from increased production, technological advancements that improve battery efficiency and lifespan, and growing competition among manufacturers. As a result, financial barriers to entry for BESS projects have decreased, allowing utilities, businesses, and consumers to invest in energy storage solutions that were once considered prohibitively expensive.

On the battery front, Lithium-ion battery pack prices (global average) fell 20% in 2023 to a record low of $115/kWh[18]. The drop is driven by manufacturing overcapacity (global production capacity exceeds annual needs by over 2.5 times, reaching 3.1 TWh), falling raw material and component costs, greater use of low-cost LFP batteries, and slower EV sales growth. Recent developments in China highlight the swift decline in energy storage costs. In 2023, Chinese battery pack prices averaged USD 94 per kilowatt-hour[19]—31% below US levels and 48% cheaper than in Europe. This edge stems from China's robust supply chain, scale, and competitive market. Pressured by tightening margins, Chinese manufacturers are now seeking growth through energy storage and expanding into more profitable overseas markets.

Figure 52 **Volume-weighted average lithium-ion battery pack and cell price split, 2013-2024**



Source: BloombergNEF. Note: Historical prices have been updated to reflect real 2024 dollars. Weighted average survey value includes 343 data points from passenger cars, buses, commercial vehicles and stationary storage.

Illustrating this trend, China Power Construction Group recently issued a 16GWh battery storage tender for projects slated for 2025-26. The state-owned firm attracted 76 bids for full turnkey solutions, with prices for battery cells, PCS, and EMS ranging from USD 60 to USD 82 per kilowatt-hour and averaging USD 66.3—underscoring the sector's aggressive cost competition.[20] This deal establishes a new low-cost benchmark, with the total contract valued at just USD 1 billion—far below the global average of USD 125 per kilowatt-hour for storage without PCS or EMS. Such pricing is made possible by centralised procurement, economies of scale, and active state backing, cementing China's dominance in the global battery storage sector. The rapid fall in costs is making energy storage increasingly competitive, boosting its attractiveness in Spain and beyond.

18 https://about.bnef.com/blog/lithium-ion-battery-pack-prices-see-largest-drop-since-2017-falling-to-115-per-kilowatt-hour-bloombergnef/

19 https://about.bnef.com/blog/lithium-ion-battery-pack-prices-see-largest-drop-since-2017-falling-to-115-per-kilowatt-hour-bloombergnef/

20 https://www.energy-storage.news/mind-blowing-bids-power-chinas-16gwh-bess-tender-state-owned-firms-market-share/

Procurement

BESS capital delivery can be sharpened through stronger procurement, smarter contracting, and streamlined supply chains.

2.2. Cost efficiencies through commercial excellence and capability enhancements

Spain's BESS market will witness accelerated growth, driven not only by increasing renewable energy penetration and capex reduction but also by growing emphasis on internal cost optimization measures, where EYP's team has extensive experience supporting market players. Leading developers are increasingly shifting focus from purely external cost drivers to internal levers—enhancing organizational capabilities, refining procurement strategies, and embedding continuous improvement across functions. In-housing of procurement and grid connection roles offers direct control over project timelines and cost structures. Strategic supplier engagement and multi-project procurement unlock volume discounts and reduce exposure to price volatility.

Beyond procurement, cost-effective delivery hinges on tools and systems. Advanced software for project tracking, digital twin simulations for design testing, and centralized data platforms enable real-time insights and efficiency. Cross-functional collaboration, structured capability building, and systematic knowledge-sharing drive consistency and reduce rework.

On the technical front, modular designs, customized system sizing, and tailored configurations aligned to specific use cases enhance lifecycle economics. Predictive maintenance and intelligent EMS integration boost asset availability and market responsiveness, lowering total cost of ownership. Finally, contracting strategies that introduce cost transparency and partnerships with Tier 2 vendors help tighten margins and improve delivery agility.

To put cost efficiencies into operational practice, two main avenues stand out. First, BESS capital delivery can be sharpened through stronger procurement, smarter contracting, and streamlined supply chains. Secondly, internal capabilities need strengthening by bringing key functions in-house, adopting digital tools, and nurturing a culture of collaboration.

The following summary tables outline key levers under each area to support accelerated and cost-effective deployment in Spain's evolving BESS market.

Table 1 **Drive BESS capital delivery advantage through commercial excellence**

Levers assessed	Area	Opportunity	Potential Impact on capex reduction
Technical	Design	▸ Leverage prefabricated components (e.g., pre-cut and pre-terminated cabling) to minimize on-site labor requirements and streamline installation timelines. ▸ Develop modular reference designs to drive standardization across projects, enabling repeatability, reduced engineering effort, and lower construction costs. ▸ Continuously assess emerging battery technologies (e.g., sodium-ion, redox flow, second-life EV batteries) to optimize for cost and performance while ensuring future-proof system design.	0-0.3%
	Customized system design	▸ Tailor BESS configurations to specific applications to avoid overdesign and reduce capital costs. ▸ Define key parameters—duration, cycling, response time—based on each use case for higher cost-efficiency. ▸ Optimize battery chemistry, inverters, and controls to match project needs and maximize lifecycle value.	NA
	Right-sizing of capacity & power	▸ Right-size BESS by aligning capacity with expected utilization and service needs to maximize financial returns. ▸ Use advanced modeling to simulate grid behavior and optimize configurations for market conditions. ▸ Balance capex and revenue by avoiding excess capacity while meeting service requirements efficiently.	NA

Levers assessed	Area	Opportunity	Potential impact on capex reduction
Operation and maintenance	Digital use cases	▸ Leverage in-house BESS data infrastructure to enable predictive maintenance strategies, reducing unplanned downtime and extending asset life. ▸ Develop advanced analytics and AI-driven platforms to optimize battery operations and maintenance, using machine learning or neural network models to enhance performance and reduce lifecycle costs.	NA
	Advanced asset management & monitoring	▸ Use AI-driven predictive maintenance to reduce outages and extend battery life, cutting total ownership costs. ▸ Deploy advanced EMS for price forecasting and dynamic dispatch to maximize revenue from market participation. ▸ Customize battery, inverter & control systems to match project needs, enhancing utilization and lifecycle value.	NA
Commercial & procurement	BESS procurement	▸ Leverage multi-project procurement strategies to consolidate BESS hardware sourcing across portfolios and unlock cost savings through volume-based commercial agreements. ▸ Engage regional supply chain specialists (e.g., in key manufacturing hubs such as China) to enhance supplier intelligence, support negotiations, and improve commercial outcomes.	2-3%
	Contracting strategy	▸ Structure RfPs and tenders with disaggregated unit pricing rather than lump-sum contracts, enabling transparency in cost build-up and facilitating informed negotiations on labor and equipment components. ▸ Explore strategic partnerships with Tier 2 subcontractors to capture on-ground execution insights, reduce intermediary margins, and drive cost efficiencies through closer collaboration.	1-2%

While commercial levers play an important role in unlocking near-term cost efficiencies, sustainable long-term advantage will come from **strengthening internal capabilities**. Building digital excellence, fostering cross-functional collaboration, and embedding continuous learning practices enable organizations to scale BESS delivery with agility and precision. The next set of measures focuses on how enhanced internal capabilities can support smarter design and execution of storage assets and enhance their lifecycle performance.

Table 2 **Enhancement of company capabilities through procurement measures, digital excellence and collaboration**

Levers assessed	Area	Opportunity	Potential Impact on capex reduction
Technical and management system	Procurement	▸ In-house capabilities: Internalize procurement and grid connection functions to enhance cost control and reduce reliance on third parties for critical timelines. ▸ Benchmark-informed negotiations: Leverage forward-looking cost benchmarks—internal or third-party—to guide contract terms and maintain real-time supplier visibility. ▸ Should-cost analysis: Conduct bottom-up, clean sheet cost modeling using projected productivity and unit benchmarks for early-stage cost clarity. ▸ Bulk sourcing across projects: Consolidate procurement of key equipment (e.g., transformers, cabling, switchgear) across projects to unlock volume discounts. ▸ Control grid delivery timelines: Develop internal grid connection capabilities to manage energization schedules and mitigate external delay risks.	2-3%
	Institutionalize Continuous Learning	▸ Establish structured feedback loops through recurring review sessions and formalized processes for capturing, documenting, and embedding operational learnings into standard project delivery practices to drive sustained cost optimization.	0-1%
	Tools / IT	▸ Deploy digital twin technologies to virtually simulate and assess design optimization opportunities, reducing rework and material inefficiencies. ▸ Implement an integrated, advanced project management platform to unify scheduling, design, and contracting workflows—enabling real-time visibility and performance tracking across workstreams. ▸ Establish a centralized, structured data environment with controlled access, ensuring seamless information sharing and decision-making across teams.	0-1%
People system	People system	▸ Appoint local market leads in priority geographies to accelerate market entry, optimize supplier engagement, and secure cost-competitive delivery through local expertise. ▸ Institutionalize cross-vertical design-to-cost forums to promote knowledge transfer, enabling teams to adopt proven cost and schedule optimization strategies from adjacent functions. ▸ Establish a foundational learning curriculum via an internal academy with shared principles and certification across verticals, followed by role-specific training—ensuring cultural alignment and operational consistency in scaling environments.	0-1%

In summary, the growth of BESS in Spain is not only a function of supportive policies and market demand but also of the strategic technical decisions taken at the design and engineering stage. Developers that embrace tailored, use-case-driven design and robust optimization frameworks are better positioned to deliver cost-effective, bankable, and future-proof energy storage solutions. As the market matures, these innovations will be key differentiators in project competitiveness and long-term value creation.

2.3. Enhanced regulatory visibility

Spain is tightening its regulatory framework to become a frontrunner in grid-scale energy storage. The government has raised its 2030 target under the energy and climate plan to 22.5 GW, aiming to deploy technologies ranging from battery storage and pumped hydro to thermal storage paired with solar thermal plants. Today, Spain has around 7 GW of flexible capacity—mostly from 6 GW of pumped hydro, about 900 MW in solar thermal storage, and just 50 MW of BESS.

This reliance on pumped hydro highlights both its centrality and its limitations: although it represents the vast majority of today's storage fleet, the high capital intensity, long construction periods and complex environmental permitting mean that its growth is structurally slower than batteries. As a result, Spain needs to accelerate BESS while continuing to modernize and expand its pumped hydro fleet for long-duration balancing.

A key regulatory move is underway from Spain's Ministry for the Ecological Transition (MITECO), which in August 2024 unveiled its first framework to bolster clean energy and renewables. Central to this is a €750 million[21] incentive scheme targeted at fostering domestic battery manufacturing and supporting the broader renewable supply chain. The initiative is intended to attract investment and build a vertically integrated battery ecosystem—reducing reliance on Asian imports—. The ambition is to create a self-sustaining energy storage sector that underpins Spain's clean energy transition.

The framework also complements broader European industrial policy efforts, as demonstrated by the European Commission's approval of a €699 million[22] state aid scheme in support of deploying up to 3.5 GW of energy storage across Spain. These grants can cover up to 85% of project capital expenditure, providing an unparalleled financial advantage for both standalone and co-located storage projects. Together, these national and European measures aim to de-risk early investments, scale deployment, and lay the foundation for a more flexible and decarbonized power system. These initiatives reinforce the EU Taxonomy, which includes Storage—of electricity, thermal energy and hydrogen—as economic activities making a "substantial contribution" to the environmental objectives of Climate Change Mitigation and Climate Change Adaptation.

[21] https://www.energy-storage.news/spain-publishes-regulatory-framework-for-clean-energy-manufacturing-support-scheme

[20] https://www.energy-storage.news/spain-publishes-regulatory-framework-for-clean-energy-manufacturing-support-scheme

In fact, a recent call for proposals under FEDER's funding to advance energy storage—where participants submitted proposals shortly before August—considered both standalone and hybrid BESS projects, with more than 100 projects expected to be awarded.

However, **beyond one-time capital aid, the long-term success of BESS deployment will hinge on market mechanisms** that create sustainable revenue streams and de-risk investment. To address this, Spain is in the advanced stages **of developing a centralized, competitive, and technologically neutral capacity market,** expected to launch during 2025 following public consultation in December 2024. This marks a paradigm shift in how Spain ensures reliability: moving from traditional capacity payments to a market-based, auction-driven mechanism that incentivizes firm and flexible capacity. The proposed Spanish capacity market, overseen by Red Eléctrica de España (REE) and the regulator (CNMC), is designed as a centralized and technologically neutral mechanism, allowing participation from a wide array of resources including BESS, pumped hydro, demand response, gas-fired peakers, and hybrid renewable-plus-storage installations.

Here again, the duality between technologies is clear: pumped hydro, despite being highly reliable and long-lived, struggles to compete on equal terms in short-term markets because of its slow expansion rate and upfront costs, whereas BESS can rapidly scale but suffers from degradation and shorter asset lives. Properly calibrating firmness factors and auction design will therefore be critical to ensure that both technologies can play their complementary roles.

To ensure a fair comparison between them, firmness factors will be introduced, with a value being assigned between 0 and 1 according to the actual responsiveness of each technology. Likewise, the possibility of establishing reserve prices, both general and specific, for existing facilities, is contemplated in order to avoid excessive income.

The structure of the market is organized around three types of auctions:

A **main auction**, held at least once every four years, will contract for capacity from new and existing resources for delivery 4 years ahead (T-4 format). This will allow firm capacity to be contracted for in the medium and long term. The service will begin within a maximum period of 5 years (9, as an exception) and the duration of the service will be 12 months for existing installations and up to half of useful life for new installations, up to a maximum of 15 years.

Annual adjustment auctions, designed to face unforeseen needs to cover demand or resolve non-compliance with awarded projects. The service will last one year, starting within 12 months of award. Only existing facilities will participate.

The **annual transitional auctions**, which will serve as a bridge until the first period of service provision derived from the main auctions begins.

In each auction, a firm capacity curve will be established based on the system's coverage needs across various time horizons. The auctioned product is firm capacity, which will be offered at a unit price expressed in €/MW per year.

The cost of the mechanism will be borne by electricity retailers and direct consumers, with charges differentiated by tariff brackets and time-of-use periods. Higher costs will apply to consumption during peak stress periods, reflecting the value of firm capacity during those critical hours.

Oversight and enforcement of the capacity mechanism will be managed by the System Operator and the National Commission on Markets and Competition (CNMC). Sanctions for non-compliance will be applied on a technologically neutral basis—equally across generation, storage, and demand-side resources—and will follow a progressive scale, with penalties increasing according to the severity of the breach.

Main Capacity Auctions

- Contract firm capacity for medium to long term horizons.
- The service start-up period will start within a maximum of 5 years (9 years in exceptional cases - new+pumping storage).

Duration of service

- Existing installations: 12 months.
- New investments: Up to half of their useful life (max. 15 years, depending on technology).
- Demand: Between 1 and 10 years.

Annual Adjustment Auctions

- Solve unforeseen needs, such as demand coverage **mismatches or failures in awarded projects**.
- Associated with a **fixed service period of 12 months,** starting within a maximum of 12 months after award.
- Exclusive participation for **existing installations** (in service before the call for proposals).
- Auctioned power is expected to be reduced.

Annual Transitional Auctions

- They cover firmness needs from the entry into force of the order until the start of the **first service provision period resulting from the main capacity auction.**
- They will have the same characteristics as the main ones except for one aspect:
- An auction shall be held for each of the calendar years from the entry into force of the order and the start of the first period of service provision.

Therefore, if this new market enters into force, one of the most attractive features of the Spanish capacity market for BESS investors would be its dual-revenue model.

Participating projects will receive:

1. Capacity payments for being available during system stress periods
2. Market revenues from energy arbitrage, ancillary services, or frequency regulation

This model greatly enhances the bankability of BESS projects by offering stable, predictable cash flows in addition to variable market-based earnings. For institutional investors and project developers, the presence of a guaranteed income stream tied to grid reliability significantly lowers perceived risk and facilitates access to financing.

Moreover, the government has committed to ensuring transparency and market integrity throughout the capacity mechanism's rollout. Key design features under consultation include:

- The **firmness coefficient** assigned to each technology, which will quantify their reliable contribution during peak hours.
- A **firm capacity demand curve,** to clearly communicate how much capacity the market will procure at different price levels.
- **Emission thresholds** may be applied to auctions to ensure alignment with Spain's broader decarbonization targets—potentially excluding or disadvantaging high-emission peaking plants.

This level of technical and regulatory sophistication demonstrates that Spain is not just adopting a capacity market but customizing it to suit a high-renewables future. The model supports Spain's goal to increase renewables to 81% of electricity production by 2030 without compromising grid reliability. By providing long-term visibility and structured participation for BESS, it creates a predictable investment climate, which is especially important in a market that is still evolving technologically and commercially.

In addition to public initiatives, Spain is witnessing significant private investments in the energy storage and battery manufacturing sectors. In December 2024, Stellantis and CATL announced a joint venture to invest up to €4.1 billion[23] in constructing a large-scale lithium iron phosphate (LFP) battery plant in Zaragoza, Spain. Designed to be completely carbon neutral, the facility is targeted to start production by the end of 2026 and could reach a capacity of up to 50 GWh, subject to market evolution and regulatory support from Spanish and EU authorities. This strategic partnership aims to produce high-quality, durable, and affordable batteries for electric vehicles, aligning with Stellantis' Dare Forward 2030 strategic plan and CATL's commitment to supporting global climate ambitions. This influx of private capital not only accelerates the development of energy storage infrastructure but also stimulates local economies and job creation, further solidifying Spain's position as a leader in the European energy transition.

In summary, Spain's proactive regulatory reforms, the establishment of a capacity market, and substantial private investments are creating an environment that is conducive to BESS deployment. These measures not only enhance grid reliability but also provide robust revenue streams for investors, positioning Spain at the forefront of energy storage integration within Europe.

2.4. Challenges

Spain's commitment to advancing BESS is evident through its regulatory initiatives and ambitious targets. For example, a recent public consultation in August for a new royal decree legislative project, introduces certain measures aimed at streamlining administrative procedures for hybrid storage and ensuring that is not penalized in terms of priority dispatch, provided certain conditions are met. However, despite these measures, other challenges could impede the seamless integration and profitability of BESS projects.

Grid integration challenges: The rapid expansion of renewable energy sources, particularly wind and solar, has led to periods where electricity supply surpasses demand, resulting in zero or even negative wholesale power prices. By the end of 2024, approximately 10%[24] of hours were expected to experience such pricing anomalies, rendering renewable investments less profitable. Additionally, the existing transmission infrastructure has not kept pace with the swift deployment of renewables. This mismatch has caused significant curtailments, where renewable generation is reduced to prevent grid overloads. In 2022, non-compensated curtailment in Spain escalated to 715 GWh[25] from 67 GWh in 2021, highlighting the pressing need for enhanced grid capacity and storage solutions and fostering electricity demand.

In this context, pumped hydro storage remains a cornerstone technology for providing large-scale system flexibility and for seasonal and long-duration balancing that batteries alone cannot fully provide.

Market dynamics and revenue diversification: While the anticipated capacity market aims to provide a stable revenue stream for BESS operators, reliance solely on this mechanism may not suffice. The ancillary services market, another potential income source, is limited in volume and may not offer substantial long-term returns due to increasing competition and decreasing prices.

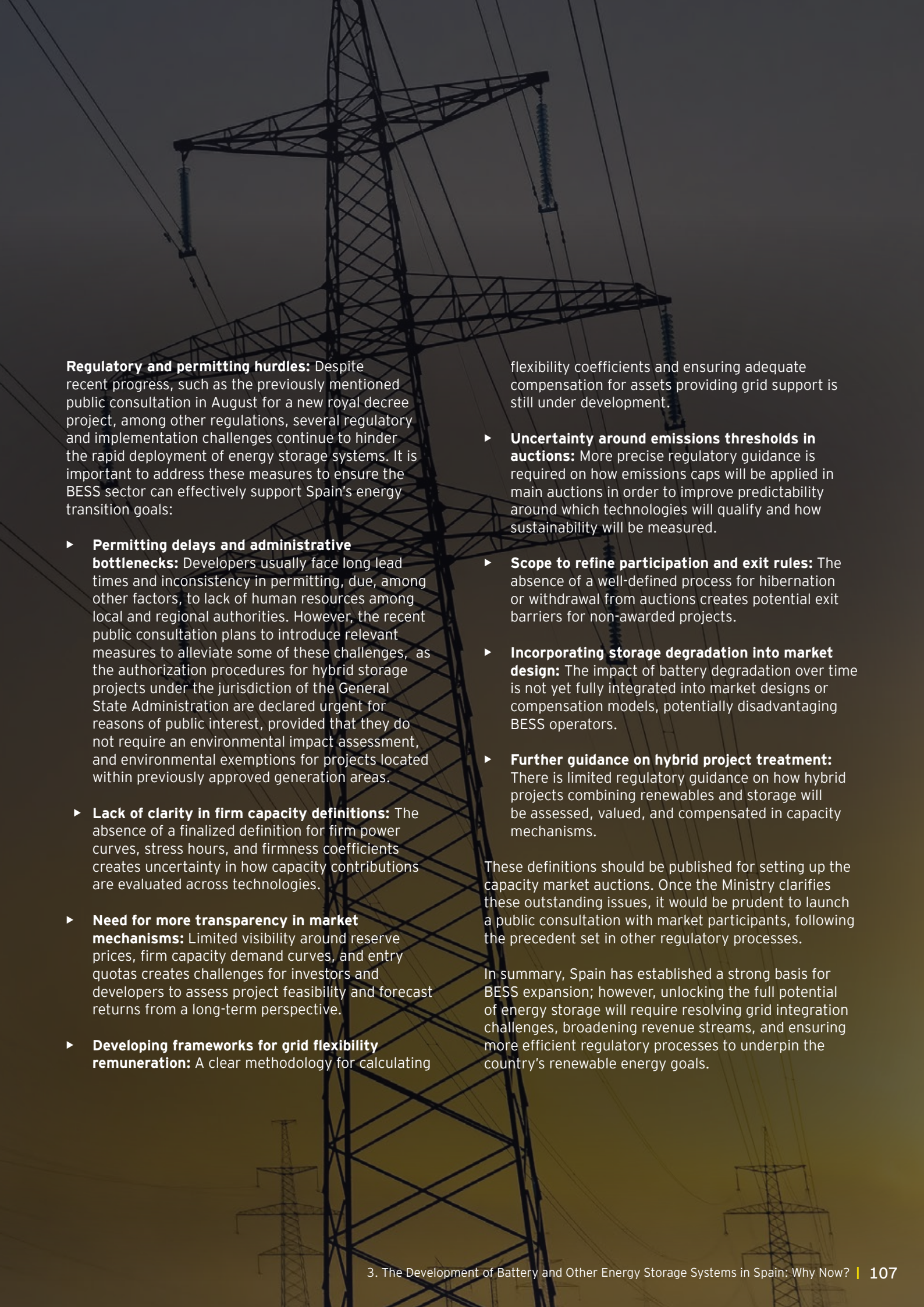
Furthermore, battery degradation over time requires strategies to maximize profitability. Engaging in energy arbitrage—charging batteries during low-price periods and discharging during peak demand—and hybridizing BESS with renewable installations can enhance revenue streams. However, these approaches require sophisticated operational strategies and may involve additional resources and structure costs.

By contrast, pumped hydro plants offer very long technical lifetimes and low degradation compared to batteries, but their revenue models are heavily exposed to wholesale market dynamics and depend on long-term policy stability to be bankable. This duality highlights the need for Spain to balance short-term deployment of BESS with medium- and long-term expansion of pumped hydro capacity.

[23] https://electrek.co/2024/12/10/stellantis-catl-form-joint-venture-50-gwh-carbon-neutral-lfp-battery-plant-eu

[24] https://www.reuters.com/business/energy/spanish-renewables-industry-warns-threats-investment-2024-10-25

[25] https://auroraer.com/media/grid-management-challenges-costing-spanish-energy-consumers



Regulatory and permitting hurdles: Despite recent progress, such as the previously mentioned public consultation in August for a new royal decree project, among other regulations, several regulatory and implementation challenges continue to hinder the rapid deployment of energy storage systems. It is important to address these measures to ensure the BESS sector can effectively support Spain's energy transition goals:

- **Permitting delays and administrative bottlenecks:** Developers usually face long lead times and inconsistency in permitting, due, among other factors, to lack of human resources among local and regional authorities. However, the recent public consultation plans to introduce relevant measures to alleviate some of these challenges, as the authorization procedures for hybrid storage projects under the jurisdiction of the General State Administration are declared urgent for reasons of public interest, provided that they do not require an environmental impact assessment, and environmental exemptions for projects located within previously approved generation areas.

- **Lack of clarity in firm capacity definitions:** The absence of a finalized definition for firm power curves, stress hours, and firmness coefficients creates uncertainty in how capacity contributions are evaluated across technologies.

- **Need for more transparency in market mechanisms:** Limited visibility around reserve prices, firm capacity demand curves, and entry quotas creates challenges for investors and developers to assess project feasibility and forecast returns from a long-term perspective.

- **Developing frameworks for grid flexibility remuneration:** A clear methodology for calculating flexibility coefficients and ensuring adequate compensation for assets providing grid support is still under development.

- **Uncertainty around emissions thresholds in auctions:** More precise regulatory guidance is required on how emissions caps will be applied in main auctions in order to improve predictability around which technologies will qualify and how sustainability will be measured.

- **Scope to refine participation and exit rules:** The absence of a well-defined process for hibernation or withdrawal from auctions creates potential exit barriers for non-awarded projects.

- **Incorporating storage degradation into market design:** The impact of battery degradation over time is not yet fully integrated into market designs or compensation models, potentially disadvantaging BESS operators.

- **Further guidance on hybrid project treatment:** There is limited regulatory guidance on how hybrid projects combining renewables and storage will be assessed, valued, and compensated in capacity mechanisms.

These definitions should be published for setting up the capacity market auctions. Once the Ministry clarifies these outstanding issues, it would be prudent to launch a public consultation with market participants, following the precedent set in other regulatory processes.

In summary, Spain has established a strong basis for BESS expansion; however, unlocking the full potential of energy storage will require resolving grid integration challenges, broadening revenue streams, and ensuring more efficient regulatory processes to underpin the country's renewable energy goals.

Conclusion

The growth of Battery Energy Storage Systems (BESS) in Spain is emblematic of the broader global transition towards a decarbonized energy landscape. As the demand for electricity is projected to surge by 70% by 2050, driven by increasing reliance on renewable energy sources, Spain is strategically positioning itself to harness this shift. With over 50% of its energy currently sourced from renewables, the country is on track to add an impressive 14 GW of battery capacity between 2024 and 2030, underscoring its commitment to a sustainable energy future.

A significant driver of BESS growth in Spain is the reduction in capital costs associated with battery technologies. As advancements in manufacturing processes and economies of scale continue to evolve, the initial investment required for battery storage systems is becoming increasingly affordable. This decline in capital expenditure not only enhances the economic viability of BESS projects but also encourages wider adoption among energy producers and consumers alike. The decreasing costs enable more stakeholders to invest in energy storage solutions, thereby facilitating the integration of renewable energy sources and contributing to a more resilient energy grid.

Optimization through tailored technical design and system-level innovation is emerging as a vital future driver for BESS growth. Developers are increasingly moving away from a one-size-fits-all approach, instead focusing on customized system designs that align with specific use cases such as frequency regulation, capacity firming, and renewable integration. By optimizing battery chemistry, inverter characteristics, and control systems to meet the unique technical and economic profiles of projects, operators can significantly enhance system utilization and lifecycle economics. Additionally, the right-sizing of capacity and power, along with strategic co-location of storage with renewable assets, ensures that BESS projects are both cost-efficient and effective in meeting grid demands.

Furthermore, regulatory visibility enhancement is another factor influencing the growth of BESS in Spain. The Spanish Ministry for the Ecological Transition has implemented a robust regulatory framework that supports clean energy initiatives and encourages domestic battery production. This framework includes attractive subsidies and incentives aimed at reducing reliance on imported technologies, fostering local innovation, and creating an environment that is conducive to investment. The clarity and stability provided by these regulations are essential for attracting both domestic and international investors, ultimately driving the expansion of BESS infrastructure across the country.

These initiatives in Spain are aligned with specific European policies designed to support energy storage. The EU Taxonomy includes Storage—of electricity, thermal energy and hydrogen—as economic activities making a "substantial contribution" to the environmental objectives of Climate Change Mitigation and Climate Change Adaptation, making these sectors especially attractive to debt and equity investors who have registered their funds under Articles 8 or 9 of the Sustainable Finance Disclosure Regulation (SFDR).

In conclusion, Spain's proactive approach to BESS growth serves as a model for other regions aiming to secure a resilient and sustainable energy future. By addressing the identified challenges and leveraging its strengths, Spain can maximize the potential of BESS in supporting global renewable energy initiatives. As the country continues to lead in the BESS landscape, it not only enhances its energy security but also contributes significantly to the global effort toward a decarbonized future. The journey ahead is promising, and with continued investment and innovation, Spain is poised to become a benchmark for BESS development worldwide.

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