

# Gridlock

the case for electricity grid investments in a 'Paris Aligned' portfolio

Commentary on behalf of the Storebrand 'Plus' funds by Lauren Juliff and Henrik Wold Nilsen

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Any scientific pathway for net zero, or alignment with the goals of the Paris agreement, involves massive growth in global electricity demand as we transition our fossil dependent economic sectors to electric alternatives. Deployment of renewable energy sources to meet the increased demand from a) the energy transition and b) Electric Vehicle (EV) uptake feed into the "4 mega-trends' driving a step change in electricity consumption"<sup>1</sup>, along with c) dramatically increasing electricity demand in the US as they re-domesticate manufacturing capacity, and d) unprecedented data centre demand growth predominantly driven by AI.

The sky-rocketing demand for renewable energy sources predicted in net zero pathways led to "record investments in renewable technologies"<sup>2</sup>. Renewables are set to outstrip coal next year to become the number one source of electricity worldwide<sup>3</sup>. For example, energy generated by renewable sources accounted for 42% of UK power in 2023, while coal and gas generation fell by 20%<sup>4</sup>. But the electricity grid has not experienced a paralleled level of investment, meaning deployment of renewable energy sources is now hitting a bottleneck, with UK grid connection waiting times reported as more than 10 years and a queue of projects waiting for connection to the USA grid accounting for around 2,600GW of power<sup>5</sup>.

This **gridlock** for the renewable energy transition has focused attention on the need for much greater transmission capacity, as well as an upgrade of existing infrastructure, if governments are to meet their stated objectives for low emission power sectors.

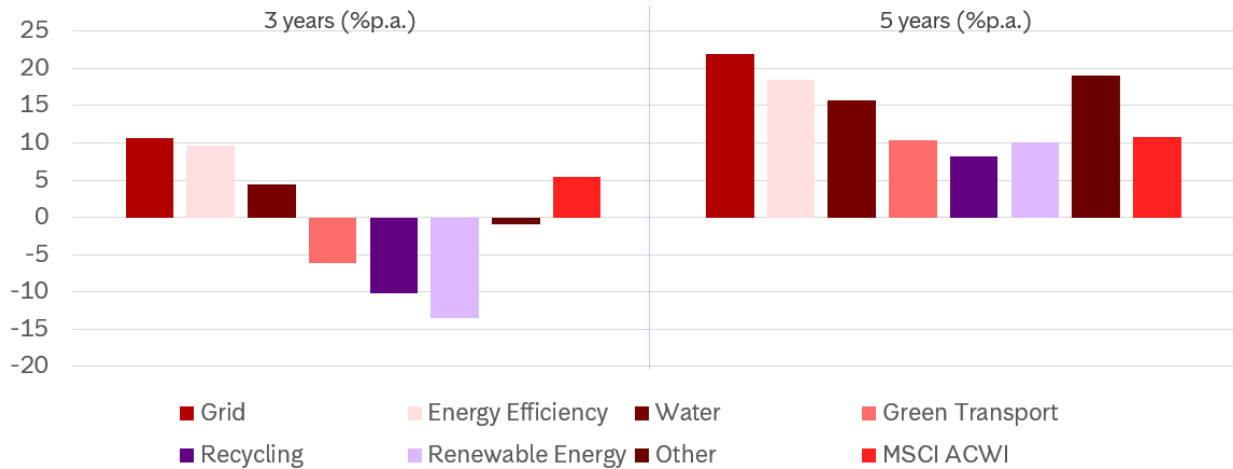
It has been a bumpy ride for investors in renewable energy technologies over the past ten years. Following outperformance of over 40% for the average thematic climate solutions fund in 2020, they have been glaringly underperforming the broader equity market ever since<sup>6</sup>. Our climate aware equity fund range (Storebrand Plus Funds) aims for long term alignment with the goals of the Paris agreement by seeking exposure to what we call '**climate beta**'. We define this as being overweight companies that we

expect to benefit from the transition to a low carbon economy (climate positive exposures) and underweight, or avoiding, companies that we expect to suffer (climate negative exposures).

We believe investments connected to upgrading and expanding the electricity grid will benefit from the transition and so we include them in our allocation to '**climate solutions**'<sup>7</sup> companies and make allowances in our portfolio construction methodology to ensure our positioning reflects that view.

Our earlier research has demonstrated that climate index strategies (such as EU defined Paris Aligned Benchmarks (PABs)) often redirect client assets in the direction of Big Tech rather than climate solutions technologies, as their largest overweight positions are in the Magnificent Seven<sup>8</sup>. Contrastingly, our largest over-weights are individually small, minimising stock risk, but reflect our thematic tilt towards companies that we expect to benefit from the transition to a low carbon economy. Our climate solutions allocation incorporates the following themes: renewable energy, energy efficiency, green transport, recycling, water, green chemistry and other<sup>9</sup>. Until recently, grid hardware investments have been incorporated into our renewable energy theme but, given the importance of the grid to transition viability, its relative lack of attention from investors in relation to renewable energy and the number of available investment opportunities we find in this space, we now recognise the need to separate and define grid hardware as a category of its own. This is supported by the fact that the performance of our grid related companies has demonstrated meaningful diversification when held alongside renewable energy technologies in our portfolio. In fact, our grid theme produced the strongest returns in 2023 and H1 2024 when compared with our other sub themes in the climate solutions portfolio. Our backward-looking analysis demonstrates that it is the best performing climate solutions theme over 3 and 5 years, where other subsectors have seen a more recent drawdown, as illustrated in Figure 1.

**Figure 1: Performance of our Climate Solutions Portfolio by Theme**



Source: Storebrand, returns in USD based on backward looking performance of companies in current portfolio using average of emerging markets and developed markets portfolios combined. For illustration only.

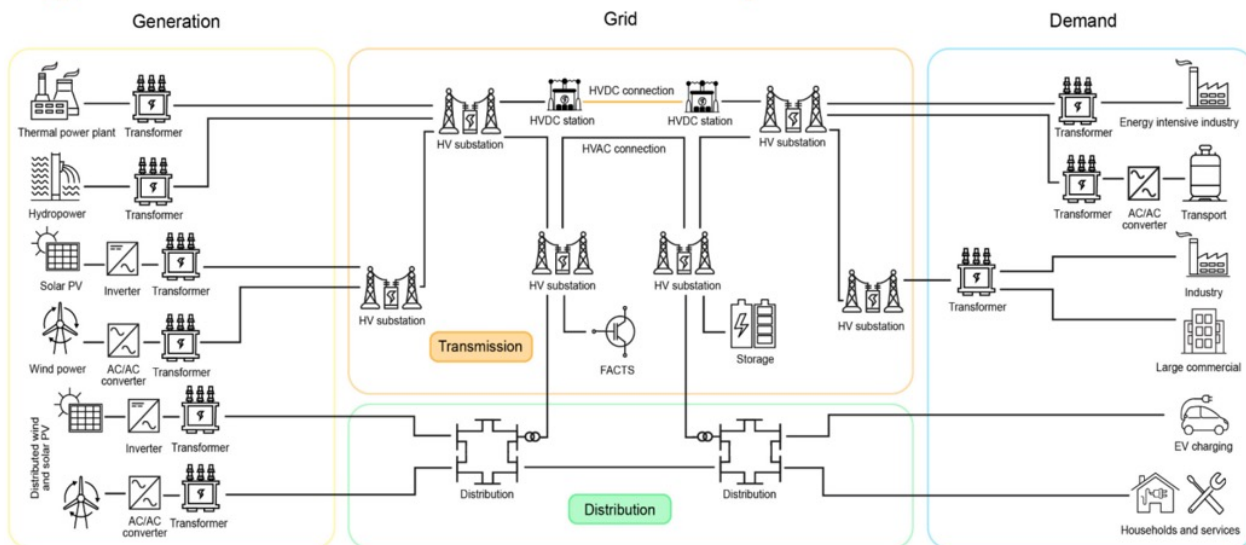
The electricity grid is an extremely complex machine with many different parts and elements, providing a variety of global and local investment opportunities.

Figure 2 provides an overview of the grid system, illustrating how electricity is produced and delivered to end consumers.

electricity generation is increasingly multifarious and diverse, introducing variability from intermittent renewable generation as well as a requirement for different methods of power conversion. Next, the electricity must be transported and distributed to the end user. This transportation through the grid requires high voltage power along long

Production and consumption volumes are matched so that our demand, whether it be boiling a kettle at home or taking the train to work, is met instantaneously and seamlessly in a well-functioning system. However, underlying the delivery we experience is a vastly complex network. First,

**Figure 2: An Overview of the Electricity Grid**



Source: IEA Grid Report 2023<sup>10</sup>. Notes: FACTS = flexible alternating current transmission system; HVAC = high-voltage alternating current; HVDC = high-voltage direct current.

distance lines to reduce energy loss and ensure a compact system. Transformers are therefore required to first increase and then reduce the voltage before and after long-distance transportation, respectively. Heavy industry demand is connected directly to the grid with on-site transformer stations but households consume low voltage power from the distribution grid.

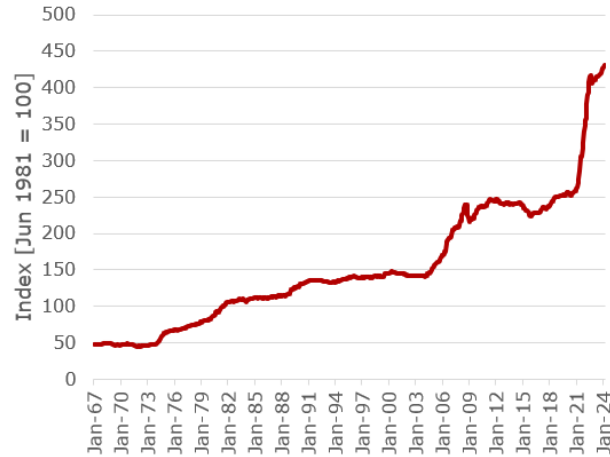
The enhanced complexity from an increasingly distributed energy production system, alongside the augmented demand for electricity driven by the 4 mega-trends listed above, mean we are stretching the capacity of our existing grid systems. Our grid needs upgrading and expanding to facilitate ongoing electricity demand, requiring substantial investment and offering interesting opportunities for investors.

Thus far, transformer stations have not received the level of focus and attention given to windmills and solar PV. A resulting shortage in hardware supply has created a bottleneck, whereby renewable projects are struggling to connect to the grid and the price of specialist transformer hardware has rocketed, as shown in Figure 3.

The two charts in Figure 4 are taken from the IEA Grid Report 2023, illustrating both energy demand projections and global electricity investments in their net zero scenario (NZE).

Recent power outages in Houston, as “sweltering heat followed the storm” of the recent Hurricane Beryl, highlighted the need for adaptive upgrading of old grid systems to cope with a changing climate<sup>11</sup>.

**Figure 3: Electric Power and Speciality Transformer Manufacturing Power Prices Index (Federal Reserve Bank of St Louis)**

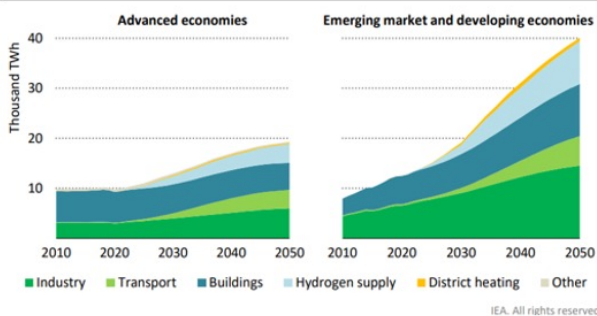


Source: Federal Reserve Bank of St Louis

Increasing temperatures and extreme weather conditions pile additional stress on the grid as demand for cooling systems rises while more equipment failures occur from overheating, floods and storms. Grid vulnerability is an issue, alongside grid capacity, in both advanced and developing economies. But, the lion’s share of demand growth will be in Emerging Markets, coming from a lower base of current energy consumption along with population growth and leading to an increase in living standards as well as a decarbonised grid. The drivers of investment in the grid are threefold – 1) replacing ageing utilities and pipelines, mainly in the global north 2) connecting renewable energy to the grid and 3) the biggest driver by far being demand, spurred by population and wealth growth in emerging markets.

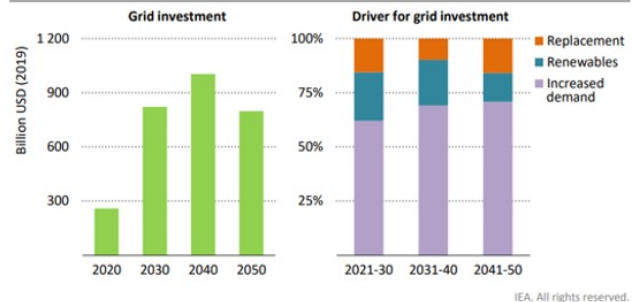
**Figure 4: An Overview of the Electricity Grid**

**Figure 3.9** Electricity demand by sector and regional grouping in the NZE



Source: IEA Grid Report 2023

**Figure 3.12** Global investment in electricity networks in the NZE



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**Figure 5: Increasing grid expenditure<sup>12</sup>**

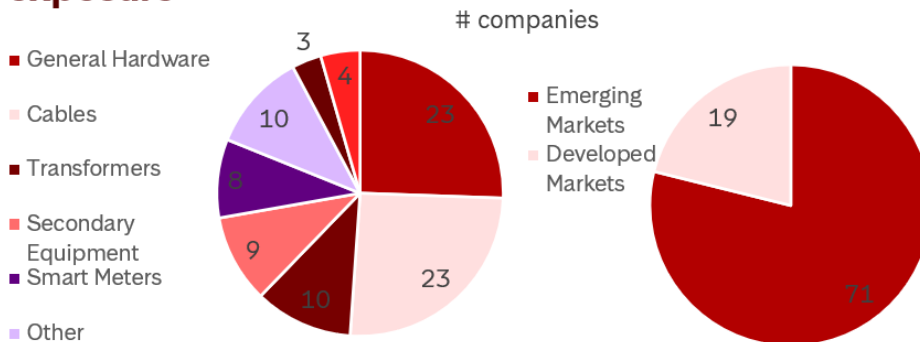


Both China and India have invested heavily in their grid systems. Chinese grid investment is set to increase dramatically over the next six years to meet rising electricity demand and align with its green energy policy, as illustrated in Figure 5.

As climate-aware investors in global markets we are keen to find broad, diversified exposure to these growth opportunities that align with our goals. Through research into the mechanics and components of the grid we can understand specifically what kind of investments must take place to expand and modernise electricity grids. For example, when building ultra-high voltage transmission grids, costs can be split into 3 components as illustrated in Figure 6: engineering; towers and cables; equipment in substations where the transforming takes place. There are multiple types of investment opportunity within the equipment category, from transformers to breakers (switches allowing power to be shut down in an emergency) and secondary equipment which relates to automisation and monitoring allowing the grid to react to changes in consumption and frequency, avoiding blackouts. On the consumer side we can gain exposure to EV charging hardware and smart grid equipment. And, as illustrated in the grid overview, Figure 2, inverters are required both on the production side, in the case of solar PV, and on the consumer side for EVs and battery storage systems.

We translate the grid theme into an investable opportunity list of 90 companies<sup>13</sup> across developed and emerging markets and find that only 15 of those companies are in the MSCI AC World Index. This means that climate indices tilting around cap-weighted parent benchmarks are often limited in terms of available exposure to grid related investment opportunities. To ensure we gain exposure to the climate related beta we seek, while minimising benchmark relative risk, we add these 90 companies to our designated climate solutions list and allow our portfolio optimiser to add them to the portfolio in a low risk, diversified manner. Each position is small, meaning stock specific risk is low, but we gain good overall exposure to the grid investment theme. Within the theme we find a broad mix of investment opportunities from hardware to cables, transformers, secondary/monitoring equipment and consumer end demand, as illustrated in Figure 6.

**Figure 6: Storebrand Plus Funds, grid investment theme exposure**



Source: Storebrand. Average returns across all companies in each climate solutions sub-theme. Grid is so far reported as part of the Renewable Electricity sub-theme, but will be carved out as a standalone theme.

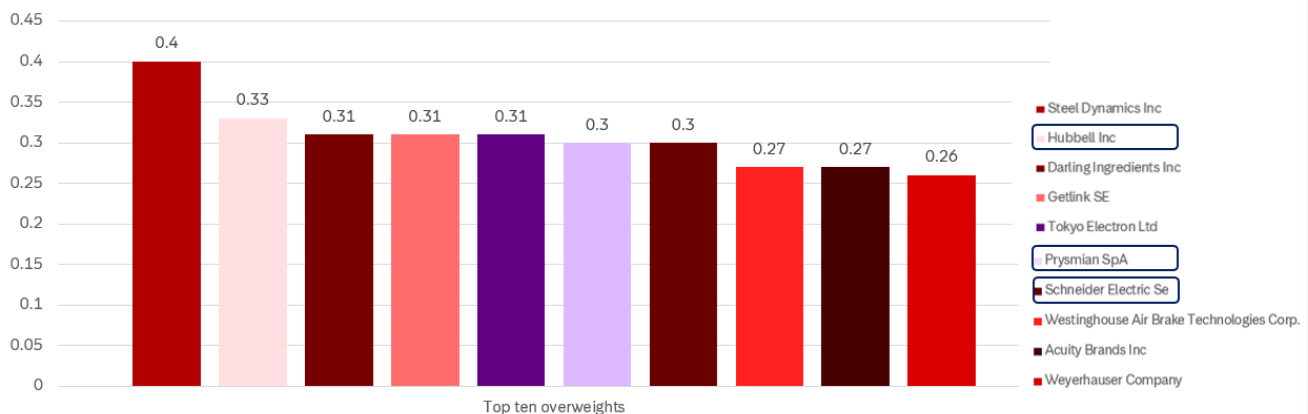
The majority of listed companies in the universe are in China, which has dominated grid expansion over the past 10-20 years, followed by India. There are far fewer companies in developed markets but here we find larger companies, such as Prysmian and Hubbell, that are also in the mainstream index. Focusing in on the developed markets exposure offers an interesting insight aligned with our earlier research on the use of reported carbon intensity as a transition risk metric.

Our aim for climate beta exposure is best illustrated by our top over- and under-weight positions relative to the market cap benchmark that we track. Our largest over-weights are small by design, avoiding stock specific risk, but are in companies that we expect to benefit from the low carbon transition. Similarly, our largest underweights will be in fossil fuel companies (excluded) and other climate negative risk exposures, alongside companies which may be excluded for other reasons such as human rights violations or poor governance.

We find that we must carve out a list of solutions companies and ensure the optimiser makes allowances for them in portfolio construction to provide meaningful and diversified exposure to climate solutions companies and themes. We do not rely entirely on optimisation using emissions data and green revenues as defined by external providers. For example, we do not apply the CO<sub>2</sub> intensity metric to climate solutions investments in portfolio optimisation. The grid investments offer a good example of why this approach is necessary.

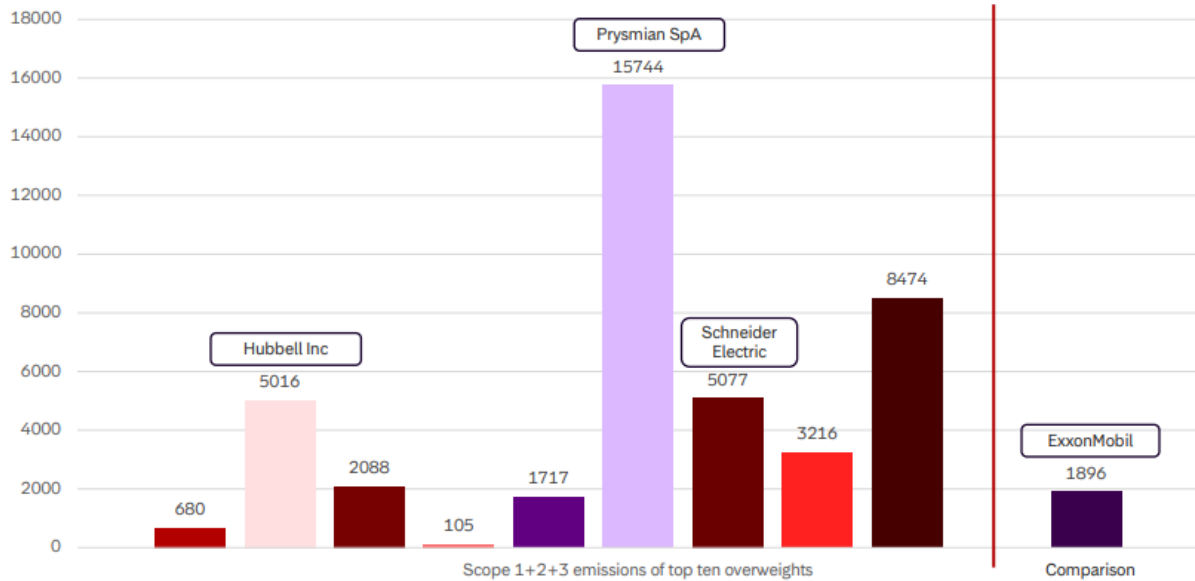
Figure 7 presents the top ten over-weights in our global developed market strategy. Our largest individual overweight position is only 40bps and all of our top ten over-weights are in companies that we judge to offer positive climate beta exposure. Three of our largest overweight positions are in grid-related investment opportunities, companies which also exist in the MSCI World benchmark: Prysmian, Schneider Electric and Hubbell Inc. However, if we sort our portfolio companies by those with the highest scope 1, 2 and 3 emissions, these companies also top the list.

**Figure 7: Storebrand Global ESG Plus top ten over-weights**



Source: Storebrand, holdings as at 31 March 2024

**Figure 8: Scope 1+2+3 emissions intensity (in ton CO<sub>2</sub> equivalent per mUSD revenue) of the top ten over-weight positions in Global ESG Plus vs ExxonMobil**



Source: Storebrand, holdings as at 31 March 2024

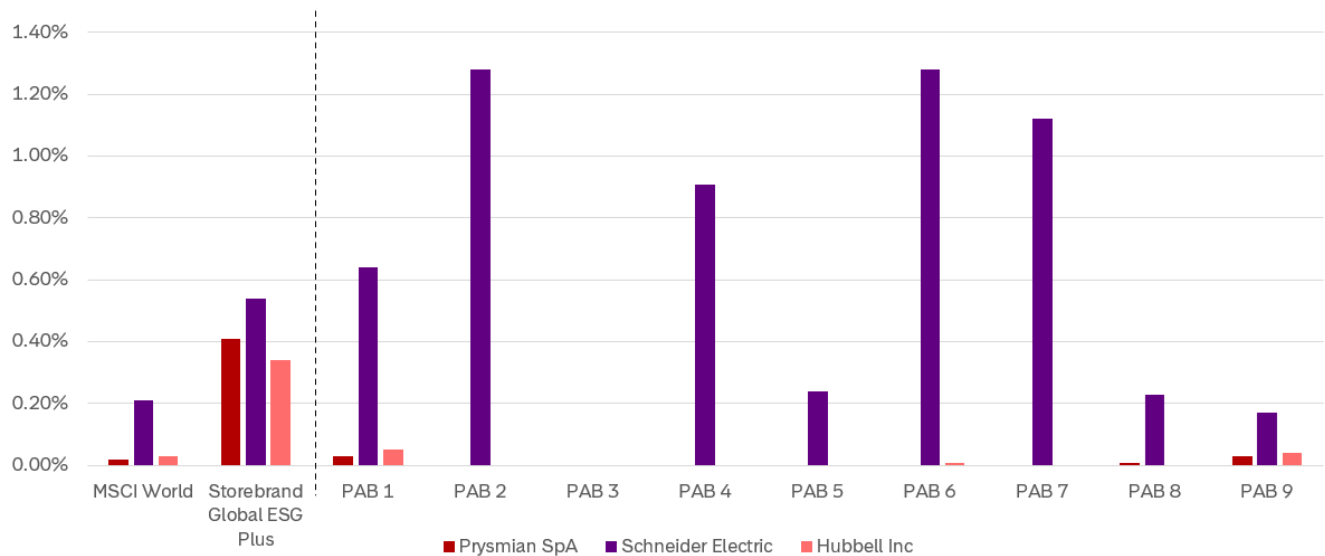
In Figure 8 we chart the scope 1+2+3 emissions for each of our top ten overweight positions, adding oil and gas giant ExxonMobil, excluded from our portfolio for fossil exposure and anti-climate lobbying, for comparison.

Notably, all of the grid related investments in our top ten over-weights have higher reported scope 1+2+3 emissions than ExxonMobil. Figure 9 charts the positions of these three grid related investments in the MSCI World Index, our strategy and a selection of 9 different PAB index tracking funds. The Storebrand Plus funds tilt towards companies that we believe will benefit from the transition to a Paris aligned economy. We include grid hardware producers in our climate solutions portfolio for that reason and so we have overweight positions in Pysmian SpA, Schneider Electric and Hubbell Inc. We find there is little commonality in how PABs allocate capital, despite being managed within the same EU defined methodology, but most PABs in our sample do not hold either Pysmian or Hubbell. As we have highlighted in our earlier whitepapers, scope 1+2+3 emissions can provide investors with a misleading indicator of climate risk in the case of climate solutions companies. We therefore do not tilt our portfolio climate solutions companies based on their emissions, as we do with the remainder of the portfolio in the optimisation process. This ensures that we avoid the unintended consequence of under-weighting, or zero-weighting, companies such as Pysmian and Hubbell, whose products and services are essential to the transition but which have high scope 3 emissions figures. In the case of these solutions products, the scope 3 emissions number can be misleading to

investors because the 'use of product' reporting method does not distinguish effectively between fossil-reliant emissions (combustion) and emissions from electricity that will diminish over time as the grid is decarbonised.

We find that almost all PABs in our sample have a position, and in most cases an overweight, in Schneider Electric and attribute this to use of green revenues figures in positive tilting. PABs rely on 'passive' use of datasets to tilt around a parent market cap benchmark. We have illustrated that this can be problematic in negative tilting, using scope 1+2+3 emissions as an indication of climate risk – but positive tilting without oversight is also limited in its effectiveness. For example, our third party green revenues dataset reports a green revenue proportion of 72% for Schneider Electric but only 32% for Pysmian and 20% for Hubbell. However, all three of these companies are positioned to benefit from the low carbon transition on a forward-looking basis. Hubbell's annual report states that 65% of their sales in 2023 were associated with their 'Products with Impact'<sup>14</sup>, a statistic that seems at odds with the green revenue figure above and with the stock's omission from 'Paris aligned' index funds. Contrastingly, the majority of PABs hold their largest overweight positions in the 'Magnificent Seven' big tech companies<sup>8</sup>, which are not necessarily linked to 'Paris alignment' of the economy.

**Figure 9: Positions of index-based grid companies in EU defined Paris Aligned Benchmarks (PABs)**



Source: Storebrand, analysis from Morningstar based on holdings as at 31 March 2024 for funds tracking 9 different PABs and the MSCI World Index

**Summary**

The enthusiasm for investments in renewable energy projects has not been matched with paralleled investments in the electricity grid, leading to gridlock. Our grids require both greater transmission capacity and an upgrade of existing infrastructure if global policymakers are to meet their net zero goals.

It is time for grid hardware to be carved out from renewable energy as a standalone investment theme. Grid hardware is deserving of its own category due to the increased attention it requires, the broad and diversified number of investment opportunities available within the theme and the fact that it has demonstrated meaningful diversification benefits alongside other climate solutions investment themes.

The lion’s share of electricity demand growth and grid related investment for net zero pathways is required in Emerging Markets. China and India have invested heavily in their grid systems and this is reflected in the number of grid related companies listed in those markets. That growth is set to continue illustrated by planned expenditure.

Companies producing grid hardware will benefit from the transition to a low carbon economy, offering a clear ‘Paris aligned’ investment opportunity. However, this is not reflected in the backward-looking metrics used to allocate capital in passive ‘Paris aligned’ index strategies, such as

PABs. The transition dependence of grid related companies is not captured by either their high reported emissions or their low green revenues. Big Tech companies are often overweighted by passive climate strategies, despite no clear link to the transition. Conversely, grid companies making products essential for the transition are often avoided. Misleading climate transition risk indicators mean oversight is necessary when constructing a systematic portfolio if genuine Paris alignment is to be achieved. Passive Paris alignment is not possible.

# Footnotes and Important Information

*In this text we describe the climate solutions methodology of the Storebrand Plus Funds and discuss the investment opportunities in grid hardware as a key part of our climate solutions mix for these funds.*

1. Bernstein, March 2024. U.S. Machinery. The Electric Butterfly Effect: Rising electricity demand, the role of the grid and the critical bottlenecks.
2. [Green energy is set to match the world's growing electricity demand - IEA report | World Economic Forum \(weforum.org\)](#)
3. [Electricity 2024 - Analysis and forecast to 2026 \(iea.blob.core.windows.net\)](#)
4. [Two-thirds of green energy projects in Great Britain fail to clear planning stage | Energy industry | The Guardian](#)
5. [US overhauls electric grid to make way for more renewables | Reuters](#)
6. Source: Storebrand internal analysis based on all global equity funds in Morningstar managed with a climate solutions related theme, as at 30 June 2024.
7. Internally defined as companies with at least 50% of revenues or market cap associated with climate solutions activity.
8. [The "magnificent" performance of climate index strategies - www.storebrand.com](#)
9. Including Carbon Capture and Storage and Green Finance.
10. [Electricity Grids and Secure Energy Transitions \(iea.blob.core.windows.net\)](#)
11. The World's Power Grids Are Failing as the Planet Warms, Bloomberg, 15/07/24.
12. [Gridlock in China: spending on network surges to support green energy transition \(ft.com\)](#)
13. We find as many listed solutions companies as possible by searching lower down the cap spectrum and in the holdings of thematic funds and incorporate them within our risk optimisation and liquidity management process.
14. [Hubbell 2024 Sustainability Report \(hubbellcdn.com\)](#)

## Important Information

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