



Emerging Markets Energy Investment Outlook 2024

Commissioned by the GFANZ Workstream on Mobilizing
Capital to Emerging Markets and Developing Economies

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BloombergNEF

Foreword from the Co-Leads of the GFANZ Workstream on Mobilizing Capital to Emerging Markets & Developing Economies

Over the last few years, emerging markets and developing economies (EMDEs) have returned to their positive, pre-pandemic economic development trend. Growing faster than most advanced economies, they have shown significant resilience amid recent inflationary and geopolitical pressures. To meet the growing demands of aspiring populations and rapidly expanding businesses across EMDEs, significant investment in new energy supply and infrastructure is essential.

This requires the full mobilization of all stakeholders, including policymakers, project developers, public finance institutions, and both domestic and international investors. Crucially, delivering this growth potential without derailing efforts to limit global warming necessitates that most of these new investments focus on cleaner energies and sustainable infrastructure.

The Glasgow Financial Alliance for Net Zero Workstream on Mobilizing Capital to EMDEs, established in 2021, was created to support collaboration aimed at accelerating capital mobilization for net-zero transitions in EMDEs, particularly through increased public-private engagement.

For the past three years, the workstream has commissioned BloombergNEF to prepare an annual report exploring the state of capital mobilization for the transition in EMDEs, examining key trends, enabling environment factors, and best practices. This year's report delves into the energy transition investments needed across EMDEs to meet growing demands in a manner aligned with achieving global net zero by 2050. Among the wealth of insights and data in the report, a few key findings stand out.

First, there is an urgent need for energy transition investments to be more widely distributed across EMDEs. China's rapid progress over the last decade means its share of EMDE energy transition investment should decline from almost 80% in 2023 to just over 40% in the 2030s, with growth shifting to other large emerging economies during this period.

Secondly, for a growing number of EMDEs, a net-zero-aligned energy sector development pathway is more economical than the more fossil-fuel-reliant alternative, thanks to the increasing attractiveness of clean technologies. Just as progress in solar and wind has enabled EMDEs to leapfrog some fossil-fuel investments, the growing availability of affordable EVs means that countries can unlock significant savings by prioritizing electric mobility.

We hope this analysis will serve as a valuable tool for policymakers, financiers, and other stakeholders interested in understanding the nature of needed energy transition investments in EMDEs. We are grateful to BloombergNEF and to the financial institutions and civil society organizations dedicated to supporting GFANZ's work on mobilizing capital to EMDEs.

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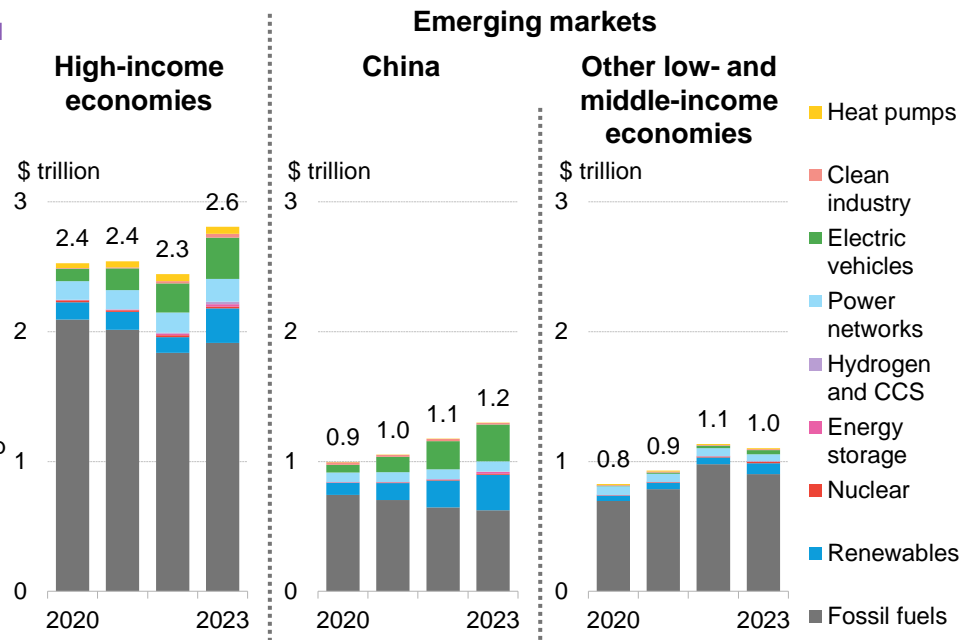
Executive summary

Historical trends

With finance a key topic at the United Nations climate talks, this report analyzes historical investment in emerging markets' energy systems and the flows required to get on track for net zero by 2050. It was commissioned by the Glasgow Financial Alliance for Net Zero's Workstream on Mobilizing Capital to Emerging Markets & Developing Economies.

- Emerging markets – defined here as low- and middle-income economies – invested \$2.2 trillion in their energy systems in 2023.** This marked a 35% rise on 2020, outpacing the 10% increase to \$2.6 trillion seen in high-income economies. China and high-income economies have increased low-carbon investment in the last four years. These solutions accounted for 49% of China's total energy investment last year, from 20% in 2020. This jump has largely been driven by renewables and electric vehicles.
- Emerging markets outside China have lagged on investment in their energy systems as well as in low-carbon solutions.** In 2023, these economies attracted \$1 trillion in energy transition investment – up 52% on 2020. However, this comprised just 14% of their overall energy-system spending last year.
- In clean power, in 2023, some 85% of low- and middle-income economies deployed more renewables capacity than fossil fuels.** Emerging markets outside China attracted \$41 billion in renewables asset finance last year, of which foreign investors provided \$18 billion. But the last decade has seen foreign renewables asset finance from public sources stall, while the private doubled to \$17 billion in 2023.

Global historical annual energy system investment



Source: BloombergNEF. Note: Includes energy system capital investment and consumer spending. Historical investment excludes conventional industry and fossil-fuel boilers but these sums are expected to be minimal. CCS refers to carbon capture and storage.

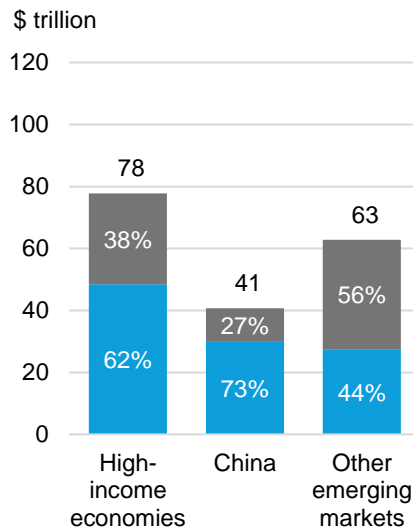
Executive summary

Total energy system investment under a net-zero pathway

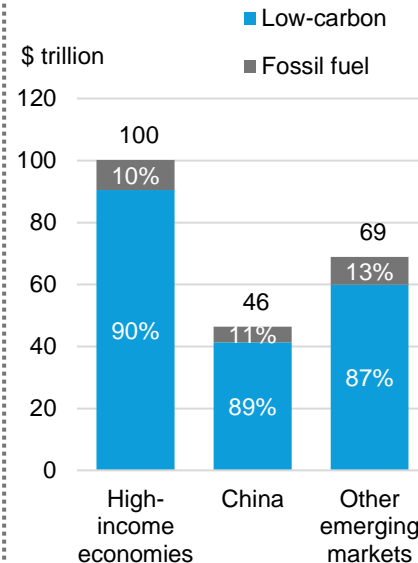
- **Emerging markets including China see \$115 trillion in energy system investment over 2024-2050 under BNEF's Net Zero Scenario.** This is based on the findings of our *New Energy Outlook*, in which the Net Zero Scenario represents a credible pathway to net-zero emissions globally by mid-century and limits planetary warming to 1.75C above pre-industrial levels. Together with high-income economies, global investment of \$215 trillion to 2050 is needed in the net-zero pathway.
- **Out of the emerging markets, China comprises \$46 trillion and the other low- and middle-income economies \$69 trillion.** These are 14% and 10% higher than in BNEF's Economic Transition Scenario. This pathway models a least-cost evolution of the energy system based on techno-economic trends, in the absence of new policy regimes. High-income economies need 29% more than in the base case.
- **All three blocs allocate much more investment to low-carbon technologies in the Net Zero Scenario.** Green solutions account for 89% of China's investment over 2024-2050. This compares with 73% in the Economic Transition Scenario and a marked increase on 23% from 2020 to 2023. Because other emerging markets have been slower at ramping up energy-transition investment, they face a bigger gap between the historical share of 5% and the 87% to 2050 in the Net Zero Scenario.
- **To get on track for net zero, low- and middle-income economies outside China must expand their share of low-carbon investment.** China's share shrinks from an average of 71% over 2020-2023 to 34% in the 10 years to 2050.

Cumulative energy system investment across 2024-2050

Economic Transition Scenario



Net Zero Scenario



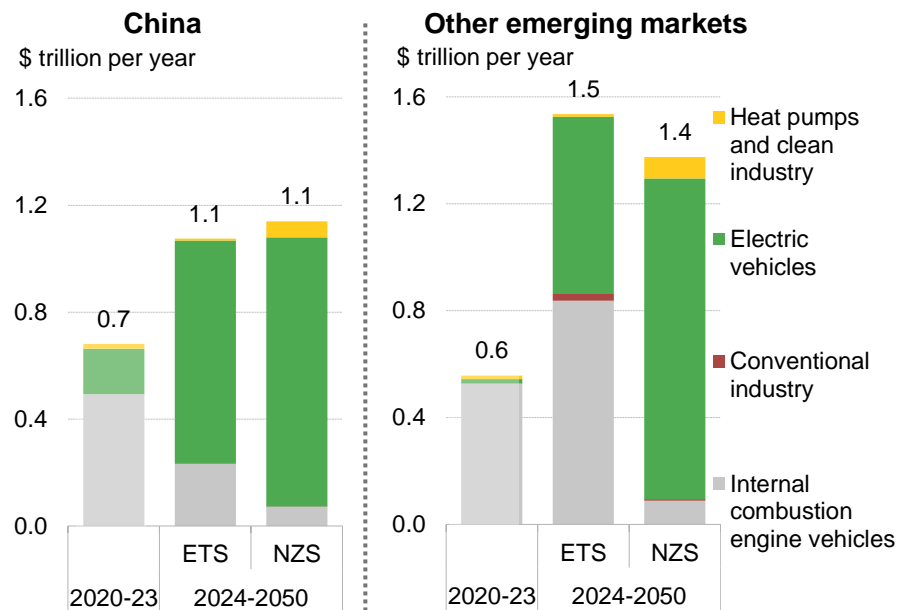
Source: BloombergNEF. Note: Includes energy system capital investment and consumer spending.

Executive summary

Demand-side investment under a net-zero pathway

- **Reaching net zero means a transformation of the road transport fleet.** All geographies need to rapidly phase out sales of internal combustion engine vehicles and scale up electric vehicle adoption.
- **The net-zero transition requires more spending than the base case for China and a number of high-income economies.** Costs are higher because some conventional vehicles need to be scrapped before the end of their operational lifetimes, to expedite decarbonization of existing fleets.
- **To get on track for net zero, low- and middle-income economies outside China spend \$1.4 trillion per year on energy demand systems like cars and heat pumps to 2050.** This marks a significant uplift from historical levels of \$0.6 trillion per year, partly due to economic and population growth, and increasing road vehicle adoption.
- **However, demand-side investment in emerging markets except China is 10% less under the Net Zero Scenario than the base case.** This is because a net-zero pathway requires a faster transition to EVs, which are increasingly cheaper than vehicles with an internal combustion engine. This reduces overall average spending on road transport.

Average annual consumer spending on demand systems in emerging markets, over 2020-2023 and 2024-2050



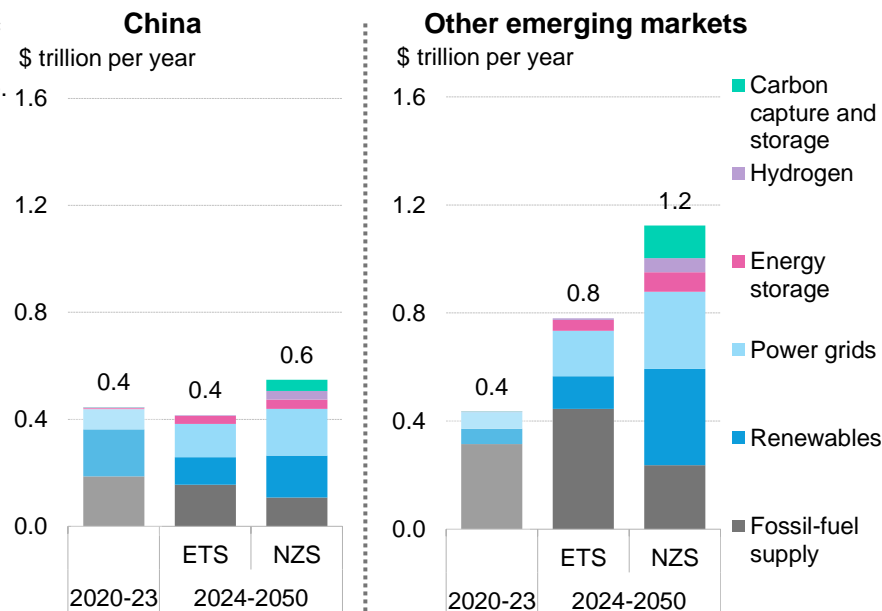
Source: BloombergNEF. Note: ETS is the Economic Transition Scenario; NZS is the Net Zero Scenario.

Executive summary

Supply-side investment under a net-zero pathway

- **Non-China emerging markets invest \$1.2 trillion per year to 2050, on average, in the supply side of the energy system in the Net Zero Scenario.** More investment in energy capacity, energy storage and power networks is required to meet rising electricity demand on the back of economic and population growth, and growing energy access. Annual supply-side investment to 2050 in the base case is 79% more than the 2020-2023 average.
- **In particular, emerging markets outside China significantly scale up investment in renewables and power networks.** In the Net Zero Scenario, these economies invest \$0.6 trillion per year on average to 2050 in these technologies. This is five times the historical average over 2020-2023 and twice as much as in the base case to 2050.
- **China sees less change in its annual average total on the supply side between historical levels and the outlook modeled.** It has already begun to ramp up energy transition investment and its power demand is not poised to increase significantly in the coming decade. But China still needs to direct more investment to low-carbon solutions to be on track for net zero, with an aggregate \$0.3 trillion per year for renewables and power networks.
- **Both China and other emerging markets see almost zero supply-side investment in fossil fuels from 2023 under a net-zero pathway.** A small sum goes to gas peaker plants, which provide flexibility to the electricity mix. Fossil-fuel supply investment is needed in other sectors, especially those that are technologically more difficult and more costly to decarbonize.

Average annual supply-side capital investment in emerging markets, over 2020-2023 and 2024-2050, by scenario



Source: BloombergNEF. Note: ETS refers to the Economic Transition Scenario; NZS is the Net Zero Scenario.

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Context

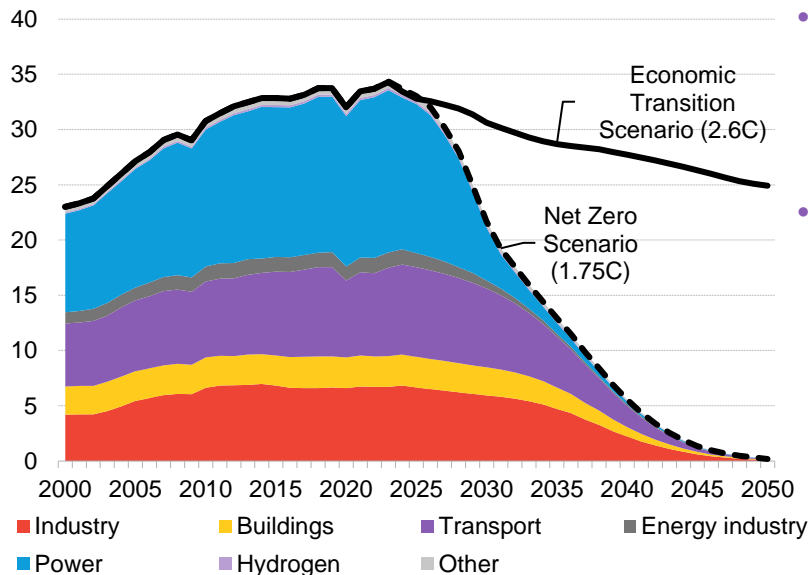


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Introduction

Global energy-related emissions and net-zero carbon budget in BNEF's New Energy Outlook 2024

Billion metric tons of CO₂



Source: BloombergNEF's New Energy Outlook 2024

- Without urgent action, the world will fail to realize the goals of the Paris Agreement – to keep the global temperature increase “well below 2C” above pre-industrial levels by the end of the century and pursue efforts to limit warming to 1.5C. This report focuses on the energy system investment needed in emerging markets to get on track for these goals, and the progress made so far.
- The analysis in this report relies on BNEF's *New Energy Outlook 2024*, which models two energy system scenarios. The economics-driven base case – known as the Economic Transition Scenario – sees a 27% fall in emissions to 2050, implying 2.6C of warming by 2100. The Net Zero Scenario shows a pathway to global net-zero emission by mid-century, consistent with 1.75C of warming. This scenario sees \$215 trillion invested globally to 2050 in energy-related infrastructure, technology and products.
- Investment will be a key topic at the 2024 UN climate summit in Baku – COP29 – where governments are due to decide on the next target for financial support for developing economies. This report answers the question of how much energy investment is required for emerging markets, in which technologies and by which dates. The markets covered are low- and middle-income economies, based on the [World Bank's classification](#) – a diverse set of geographies with varying capacities, resources and pathways to net zero. The analysis gives a complete picture of the scale and focus of the investment needed to achieve carbon neutrality by 2050.

Further reading

Visit this [page](#) for the executive summary of the *New Energy Outlook 2024*, and the full analysis on the [BNEF website](#) or [Bloomberg Terminal](#). Alternatively, scan the QR code on the right for more details.

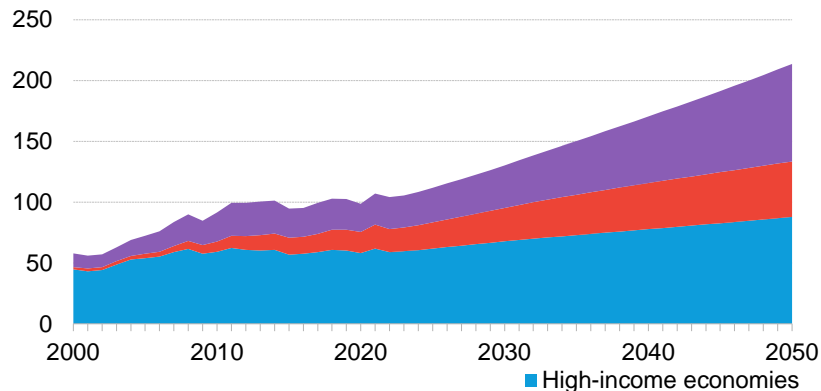


Emerging markets will drive most of the world's economic growth to 2050

Many low- and middle-income economies – termed “emerging markets” in this report – will see rapid growth in energy demand in the upcoming decades, based on economic growth forecasts. But all are under pressure to decarbonize. China’s GDP is due to rise 123% over 2024-2050, while its population declines 9%, based on BNEF analysis of International Monetary Fund and Organisation for Economic Co-operation and Development data. Other emerging markets see a considerable increase in both GDP (192% to 2050) and population (31%). This compares with a gain of only 45% for high-income economies’ GDP, as well as a 0.1% drop in population. Another demand driver for some emerging markets is improved energy access, though the share of the global population with electricity access is set to increase only 1 percentage point to 92% by 2030 relative to 2021, based on the latest [Energy Progress Report](#).

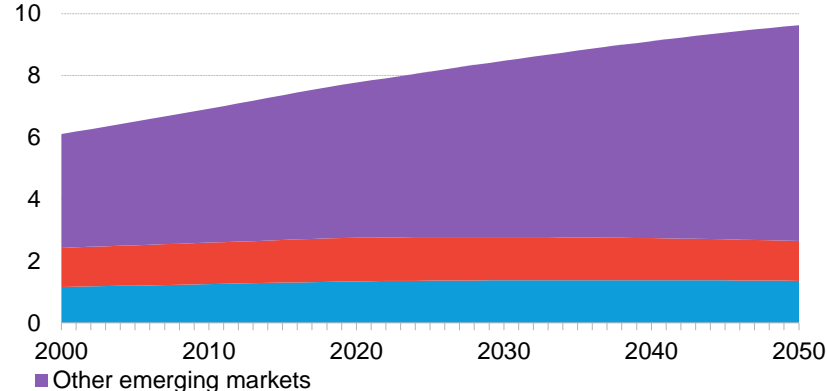
Global GDP

\$ trillion (real 2023)



Global population

Billion people



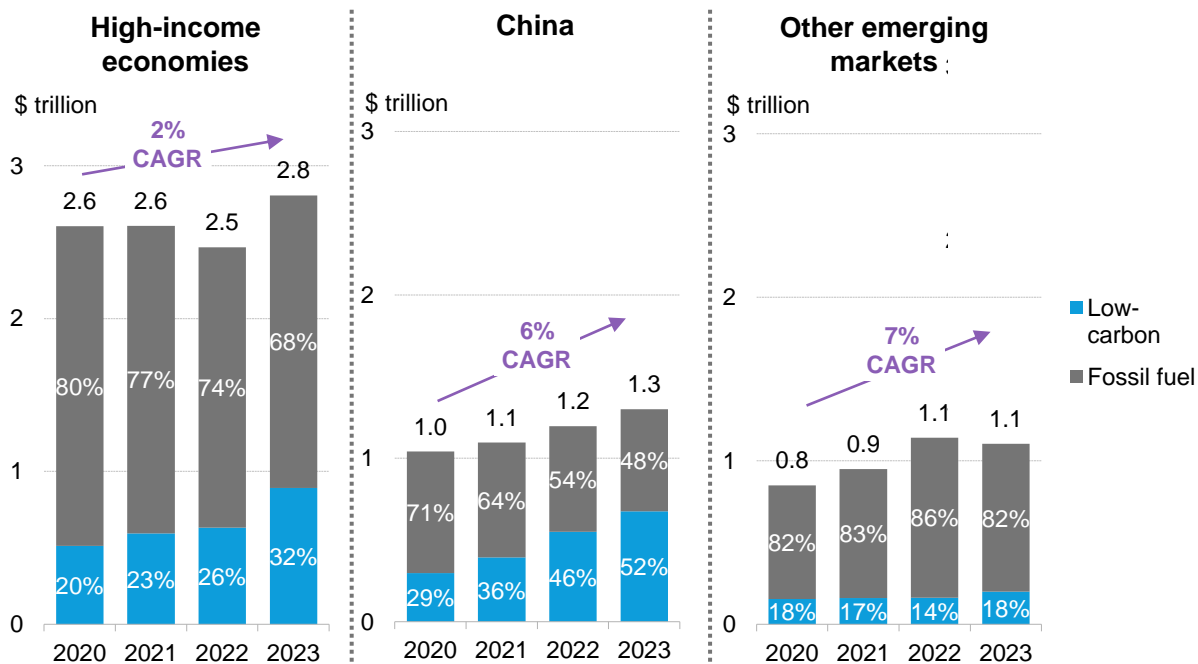
Source: BloombergNEF, International Monetary Fund, Organisation for Economic Co-Operation and Development, United Nations, World Bank. Note: Nominal GDP series in local currency have been converted to real US dollars using market exchange rates and the US dollar GDP deflator from the OECD. They are therefore not adjusted for purchasing power parity. For more on the World Bank classification, see the [‘Methodology and data sources’ section](#).

Emerging markets' investment today



Emerging markets' energy investment (excluding China) is heavily tilted toward fossil fuels

Historical annual energy system investment

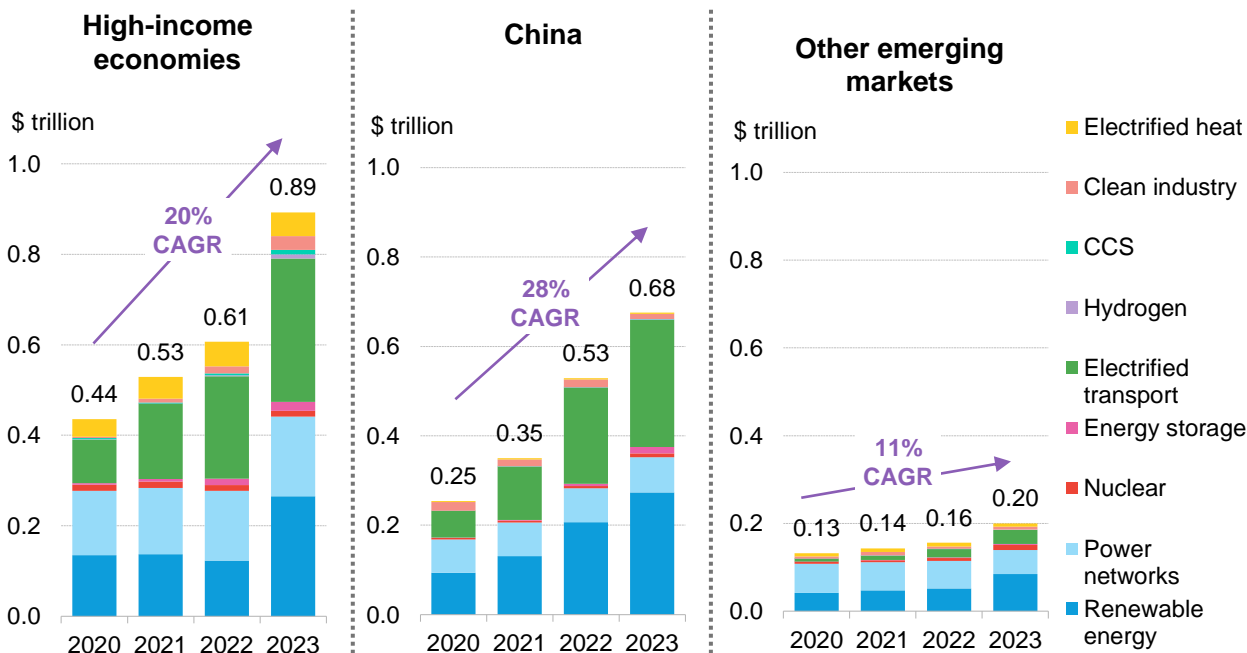


Source: *BloombergNEF Energy Transition Investment Trends 2024*. Note: CAGR refers to compound annual growth rate.

- Energy system investment has remained relatively flat in recent years. A bigger change has been seen in the increasing share of low-carbon technologies for high-income economies and China – but not for other emerging markets. In total, \$2.4 trillion was invested in the energy system across all low- and middle-income economies in 2023.
- Both China and the other emerging markets saw a similar compound annual growth in energy investment over 2020-2023. However, low-carbon technologies comprised a much bigger share in China – at just over half in 2023, up from 29% in 2020. Similarly, high-income economies expanded their low-carbon share from 20% to 32% over the same period.
- In contrast, emerging markets outside China have yet to begin this transition: on average, just 17% of annual investment was allocated to clean energy in the last four years..
- Across all markets, the share of investment going into low-carbon technologies needs to rise to meet a Paris-aligned pathway.

Emerging markets outside China are falling behind on energy transition investment

Historical annual energy transition investment

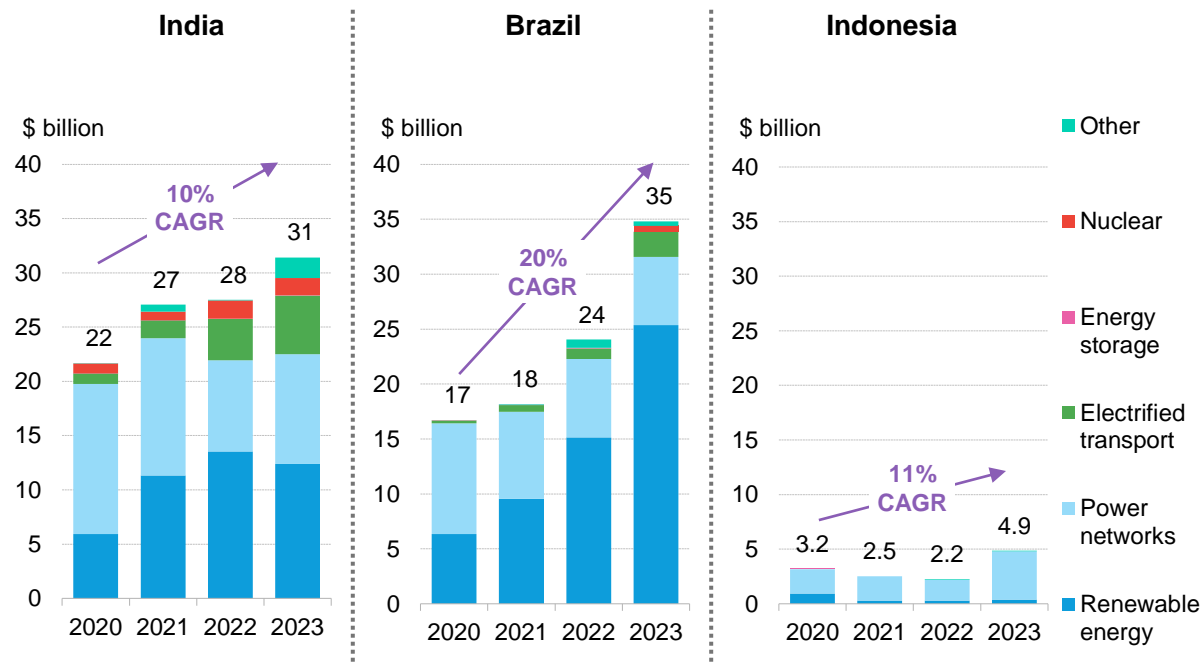


Source: [BloombergNEF Energy Transition Investment Trends 2024](#). Note: CCS refers to carbon capture and storage; CAGR is compound annual growth rate.

- In total, \$876 billion was invested in energy transition technologies across all low- and middle-income economies in 2023. China attracted the vast majority of this sum, having increased low-carbon investment by 28% on a compound annual basis since 2020. This growth rate is 8 percentage points above high-income economies with 20%. This was also significantly ahead of other emerging markets' 11% compound annual growth rate, though these economies may have seen the start of a shift in 2023.
- China has seen especially steep growth in EV and renewables investment in recent years. These technologies accounted for 42% and 40% of China's energy transition investment, respectively, in 2023.
- Similarly, renewables attracted a sizable share of funds in other emerging markets, at 42% in 2023. But the second-biggest slice was for power networks, as these economies have expanded their electricity grids to meet increasing demand from economic growth and electrification.

Some markets are having more success at growing clean energy investment than others

Historical annual energy transition investment in selected emerging markets

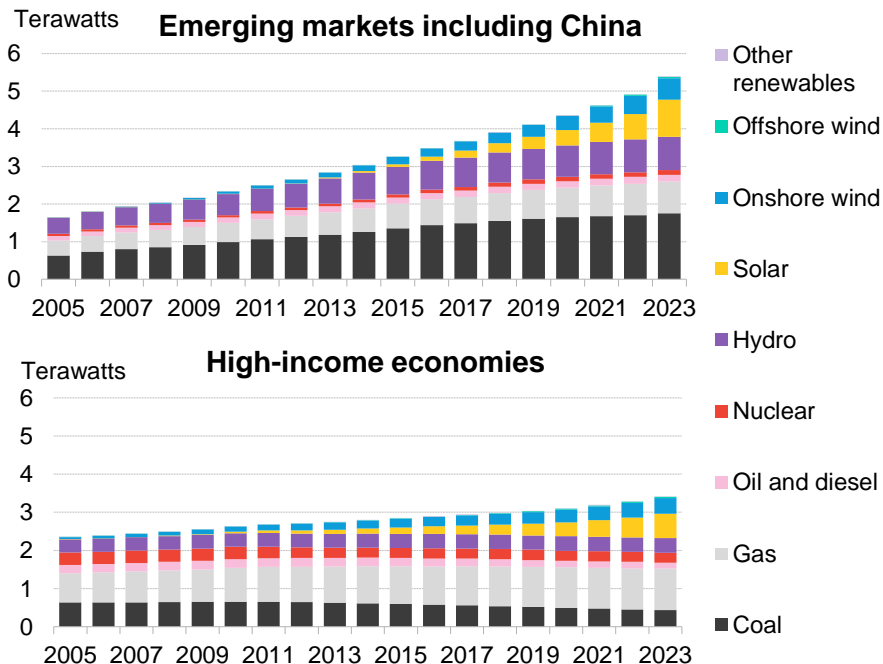


Source: BloombergNEF Energy Transition Investment Trends 2024. Note: CAGR refers to compound annual growth rate.

- Low- and middle-income economies beyond China vary considerably in terms of energy transition trends due to factors like economic growth, government support, power market structure and access to capital. For example, India saw a compound annual growth of 10% for total clean energy investment over 2020-2023. In contrast, Brazil had a CAGR of 20%.
- This variation is especially visible when looking at more mature technologies. In India, renewables investment rose by a CAGR of 20% over 2020-2023 and 53% for EVs.
- Brazil was even more successful, with a 41% increase for renewables. It also expanded EV spending by 74%, albeit from a very low base.
- At the other end of the spectrum lies markets like Indonesia, where renewables investment fell by 20% per year over the same period. However, an uplift for power networks meant Indonesia saw 11% compound annual growth over 2020-2023.

Despite renewables rollout, fossil fuels comprised 53% of emerging markets' power capacity in 2023

Cumulative installed power capacity

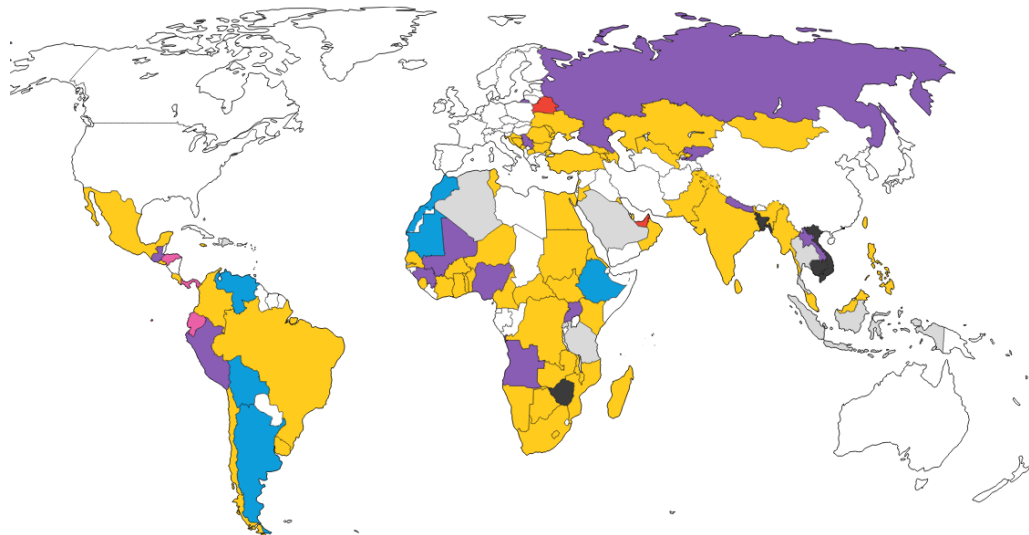


Source: BloombergNEF

- Economic and population growth, as well as increasing electrification, have driven emerging markets to increase power-generating capacity by 227% since 2005, while high-income countries only expanded their capacity by 45% over the same period.
- This increase has relied on a broad technology mix. Fossil-fuel capacity climbed 126% over 2005-2023, including a 177% rise for coal. China, which accounted for 54% of power-generating capacity in emerging markets in 2023, expanded its coal-fired capacity by 230% over those 19 years.
- Renewables have also seen marked growth. By the end of 2023, China had doubled its aggregate wind and solar capacity 10 times from 2005. The other emerging markets saw six doublings over this period.
- In contrast, high-income economies cut fossil-fuel capacity by 6% across 2005-2023, a 13% reduction for coal and 27% for oil and diesel, partly offset by a 46% rise for gas. They also rolled out renewables but not on the same scale as emerging markets: by the end of 2023, they had 19 times as much aggregate wind and solar capacity as in 2005.
- As a result of these trends, both groups of countries have made some progress in decarbonizing their power capacity mix, but neither is on track for net zero by mid-century. Emerging markets reduced their fossil-fuel share from 70% in 2005 to 52% in 2023, and high-income economies from 69% to 49%.

In 2023, some 85% of emerging markets deployed more renewables capacity than fossil fuels

Most popular new power-generating technology installed in emerging markets in 2023



■ Solar ■ Natural gas ■ Hydro ■ Wind ■ Coal ■ Nuclear
■ Oil and diesel

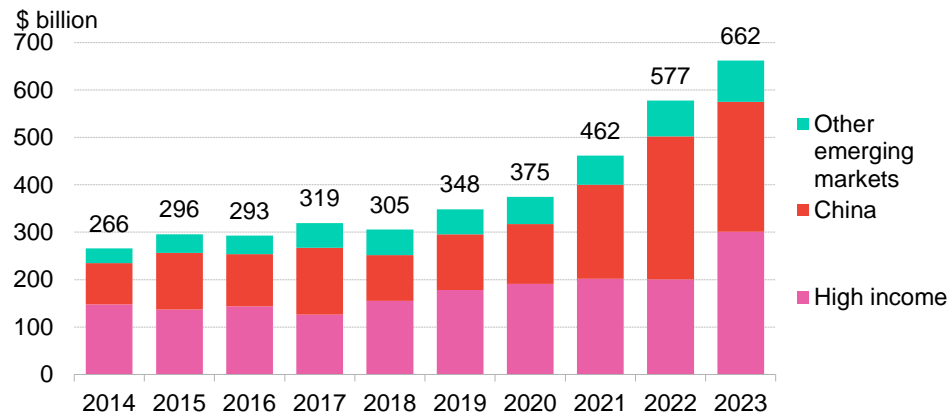
- More emerging markets are choosing low-carbon solutions to build out their power plant fleet. Last year, 64 low- and middle-income economies installed more renewables capacity than any other technology. At the end of 2023, these economies accounted for 96% of power-generating capacity deployed in emerging markets.
- Solar was by far the preferred option for the highest number of these regions. Because these included such economic heavyweights as mainland China, India and Brazil, the solar hot spots comprised 87% of emerging market power plant capacity. Other low- and middle-income economies have also ramped up solar build. Pakistan, for example, has seen rapid growth in solar module imports, suggesting the market is strong. BNEF forecasts it could become the sixth largest solar market in the world in 2024.
- Wind was second, having been favored in regions with 5% of generating capacity.
- In contrast, the popularity of fossil fuels is waning. In total, they were preferred in regions accounting for 4% of the emerging market power fleet. Natural gas made up the bulk of new fossil-fuel additions, and only three of these economies installed more coal power than any other technology.

Source: BloombergNEF

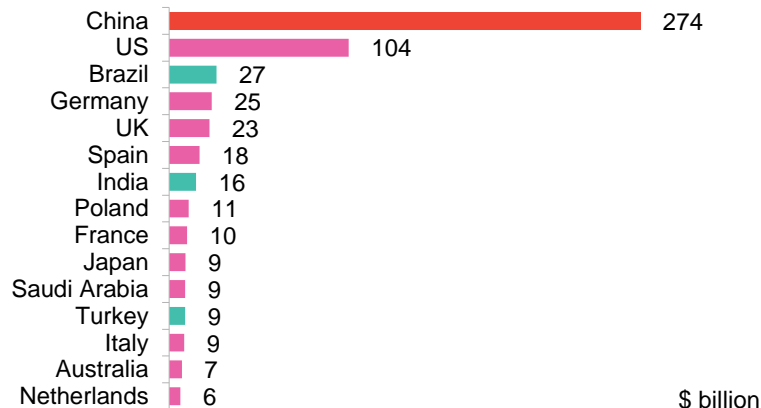
Global renewable energy investment hit another record in 2023 at \$662 billion

- Global renewable energy investment rose to new records in 2023, predominantly driven by high-income economies. The US, for example, boosted investment by 73% as solar supply chain pressures eased and uncertainties regarding the Inflation Reduction Act were mostly resolved. Solar also helped Germany achieve a 64% rise in renewables funding, partly motivated by momentum from the energy crisis, while UK investment was more than six times that in 2022, as offshore wind auction winners secured financing.
- Emerging markets attracted \$361 billion in new renewables investment in 2023, more than double the total five years earlier. However, they have yet to significantly expand their aggregate share of global investment, which grew only 6 percentage points to 55% over 2019-2023. China dominates the picture, with a 41% share of the global total in 2023. Only three other emerging markets were in the top 15 for renewables investment last year.

Global annual new renewable energy investment



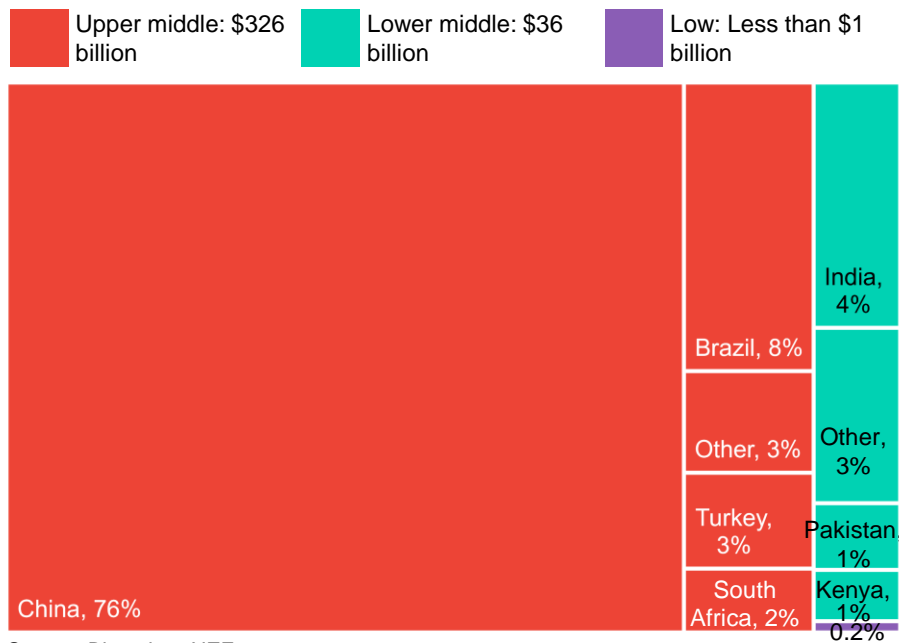
Top 15 economies for renewables investment in 2023



Source: BloombergNEF. Note: BNEF's renewables data includes a global buffer for small-scale solar due to difficulties in tracking individual projects. In the left-hand figure, the buffer is included in the series for high-income economies but due to the lack of a country breakdown, it is excluded from the right-hand figure.

China accounted for three-quarters of renewables investment in emerging markets in 2023

Renewable energy investment in emerging markets by income group in 2023

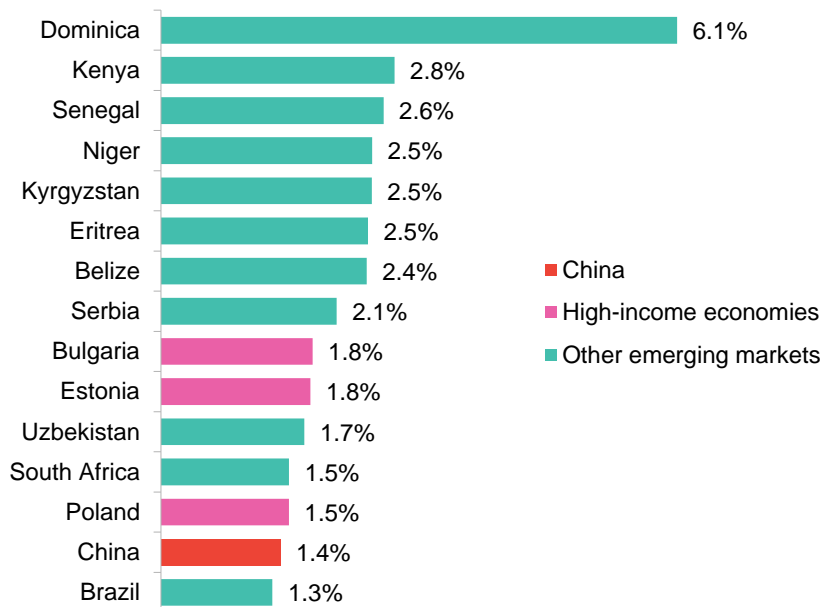


Source: BloombergNEF

- A few big geographies account for a substantial share of emerging market investment in each income group. China is a stand-out, though capital deployment dipped slightly in 2023, to \$274 billion. This was largely due to declining equipment costs and reduced onshore wind funding. Nonetheless, it achieved a 133% increase over 2019-2023, well above the growth rate of 88% globally and 66% for high-income economies.
- The rest of the upper middle-income group comprised 15% of the emerging market total. Brazil was by far the next largest contributor, with \$27 billion, followed by Turkey at \$9 billion.
- Lower middle-income economies made up 9% of total renewables investment in emerging markets in 2023. While India saw a modest reduction in dollar terms, it still comprised more than half the total for this income group.
- Less than \$1 billion, or 0.2%, of the emerging markets sum, was allocated to low-income economies. Niger accounted for almost 60% of the total for that income group.
- In contrast, some large emerging markets still lag behind on attracting renewables finance due to factors like regulatory barriers and a lack of government subsidies. These include Indonesia, Thailand, Argentina, Nigeria and Bangladesh.

But 14 other emerging markets attracted more renewables investment per unit of GDP than China

Top 15 economies for new renewable energy investment as a share of GDP in 2023



Source: BloombergNEF

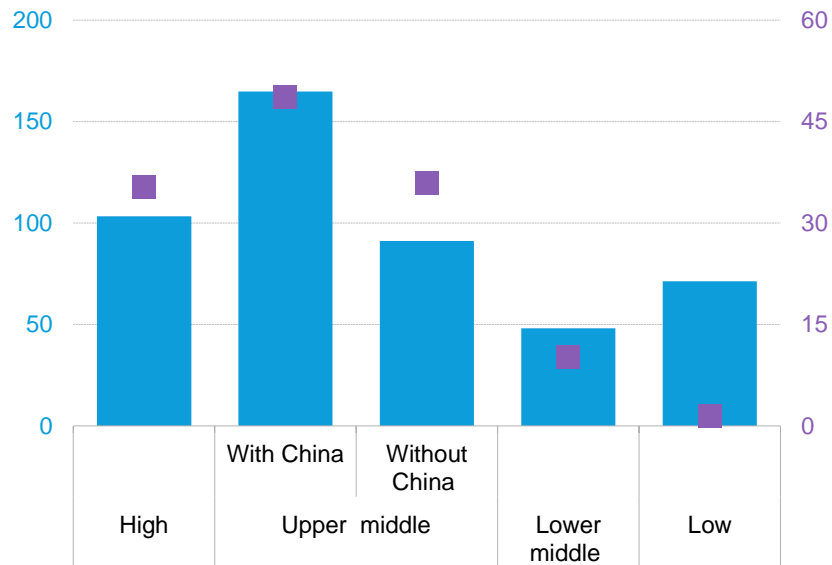
- China outranks other markets in absolute volumes of renewables investment, with an annual average of \$258 billion per year over the last two years. That is 3.6 times the aggregate average for all other emerging markets.
- However, the sheer size of their economies gives markets like China and the US a significant advantage. Another way to compare markets is by normalizing for GDP. On this basis, China's annual renewables investment was equivalent to 1.4% of its GDP in 2023, putting it in 14th place globally. The US total was only 0.4% of its GDP, putting it in 53rd position.
- Some emerging markets performed especially well in 2023 when renewables investment is levelized against GDP. Out of the top 15 geographies worldwide for this metric, only three are high-income economies. As discussed on the [next slide](#), renewables investment in lower-middle and low-income economies fluctuates considerably year-on-year. Therefore, the top 10 ranking for normalized renewables investment is likely to comprise a different set of markets each year, though China will probably always appear.
- However, the high number of emerging markets with minimal renewables investment over this period means that overall they average 0.4% – 1 percentage point below the mean for high-income economies.

Low- and lower-middle economies have fewer and smaller renewables deals

Renewable energy deal sizes and flow across 2019-2023, by income group

Average deal size (\$ million)

Average number of deals per year



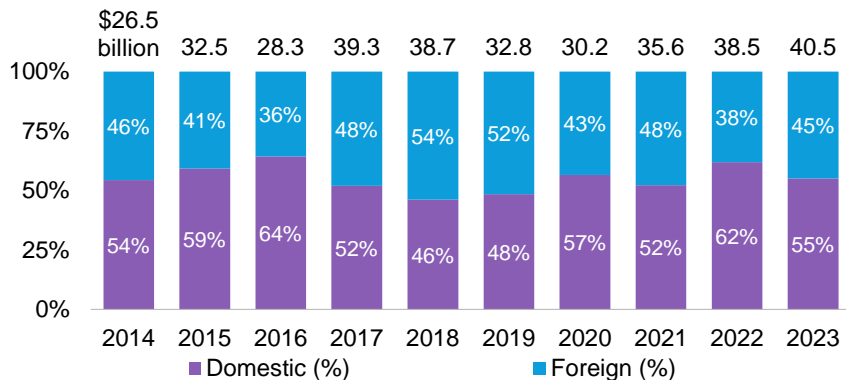
Source: BloombergNEF

- In general, emerging markets – especially outside China – have fewer renewables deals annually. As a result, investment levels fluctuate year-on-year and may deter project developers and investors. On average, each low-income economy attracted 1.4 deals per year over 2019-2023, with a mean size of \$71 million. There is variation within each income group: almost half of these markets had no deals in 2023, for example.
- Lower middle-income economies average 10 deals per year. But they tend to be smaller at \$48 million on average, partly due to markets with a much higher number of small investments like India, the Philippines, Nigeria and Bangladesh. To scale up renewables investment the priority for low-income economies would be to increase deal volumes, while lower-middle economies have room to grow the size of deals.
- The average for upper-middle income countries was elevated by China, which attracted around 2,100 deals per year on average over 2019-2023, with a mean size of \$95 million. Without China, each market in this income group had 36 deals, each worth \$91 million, on average.
- Year-on-year investment volatility can also increase if private sector players are only allowed to, or are strongly incentivized to only, participate in the market through a dedicated renewables scheme. For example, South Africa's stop-and-start auctions have led to volatility. On average, renewables investment there fluctuated by 176% year on year over 2019-2023. This compares with 14% for India, where there are multiple routes to market for renewables developers.

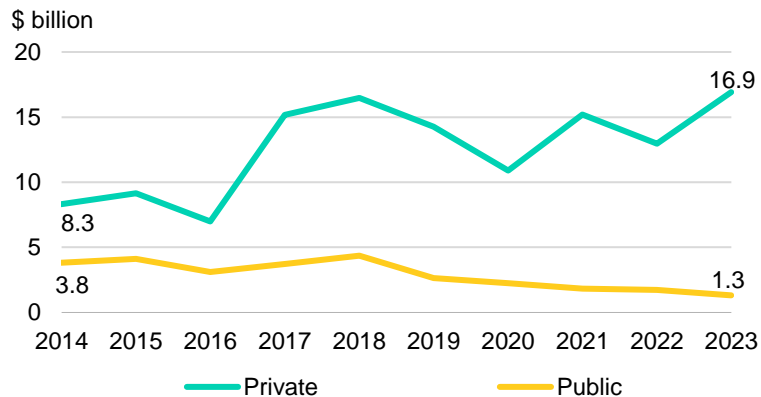
Foreign private investors drive up renewables asset finance

- Emerging markets outside China attracted \$40.5 billion in renewable energy asset finance in 2023, a 5% increase year-on-year. Historically, domestic investors are responsible for most of this investment, reaching 55% of the total last year. However, this varies significantly across markets. From 2019 to 2023, domestic investment in India was over four times greater than foreign, while in Brazil both had roughly the same values.
- The private sector plays a major role in foreign asset finance for renewables. Over the past decade, public investment stalled, while private steadily increased. In 2023, some \$16.9 billion – or 93% – of foreign asset finance came from the private sector.

Non-China emerging markets renewable energy asset finance, by investor origin



Non-China emerging markets foreign renewable energy asset finance, by investor type



Source: BloombergNEF. Note: The private and public classification for foreign investment is based on companies' ownership status. Public investors include export credit agencies, multi-national development banks and sovereign funds.

Future investment needs



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Energy and climate scenarios for the transition to a low-carbon economy

The analysis in the following section builds on the results of the *New Energy Outlook 2024*, BNEF's latest energy and climate scenarios. The *New Energy Outlook* models the power, transport, industry and buildings sectors to 2050 using bottom-up subsector models for 12 countries and seven regions, with additional power sector detail for 19 markets. It covers 16 subsectors and more than 75 decarbonization technologies.

The core scenario used in BNEF's research is our Economic Transition Scenario (ETS). This lays out how commercially available technologies could be deployed based on the underlying economic fundamentals of the energy transition, in the absence of new policy regimes. It employs a combination of near-term market analysis, least-cost modeling, and consumer uptake and trend-based analysis. The Net Zero Scenario (NZS) describes a tough but achievable stretch that reaches net-zero emissions and keeps temperatures well below 2C by mid-century, via an orderly transition using current technologies.

Economic Transition Scenario (ETS)

- Exploratory base case that describes how the power, industry, transport and buildings sectors might evolve as a result of cost-based technology changes.
- Consistent with a **2.6C** warming by 2100 outcome.
- Assumes no further policy support for the energy transition beyond existing measures.
- The low-carbon transition is largely limited to the power and transport sectors.

Net Zero Scenario (NZS)

- Normative climate scenario that describes a tough but achievable stretch to get on track for net-zero emissions by 2050 by meeting sectoral carbon budgets.
- Consistent with a **1.75C** warming by 2100 outcome.
- No overshoot or reliance on net-negative emissions post-2050.
- Fully decarbonizes power, transport, industry and buildings by 2050.

- Uses bottom-up subsector models at hourly and yearly granularity.
- Leverages proprietary data and the expertise of 200 analysts.
- Detailed data on country- and sector-level data inputs and results.

New Energy Outlook 2024

Global report



Published in May 2024

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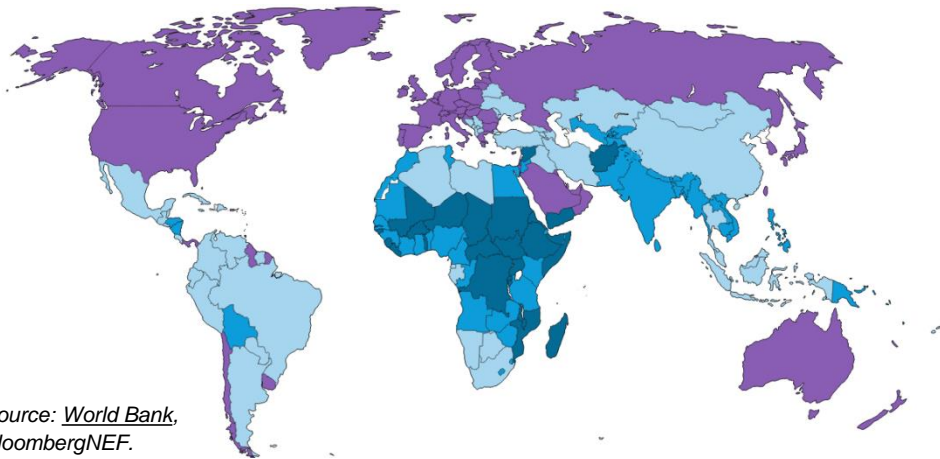
Bottom-up country and regional models for BNEF's base case and climate scenarios

		Tier 1	Tier 2	Tier 3
Geography		Countries	Regions	Additional power sector detail
Asia Pacific	Northeast Asia	China Japan South Korea		
	South Asia	India		
	Southeast Asia	Indonesia Vietnam	Other Southeast Asia	Malaysia, Philippines, Thailand
			Oceania	Australia
			Other Asia Pacific	
Europe, Middle East and Africa	Europe	Germany France UK	Other Europe	Iberia, Italy, Poland, North Europe, Rest of Europe
			Middle East and North Africa	Middle East and North Africa
	Sub-Saharan Africa		Sub-Saharan Africa	South Africa, Rest of Sub-Saharan Africa
	Americas	US	US	
Latin America		Brazil	Other Latin America	Mexico, Chile, Rest of Latin America
	Rest of the world		Rest of the world	

Geographical classification and historical data

The future investment figures modeled in this report are based on BNEF's unique set of country- and regional-level data for net-zero scenarios. This report attributes this data to countries based on the World Bank's income-based classification and defines 'emerging markets' as low- and middle-income economies. Where a region contains a mix of emerging markets and high-income economies, we attribute based on GDP. This report covers capital deployed on fossil-fuel-based and low-carbon technologies, on both the supply and demand sides of the energy system. The dollar figures in this report represent either capital investment or consumer spending, in line with national accounting conventions. The former refers to the gross investment in physical assets that yield continuous service beyond the point of purchase. Meanwhile, 'spending' refers to the expenditure of consumers and households (essentially the end users). Note that both capital investment and consumer spending are described as 'investment' throughout this report, unless specifically distinguished. All investment figures for 2024-2050 are measured in real 2023 US dollars based on analysis in the *New Energy Outlook 2024*.

World Bank income-based classification

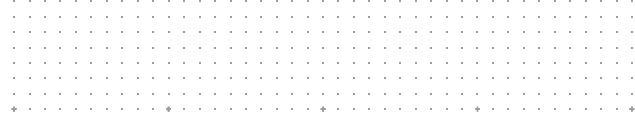


Source: [World Bank](#), BloombergNEF.

Historical data

- Low-carbon:** Historical investment data for energy transition-related assets were obtained and aggregated from BNEF's *Energy Transition Investment Trends* ([web | terminal](#)). These include investment and spending on clean technologies such as clean energy, EVs, heat pumps, hydrogen, carbon capture and power grids. In a word, the focus is on the deployment of technologies that mitigate emissions or are needed for net zero across the supply and use of energy.
- Fossil fuel:** Investment in *fossil-fuel supply* were aggregated by BNEF from the International Energy Agency's World Energy Investment 2024 database. BNEF indexed the historical investment for oil, gas and coal, alongside unabated power generation for different regions. to its fossil-fuel production and fossil-fuel generation figures. Note: In our outlook, fossil-fuel investment is attributed to consumption. Fossil-fuel demand spend revolves around consumer spending on internal combustion engine vehicles. This is the product of the average sales price and unit sales for different vehicle types, in different regions. Historical estimates for fossil-fuel demand spend exclude conventional industry and fossil-fuel boilers, though this investment is expected to be modest.

Investment and spending scope



BNEF's investment and spending scope

	Low-carbon	Fossil-fuel-based
Energy supply	Power generation capacity Renewables, nuclear, energy storage	Unabated fossil-fuel generation
	Power networks Transmission and distribution of power grids, and EV charging infrastructure (both commercial and residential)*	
	Fossil-fuel processes	Upstream, midstream, downstream value chains of the oil, natural gas and coal sectors (note that these costs are based on consumption, meaning the investment volume does not necessarily reflect where production assets are situated)
	Carbon capture and storage Abated power generation plants, and infrastructure to capture, store and transport CO ₂	
	Hydrogen Hydrogen-combined gas turbines, and green and blue hydrogen production, storage and transport facilities	
Energy demand	Electrified heat Sales of heat pumps	
	Industry Clean plants – production and recycling facilities for aluminum, cement, petrochemicals, and steel	Conventional plants – production and recycling facilities for aluminum, cement, petrochemicals and steel
	Road transport Sales of battery-electric and plug-in hybrid cars, buses, trucks and two- and three-wheelers	Sales of internal combustion engine cars, buses, trucks and two- and three-wheelers

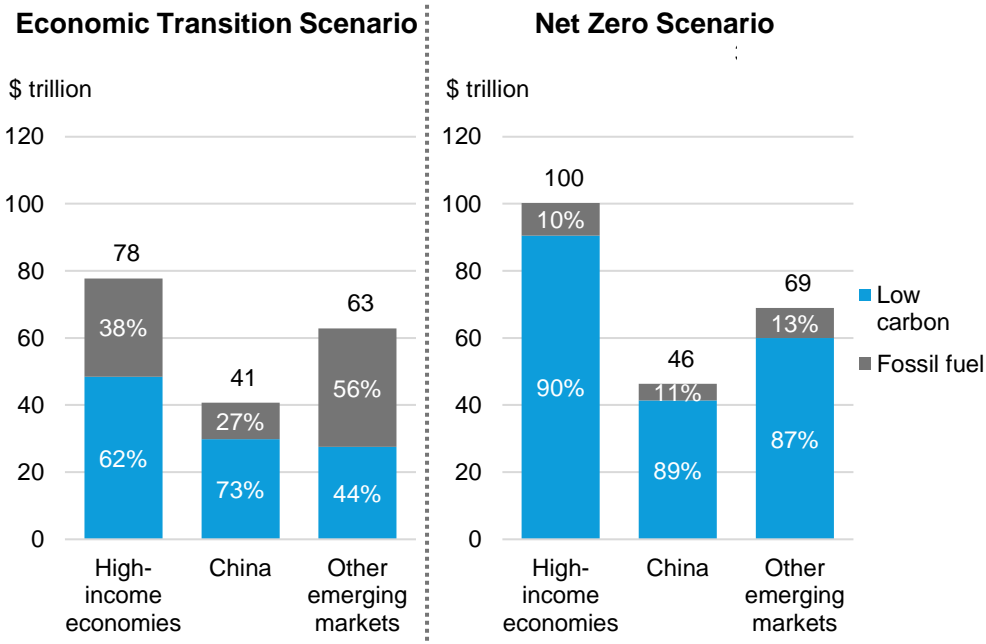
Source: BloombergNEF. Note: *Commercial electric vehicle chargers include public, work and depot chargers. Residential chargers include home chargers.

Total investment



Some \$115 trillion is invested in emerging markets to stay aligned with net zero by 2050

Cumulative energy system investment across 2024-2050

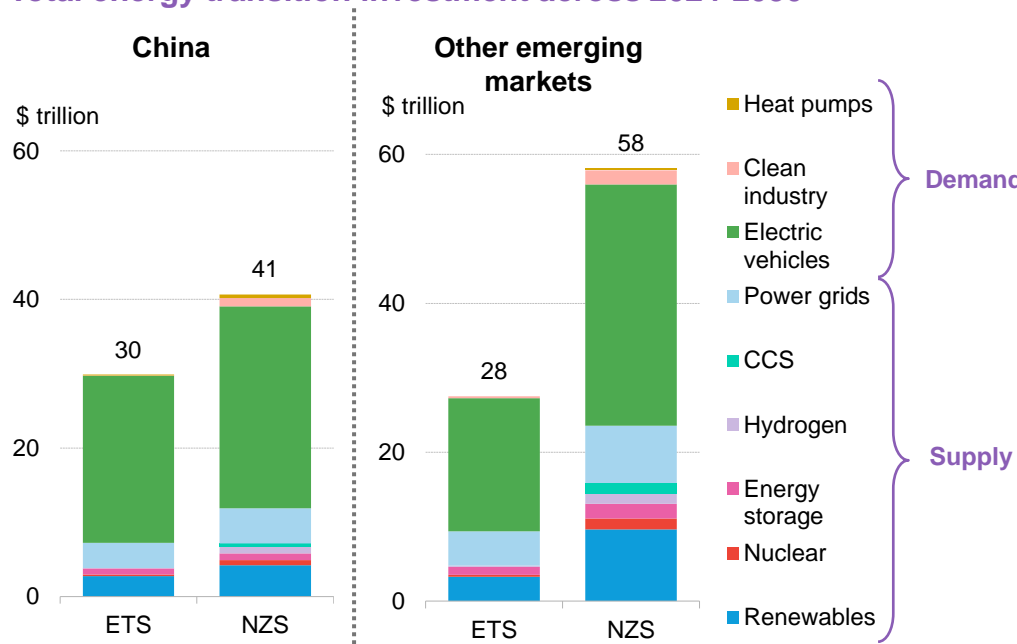


Source: BloombergNEF

- In total, a net-zero energy transition requires \$115 trillion of investment across all emerging markets over 2024-2050. Out of this total, China comprises \$46 trillion – 14% more than in the economics-driven base case. The other low- and middle-income economies need \$69 trillion, 10% more than in the Economic Transition Scenario.
- The biggest change concerns the share for low-carbon solutions, which account for 89% of investment in China in a net-zero pathway compared with 73% in the base case and 23% over 2020-2023. However, investment across the other emerging markets currently remains heavily tilted toward fossil fuels: energy transition technologies attracted only 5% of funds between 2020 and 2023. This share expands to 44% in the Economic Transition Scenario up to 2050, while a net-zero pathway implies that 87% of investment is allocated to low-carbon solutions.
- High-income economies see \$78 trillion of investment in the base case over 2024-2050. But they will need to secure 29% more investment – a bigger gap than emerging markets – to be on track to net zero. Today, around a quarter of investment goes to clean energy technologies but this increases significantly to 90% over 2024-2050 in the Net Zero Scenario.

Emerging markets need to invest almost \$100 trillion in low-carbon solutions to be on track for net zero

Total energy transition investment across 2024-2050

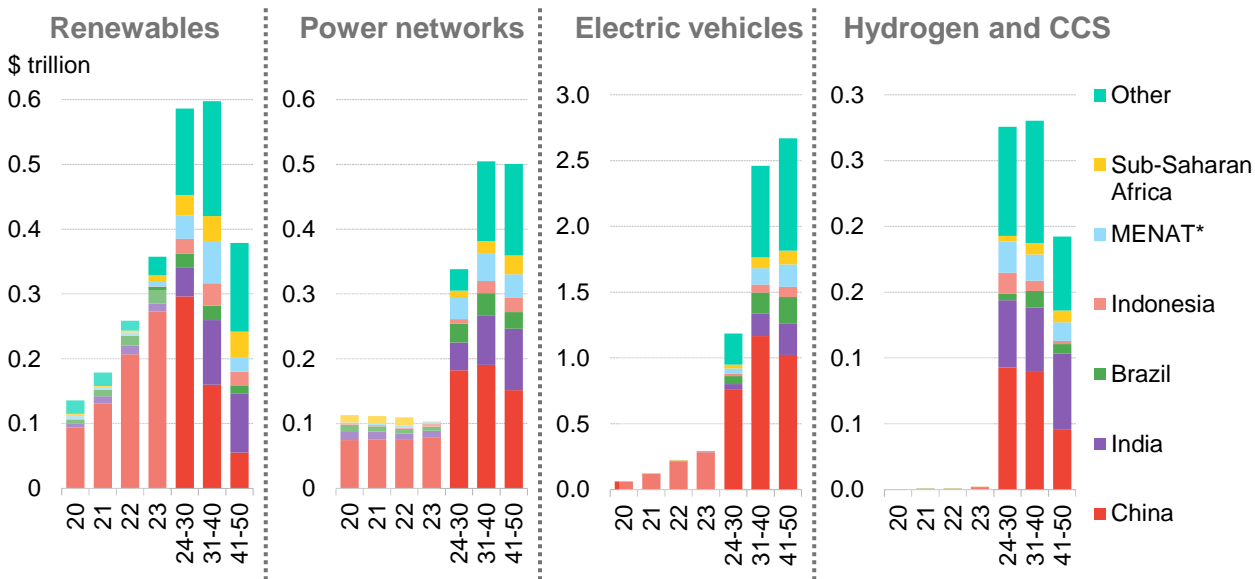


Source: BloombergNEF. Note: CCS refers to carbon capture and storage; ETS is the Economic Transition Scenario; NZS is the Net Zero Scenario.

- The economics-driven base case sees \$58 trillion of energy transition investment across all emerging markets over 2024-2050. This is split relatively equally between China and the other geographies. In contrast, low-carbon investment across all emerging markets amounts to \$99.8 trillion in the Net Zero Scenario.
- In a net-zero-aligned pathway, China invests \$41 trillion over 2024-2050. EV spending accounts for two-thirds of this (equivalent to \$27 trillion), by far the biggest share. On the supply side, power networks and renewables are the main drivers: the former totals \$4.7 trillion (12% of China's low-carbon investment) and the latter \$4.2 trillion (10%).
- EVs also account for the largest share of low-carbon investment in emerging markets outside China, with \$32 trillion in the Net Zero Scenario. This equates to a 57% slice – 9 percentage points lower than in China. That is because low- and middle-income economies outside China invest more in building clean power capacity and networks, to meet growing electricity demand. As a result, renewables comprises 17% (\$9.6 trillion) of non-China emerging markets' energy transition investment to 2050, while networks accounts for 13% (\$7.7 trillion).

Emerging markets outside China expand their share of low-carbon investment over time

Breakdown of emerging markets' historical investment and outlook for annual average investment in the Net Zero Scenario for selected technologies, 2024-2050



- China has dominated energy-transition investment in emerging markets, accounting for 71%, on average, per year over 2020-2023. This share varies across specific solutions, with 96% for EVs at one end of the spectrum. At the other end, it averaged 68% of the emerging market total for hydrogen and carbon capture and storage (CCS), but these sectors have been dominated by a limited number of small deals and an overall low level of investment.
- However, the Net Zero Scenario sees China's average share of low-carbon investment halve to 34% over 2041-2050. Widespread deployment of renewables means the economy accounts for only 15% of renewables investment in emerging markets in that decade and is surpassed by India. The latter also has the biggest share of aggregate hydrogen and CCS funding.

Source: BloombergNEF. Note: CCS refers to carbon capture and storage. MENAT* means low- and middle-income economies in the Middle East, North Africa and Turkey.

India faces a bigger gap between investment in the base case and net-zero pathway than other sizable emerging markets

Brazil

Energy investment in line with net zero reaches **\$6 trillion** by mid-century – only 5% more than the base case. Some \$4 trillion in the Net Zero Scenario comprises EV spending to reshape the mobility landscape. On the supply side, renewables and the power network comprise a total of \$1.3 trillion. To be on track for net zero, Brazil will need to scale the \$35 billion in energy transition investment mobilized in 2023 by a factor of three across the remainder of the decade.

Indonesia

The cumulative energy investment opportunity in the Net Zero Scenario stands at **\$4 trillion** for Indonesia. This is 13% above the base case. Energy supply accounts for \$2.4 trillion in the net-zero pathway, primarily for renewables and power networks. Demand-side spend is largely directed toward EVs. This provides the opportunity to bolster and build out the region's manufacturing capabilities and metals supply chains.

China

China requires the most energy investment and spending of all the key markets assessed, at **\$46 trillion** in the Net Zero Scenario – 12% more than in the base case. China has been the leader in facilitating energy transition-related investment over the past decade, mobilizing \$676 billion in 2023 – equivalent to over a third of the global total. Clean energy spend needs to more than double across the remainder of the decade to be on track for net zero.

Middle East and North Africa

Emerging markets in MENA and Turkey require **\$8 trillion** in investment to be aligned with a net-zero pathway. This marks a 4% discount from the base case, which is elevated by continued fossil-fuel capital expenditure. Even in the Net Zero Scenario, 19% of total investment is allocated to fossil-fuel production and processes. Still, the biggest share, at \$3.2 trillion, comprises consumer spending on EVs, versus with \$0.2 trillion on ICE vehicles.

India

India needs **\$12 trillion** of investment to align with a net-zero trajectory, 33% higher than the base case. This is driven by a \$4.9 trillion difference in energy supply investment, of which more than half is for power generation and networks. Wind and solar alone comprise \$1 trillion a piece. But India needs to more than triple the \$15 billion mobilized for renewables in 2023 to meet the annualized requirement for net zero through this decade.

Sub-Saharan Africa

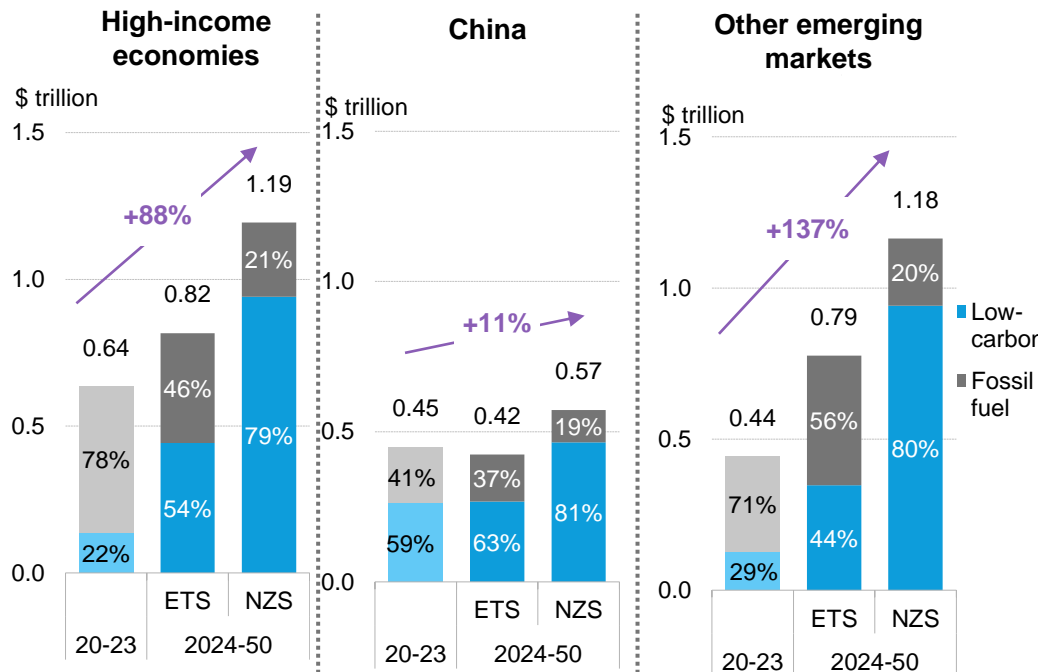
Sub-Saharan Africa's energy investment totals **\$8 trillion** under a net-zero pathway. This is 9% more than the base case and a large uplift on historical trends. Demand-side spend is slower, making up 47% of total energy investment over 2024-2050 under the Net Zero Scenario. On the supply side, the biggest slice is for new clean power generating capacity, expanding and reinforcing the grid, and deploying EV charging infrastructure.

Supply-side investment



Emerging markets outside China need to significantly scale up clean energy supply investment

Annual average energy system supply-side investment

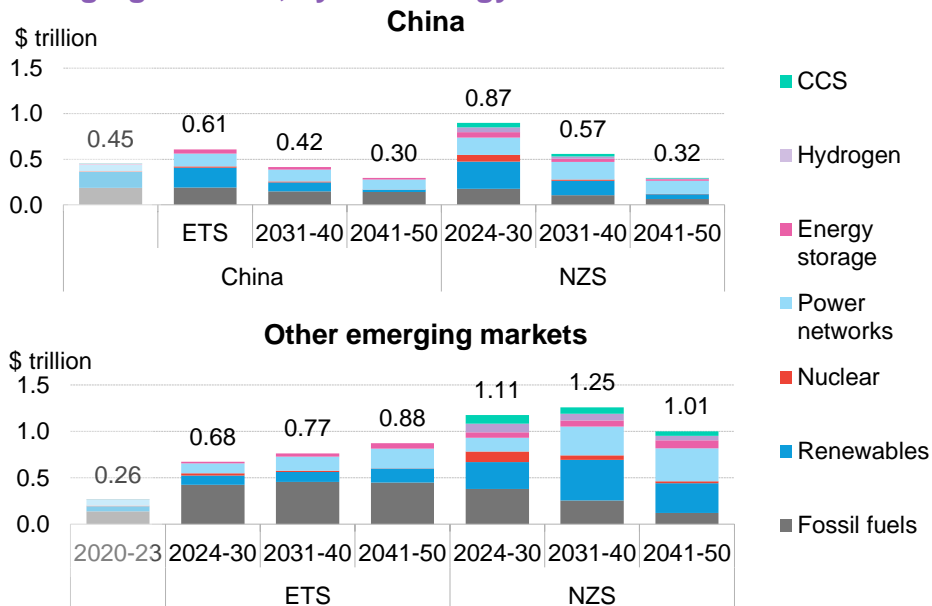


Source: BloombergNEF. Note: ETS refers to the Economic Transition Scenario; NZS is Net Zero Scenario.

- This section focuses on supply-side investment, which mainly comprises gross fixed capital investment in the infrastructure that supplies energy – both high- and low-carbon.
- With China expected to see only modest power demand growth, its annual average investment on the supply side is 13% lower in the base case over 2024-2050 than over 2020-2023. In contrast, other emerging markets see average annual investment rise by 67% under the Economic Transition Scenario, compared with current levels, indicating a large growth opportunity even under a base-case trajectory.
- For most emerging markets, being on track for net zero means more supply-side investment than historical values. China allocates 11% more capital in the Net Zero Scenario than over 2020-2023, and for the other emerging markets, the increase is much steeper at 137%.
- Non-China emerging markets invest slightly more per year, on average, in the base case relative to 2020-2023. This partly reflects underinvestment in new power generation capacity in some of these economies. However, all economic groups allocate a bigger share of investment to low-carbon technologies in the Net Zero Scenario. In particular, under a net-zero pathway, 81% of China's annual average supply-side investment is spent on the energy transition. For the other emerging markets, the share is 80%.

China's energy supply investment is set to fall, as other emerging markets scale up rapidly

Annual average energy system supply-side investment in emerging markets, by technology

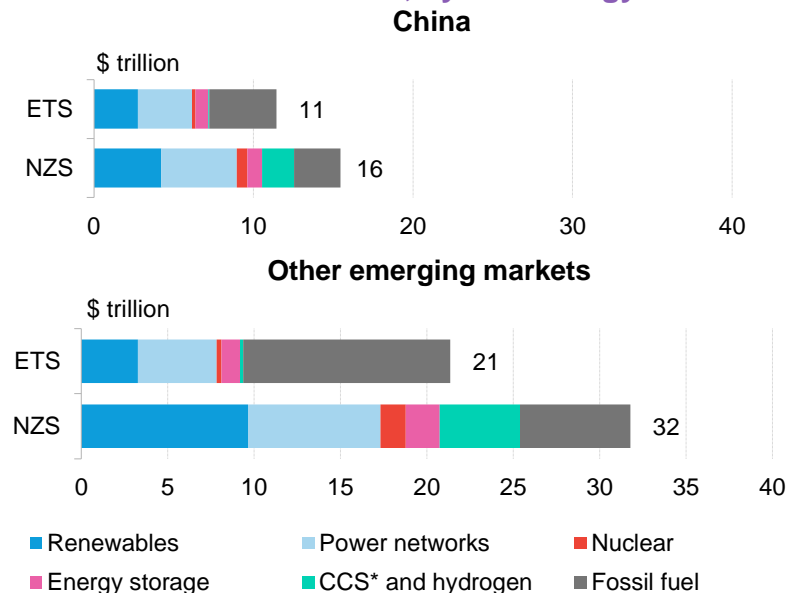


Source: BloombergNEF. Note: CCS refers to carbon capture and storage, including power with CCS. ETS is the Economic Transition Scenario; NZS is the Net Zero Scenario.

- China reduces annual average supply-side investment in fossil fuels over the next 26 years under both scenarios. In contrast, it ramps up low-carbon investment, especially renewables and networks, with even more capital required to be on track for net zero compared with the base case. However, as power demand growth slows, so too does total supply-side investment.
- As for the other emerging markets, average annual investment on the supply side is markedly higher in the base case from 2024 compared with the 2020-2023 trend. The uplift is even greater in the Net Zero Scenario. Many of these markets are expected to see significantly higher electricity demand over the coming decades due to economic and population growth, as well as increasing energy access.
- Some large emerging markets have big pipelines of new fossil-fuel power plants. But in a net-zero pathway, emerging markets excluding China see average annual investment in fossil fuels peak this decade. A small sum is allocated to gas peaker plants without carbon capture and storage, to provide critical back-up for an increasingly wind-and-solar-dependent electricity mix. Fossil fuels also continue to be used in non-energy applications, such as inputs in industrial processes.
- Switching to renewables capacity build earlier avoids fossil-fuel deployment that would bake in future emissions and require more severe reductions and potentially stranded assets closer to 2050.

Net Zero Scenario requires much more investment in hydrogen and CCS than base case

Energy-system supply-side investment in emerging markets across 2024-2050, by technology

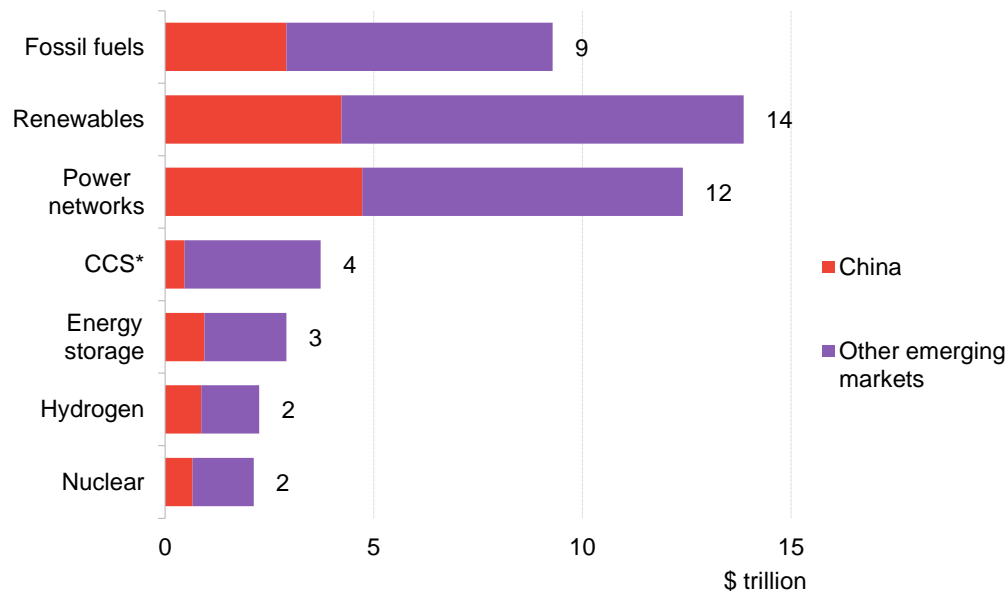


Source: BloombergNEF. Note: ETS refers to Economic Transition Scenario; NZS is Net Zero Scenario. CCS* means carbon capture and storage, including power with CCS.

- With a crucial role to play in the energy transition, renewables account for 27% of 2024-2050 supply-side investment in China in the net-zero pathway – only 3 percentage points more than in the base case. The difference is more striking for the other emerging markets, where renewables comprise 30% under the Net Zero Scenario – double the share in the base case.
- Investment in electricity networks is also higher in a net-zero aligned pathway – up 69% relative to the base case for emerging markets outside China. This deployment helps meet the added supply of renewable power from a more distributed fleet, as well as the need for charging infrastructure as EV sales grow.
- Relatively little fossil-fuel investment is allocated to electricity generating capacity. Instead, the bulk is for the up-, mid- and downstream value chains of fossil-fuel sectors. In particular, oil processes retain an 11% share in total supply-side investment in non-China emerging markets. This may be because the ramp-up in EV deployment occurs slightly later or due to growth in the petrochemicals industry and other sectors.
- Another big difference between the two scenarios is the need for more investment in other low-carbon solutions to be on track for net zero. Some, like energy storage, provide flexibility to the power system, while others, like hydrogen and carbon capture and storage, are key to achieving additional decarbonization across multiple sectors. In aggregate, CCS, hydrogen, nuclear (including small modular reactors) and energy storage account for 19-20% of supply-side investment in both China and the other emerging markets. This compares with 7-9% in the base case.

On average, emerging markets outside China account for two-thirds of supply-side investment

Energy-system supply-side investment in emerging markets in Net Zero Scenario across 2024-2050

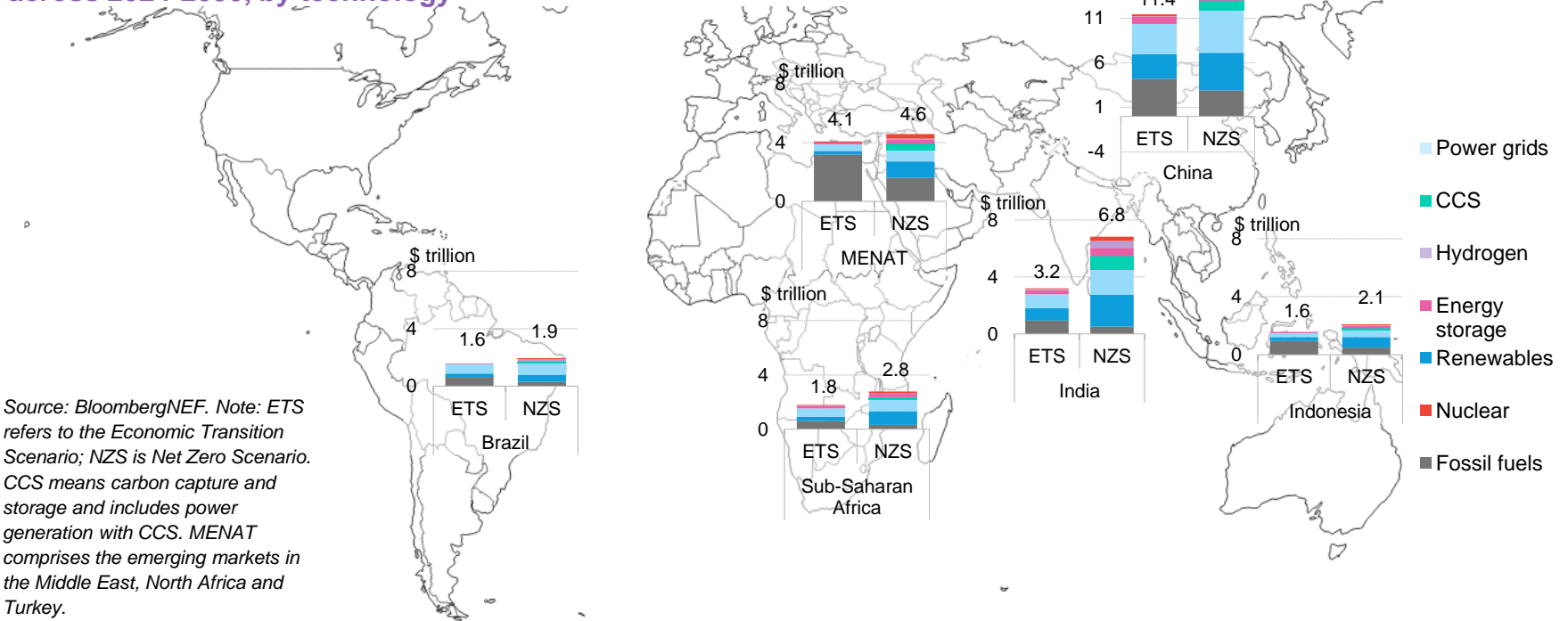


Source: BloombergNEF. Note: CCS refers to carbon capture and storage, including power generation with CCS.

- Emerging markets excluding China attract between 62% and 88% of investment in each supply-side technology over 2024-2050 under the Net Zero Scenario.
- Their largest aggregate share is for carbon capture and storage. India ranks first, with 25% of the total for all low- and middle-income economies. It sees significant growth in CCS investment to decarbonize growing industrial production and as critical back-up in the power sector. China is runner-up for CCS, with 12% of the emerging markets total.
- All of the individual markets shown on the [next slide](#) invest more in CCS for net zero than hydrogen. The exception is Brazil, where it is already cheaper to build a new hydrogen plant running on renewables than continuing to run an existing fossil-fuel hydrogen plant. As a result, Brazil accounts for 6% of emerging-market investment in hydrogen over 2024-2050.
- China ranks first, with 38% of the hydrogen investment in low- and middle-income economies. Not only does hydrogen play an important role in cutting emissions in hard-to-abate industries, but electrolyzers also provide important flexibility in the power system. As a result, hydrogen accounts for China's largest share of emerging market investment in supply-side technologies.

India and MENAT offer biggest opportunity for supply-side investment outside China

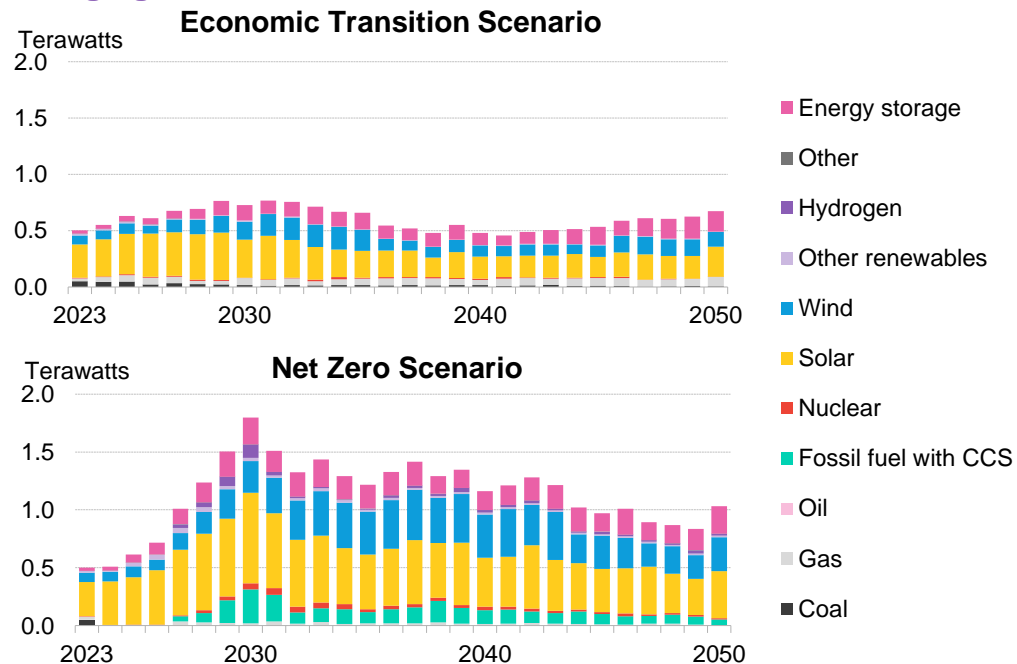
Energy-system supply-side investment in selected emerging markets across 2024-2050, by technology



Source: BloombergNEF. Note: ETS refers to the Economic Transition Scenario; NZS is Net Zero Scenario. CCS means carbon capture and storage and includes power generation with CCS. MENAT comprises the emerging markets in the Middle East, North Africa and Turkey.

Additional solar, wind and CCS rollout is critical for power-system decarbonization

Annual power generation and storage capacity additions in emerging markets

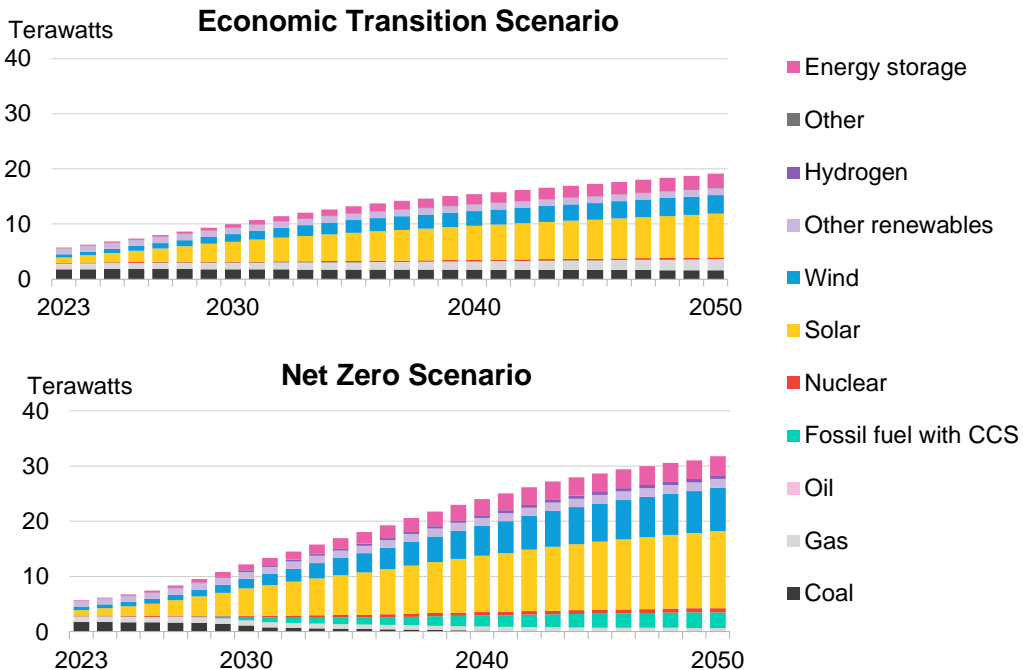


Source: BloombergNEF. Note: CCS refers to carbon capture and storage.

- Under the base case, emerging markets deploy almost 2 terawatts of new fossil-fuel generating capacity over 2024-2050, including 440 gigawatts of coal. However, to be on track for net zero, they will need a wholesale shift toward clean technologies.
- As a result, under the Net Zero Scenario, emerging markets fully cease commissioning new coal-fired power plants and combined-cycle gas turbines without CCS in 2023. Some 465GW of gas peakers are built to provide power system flexibility, but this is dwarfed by the 28TW of new low-carbon generating and storage capacity added up to 2050 – double the volume deployed in the base case.
- Increasingly cost-competitive solar and wind account for 44% and 21% of capacity added by emerging markets in the base case, respectively, and these figures only rise by a few percentage points under a net-zero pathway.
- Instead, the deeper decarbonization of the power system depends on the deployment of electricity generation with CCS and to a lesser extent hydrogen, which together comprise 11% of new capacity – up from almost zero in the base case.

Emerging markets close almost all unabated fossil-fuel capacity to be on track for net zero

Cumulative installed power capacity in emerging markets

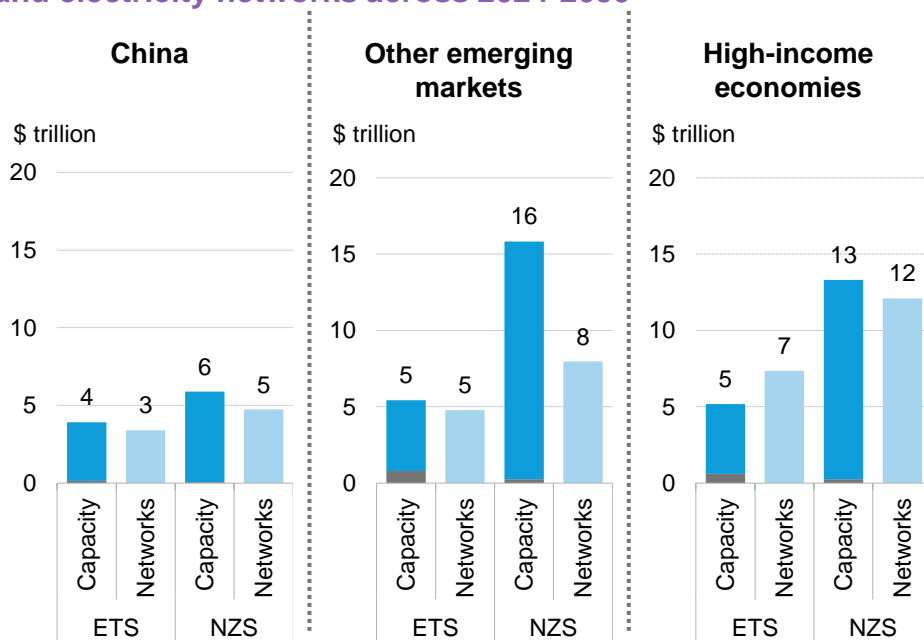


Source: BloombergNEF. Note: CCS refers to carbon capture and storage.

- With no new unabated coal and combined cycle gas turbine assets added from 2024 in the Net Zero Scenario, these technologies' aggregate share of net installed capacity shrinks to 1% (209GW) by 2050. This marks a significant change from 46% in 2023 and 15% in 2050 under the base case.
- Even though some new gas peakers are commissioned in the net-zero pathway over 2024-2050, they only account for 1% of capacity by the end of the period.
- In their place, considerable new build of wind and solar assets is required to decarbonize the electricity system. As a result, by 2050, some 28GW of such power plants are installed across emerging markets compared with 11GW under the base case and 1.6GW in 2023.
- To mitigate the increase in variable wind and solar generation, energy storage capacity reaches 3.5TW by 2050 – 33 times the volume in 2023. To remain aligned with net zero, CCS technologies are installed with fossil-fuel power plants yet to reach the end of their useful lives. By 2050, 2.9TW of generating capacity with CCS comes online, up from almost zero in 2023.

Emerging markets need a huge scale-up in power capacity investment in the Net Zero Scenario

Total investment in power generation and storage capacity, and electricity networks across 2024-2050

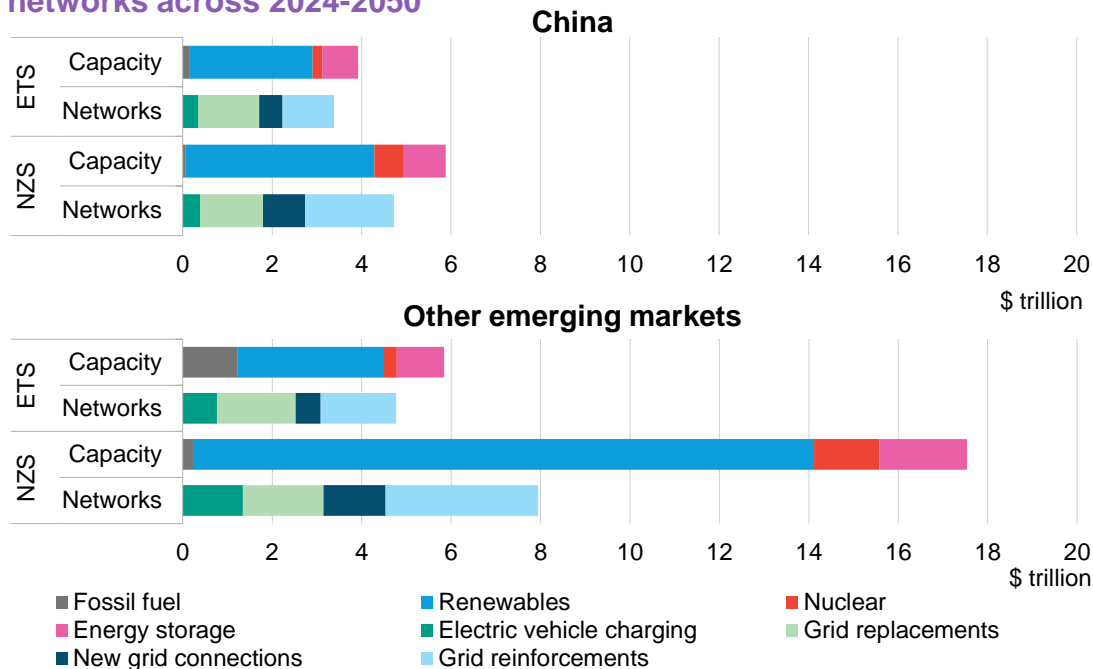


Source: BloombergNEF. Note: ETS is Economic Transition Scenario; NZS is Net Zero Scenario.

- Under a net-zero pathway, China invests \$11 trillion in the power system over 2024-2050 – 45% more than in the base case. The difference between the two scenarios is much greater for the other emerging markets, at 133%. These economies in particular need to scale up generating capacity – including renewables, nuclear, energy storage, and abated and unabated fossil-fuel assets – to meet growing demand from electrification of end-use sectors, notably transport, while not expanding the fossil-fuel fleet and raising the risk of stranded assets.
- The new capacity added in the Net Zero Scenario also increases expenditure on power networks, though the amount varies across geographies. In some markets, like China and Indonesia, investment in power capacity and networks is fairly equal, but in most emerging markets, including India and Sub-Saharan Africa, capacity-related investment far outweighs the total for networks.
- Brazil is unusual in that its share of power investment for the electricity network is 12 percentage points higher than for capacity. This is because the country already has a relatively low-carbon power mix, due to abundant hydro resources and a growing fleet of onshore wind farms. France is in a similar position thanks to the large presence of nuclear power. However, in many high-income economies, such as Germany and the US, investment in capacity and networks is relatively balanced.

Renewables investment in China is dwarfed by other emerging markets in the Net Zero Scenario

Emerging markets' investment in power generation, storage and networks across 2024-2050

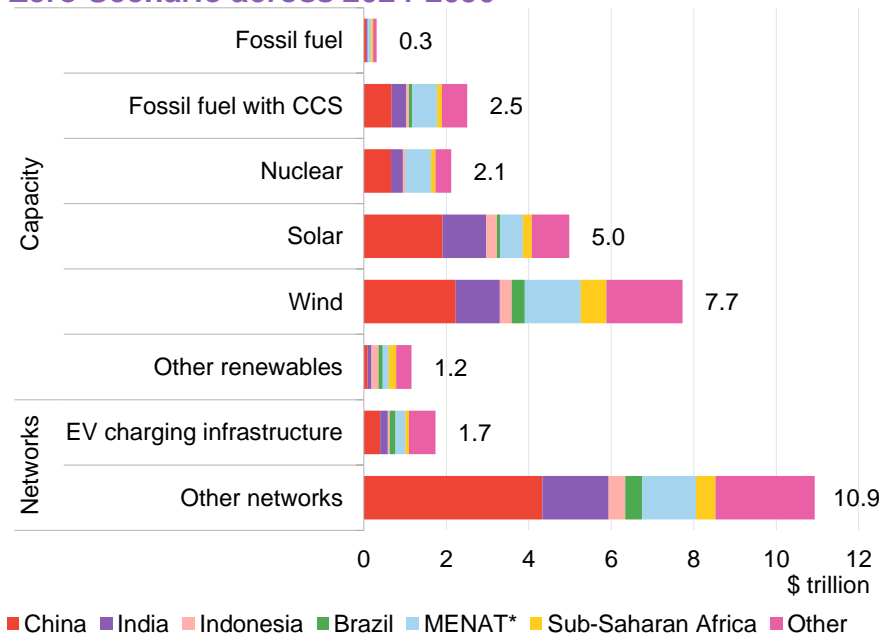


- The base case sees China and the other emerging markets invest \$3 trillion over 2024-2050 in renewables. However, to be on track for net zero and meet rising power demand, low- and middle-income economies outside China account for \$14 trillion to 2050, or more than three times the total for China.
- Onshore wind is the biggest line item for capacity investment: totaling \$6 trillion across all emerging markets over 2024-2050 in the Net Zero Scenario, this is two-and-a-half times more than the base case. Solar follows, with \$5 trillion, 80% up on the base case.
- Onshore wind and solar are already the cheapest source of new bulk electricity generation in large emerging markets like China, Brazil, India, Mexico and South Africa.
- The Net Zero Scenario sees emerging markets including China invest around \$13 trillion in power networks over 2024-2050, to transport the additional and sometimes more distributed renewables capacity. This includes almost \$2 trillion of investment in EV charging infrastructure, but the biggest share – \$5 trillion, or 43% – is allocated to grid reinforcement.

Source: BloombergNEF. Note: ETS refers to the Economic Transition Scenario. NZS is the Net Zero Scenario.

China attracts a third of emerging markets' power system investment in Net Zero Scenario

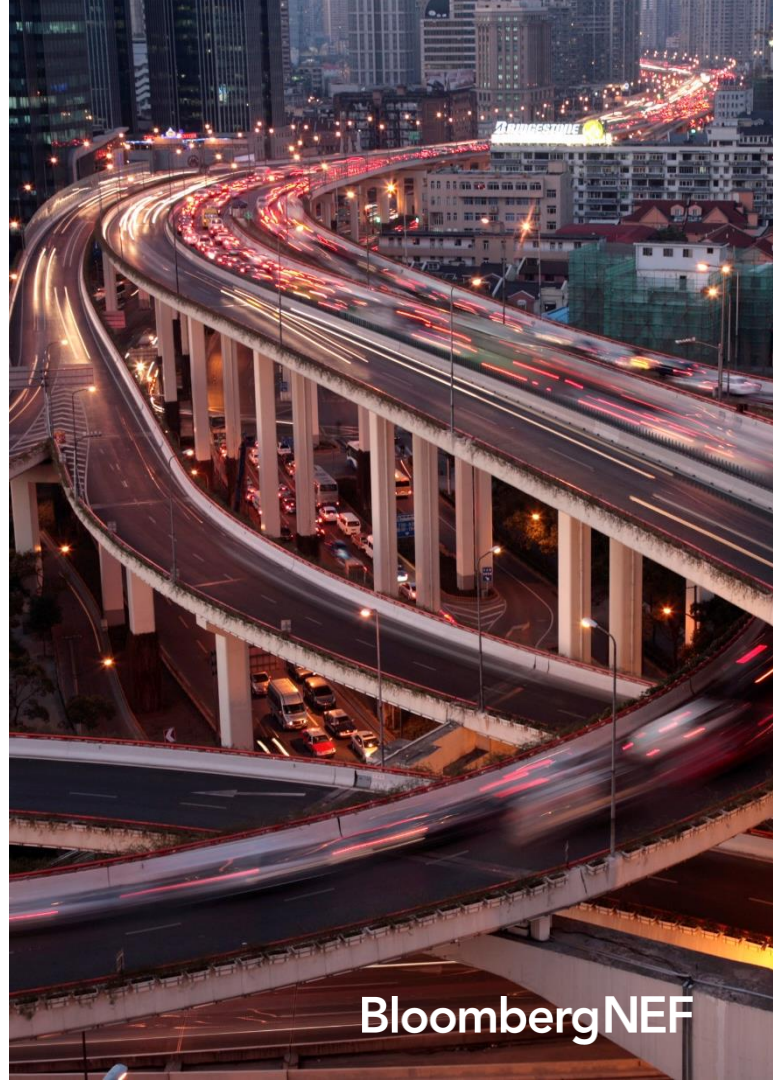
Power-system investment in emerging markets in Net Zero Scenario across 2024-2050



Source: BloombergNEF. Note: MENAT* comprises the emerging markets in the Middle East, North Africa and Turkey. CCS refers to carbon capture and storage.

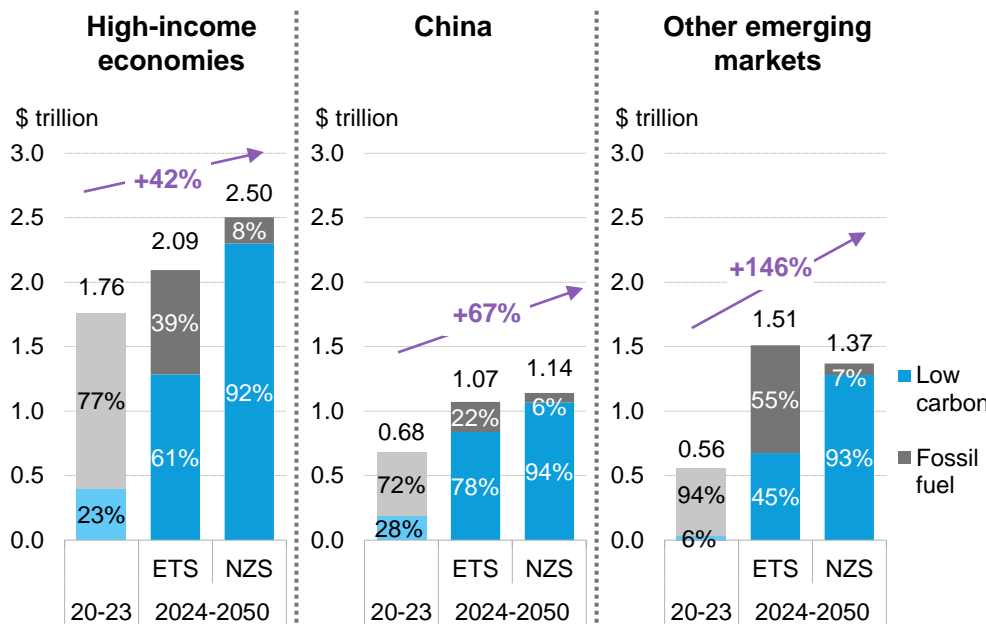
- The only technology and fuel where China does not comprise the biggest share of emerging market investment is non-wind or -solar renewables. In this case, Indonesia and Sub-Saharan Africa together comprise 28% of the emerging market total, partly due to geothermal and hydropower potential. Brazil has a further 8%, also due to hydropower resources, which have helped it make progress on decarbonizing its electricity mix. As a result, it only comprises a minor share of emerging market investment for all technologies and fuels.
- An established fossil-fuel sector in the Middle East, North Africa and Turkey (MENAT) helps emerging markets in the region secure more than 20% of investment for fossil-fuel electricity both with and without CCS. Some of these economies also have bold nuclear power plans, giving MENAT a 29% share for the technology – 2 percentage points behind China. These markets are driving current nuclear deployment globally.
- The relatively young electricity network in some regions should defer the need for funding for grid replacements. But by 2050, investment rises notably. What is more, under a net-zero pathway, the expansion of renewables, which tend to be more decentralized than fossil-fuel plants, require more grid-kilometers to be added for each installed gigawatt of capacity. For example, China's transmission grid grows more than 1.6-fold between 2020 and 2035 in the Net Zero Scenario, helping it account for 41% of emerging market investment in new grid connections.

Demand-side investment



Low-carbon solutions comprise over 90% of demand-side spending in a net-zero pathway

Annual average energy system demand-side investment



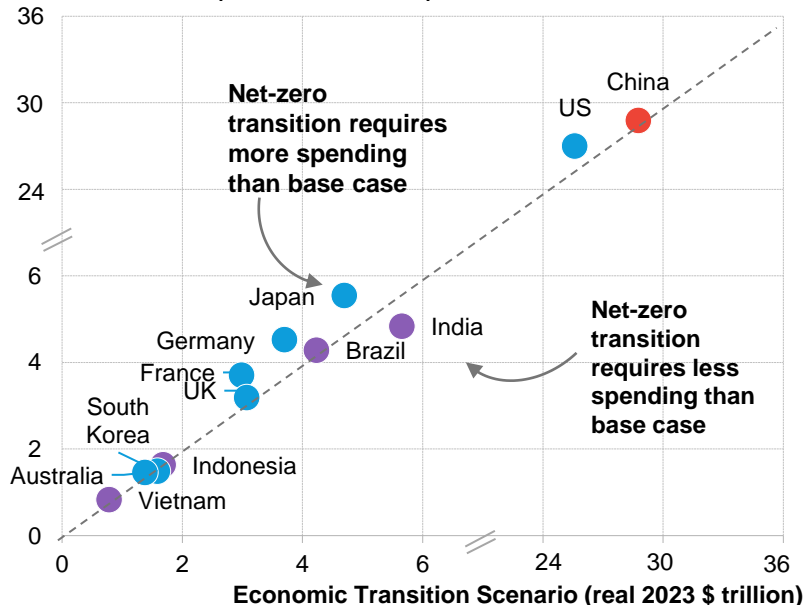
Source: BloombergNEF. Note: 2020-23 estimates exclude conventional industry and fossil-fuel boilers, though these sums are expected to be minimal. ETS is Economic Transition Scenario; NZS is Net Zero Scenario.

- This section focuses on demand-side expenditure, which mainly comprises consumer and business spending on assets and products that use energy like cars and heat pumps. It does not include operational expenditure such as fuel purchases.
- Due to economic and population growth, and increasing consumer adoption of road vehicles, both scenarios see emerging markets ramp up demand-side investment. As a result, China invests \$1.1 trillion per year on average over 2024-2050 in the Net Zero Scenario – 67% more than across 2020-2023.
- The increase is even steeper for other emerging markets, with a 146% rise between the 2024-2050 annual average and historical trends. However, a net-zero pathway requires 9% less spend than the base case in non-China emerging markets.
- The two scenarios differ in the breakdown between fossil-fuel and low-carbon technologies. In China, EVs are close to reaching price parity in some market segments with internal combustion engine vehicles. Hence the economies-driven base case projects this share expands to 75%, on average, over 2024-2050 – 34 percentage points more than over the last four years. In contrast, non-China emerging markets only accrue a 42% low-carbon share in the Economic Transition Scenario.
- But to be on track for net zero, China, other emerging markets and high-income economies need to allocate 91-92% of demand-side spending to low-carbon solutions.

Road transport spend in non-China emerging markets is lower in a net-zero pathway

Total road transport spending across key markets, by scenario

Net Zero Scenario (real 2023 \$ trillion)

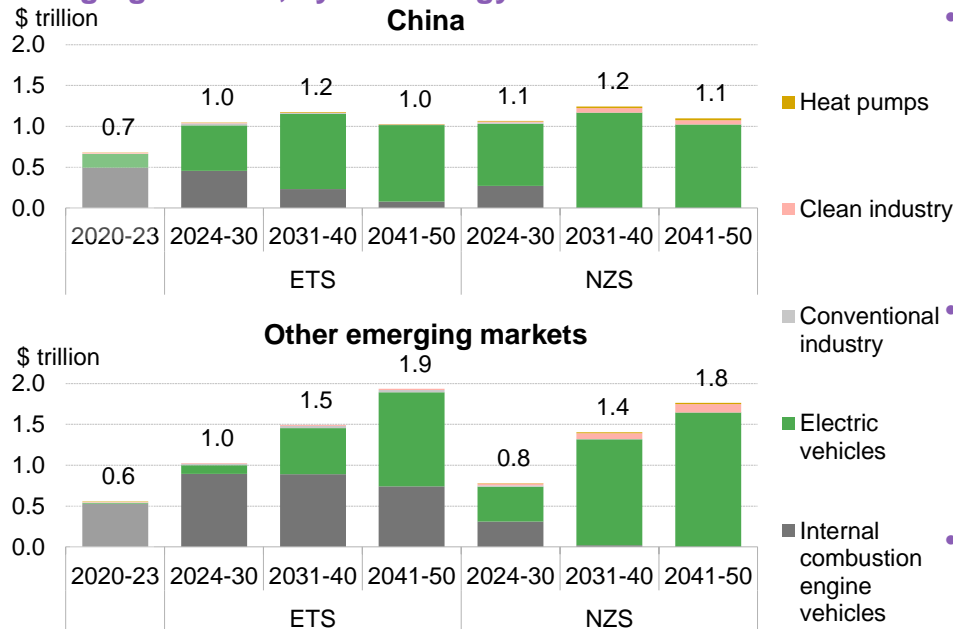


Source: BloombergNEF. Note: The scale has been truncated to include the spending volumes of all key markets.

- EVs are close to achieving price parity in more and more geographies, with China and high-income economies like Europe, the US and Japan leading the shift toward electrified drivetrains for road transport vehicles.
- All geographies need to rapidly phase out ICE vehicle sales and scale up EV adoption far above historical levels, to swiftly transition the fleet to cleaner drivetrains. The transition of global road transport is a story of substitution between conventional and electrified drivetrains, but varies across markets.
- The net-zero transition requires more spending than the base case for some high-income economies like France, Germany, Japan and the US. To accelerate the decarbonization of existing fleets and meet the transport sector's carbon budget in the net-zero pathway, some conventional vehicles need to be scrapped and replaced with low-carbon alternatives before the end of their operational lifetimes. This leads to an overall higher cost to turn over the fleet.
- But the net-zero transition in road transport may be cheaper for emerging markets outside China. This is because a net-zero pathway requires a faster transition to EVs, which are increasingly cheaper than ICE vehicles. This reduces overall average spending on road transport in fast-growing markets.
- In comparison, China, as well as high-income economies, will need to spend more on scrapping and replacing existing vehicles to be on track to net zero. Hence China, for example, spends 6% more in the Net Zero Scenario compared with the base case.

ICE vehicle spending peaks this decade in China but continues to rise in other emerging markets

Average annual energy system demand-side investment in emerging markets, by technology

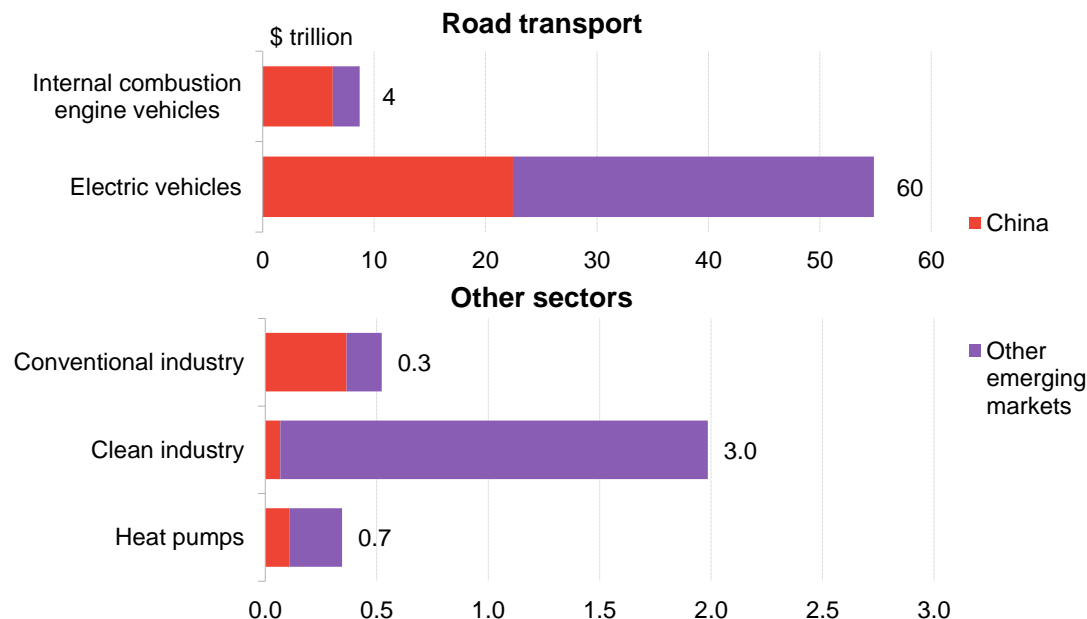


Source: BloombergNEF. Note: ETS refers to the Economic Transition Scenario; NZS is the Net Zero Scenario.

- For all scenarios and geographies, road transport accounts for the lion's share of demand-side expenditure.
- Because EVs are close to reaching price parity with ICE vehicles in China, more demand-side spending is allocated to electric drivetrains earlier in the transition than in other emerging markets. The base case sees 53% of China's annual average spending go toward EVs between 2024 and 2030 – more than double the share over 2020-2023. This figure excludes investment in charging infrastructure, which is included in the data for power networks in the [supply-side section](#). In contrast, the other emerging markets only allocate 10% per year on average to EVs in the six years to 2030.
- A net-zero pathway expects both blocs to ramp up investment in electrified drivetrains, even this decade. China reaches a 71% share of EVs in demand-side investment over 2024-2030 in the Net Zero Scenario, while the other low- and middle-income economies are at 55%. By 2041-2050, expenditure on ICE vehicles shrinks considerably under a net-zero-aligned pathway, with EVs comprising 93% of demand-side spending, on average, for both China and the other emerging markets.
- Spending outside the transport sector pales in comparison across all emerging markets. Still, low-carbon solutions account for an increasingly large share, especially in the Net Zero Scenario. As such, by 2041-2050, clean energy technologies comprise 100% of China's annual demand-side total for industry and 99% for the other emerging markets.

Non-China emerging markets attract 55% of total demand-side spending in the net-zero pathway

Energy-system demand-side investment in emerging markets under the Net Zero Scenario across 2024-2050

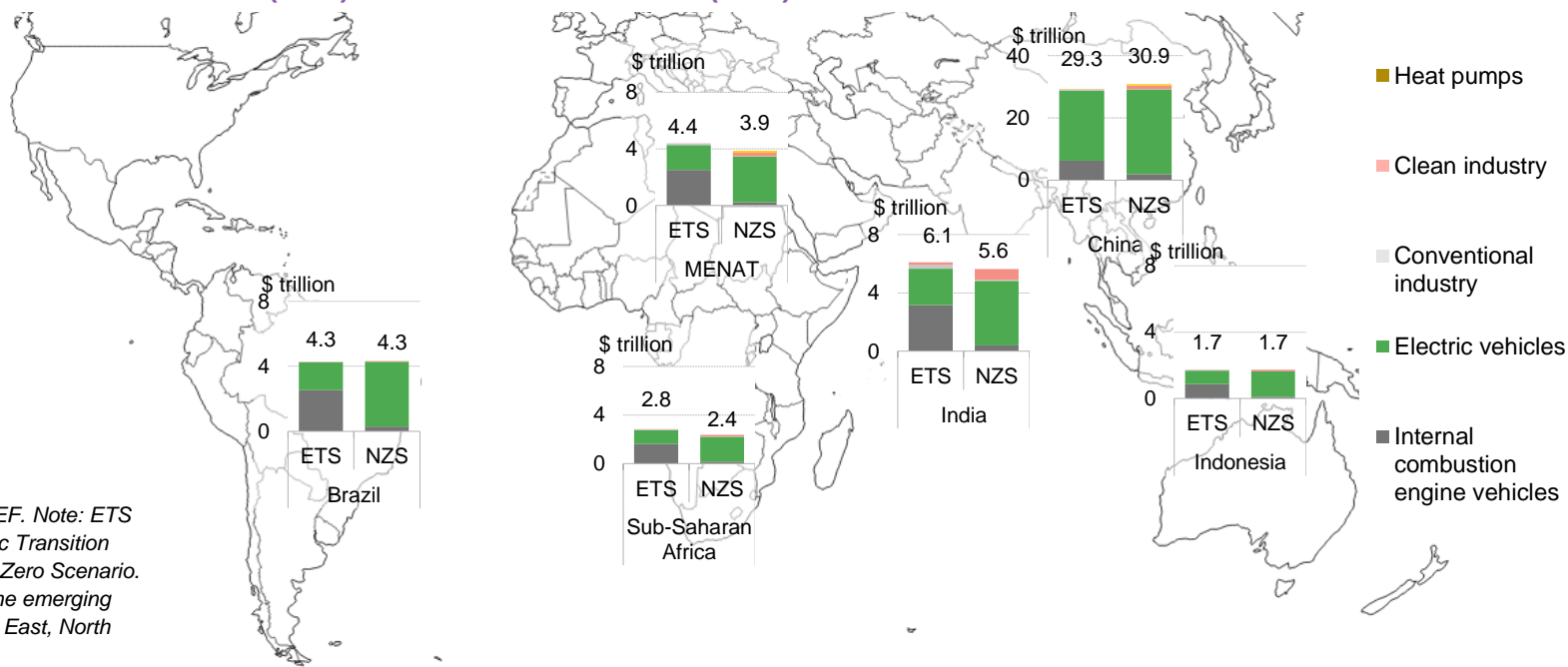


- China is already leading the global shift toward electrified transport, with EVs making up 27% of new passenger vehicle sales in 2023. Uptake has been slower in other emerging markets due to factors like current uncompetitive economics, weak EV policy support, lack of model availability, and plentiful supply of cheap used vehicles.
- However, due to the need to decarbonize the mobility sector, the Net Zero Scenario sees non-China emerging markets attracting 54% of EV spending in low- and middle-income economies over 2024-2050.
- In addition, under a net-zero pathway, as emerging markets outside China boost industrial production, they attract more clean industry expenditure. In the Net Zero Scenario, non-China emerging markets account for 63% of clean industry spending in low- and middle-income economies. India alone accounts for 24%.
- However, China's relatively cold climate means that the economy has 67% share of heat-pump expenditure in emerging markets under the Net Zero Scenario.

Source: BloombergNEF

Net zero means an almost total transition away from internal combustion engine vehicles

Energy-system demand-side investment by technology in selected emerging markets across 2024-2050, under the Economic Transition Scenario (ETS) and Net Zero Scenario (NZS)



Source: BloombergNEF. Note: ETS refers to the Economic Transition Scenario; NZS is Net Zero Scenario. MENAT* comprises the emerging markets in the Middle East, North Africa and Turkey.

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