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Commodity Insights

Shifting currents

8 graphics that show how the global power sector managed changing market dynamics and the continued rise of renewables in 2024

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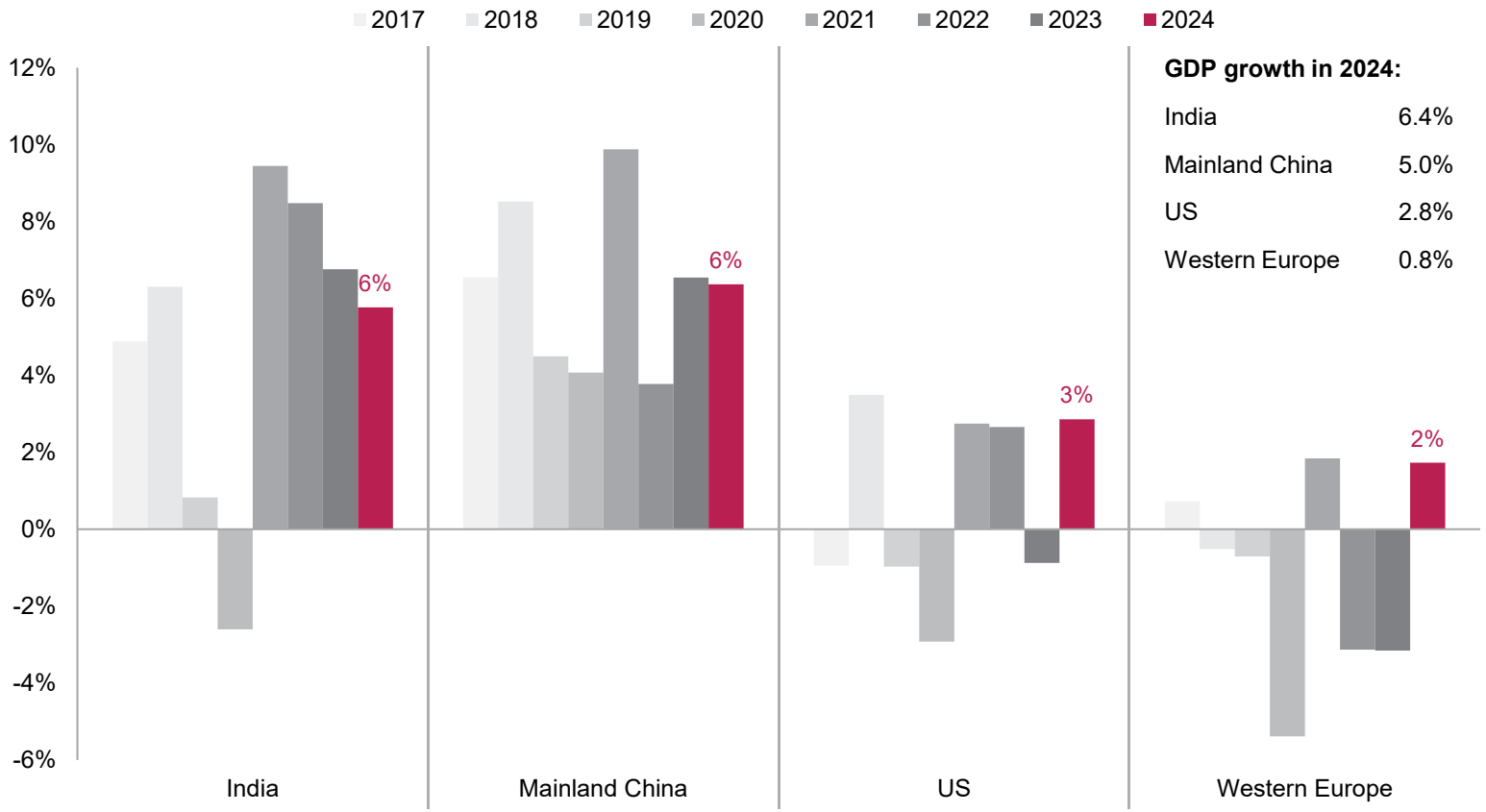
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Power generation expanded globally in 2024, with mature markets returning to growth and emerging regions maintaining momentum

Annual growth rate in gross power generation for select power markets, 2017–2024



- S&P Global Commodity Insights estimates that global power generation grew by 4% year over year in 2024. While this trend was largely driven by emerging markets, mature markets also saw a return to growth during the year.
- Generation growth in mainland China and India is strongly linked to GDP growth, and thus, a slight economic slowdown in both countries has correspondingly led to lower, but still strong, year-over-year power generation growth in both countries.
- US power generation in 2024 grew by the highest rate since 2018, driven by warmer temperatures in much of the country, as well as by increased manufacturing and datacenter activity. Western Europe's generation posted positive growth for only the third time over the past eight years on an improving economy and electrification initiatives. Likewise, heatwaves in Eastern Europe over the summer of 2024 meant that significant generation was exported eastward, pushing gross generation slightly higher in Western Europe.

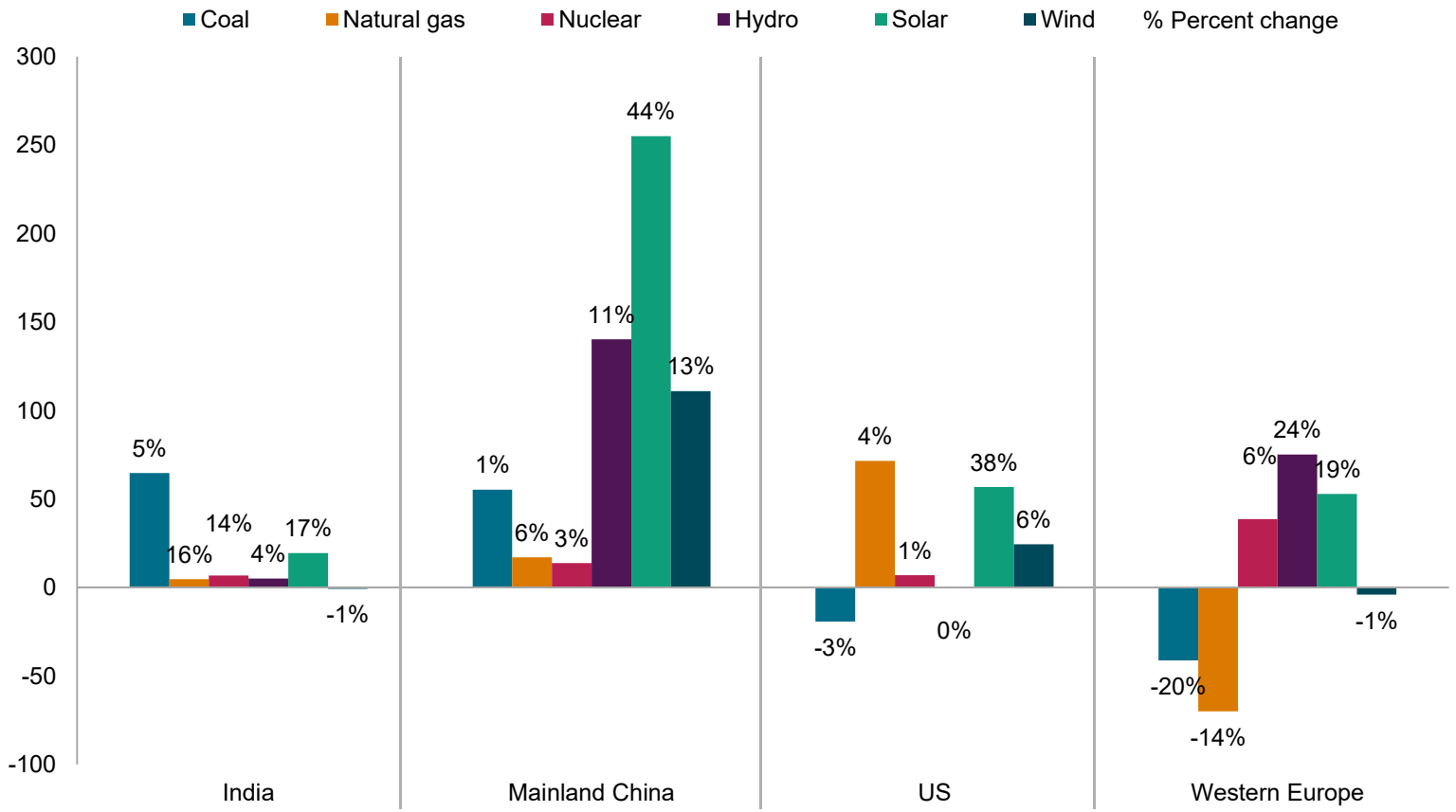
As of Feb. 25, 2025.
Western Europe refers to Austria, Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, Switzerland and the UK. Key markets refer to India, mainland China, the US and Western Europe. The markets above represent about 60% of power generation globally.
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Solar generation continued increasing penetration across key markets in 2024; thermal generation trends diverged between emerging and developed markets

Changes in power generation mix in key markets, 2024 vs. 2023, TWh



- Renewables generation continued growing its share of the generation mix in 2024 as their economics remain competitive in most markets and business cases. Solar generation saw double-digit year-over-year growth in key markets, with mainland China leading at 44%. On the other hand, wind generation growth remained relatively flat in India and Western Europe, reflecting generally lower wind speeds in 2024 for these markets.
- Nevertheless, emerging economies remained heavily dependent on thermal generation. India and mainland China continued to rely on coal and natural gas to satisfy rising energy demands, even as hydropower output recovered following a sharp decline in 2023.
- Gas generation in the US increased as low gas prices (averaging $2.2/MMBtu at Henry Hub in 2024) drove coal to gas switching, while coal capacity continues to be retired. Western Europe continued squeezing out thermal generation as demand recovery in the region remained slow and as the shift toward decarbonization continued.

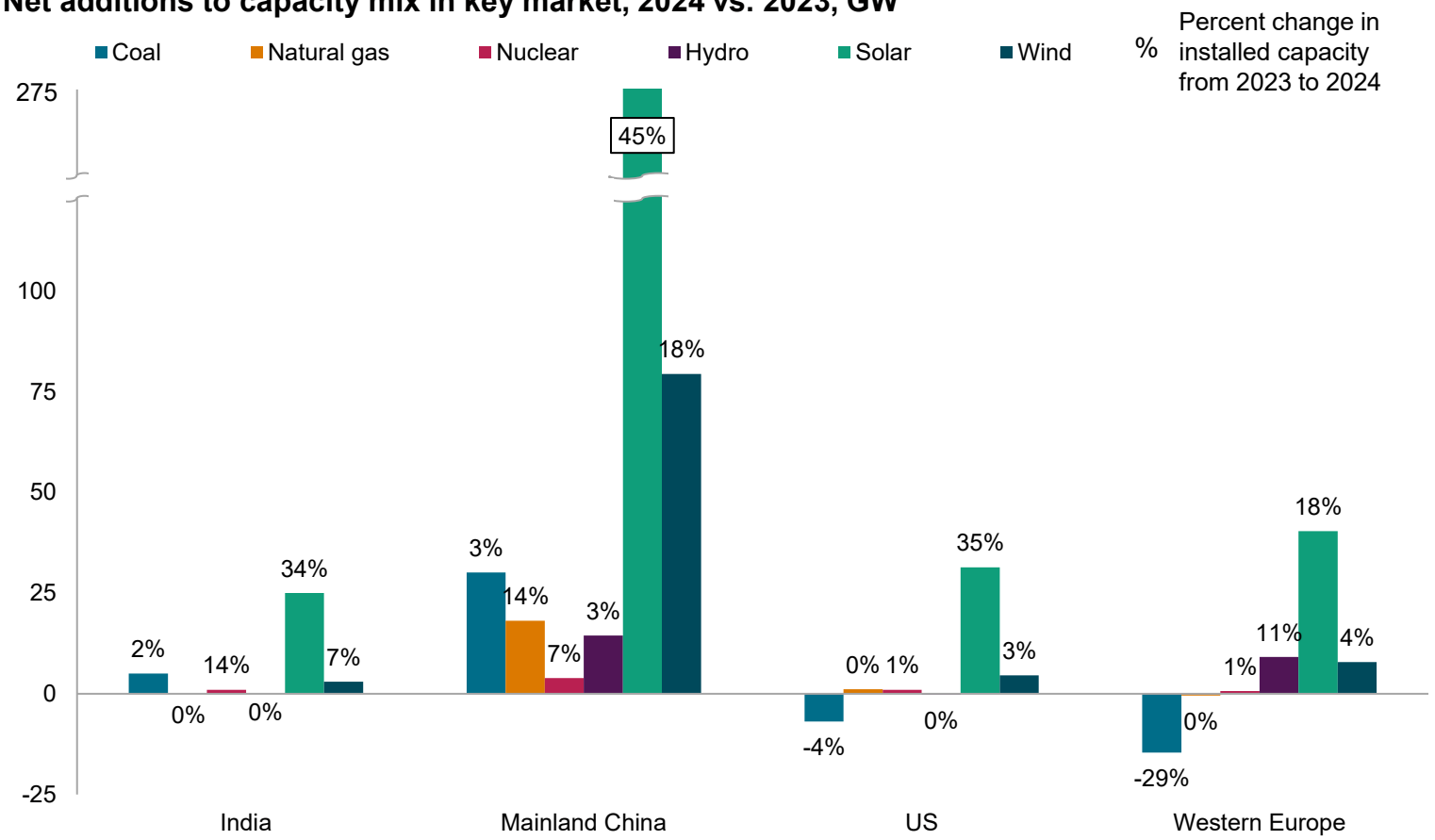
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Renewables dominated capacity additions in key regions, while thermal capacity evolution varied among power markets

Net additions to capacity mix in key market, 2024 vs. 2023, GW



- Solar capacity saw double-digit year-over-year growth in 2024 across all major regions, with mainland China leading the charge. Its capacity additions reached 277 GW, nearly triple the combined capacity of the other key regions. Similarly, mainland China was key in driving global wind capacity growth in 2024, quintupling combined additions of the other key markets.
- While developed economies continued phasing out coal capacity on worsening coal economics and amid a focus on decarbonization, emerging economies witnessed continued growth in coal capacity, driven by increasing power needs.
- Gas capacity remained stable in key markets, except mainland China, as the technology moves toward serving as flexible capacity to buffer renewable intermittency. Absolute nuclear capacity additions remained low, totaling 6.5 GW for key regions in 2024, as the sector continues reckoning with regulatory hurdles, high capital costs and lengthy development times.

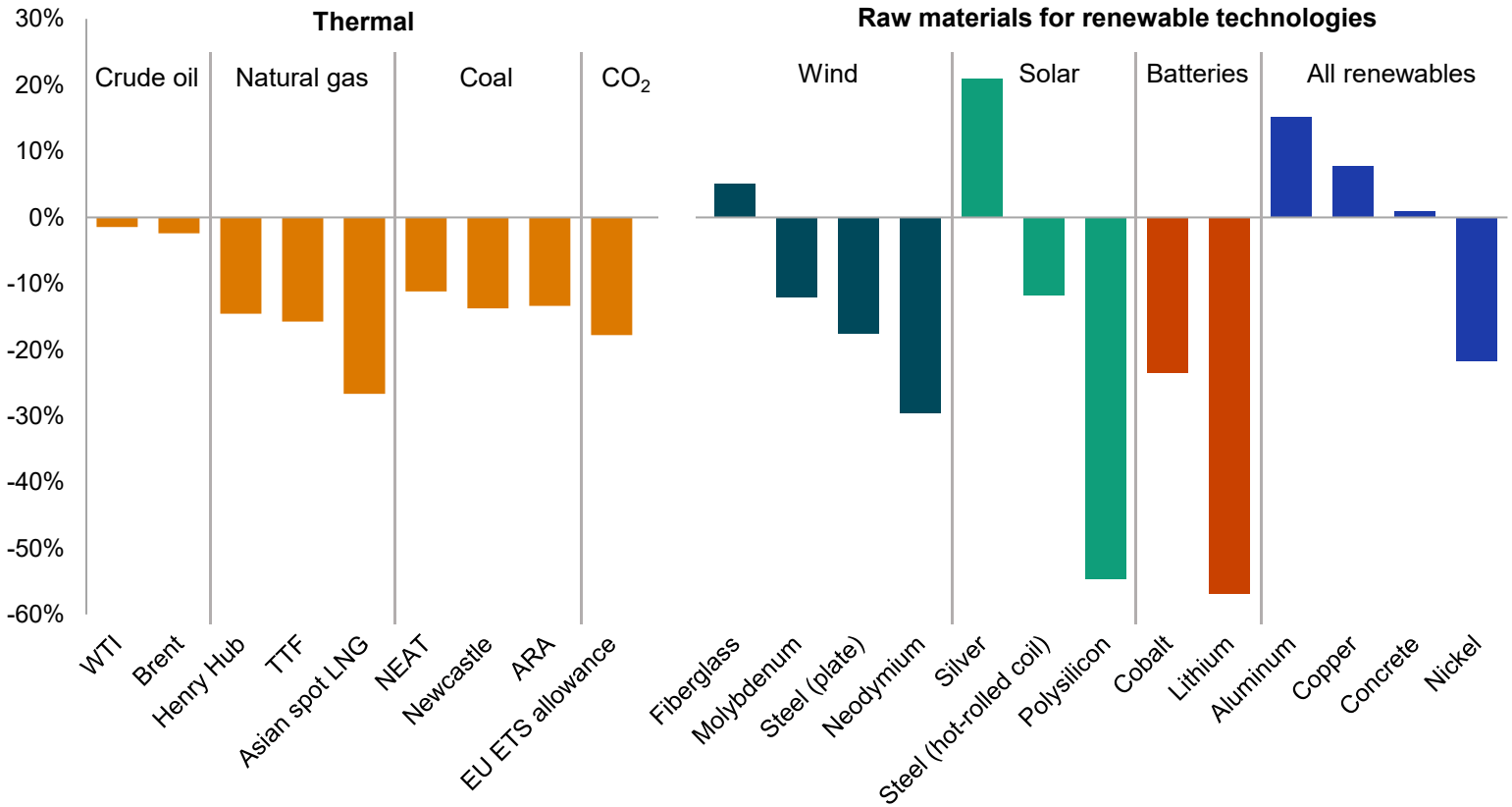
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Fuel and renewables input costs largely fell in 2024, relative to 2023, but generally remain above the levels at the start of the decade

Price changes for fuels at key hubs (left) and for raw materials used in renewable technologies (right), 2024 versus 2023



- The trend of broadly declining commodity prices continued for fossil fuels and renewable technology materials following the highs of the 2021–22 crisis. Notably, all thermal energy prices experienced further reductions after significant declines in 2023, reflecting the stabilization of market conditions. Meanwhile, certain materials, like polysilicon and lithium, for renewable technologies fell sharply as supply chains became oversupplied.
- Nevertheless, when compared with 2019 levels, most commodity prices remain elevated. Title Transfer Facility (TTF) natural gas and Asian spot LNG are more than double pre-pandemic levels, with only Henry Hub prices down 15% compared with 2019. Meanwhile, key inputs for renewables, such as steel, aluminum, copper and nickel, are still 15% to 60% higher than their 2019 levels.

Data compiled Feb. 25, 2025.

WTI = West Texas Intermediate; Brent = Brent Crude; TTF = Title Transfer Facility; ARA = Amsterdam-Rotterdam-Antwerp; NEAT = Northeast Asian Thermal Coal; EU ETS = European Union Emissions Trading System; Polysilicon cost corresponds to average selling prices ($/kg). Prices are based on global benchmarks or averages where available. Otherwise, prices may be based on individual jurisdictions.

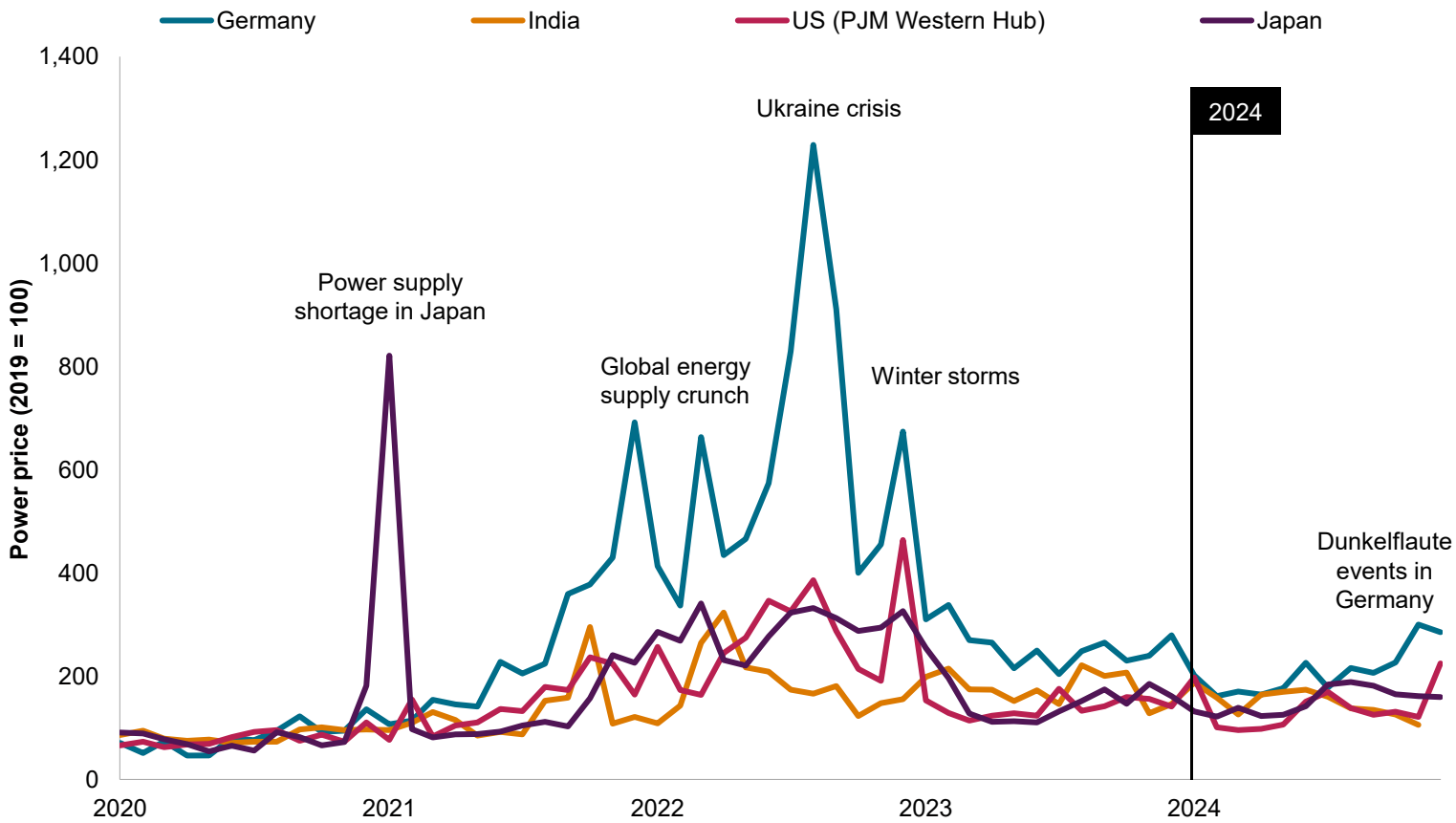
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Renewables took a larger role in power pricing in 2024, driving more low-price hours and increased volatility, while lower fuel costs added to downward pressure

Average monthly wholesale power prices vs. 2019



- Wholesale power prices continued to stabilize, maintaining the trend of normalization seen in 2023. The year 2024 was marked by generally calm market conditions, with exceptions during extreme weather events like heatwaves and cold, windless winters. The depressed prices followed falling fuel prices and increased renewable penetration in key markets.
- Western Europe emerged as an indicator of how high renewable penetration affects grid operations, showcasing trends that may become more pronounced in other markets as their reliance on renewables grows. The volatility associated with renewable energy sources, such as grid congestion, low or negative price hours and price spikes during periods of low wind and low solar, was particularly evident during the summer and winter periods, especially in the evenings.

Data compiled Feb. 24, 2025.

PJM = Pennsylvania, New Jersey and Maryland. Prices are monthly averages calculated in local currency units and normalized to 2019. Data are typically for day-ahead, spot, or balancing markets of main interconnected grids or at primary grid nodes/zones. “Dunkelflaute” refers to a prolonged period of little to no solar and wind output.

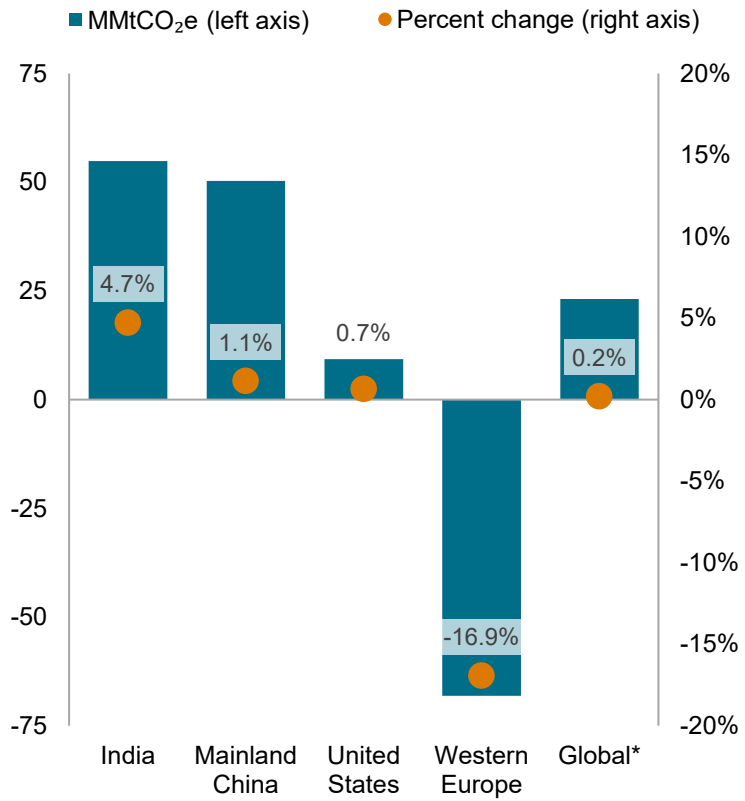
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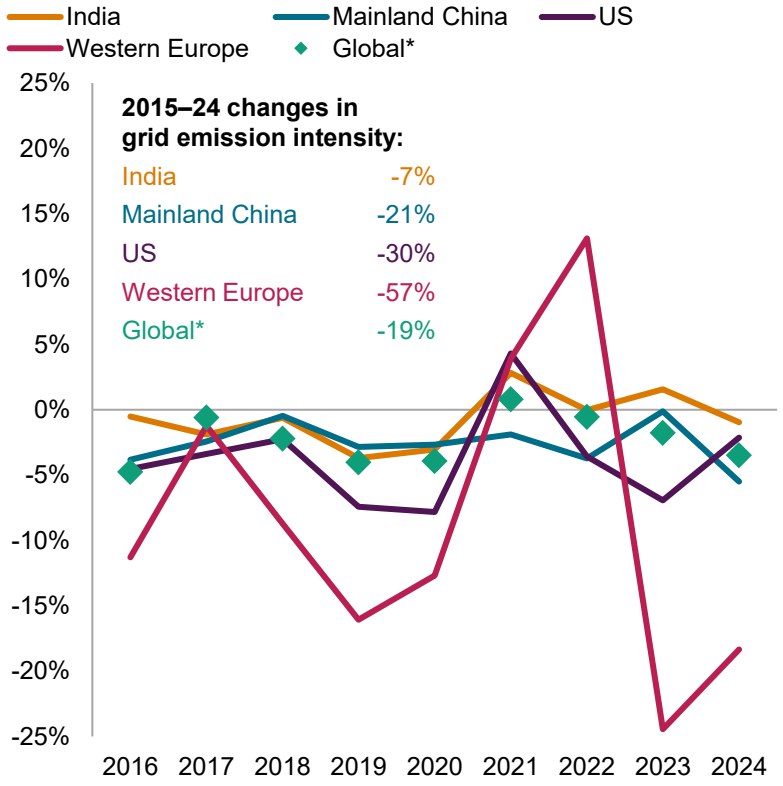
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Global power sector emissions stabilized in 2024, although grid emission intensity overall continued to fall on higher renewable penetration

2023–24 change in CO_2 emissions for select power markets



Annual change in the emission intensity of select power markets



- In 2024, global power sector emissions held steady compared with the previous year, though regional disparities emerged. Developing economies increased their reliance on thermal generation, with mainland China and India both hitting record-high grid emissions. Meanwhile, US saw a 0.7% rise in grid emissions, in contrast to Western Europe's notable 17% reduction.
- Over the past eight years, global grid emission intensities have declined significantly — aside from a temporary uptick in 2021 — driven largely by the expansion of zero-emission generation technologies (and, in some jurisdictions, retirements of fossil fuel facilities). Since 2015, India's emission intensity has fallen by about 7%, while Western Europe has achieved a more than 55% decrease.

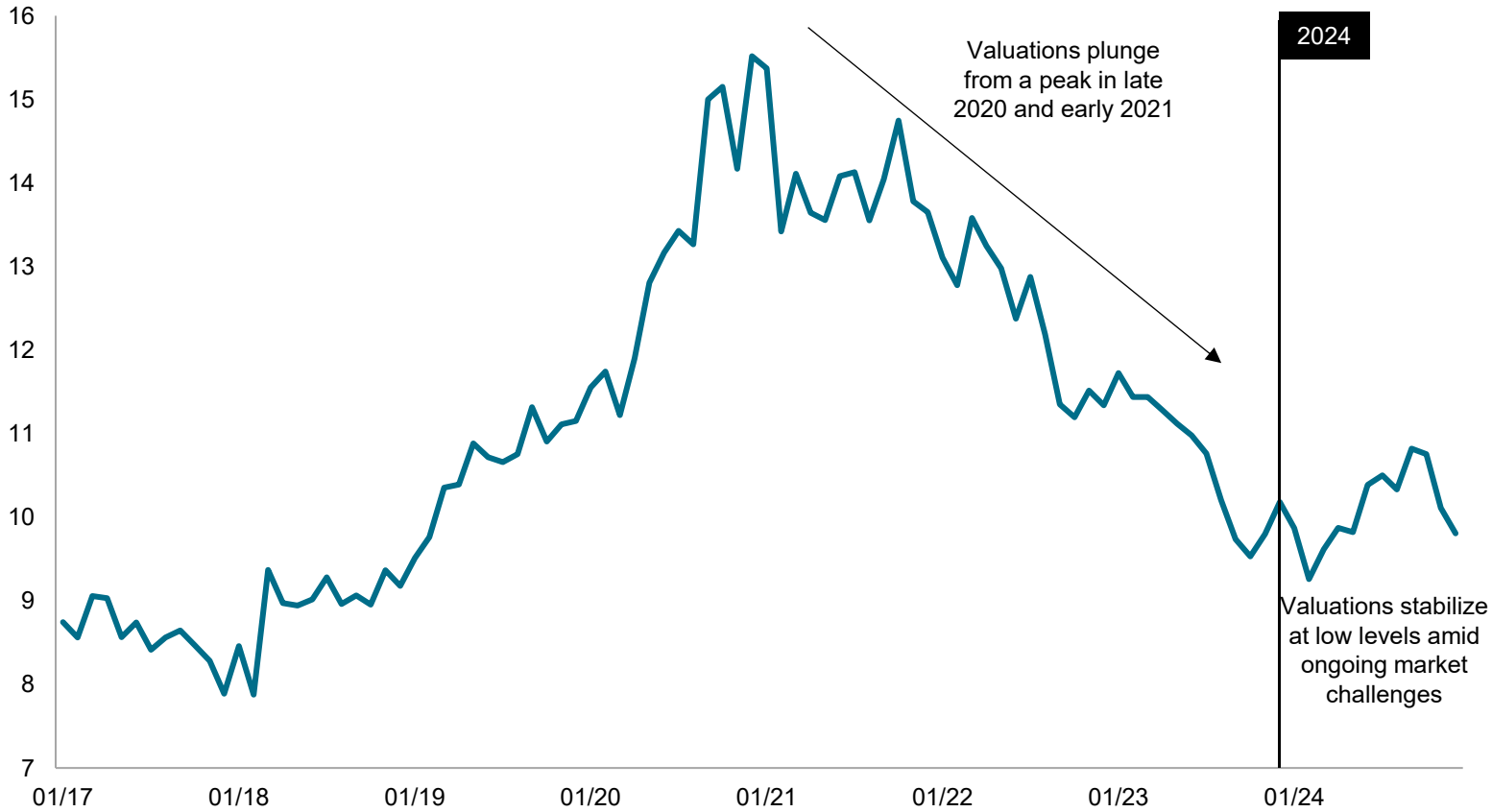
Data compiled Feb. 25, 2025.
$MMtCO_2e$ = million metric tons of CO_2 equivalent.
* Global totals represent about 81% of power generation worldwide.
Emission intensities are calculated as total power sector emissions divided by total power generation.
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Renewables valuations remain depressed amid market challenges, but M&A activity, expectations for growing demand and energy transition interest set a floor

Global renewable generation companies: Equity market valuations, EV/NTM EBITDA



- In 2024, the renewables sector faced an array of headwinds — elevated interest rates, input and labor cost inflation, supply chain constraints, regulatory uncertainty, permitting and interconnection delays, and higher project costs for certain technologies — all of which have negatively impacted financial performance. This trend, coupled with a shift in the market away from a focus on sustainability and toward energy affordability and security, has led to declining investor interest in the sector, with valuations for renewables generation companies remaining well below the highs of late 2020/early 2021.
- Still, these lower valuations have attracted new buyers, sparking robust M&A activity. Meanwhile, growing power demand and continued corporate decarbonization commitments offer favorable long-term tailwinds for the industry.

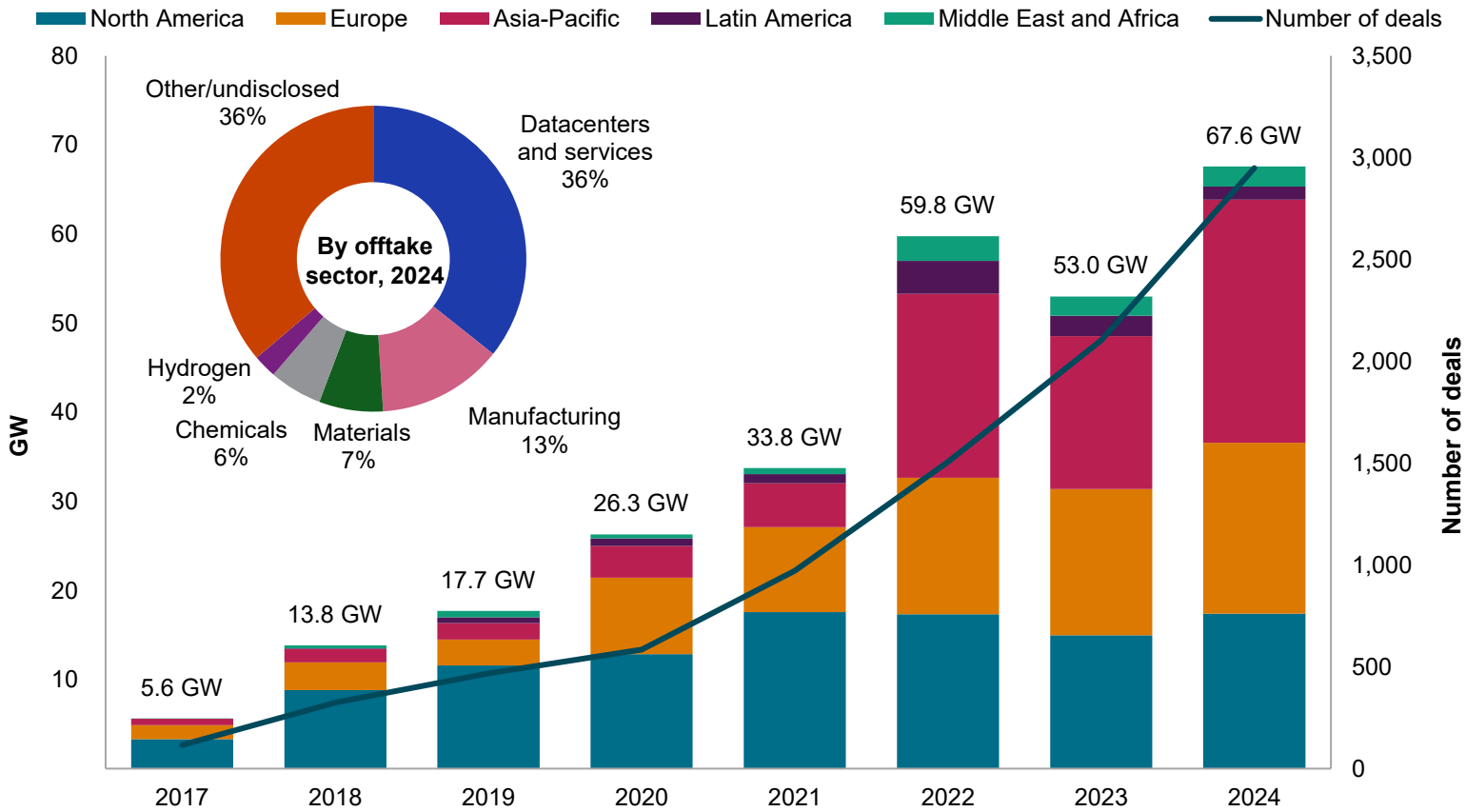
Data compiled Jan. 2, 2025.
EV = enterprise value; NTM = next 12 months.
Includes publicly traded companies worldwide with a market capitalization of at least $1 billion, for which operations either entirely pertain to or largely consist of development of, ownership of, and/or investment in utility-scale wind and solar photovoltaic assets.
Sources: S&P Global Commodity Insights; S&P Global Market Intelligence.

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The corporate sector procured nearly 68 GW of clean power in 2024, with the number of deals contracted reaching a new peak

Corporate clean energy procurement activity by region



- In 2024, corporate procurement of clean power soared to a record 68 GW of announced contracts — up 28% year over year — across more than 3,000 deals. Asia-Pacific emerged as a key growth market, posting the highest increases in both capacity and deal count.
- Stable power purchase agreement prices and stronger corporate commitments drove a 17% rise in Europe's corporate procurement, reaching a historic 19 GW.
- In North America, markets rebounded from the 2023 slowdown, also growing 16% to 17 GW, helped by a more favorable macroeconomic landscape, falling interest rates and incentives under the US Inflation Reduction Act (IRA).
- For the past three years, datacenter and services companies have led in procurement volumes, with Microsoft Corp., Amazon.com Inc., Google LLC and Meta as the top global offtakers. Meanwhile, the manufacturing, chemicals and materials sectors form the next significant group of corporate buyers.

Data compiled Feb. 25, 2025.
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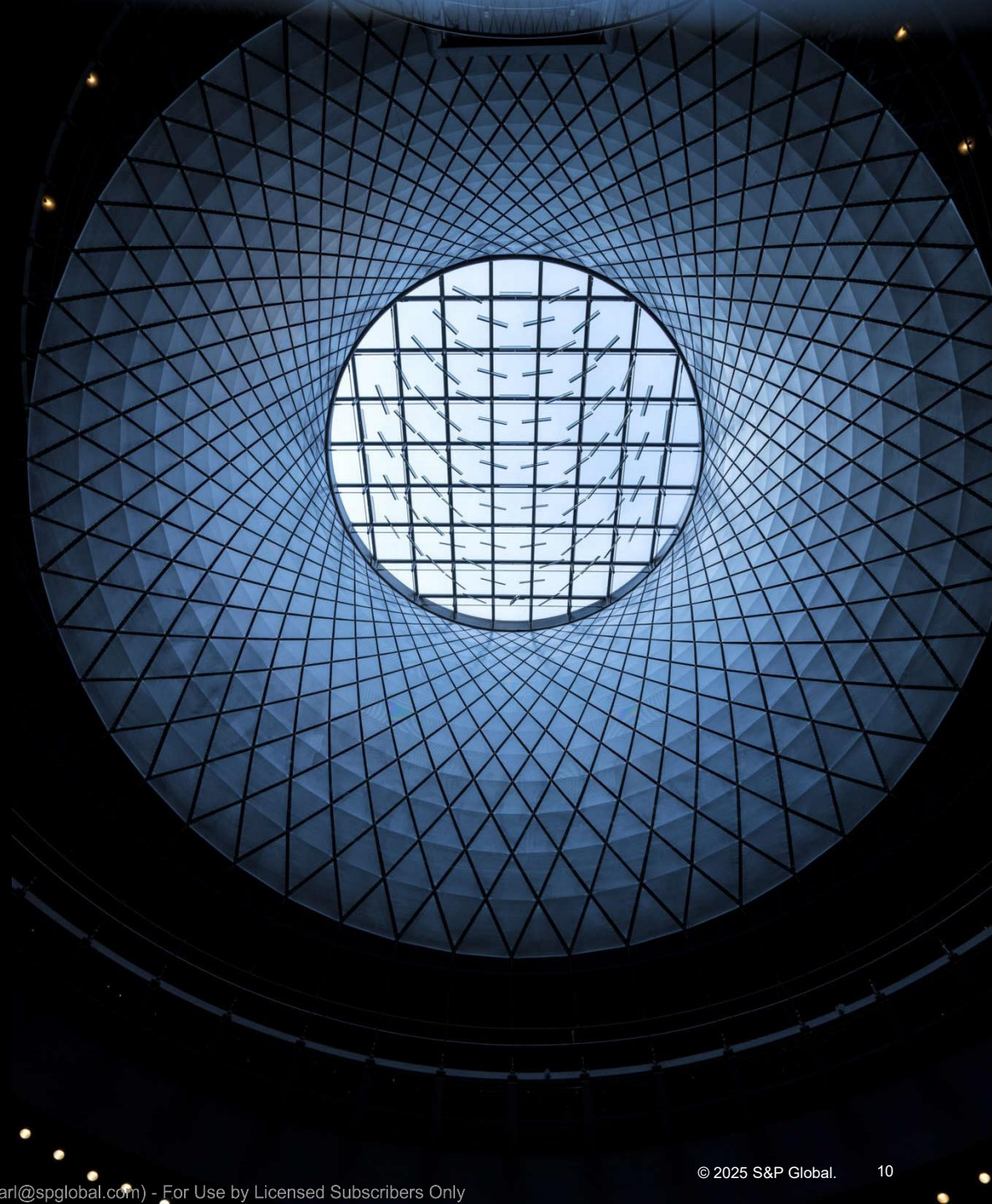
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