The Nordic Energy Transformation Imperative

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The energy sector is a cornerstone of the Nordic economy and a pillar of the region's industrial competitiveness. Energy accounts for approximately 10% of the Nordics' gross value added GVA[1], which is on par with leading sectors such as healthcare, real estate, and retail. Moreover, because the energy sector delivers some of the lowest-cost and lowest-emission power in Europe, the region's energy-intensive sectors, from aluminum production in Norway to steel manufacturing in Sweden, are highly competitive on the global stage.

Despite its strong legacy, however, the sector faces mounting structural challenges. Over the past decade, returns have consistently trailed other industries, with energy companies delivering materially lower return on capital employed (ROCE) than industrial peers. To improve their own performance and continue to support the region's economy, companies need to address three broad trends: stagnating productivity, increasing complexity, and uncertain demand.

A Strong Economic Engine

Although the share of GVA has declined from a peak of around 15% during the energy crisis, it's grown from a decade ago when it stood at 7–8%. The contribution is most pronounced in Norway, where petroleum activities account for roughly 30% of GVA. Across Sweden, Finland, and Norway, the power and utilities sector—supported by substantial domestic hydropower and wind resources—contributes 2–3% of GVA. The remaining share stems from refined petroleum and chemical products **(see exhibit 1)**.

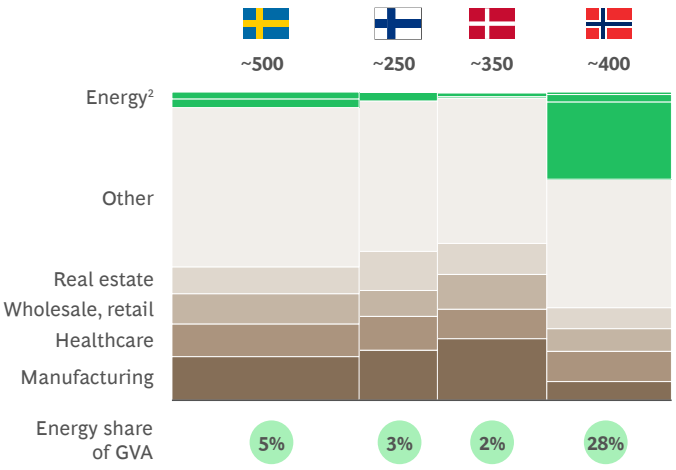
Abundant domestic resources, strong regional integration, and a well-developed power system provide reliable, low-cost electricity that gives the Nordics an industrial advantage. In the first half of 2025, for example, Danish non-households paid 35% less for electricity than the EU average, while Norwegian non-households paid 57% less.

In addition, because the Nordics generate some of the lowest emissions electricity in the world—50% to 90% lower than the European average—they can offer premium low-carbon products such as low-carbon aluminum, green steel, and synthetic fuels **(see exhibit 2)**. They also have less exposure to carbon pricing under the EU Emissions Trading System.

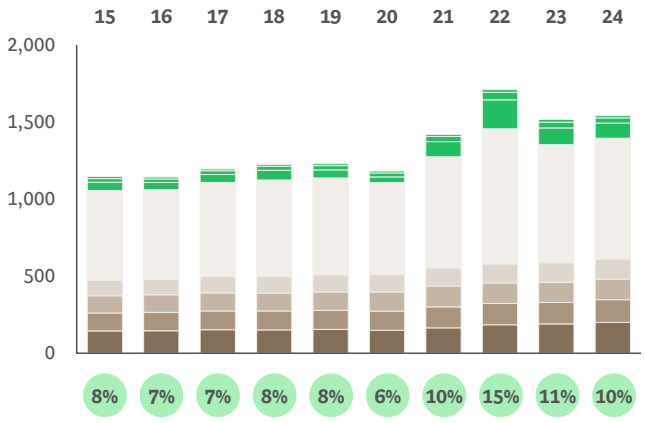
EXHIBIT 1

Energy industry contributes 10% of the total gross value-add in Nordics annually

Gross Value Add in Nordics by country[1] (€B, '24)



Gross Value Add in Nordics[1] (€B, '15–'24)



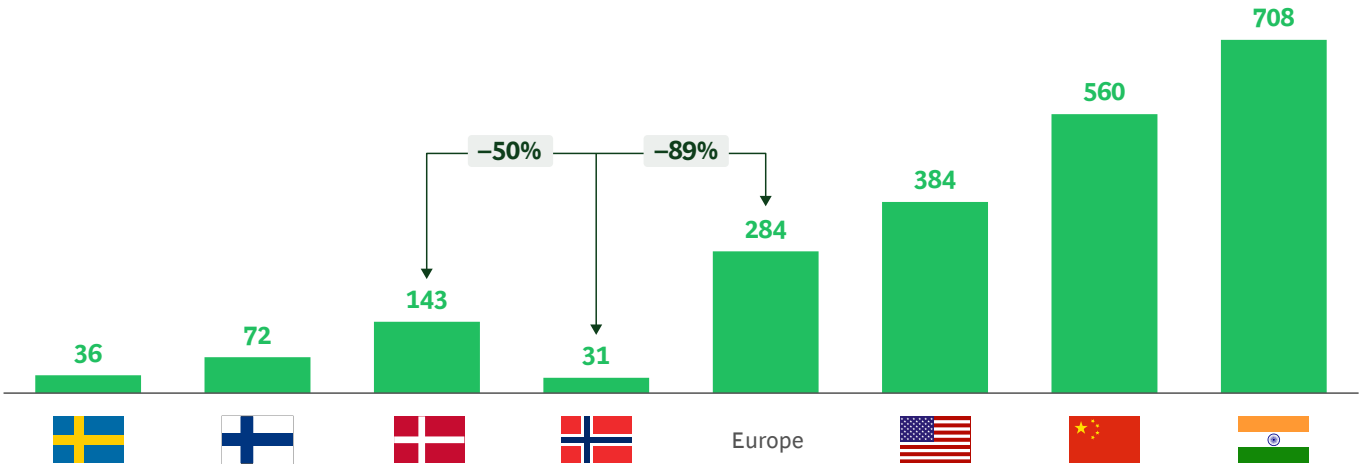
Sources: Eurostat and National statistics authorities: Tilastokeskus (FI), Statiska Centralbyrån (SWE), Danmarks Statistik (DK), Statistisk Sentralbyrå (NO).
[1]Economies of Sweden, Finland, Norway and Denmark.
[2]Including O&G upstream and downstream, electricity production and distribution.

1. Gross Value Added (GVA) is a standard economic measure of the value created by an activity, sector, or economy (total output – total intermediate consumption).

EXHIBIT 2

The Nordic energy supply is cleaner than that of other major economies

Carbon intensity of electricity generation (gCO_2e/kWh)



Sources: Ember (2025); Energy Institute - Statistical Review of World Energy (2025); Our World in Data; BCG analysis.

A Decarbonization Leader

The energy sector has been the primary driver of decarbonization in the Nordics, accounting for more than 60% of total emissions reductions since 1990. It is expected to deliver nearly half of the remaining reductions required by 2035, underscoring its central role in achieving climate targets.

Large-scale, sustained investments in low-carbon energy have made this progress possible. In Denmark alone, renewable energy generation has increased by roughly 60% over the past decade, while biofuels and waste have grown by 38%. In many cases, this transition has required significant capital deployment and has weighed on short-term returns.

At the same time, the increasing penetration of wind power is starting to erode earnings. Similar weather patterns in regions with wind farms are driving up supply simultaneously, increasing the overall system supply and thereby pushing prices down. These correlations cause price capture rates to decrease significantly for renewable producers.

Profitability Challenges

Given the industry's positive economic influence, it's a paradox that the ROCE of individual energy companies has consistently trailed industrial peers. Asset-based utilities have fared particularly poorly, with an average pre-tax ROCE of around 7% compared to the 26% average delivered by Nordic manufacturing peers (**see exhibit 3**).

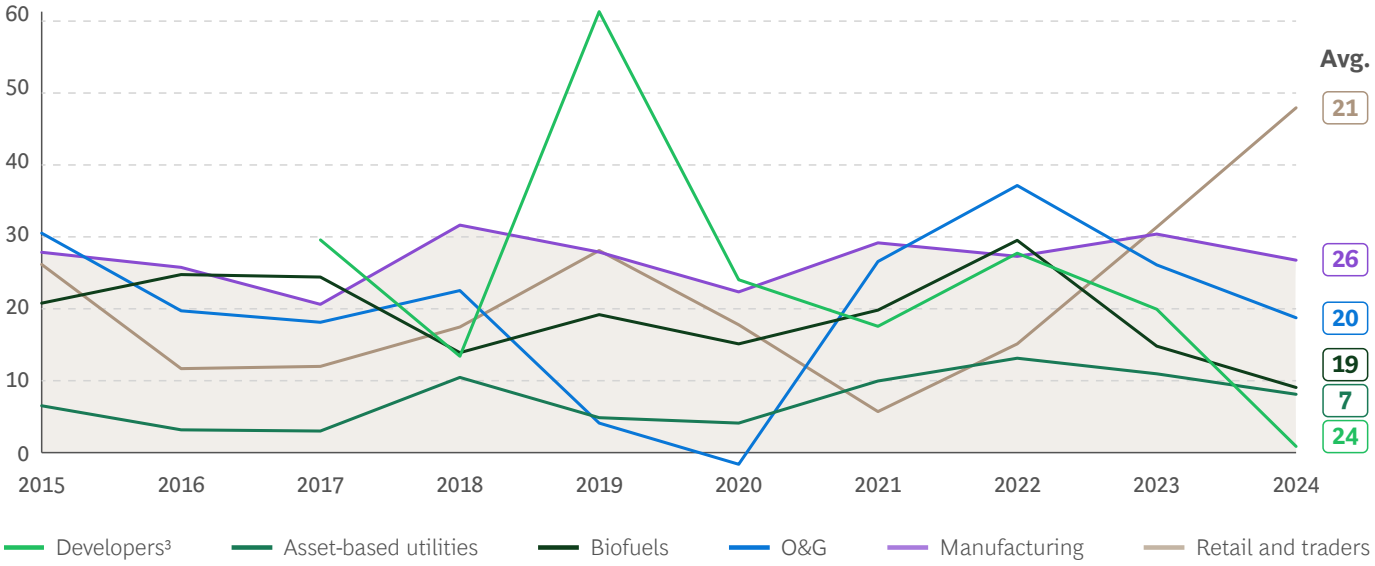
Meanwhile, profitability has become more volatile, amplified by the 2022 energy crisis. O&G companies, for example, moved from negative ROCE in 2020 to 36% in 2022. The patterns are similar among biofuel producers and asset-based utilities. Retailers and traders, however, display a different dynamic: retailers appear to have sustained elevated post-crisis pricing levels, while trader profits are primarily driven by increased volatility caused by the rising share of renewables in generation.

To improve ROCE and profitability and position themselves for long-term success, energy companies need to address three key trends: stagnating productivity, increasing complexity, and uncertain demand.

EXHIBIT 3

Energy returns have generally been low compared to manufacturing peers

ROCE for selected Nordic industries 2015–2024 (%)[1]



Source: Moody's Orbis.
[1]ROCE using pre-tax profit/loss. Peer set includes companies under NACE codes 35XX for Energy, 28XX for Manufacturing, and search is limited to companies with >10M€ Revenues in 2024.
[2]Peer set includes companies under NACE code 3511-Production of electricity, with >10M€ Revenues in 2024. Excl. 2015–2016 due to data availability.

Stagnating Productivity

Returns for electricity producers have declined since 2023, largely due to lower power prices. Yet these short-term market movements mask a more persistent structural issue: stagnating productivity. Over the past decade, industrial labor productivity has increased by 23% while labor productivity at utilities has improved by only 2%—closer to the construction sector, where productivity has declined by 15% **(see exhibit 4)**.

When productivity is measured as generation per hour worked, a similar pattern emerges. The UK and Italy show comparable stagnation or decline. In contrast, the United States has achieved marked productivity gains over the same period, demonstrating that improvement is possible **(see exhibit 5)**.

Increasing Complexity

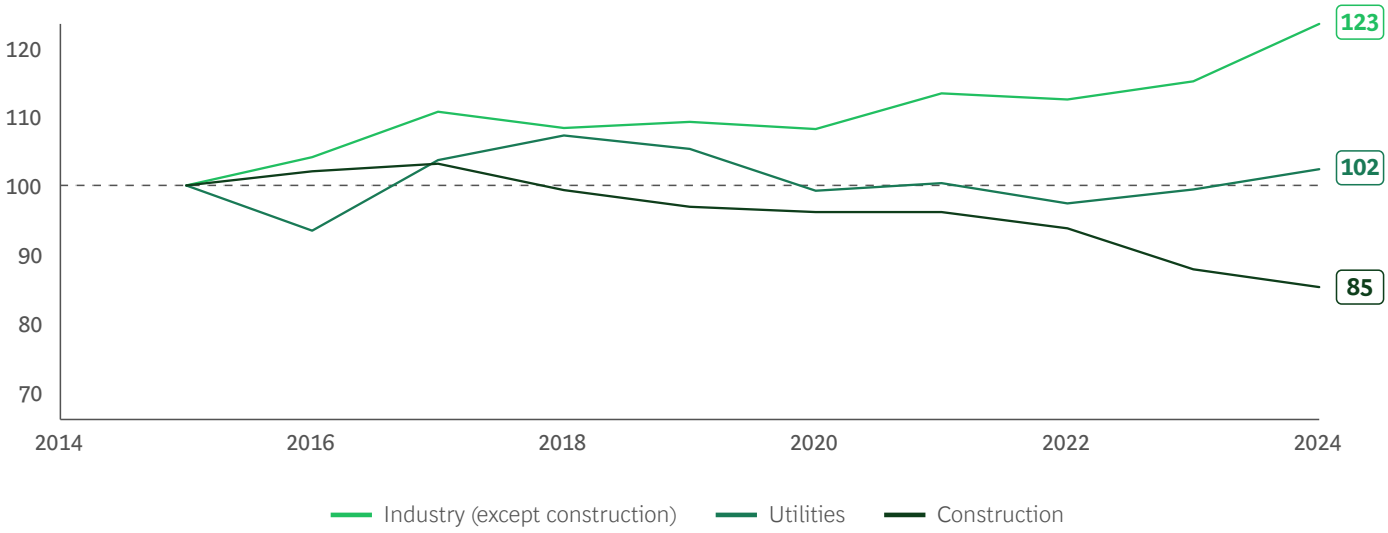
A growing share of variable renewable generation, the phase-down of dispatchable fossil capacity, the transition to 15-minute settlement in day-ahead markets, and deeper interconnection with the broader European power system are all contributing to greater system complexity and volatility. Although absolute price levels have eased since the energy crisis, daily price fluctuations remain elevated **(see exhibit 6)**.

The shift toward a more decentralized and variable generation mix is also placing growing pressure on the power grid. Changing demand patterns, such as rising EV charging, further amplify system complexity. While challenging, all this complexity and volatility creates opportunities for those with the right capabilities, flexibility and commercial drive to monetize the emerging opportunities.

EXHIBIT 4

Utilities have not kept up in productivity growth

Real labor productivity growth Nordics 2015–2024[1]

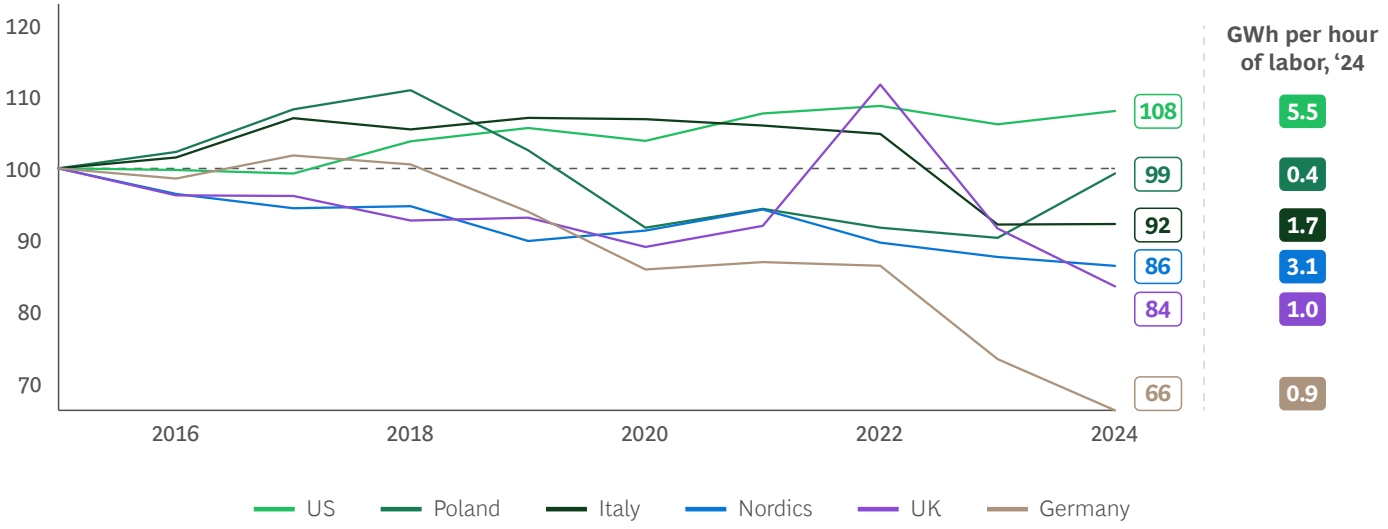


Source: Eurostat.
[1]For "Labour productivity and unit labour costs by industry" –statistic. Selected codes: "Electricity, gas, steam and air conditioning supply", "Construction" and "Industry (excluding construction)".

EXHIBIT 5

Productivity development of Nordic Utilities has also been weak compared to some western peers

Annual GWh generated per hour worked, indexed, 2015–2024[1]

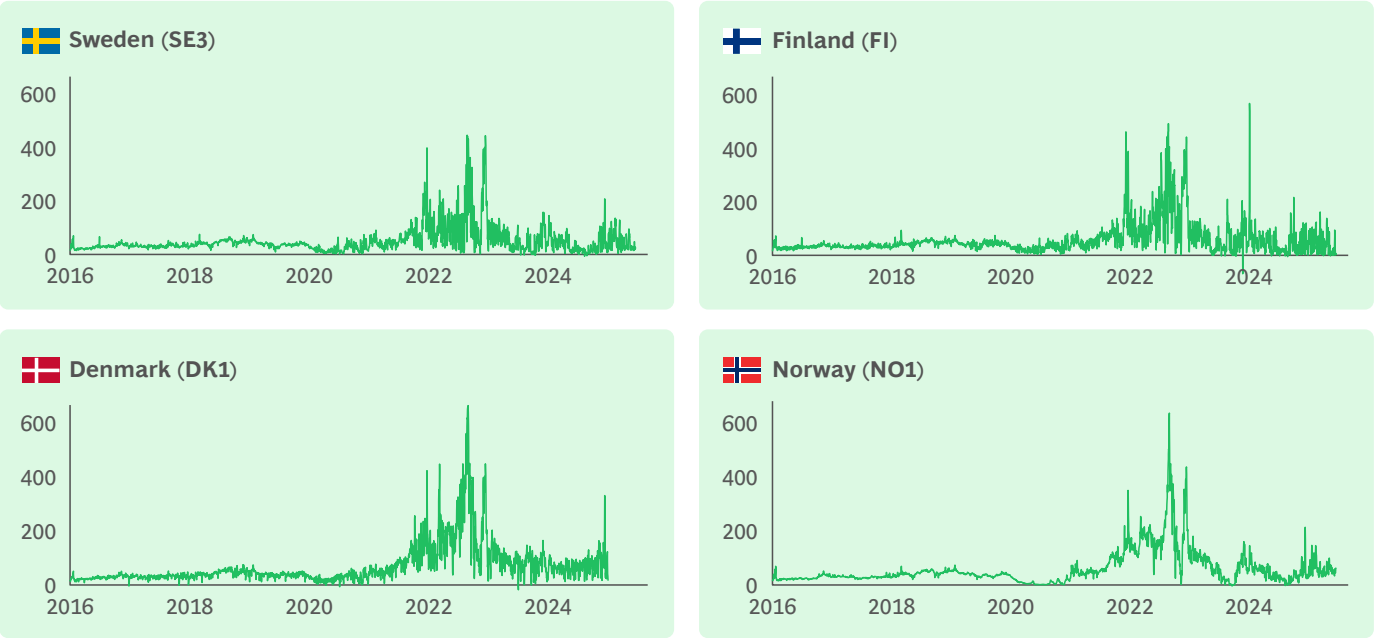


Source: Eurostat, National Statistical Agencies (UK – Office for National Statistics and US – Federal Reserve Bank of St. Louis / U.S. BLS).
[1]Annually generated GWh divided by hours worked in "Electricity, gas, steam and air conditioning supply" industry.

EXHIBIT 6

While prices have come down from the crisis, volatility has remained

Daily average electricity price for selected price areas (€/MWh)



Source: Nord Pool.

Uncertain Demand

The Nordic power system is entering its most dynamic demand shift in decades. Historically, electricity demand has remained relatively stable, as efficiency gains and the outsourcing of energy-intensive industries offset underlying growth.

That dynamic may now be changing. Several projections[2] indicate a marked acceleration in demand, driven by expanding data centers, transport electrification, and large-scale industrial decarbonization. This creates substantial investment opportunities across generation, grids, and flexibility solutions targeting how energy is consumed, stored, and moved. However, uncertainty remains high—particularly in hard-to-abate sectors such as green steel and green fuels, where projects have recently been delayed, scaled down, or cancelled.

As a result, future demand may differ materially from historical patterns in both timing and location. Volume trajectories, load profiles, and regional concentration are likely to be less predictable, challenging traditional capital allocation frameworks and risk models.

Each Energy Segment Must Transform

To meet the next decade's demands, energy companies need to transform how they operate across three strategic axes.

- ***Lift productivity and performance*** through operational excellence and disciplined capital allocation.
- ***Conquer complexity*** in order to navigate more volatile markets and operate in a more decentralized energy system.
- ***Prepare for uncertain growth*** by leveraging more adaptive approaches to planning, investment, and supply-chain management.

But there is no one-size-fits-all approach to tackling these three. Each segment of the energy sector faces distinct starting points and future pressures that will dictate how they proceed.

2. E.g., Nordic Grid Development Perspective 2025, DNV Norway Energy Transition Outlook 2024.

Asset-based utilities prioritized expanding renewables both domestically and internationally before and during the energy crisis. With slow demand growth and declining power prices, they also ventured beyond their core, exploring energy-transition opportunities such as EV charging and green hydrogen. While these efforts delivered economic and decarbonization benefits, shareholder returns have lagged.

To improve financial performance, their focus must now shift toward productivity. Companies need to focus on cost efficiency and build optimization capabilities to extract value from flexibility, especially as margins have faced pressure from lower prices and rising exposure to international competition. Simultaneously, mastering the **complexity** of a decentralized energy system will unlock further value.

To succeed, asset-based utilities must also address some of the legacy operating model challenges they have inherited, including top-heavy governance, lengthy decision-making, insufficient accountability, and difficulties prioritizing initiatives. Doing so will put them in an excellent position to benefit from accelerating domestic demand.

Molecule-based suppliers pursued aggressive growth following new and expected regulations, the European energy crisis, and elevated price levels. Alongside fossil fuel investments, many diversified heavily into the energy transition, expanding into biofuels, offshore wind, and hydrogen.

But given the recent lower price environment and margin pressure, the focus must return to productivity. Fossil fuel operations need to establish a leading cost position as global demand stabilizes or declines. Renewable fuels must contend with more intense competition from oil and gas majors and low-cost Chinese players. As the market matures, rising volatility will also present growing opportunities for those able to capture value from price swings.

Retailers and traders have a strong track record of combining innovation and financial performance with an asset-light business model, improving ROCE compared to other energy sector players. Going forward, retailers should continue to automate and streamline customer-facing processes and pursue M&A to grow and scale efficiencies. In particular, they could target less developed European markets.

Continued product innovation is also important, such as devising new contracting models that balance the risk and cost concerns of different customer segments. For example, by connecting and aggregating consumer level flexible loads, helping customers to save costs by participating in system balancing across different markets.

Traders, meanwhile, need to double down on automating trading models to optimize flexibility assets, such as batteries and e-boilers, over shorter time periods. Success will depend on tapping into complex data to improve forecasting, building flexibility portfolios, and offering optimization as a service.

Asset developers expanded rapidly, building out large project pipelines at attractive valuations during a prolonged period of favorable conditions: strong investor appetite, low interest rates, declining equipment costs, and high capture rates. But the environment has now shifted. After a decade of exponential growth in wind and solar, the Nordic–Baltic market entered its first broad-based downcycle in 2022–2023.

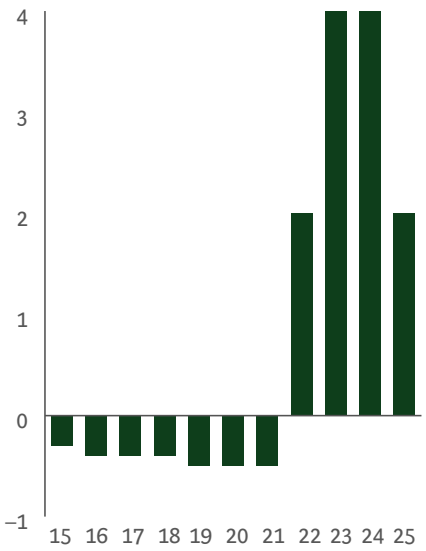
A combination of headwinds has reshaped the economics. Equipment costs rose sharply due to supply chain disruption and inflation. Financing costs increased as interest rates moved up from historic lows. At the same time, revenue expectations weakened amid lower and more volatile power prices. Capture rates declined as the share of co-variant renewable generation increased. In Finland, for example, wind capture rates fell from 93% in 2021 to 66% in 2024.

To remain competitive, developers must drive down costs through operational efficiency, discipline and procurement excellence. At the same time, integrating flexibility—such as storage (holding when prices are low and selling when prices are high) and advanced asset steering (optimizing the use of an asset)—will be critical to capture value from volatility. Looking further ahead, developers must balance readiness for renewed demand growth with capital discipline. Investment decisions should be grounded in clear demand signals.

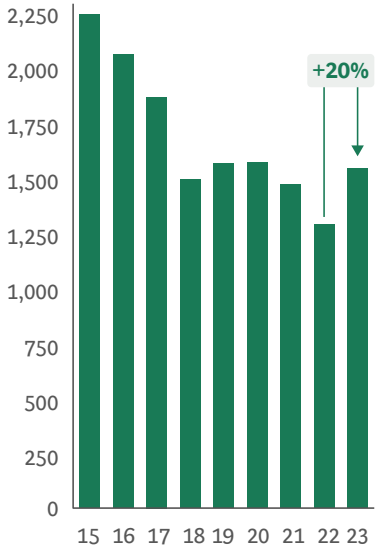
EXHIBIT 7

Asset developers face a triple-headwind

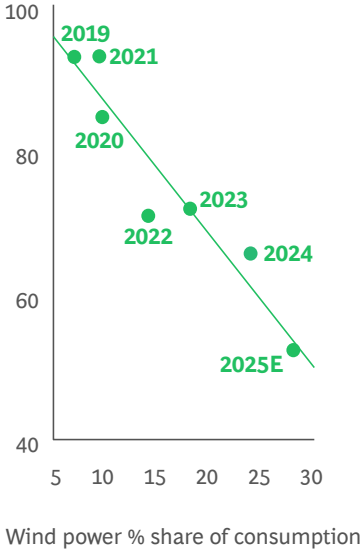
ECB overnight deposit rate (%)



Onshore wind weighted avg. installed cost in Sweden ($/kWh)



Wind capture price factor and share of consumption in Finland (%)



Sources: IRENA, ECB, LSEG, Tilastokeskus, Nord pool Spot, Energiateollisuus; BCG: How wind power lost 35% of its value in five years – case Finland; BCG analysis.
Note: 2025E Year to date until 23.9.

Common Traits of Success

Each segment of the energy sector will address productivity, complexity and growth challenges differently based on their own unique starting point. But in our experience, successful transformations share several common traits.

- Strong top-down leadership, with a CEO putting the transformation at the center of the agenda.
- Credible targets and reporting, with the CEO and Board held accountable to external stakeholders for delivering tangible results.
- Keeping the entire company in scope to enable dynamic prioritization according to value, with the impact hitting the P&L.
- Leading with action with a laser-focus on P&L impact. Action and consistent messaging drive change towards a more performance-oriented culture.
- Delivery discipline with a clear commitment to targets, consistent follow-up, and an unbending drive to deliver value.

A Holistic Approach to Transformation

Many Nordic energy companies have taken concrete steps to transform and prepare for the future energy ecosystem. But their approach has often been too narrow, either focusing on growth, productivity or complexity. Instead, companies must balance these three based on their own unique circumstances.

Future energy transformations need to combine a tried-and-true programmatic rigor with a strategic perspective, prioritizing the most effective initiatives to reduce costs and accelerate revenue growth to drive returns and shareholder value. This will require boldness, clarity and deep structural changes.

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