

November 2025
Energy - Issue #1



Energy Infrastructure *-The Green Transition*

Market Report - November

10.11.2025 - Bergen, Norway



NHHS
Private Equity

Net-Zero: Private Equity Paving the Way for a Sustainable Future

Energy Transition = Financial Opportunity, Not Just Climate Policy

Green infrastructure has moved from idealism to institutional investment. Renewables, grids and storage now deliver long-term, inflation-linked returns and are core in pension, PE and infrastructure portfolios.

Massive Capital Inflows and Deal Activity

Private equity and private credit are accelerating investments in clean energy, battery storage, grid upgrades and nuclear. Financing is shifting from state-owned utilities and banks to private markets.

Geopolitics Reshapes Energy Strategy and Capital Flows

Russia -- Ukraine, U.S. and China's tensions and Europe's dependency on imports have made energy security a financial priority. Governments now incentivize local energy production through subsidies and contracts-for-difference.

Policy-Driven Growth With a Multi-Trillion Capital Gap

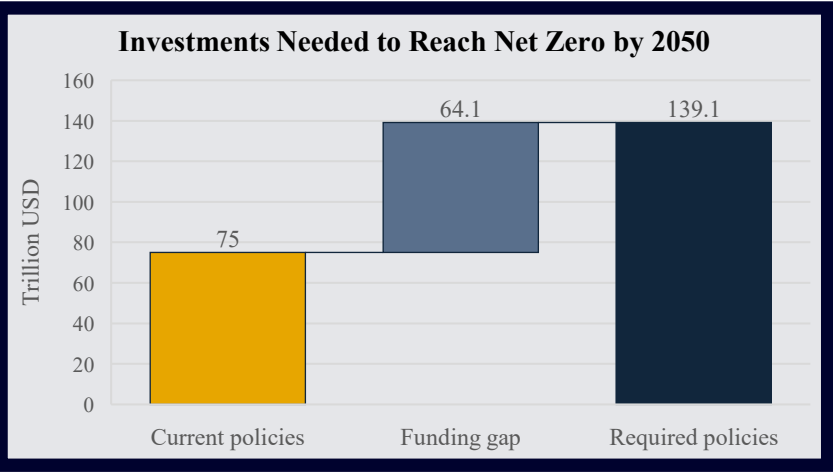
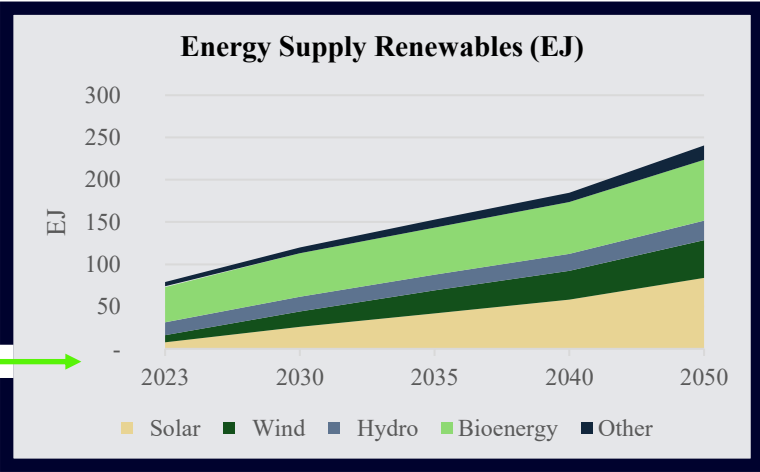
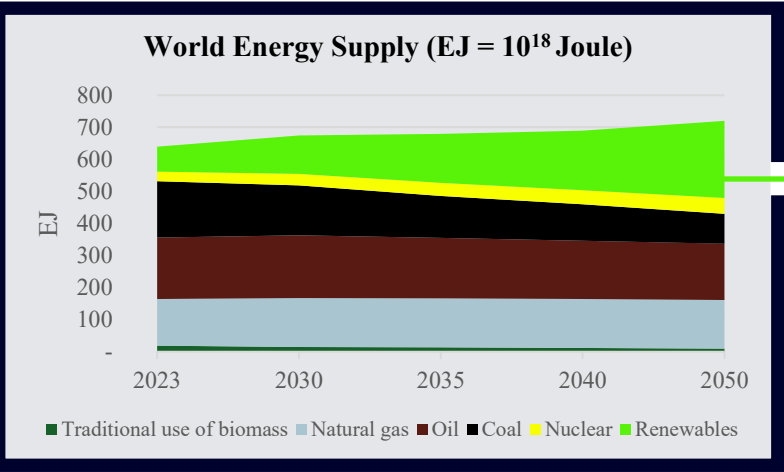
IEA estimates clean energy investment must exceed \$4 trillion annually by 2030. Current levels are less than half of that, creating a massive opportunity for private capital.

The Gap

The total investment required to reach net-zero emissions by 2050 is estimated at **USD 139 trillion**. Current policies only cover **USD 75 trillion**, leaving a funding gap of approximately **USD 64 trillion**.

This gap represents not only a climate challenge, *but a historic investment opportunity*. It opens the door for private capital to fund essential infrastructure with regulated returns, inflation-linked revenue models and strong policy backing.

As capital shifts from fossil fuels to renewables, grids, storage and nuclear, investors are positioned to capture stable, long-duration cash flows while directly financing the energy systems of tomorrow.



Sources: IEA, World Energy Outlook 2024 and FIDIC

NBIM's Investments in Unlisted Renewable Energy Infrastructure: Private Equity in a Green Suit?

NBIM's Placements in Green Infrastructure

Mandate: In 2019, the Norwegian parliament expanded NBIM's "environment-related mandate", allowing up to 2% of the fund to be allocated to unlisted green infrastructure. With the fund valued at roughly NOK 20,000bn, this caps the mandate at about NOK 400bn. With estimated investments and commitments of NOK 122bn, there is still significant room for further investments.

Direct vs. Indirect Investments: While NBIM does not formally categorize the direct investments as private equity, unlisted renewable energy projects share similar characteristics: they are illiquid, long-term and require active ownership. The indirect investments, which is primary commitments to external managers, offer broader diversification than direct ownership by spreading capital across multiple projects, geographies, technologies, and development stages, thereby reducing project-specific risk. This structure is particularly notable given the repeated political opposition to private equity exposure. By classifying primary commitments as indirect investments rather than traditional PE, the managers of the environment-related mandate appear to have navigated this constraint. Within a 15% sub-cap of the mandate, NBIM currently has NOK 25bn committed to CIP and Brookfield.

Green Infrastructure Investment Rationale: Long-lived cash flows supported by contractual mechanisms (for example PPAs) and long-term contracts that can reduce exposure to short-term market volatility. In addition, these assets often exhibit low correlation with traditional listed markets, providing valuable diversification benefits.

CIP

Copenhagen Infrastructure Partners

CIP was founded in 2012 in Copenhagen and has since developed into a leading renewable-focused private equity manager. The firm has launched five flagship funds to date, with NBIM committing €900m to fund V. CIP has €33bn under management.

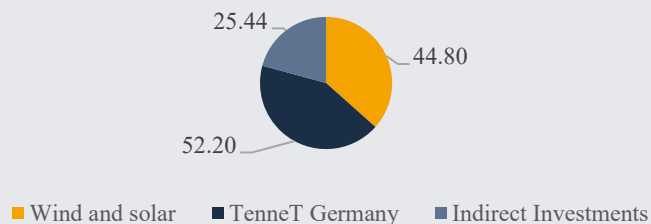
Fund V, like CIP's earlier vehicles, aims to capture value from the accelerating global energy transition by investing primarily in greenfield renewable infrastructure.

Brookfield

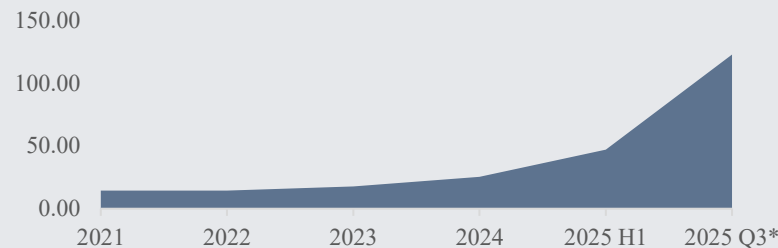
Brookfield is one of the world's largest alternative asset managers, headquartered in New York with approximately \$1tn in AUM. NBIM has newly committed \$1.5bn as a primary investor in Brookfield's "Energy Transition Fund II".

This fund investment allows NBIM to gain exposure to a broader range of global energy transition projects and decarbonization solutions.

Environment-Related Mandate Investment Allocation (NOK bn)



The Size of the Environment-Related Mandate (NOK bn)



Sources: NBIM, Brookfield Asset Management, Copenhagen Infrastructure Partners, Impact Investor, *Commitments are added



A Brief Introduction of TenneT

TenneT Holding

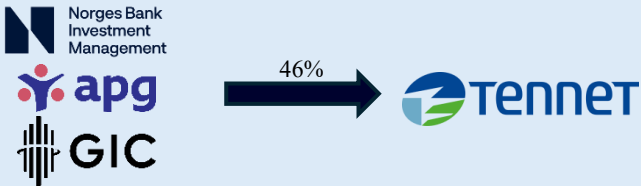
TenneT Holding B.V. is the Dutch state-owned transmission system operator (TSO) responsible for the high-voltage grid in the Netherlands and large parts of Germany. At group level, TenneT supplies electricity to around 43 million end users and operates more than 25,000 km of high-voltage lines and cables, of which ~ 14,000 km are in Germany. The group is also a central player in the North Sea energy transition, with 19 offshore grid connections providing roughly 12 GW of connection capacity.

TenneT Germany

TenneT Germany is the group’s largest and fastest-growing business. It is currently executing a multi-year investment programme worth tens of billions of euros to strengthen north–south power transmission in Germany and to connect large volumes of new offshore wind to the onshore grid.

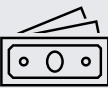
The Deal

Value | 9.5 Bn EUR



NBIM, together with APG and GIC, agreed on 24 September 2025 to acquire a 46% minority stake in TenneT Germany, the German transmission business of Dutch state-owned TenneT Holding B.V. The transaction values TenneT Germany at an enterprise value of €40 billion and is intended to finance Germany’s large-scale grid expansion. The transaction implies an **EV/ RAB of 1.09x**

The Investment Rationale



Secure Access to Long-term, Regulated Returns

TenneT Germany operates under the German regulatory framework, providing NBIM with predictable, tariff-based and inflation-sensitive returns over a very long horizon



Strategic Alignment With NBIM’s Mandate

Investing in a core European TSO advances NBIM’s stated goal of supporting sustainable, real-economy infrastructure in developed markets. NBIM backs the grid operator that enables the German and EU energy transition.



Energy-Transition Exposure Without Project/Technology Risk

TenneT sits at the center of Germany’s grid expansion ,offshore wind connections and north–south reinforcements, giving NBIM growth in RAB and earnings tied to decarbonization, not to single projects.

The Pricing of a TSO

$\frac{EV}{RAB}$

For regulated grids, valuation often starts with Enterprise to the Regulated Asset Base (RAB). RAB represents the asset base on which the regulator allows the company to earn a fair return. Large TSOs typically trade at 1.0-1.4x RAB.

$\frac{EV}{EBITDA}$

Used to assess valuation relative to current earnings. However, for networks experiencing significant investment, EBITDA understate the embedded value because earnings lag capital deployment.

Why start with RAB? In regulated models, future revenues are linked to the size of the RAB rather than historical profitability, making RAB-based multiples a more relevant valuation measure

Sources: Mergermarket, TenneT, NBIM , GIC

From Gusts to Gigawatts: Private Equity Commits to World’s Largest Offshore Wind Farm

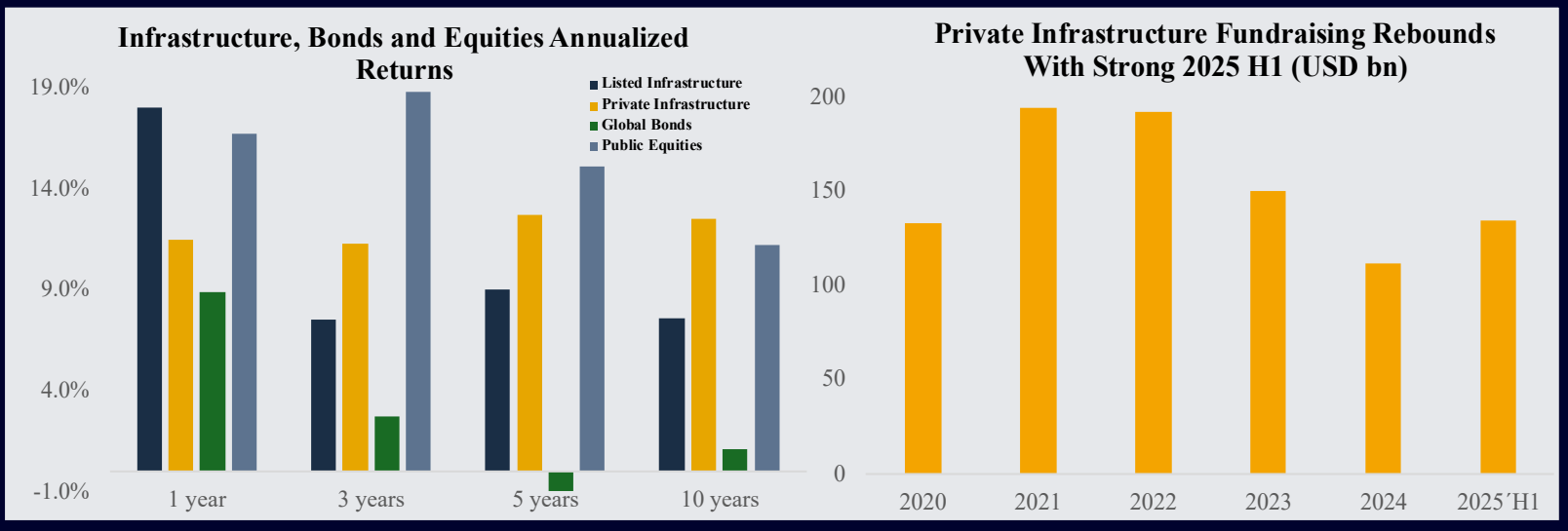
Apollo Invests in Ørsted A/S

Overview: Apollo funds commit USD 6.5bn to Ørsted’s Hornsea 3 offshore wind park in the UK. The investment includes a 50% equity stake in the project, along with a commitment to fund 50% of the projects remaining construction cost. USD 3.25bn will be invested upon closing, with the remaining USD 3.25bn to be funded as construction advances and certain milestones are reached.

Apollo Rationale: Partnering with Ørsted strengthens Apollo’s position as a preferred provider of long-term capital for clean European energy infrastructure . Allocation towards real assets with predictable long duration cash flows synergizes well with Apollo’s insurance arm Athene, which requires long-duration assets to back annuity payments. Policy uncertainty surrounding renewable energy in the US can compress valuations, creating attractive entry points as structural demand in Europe remains unchanged.



Apollo Global Management is one of the largest Alternative Asset Managers with an estimated USD 840B AUM. The firm focuses on private equity, credit and real assets. In 2021 Apollo also extended their operations into retirement services through a merger with Athene. The firm has been a leading investor in European energy infrastructure this year, with a record USD 17bn committed in 2025.



Hornsea 3 is a 2.9 GW offshore wind farm and is one of Ørsted’s largest projects to date. Located in the North Sea off the British coast, construction is set to be completed in 2027. Hornsea 3 will be the world’s largest offshore wind farm and is expected to power over 3 million homes in the UK once fully operational. The project has already secured government backed revenue support through *contracts for difference* (CFD), with Britain aiming to decarbonize its electricity system by 2030.

Sources: Financial Times, Apollo Global Management, Ørsted, CBRE

Nuclear Records: The largest Sterling-Denominated Private Credit Transaction of All Time

Apollo Commits to £4.5 Billion of Financing to Électricité de France (EDF)

The Deal: Apollo is providing up to £4.5 billion in private credit to EDF, mainly to support the delayed and over-budget Hinkley Point C project. The financing comes in the form of unsecured, investment-grade debt with an interest rate just below 7%, issued in fixed-rate callable notes with maturities of up to 12 years.

For EDF, the deal helps bridge a significant funding gap after earlier financial partner China General Nuclear (CGN) halted additional investments, following the UK government’s decision to exclude CGN from the Sizewell C project. The agreement provides EDF with substantial sterling-denominated financing while reducing its dependence on public markets.

For Apollo, the agreement offers exposure to a long-term, government-supported infrastructure asset with attractive returns and customised lender protections. Strategically, it deepens Apollo’s presence in European private credit and infrastructure financing, positioning them well for further investments. More broadly, the deal signals how private credit is moving into large-scale, strategic projects traditionally funded by banks or public markets.

Private Credit

Private credit refers to loans provided directly to companies by non-bank lenders. The market gained momentum after the financial crisis, as tighter regulations made traditional bank lending more restrictive.

These loans are *privately negotiated* and can be customised with unique terms on interest rates, covenants, repayment structures and timing, flexibility that standard bank loans rarely offer. Demand has surged globally, particularly in Europe, where assets under management have grown from around **USD 93 billion** in 2013 to over **USD 505 billion** in 2023. Worldwide, the market is expected to reach roughly **USD 5 trillion by 2029**. Investors are attracted by higher yields, diversification benefits and stronger lender protections.

Hinkley Point C

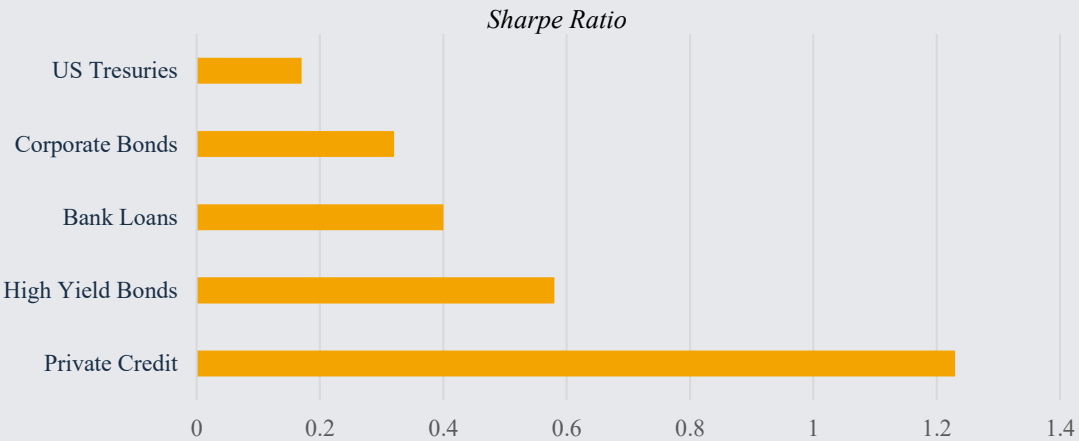
 Hinkley Point C in Somerset is one of Europe’s largest infrastructure projects. It will generate 3.2 GW of electricity, enough to power six million homes, and is led primarily by EDF.

 The project has faced significant delays and cost overruns, rising from £18 billion to over £45 billion. Completion has been pushed from 2025 to 2029–2031, adding financial pressure to EDF.

 To lower risk and cost, EDF and the UK government approved Sizewell C as a near replica of Hinkley. Reusing design, suppliers and construction is intended to improve capital efficiency.

 EDF secured a government-backed Contract for Difference guaranteeing a strike price of £92.5 per MWh in 2012 prices. The price could fall to £89.5 if the planned Sizewell project goes ahead.

10-Year Returns Relative to Volatility - Private vs. Public Markets



Sources: Apollo Global Management, Morgan Stanley, Financial Times, CNBC

Net-Zero Promises, Emerging World Demand: Can the Transition Keep Up?

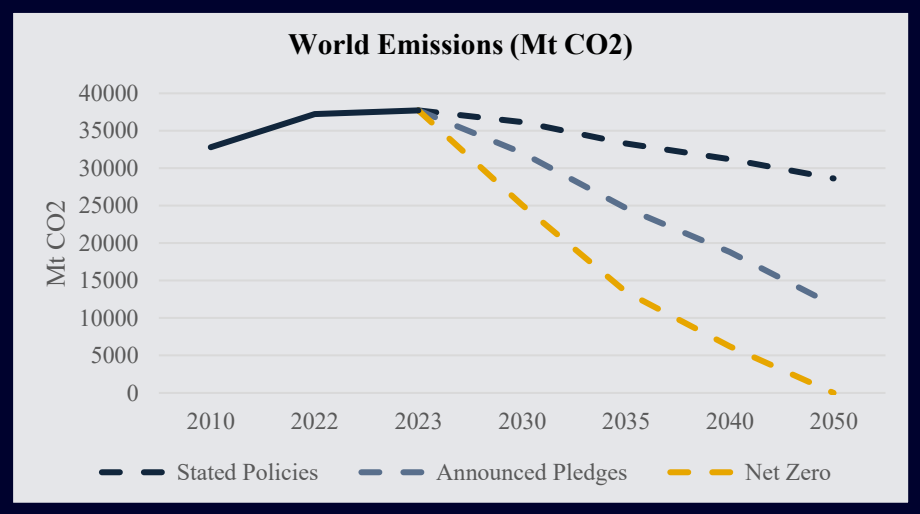
Net Zero: Ambition vs. Reality

Almost ten years after the Paris Agreement, climate policies are reshaping energy markets, unfortunately not fast enough. The EU and U.S. aim for net zero by 2050, China by 2060. Tools like the EU Emissions Trading System, with carbon prices heading above €100 per tonne, are making fossil fuels more expensive and boosting the case for renewables, nuclear and grid upgrades.

However, progress is still too slow. As the emissions graph shows, stated policies only lead to a small decline in emissions. Even if all announced pledges (countries fully delivering on their climate targets) are met, the IEA says the world is still not on track. Reaching net-zero seems almost impossible with the current measures.

There are still reasons for optimism. China has built more solar and wind capacity than Europe and the U.S. combined and is exporting this technology worldwide, pushing costs down.

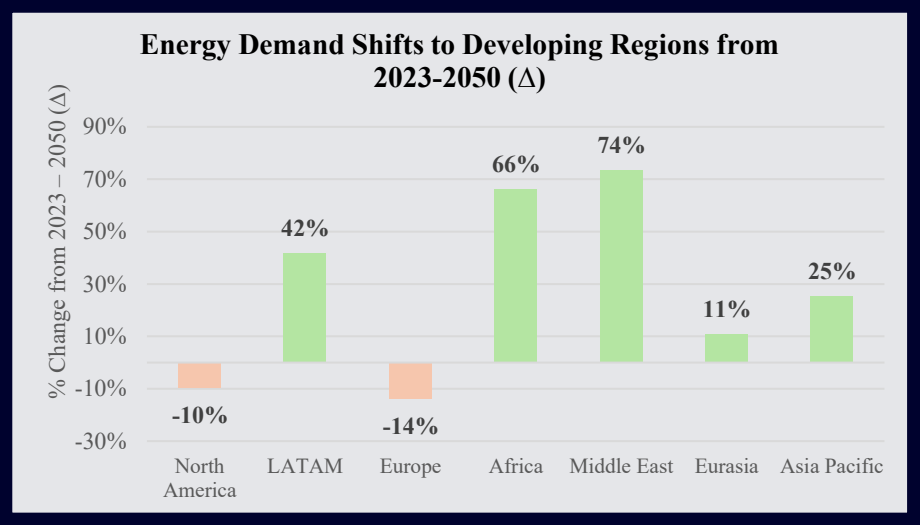
This scale-up, along with broader technological progress, has made green infrastructure like solar panels, batteries and heat pumps far cheaper and more efficient over the past decade. It proves that decarbonisation at large scale is possible. However, to reach net zero globally, this momentum must be sustained through continued innovation, massive investment, strong policy frameworks and international cooperation.



Energy Demand Is Rising Where Investment Isn't

 From 2023 to 2050, nearly all growth in global energy demand will come from developing economies, while demand in Europe and North America declines. Rapid population growth, urbanization and rising incomes in regions like Asia, Africa and Latin America are driving this shift.

 Yet investment isn't following. These economies are responsible for over 80% of energy demand growth in 2024 but receive only around 15% of global clean energy investment. Due to high risks, weak institutions, and limited investor protection, capital remains scarce. This gap poses a major challenge, as future emissions and infrastructure needs will concentrate in regions with limited capital and technology thus making net zero harder to achieve.



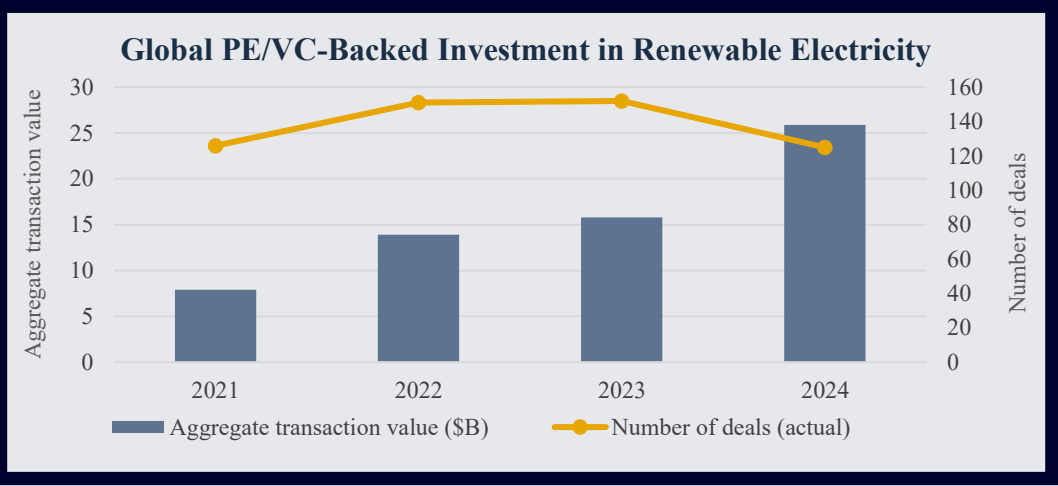
Sources: IEA World Energy Outlook 2024, The Economist, KPMG

Investments in Green Infrastructure Are Maturing: Where Climate Policy Meets Alpha

From Climate Goals to Capital Allocation

Global net-zero ambitions are no longer abstract policy goals, they are reshaping where capital flows. Green infrastructure now anchors the energy transition, spanning renewables, grids, storage, and digital systems that enhance efficiency. According to KPMG’s Energy Transition Investment Outlook 2025, clean-energy investment exceeded **USD 2 trillion in 2024**, overtaking fossil fuel spending for the first time.

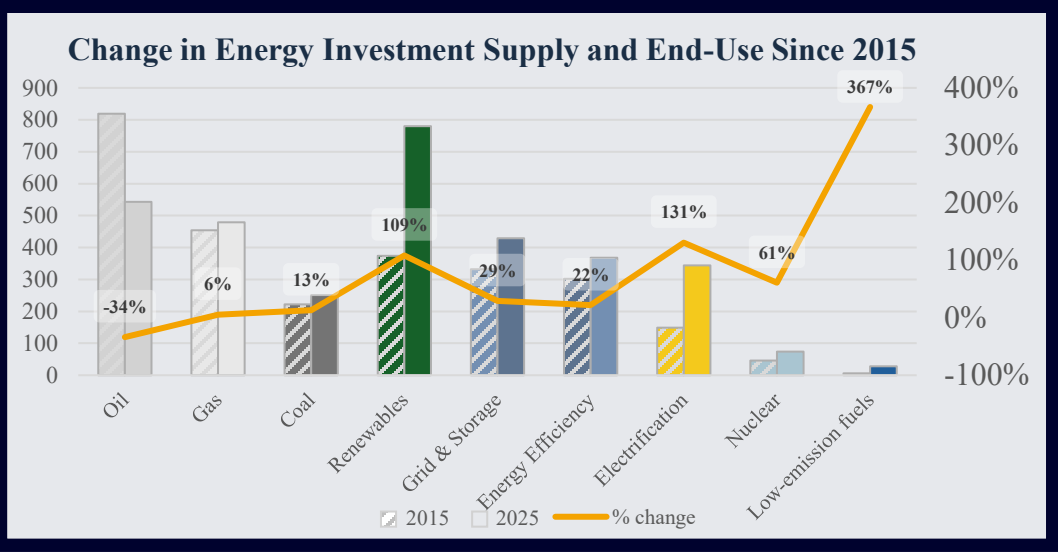
This marks a structural reallocation of capital as investors seek both stability and sustainability. In a high-interest-rate environment, assets offering contracted cash flows and measurable impact have become increasingly attractive. At the same time, carbon-intensive assets face mounting regulatory and reputational headwinds, positioning green infrastructure as both a competitive return play and a strategic hedge against transition risk.



Private Capital: Financing the Transition

Private investors are increasingly drawn to green infrastructure for its mix of stability and growth. Unlike early-stage clean-tech ventures, mature assets such as wind, solar, grids, and storage systems generate predictable cash flows through long-term power purchase agreements (PPAs) and regulated frameworks. These assets balance downside protection with upside potential from operational efficiency and technological improvement.

As public budgets tighten, private capital has become essential in bridging the funding gap of the energy transition. Institutional investors now drive build-out capacity through partnerships and fund structures rather than direct subsidies. Over 55% of private equity funds disclose environmental performance to the Carbon Disclosure Project (CDP), underscoring that sustainability has shifted from reputational signaling to a financial prerequisite for capital access and competitiveness.



Sources: KPMG, Bain, S&P Global Market Intelligence, International Energy Agency Barclays Private Bank

Policy and Security Dynamics Shape Global Capital Allocation, Creating Opportunities for PE



4-Year Period Changes: Environmental regulations and subsidy regimes are increasingly critical to private equity investment in renewables. The contrast between the Biden administration's IRA and Donald Trump's pro-oil stance highlights the volatility investors face. Shifting policies across regions directly impact the viability and returns of energy investments.



Different Incentives: The U.S. is driving clean energy with massive direct subsidies through IRA. Amongst these are tax credits, production incentives, and CAPEX support. Europe (and the Nordics) rely more on carbon pricing and market mechanisms, with support coming via grants, loans, and tax relief under stricter regulatory. American subsidies provide significant downside protection for funds. Tax credits and production-based incentives enhance internal rates of return (IRR) and attract LP capital. By contrast, European and Nordic funds face narrower margins, more bureaucracy, and increasing global competition for capital.



Bottom Line: Infrastructure is geopolitics-exposed. The UK's removal of CGN from Sizewell C plus the knock-on funding strain at Hinkley and Germany's block of a Chinese turbine deal show how security reviews can recut counterparties, supply chains, and capital stacks mid-project. Security screens can change who can invest, who can supply, and when cash arrives. Beyond subsidies and carbon pricing, the decisive variable is **geopolitical durability**, whether permits, financing, vendors, and offtake survive shifting security priorities. Underwriting should reflect this via partner selection, technology-provenance checks, contingency buffers, and clear exit pathways.

Selected highlights



Sizewell C – CGN (China) banned from investing in Sizewell C



Hinkley Point C – CGN stopped funding due to cost increases and security issues



MAN Energy solutions – Germany blocks sale to CSIC citing national security reasons

What about Norway?

Norway's first draft of the state budget (2025), proposes major cuts to Innovasjon Norge, including the full removal of the *Grønt investeringsstilsudd*. No new capital is allocated to key state investment arms Nysnø or Investinor. This weakens the anchor role public LPs often play in launching new private equity or VC funds. Without state-backed anchor LPs, new Norwegian energy focused funds may struggle to reach close.

The long-term effect of cuts to Innovasjon Norge could be a shrinking pipeline of mature companies, as early-stage renewable ventures face capital constraints. Private equity may need to engage earlier or look abroad for scalable deals.

Sources: Energyconnects, The Independent, NHO

Key Takeaways

- 1 **Global energy demand is rising, and renewables must fill the gap**
Massive underinvestment of USD 64tn creates a financing opportunity across the energy transition.
- 2 **NBIM has untapped capacity in their green infrastructure mandate**
Although the mandate allows 2% allocation to unlisted green infrastructure, only ~30% is utilized: implying potential significant future deployment into the investment sector.
- 3 **US private capital is pivoting towards European energy infrastructure**
Firms like Apollo are leading a wave of large-scale U.S. investments in European energy assets.
- 4 **Nuclear remains part of the solution but faces traditional bottlenecks**
Private credit is emerging as a key tool to finance strategically sensitive energy projects, especially where national security concerns limit public funding.
- 5 **Developing markets are severely underinvested despite rising demand**
High risk, weak institutions, and financing gaps persist, but they represent substantial long-term growth opportunities.
- 6 **Green investments have evolved from subsidy-dependent to return-generating**
What was once seen as capital-draining is now one of the most attractive and resilient investment themes.
- 7 **Energy investments are exposed to policy and geopolitics**
Rising tensions are pushing Europe to shield strategic infrastructure, even as financing gaps persist – possibly creating opportunity for Private Equity.



Report Contributors



Erlend Hanem
Fourth year - MSc



Vetle Vikene Waldenstrøm
Third year - BSc



Truls Wigdel
Third year - BSc



Tryggve Haslerud Johannessen
Second year - BSc



Fredrik Bergmann Røren
Third year - BSc



Katrine Wee
Fourth year - MSc



Sina Dorthea Egeland Sverdrup
Third year - BSc

About Us

NHHS Private Equity is a student-led group at the Norwegian School of Economics (NHH), created for students with a strong interest in private equity. Our mission is to understand the PE industry through academic events, workshops, company visits, and hands-on case work. We aim to foster a strong learning environment and serve as a bridge between the student mass at NHH and the private equity industry in Norway and the broader Nordic region.

Reach us at: Privateequity@nhhs.no

We publish in-depth sector reports each semester, covering:

- Consumer Goods & Retail
- Industrials
- Energy
- Healthcare
- TMT
- Real Estate

These reports provide students with applied insights into market dynamics, valuation trends, and investment trends across industries.



NHHS
Private Equity