Mobilizing Capital Into Emerging Markets and Developing Economies

Commissioned by GFANZ Glasgow Financial Alliance for Net Zero

November 1, 2022

Bloomberg NEF

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

Emerging Markets and Developing Economies (EM&DEs) need an additional US\$1 trillion of investment per annum by the end of the decade in order to transition to net-zero energy systems.¹ Further investment is also required in sustainable industry, transport, land-use, and adaptation. While renewable energy investment increased by 41% over 2017-2021 compared to the previous five-year period, the pandemic squeezed much-needed investment flows to these economies.² More climate finance needs to get to EM&DEs and quickly.

To have a full understanding of the challenges and the effectiveness of the solutions we are pursuing, we need high quality, readily-available information on current and potential sources of capital flows. GFANZ therefore commissioned BloombergNEF, given its expertise, to produce this report to better understand energy transition investments across EM&DEs and to establish strong analytical foundations for future work.

The report reviews energy transition investment trends and highlights important features and enabling policies that have proven successful in unlocking private investment. It emphasizes the need to bolster global efforts and build even stronger partnerships to create the right conditions to accelerate increased investment. GFANZ aims to publish updates to the report with the goal of expanding its scope in the future.

The data presented in the report ends in 2021, when COP26 marked a pivotal moment in placing private finance at the heart of global net-zero efforts. In the <u>GFANZ Actions to Mobilize Capital to Emerging</u> <u>Markets and Developing Economies</u> report, GFANZ states that it will continue to work with stakeholders to create the right conditions for increased investment. It also outlines the work it has undertaken, and the progress delivered in 2022.

We thank BloombergNEF and all those who are working to improve the quality and availability of data to support the transition to net zero, particularly for EM&DEs. Without high quality, accessible data, we will not have a clear understanding of whether — and how — our efforts to mobilize capital for the transition of EM&DEs are working.

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¹ Reflects clean energy investment needed by the end of the decade if the world is to meet net zero by 2050. The data does not include statistics from China. Source: Financing clean energy transitions in emerging and developing economies, IEA, 2021.

² Mobilizing Capital into Emerging Markets and Developing Economies, BloombergNEF, 2022.

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Section 1. Executive Summary

\$785 billion

2021 global investment in low-carbon energy technologies

\$67 billion

2021 investment in lowcarbon energy technologies in EM&DEs

41%

Spike in renewable energy investment over 2017-2021, compared to 2012-2016 Emerging markets and developing economies (EM&DEs) account for nearly half of the total global greenhouse gas (GHG) emissions and over a third of energy-related emissions. However, the volume of capital currently being deployed to transition these countries to lower-carbon sources of energy is insufficient given the size of the climate challenge.

This report offers a snapshot of current conditions for energy transition investment in EM&DEs. It analyses the slowing capital flows from wealthy to less developed nations post Covid-19. It notes that the "pipeline" of new clean energy projects under development has shrunk, that development finance institutions have deployed fewer dollars, that individual nations have implemented fewer critical policies and that the private sector scaled back investments in 2020-2021. Each major stakeholder group must raise its effort to help EM&DEs transition to lower-carbon energy.

The news is far from all bad. Investment into renewable energy capacity jumped 40% in the five years ending in 2021, compared to 2012-2016. The past five years also saw a 25% drop in fossil-fuel fired capacity investment in these markets with renewables attracting 15% more capital than their fossil-fueled rivals. Despite supply-chain bottlenecks and higher commodity prices, clean energy is today more cost competitive in more nations than ever. However, overall energy transition investment, including funds flowing from wealthy to EM&DEs, has stalled at the very moment when it must accelerate.

Getting on track will require unprecedented collaboration between stakeholders – including policy makers, development financiers and private investors – to build durable enabling frameworks within nations. Extraordinary declines in zero-carbon technology costs and key successes in certain EM&DE's highlight how quickly successes can come under the right circumstances. When the right players work together in the right ways, change can come very quickly.

The report's key points:

- Climate investment into EM&DEs remains insufficient to meet the goals of the Paris agreement. Volumes currently being deployed into clean energy are far less than the \$1 trillion/year the International Energy Agency (IEA) estimates will be needed by the end of the 2020s to reach net-zero global emissions by 2050.
- Decarbonizing energy, with a special focus on power generation, is the most immediate and efficient pathway to keeping EM&DEs on track in the race to zero. Looking to 2030, more than three quarters of potential global CO2 reductions will come from the power sector.
- The investment gap between developed and developing economies has widened. Global investment in low-carbon energy technologies hit a high of \$785 billion in 2021, spiking 24% from the previous year, but the growth came nearly entirely in richer nations (Figure 1). In EM&DEs, energy transition asset finance stayed essentially flat in 2021 at under \$67 billion (Figure 2). The 2021 share of global energy transition asset finance flowing into EM&DEs hit its lowest level in 10 years, at just 8%, far below the 20% peak reached in 2012.
- Part but not all of the discrepancy can be accounted for by electric vehicle adoption. Uptake of four-wheeled EVs in wealthy nations has surged in the last three years but not begun in EM&DEs due to the cost of such cars. Even factoring out the "EV effect", however, the gap between wealthy and less developed nations has widened.

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Figure 1: Global energy transition asset finance

Figure 2: Energy transition asset finance in EM&DEs

Source: BloombergNEF. Note: Energy transition technologies include renewable energy, carbon capture and storage (CCS), electrified heat, electrified transport, energy storage, hydrogen and nuclear. Investment numbers include both equity and debt.

- EM&DEs energy transition investment is concentrated in just a handful of countries. In 2021, the top 10 EM&DEs included India, Brazil and Vietnam, and attracted \$50.4 billion, or 76% of the EM&DE total.
- Foreign direct investment (FDI) for renewables in EM&DEs sank to a four-year low in 2021. Private FDI (including both equity and debt) hit its lowest level since 2016 while public flows plummeted to their lowest in 10 years, at a mere \$2 billion. Public foreign funds accounted for just 13% of the total while private investment represented 87%.
- The macroeconomic picture has been challenging. A once-in-a-century pandemic, supply chain constraints, surging inflation, and economic contraction have created unique and challenging circumstances. As result, overall foreign direct investment into EM&DEs slipped in 2019-2020. The Bloomberg Global Emerging Markets Sovereign Index, which tracks the performance of major sovereign bonds in EM&DEs, is off 18.7% since 2019. Today's challenge: rising interest rates.
- The project pipeline has shrunk. State- or utility-organized reverse auctions for clean power delivery contracts have historically proven most effective for scaling renewables in EM&DEs. But Covid-19 slowed economic growth, calling into question the need for additional capacity. Due to this uncertainty, only 13 EM&DEs contracted capacity through auctions in 2020, compared to a peak of 22 in 2019. Capacity awarded plummeted 56%, from 35.1GW in 2019 to 15.6GW in 2020, with 94% of activity in India.
- Nonetheless, investment into renewable energy capacity in EM&DEs saw a 41% spike in the five years ending in 2021, compared to 2012-2016. Solar led the growth with a doubling of investment, followed by wind with a 34% increase (Figure 3).
- Fossil investment has dropped since 2019, but volumes remain significant. EM&DEs attracted an estimated \$243 billion for new fossil fuel-fired capacity 2017-2021, 25% below the investment recorded in 2012-2016. This trend should continue if investors follow through on public commitments (Figure 3).

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Figure 3: Fossil and renewable energy investments in EM&DEs

Source: BloombergNEF.

 The current allocation of energy transition funding is not aligned with the world's longterm need to decarbonize. While developed nations attracted, on average, \$121 million of energy transition investment over 2017-2021 for each MtCO2e energy emissions, the top 20 emitters among EM&DEs attracted just a fifth of that (Figure 4). Countries such as Indonesia and Thailand are among the highest emitting EM&DEs, but received, on average, \$700 million lower annual energy transition investment over 2017-2021.



Figure 4: Energy transition asset finance vs. energy emissions by country group

Source: BloombergNEF, Climatewatch. Note: China and the US, the world's two biggest emitting nations, were omitted to facilitate visualization, but are included in the trendlines.

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- Covid-19 and the war in Ukraine hurt many emerging markets, but some are showing resilience. While emerging markets inevitably have been subject to serious economic and policy disruptions since early 2020, the impacts have varied. Commodity exporting nations tended to benefit from the general uptick in prices while importers have suffered most.
- Despite renewables being cheaper than fossil fuels in most places, barriers limit emerging markets deployment. Renewables are the cheapest power source in countries where two-thirds of the world lives, including in many EM&DEs, and the economics have only improved as fossil fuel prices have surged. But financial, regulatory and policy-related obstacles can artificially inflate clean technologies costs or make them difficult to deploy.
- Appropriate policies are fundamental to attract climate finance, but only a limited number of EM&DEs have the necessary supportive policies in place. A growing number of emerging markets have made ambitious pledges to cut their CO2 emissions, but there is little evidence that these have triggered mass implementation of more concrete policies. Over 80% of emerging markets have clean energy targets in force, but more specific and effective mechanisms are lacking, such as auctions and feed-in tariffs. For other clean energy sectors, such as transport and clean buildings, the policy environment is even less developed.
- The typical stages for EM&DEs lower-carbon energy technology adoption can be mapped. When contemplating the adoption of a new, lower-carbon technology, a nation typically starts in the "early stage" with a weak enabling environment. It then moves to "enabled for market development" when risk diminishes, and then progresses to "enabled for private finance" when capital flows accelerate. As penetration of the technology grows, policy makers remain essential in the "maintenance" stage to avoid market saturation. This can be done by implementing policies to deploy complementary technologies (which would fall in the early-stage category), such as storage to support wind and solar penetration.

Figure 5: Energy transition stages



Less experience

More experience

Source: BloombergNEF

 Coordinated public-private engagement is key to unlocking energy transition investment for EM&DEs. Once appropriate policies and regulations are in force, engagement between public and private stakeholders through catalytic investment is fundamental to help EM&DEs open doors to larger pools of private capital. More – much more – such engagement is now needed to accelerate the transition.

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Section 2. State of energy transition investment

The rate at which climate financing is being deployed in emerging markets and developing economies (EM&DEs) remains incompatible with keeping global warming on a trajectory that does not exceed 1.5C. In fact, the gap between the volume of energy transition capital flowing to developed and less developed economies has actually widened in the last few years. A smaller "pipeline" of renewable energy projects and rising concerns over country risks help explain the low figures. For the world to have any chance of achieving net-zero emissions by 2050, investment must now surge dramatically and very quickly. Nonetheless, the latest investment data does offer some silver linings. Most notably, investment into renewable energy capacity in EM&DEs jumped 41% in the five years ending in 2021, compared to 2012-2016, and these nations are now attracting more investment for clean power projects than for fossil fuel fired-capacity.

In this report, EM&DEs are defined¹ as non-OECD countries minus China but plus Mexico, Colombia, Chile and Costa Rica. While there is no universal way for categorizing such countries, "developing economies" usually includes lower-income countries, while "emerging markets" includes somewhat higher-income nations. EM&DEs defined by The World Bank² as "Uppermiddle income" are the highest emitting nations, with an average of 476MtCO2e per country, and account for 59% of the 2019 emissions. They are followed by "lower-middle income" (32% of the total), "high income" and "low income", with 5% of the total each (Figure 7 and Figure 8). This report omits China from the EM&DE category because the country represents an entirely unique case in terms of the volumes of capital it attracts and where it sources its funds. This is discussed further below.

Figure 6: 2019 emissions in EM&DEs by World Bank income Figure 6: 2019 emissions level classification Elevel classification



Figure 7: Average 2019 per-country emissions among EM&DEs by World Bank income level classification



le ■Lower-middle income ■Upper-middle income ■High income

Source: BloombergNEF. Note: EM&DEs categorization according to IEA and income level categorization according to the World Bank.

¹ EM&DEs categorization aligns with the IEA classification.

² The World Bank assigns the world's economies to four income groups – "low", "lower-middle", "uppermiddle", and "high" – based on gross national income (GNI) per capita in current US dollars.

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Climate investment into EM&DEs remain insufficient to meet the goals of the Paris agreement

Investment in EM&DEs trails far behind the \$1 trillion per year that the International Energy Agency (IEA) estimates will be required in clean energy investment by the end of the 2020s to put the world on track to reach net zero emissions by 2050³. In 2021, EM&DEs attracted just \$145 billion for renewable energy and nuclear capacity, battery storage, energy efficiency and transmission, and distribution electricity networks – 14.5% of the 2030 requirement, the IEA says.

Rapid economic development and industrialization of certain EM&DEs have caused energyrelated emissions from power and heat production, transport and industry to surge in the past 30 years. However, thanks to extraordinary progress achieved in the last decade, low-carbon emitting technologies now exist that are lower cost than their fossil-fueled rivals. At the top of the list are wind and solar power projects in most of the world, followed by electrified vehicles in a small but growing number of nations.

Decarbonizing energy, with a special focus on power generation, represents the most immediate and efficient pathway to keeping EM&DEs on track in the race to zero. Already, the switch from coal to other sources of generation is helping cut power-sector emissions throughout the world. Looking to 2030, more than three quarters of potential global CO2 reductions will come from the power sector, BNEF estimates⁴, as wind, solar and battery deployment accelerates. Another 14% cut is achieved via greater use of electricity in transport, building heat and provision of lower-temperature heat in industry.

Investment in other climate-related sectors in EM&DEs lags further behind and has to date relied almost entirely on public funding from governments and development organizations. According to the Climate Policy Initiative, non-energy sectors attracted \$122 billion in climate finance over 2019-2020. These included infrastructure and industry (\$36 billion), water (\$22 billion), and land use (\$14 billion), among others⁵.

The energy transition investment gap between developed and developing economies is widening

Globally, investment in low-carbon energy transition technologies, including equity and debt for renewables, carbon capture and storage, electrified heat, electrified transport, energy storage, hydrogen and nuclear reached a record high of \$785 billion in 2021, spiking 24% from the previous year (Figure 8). But beneath the headline figure, the gap between what is being deployed in wealthy and less developed countries has widened in recent years, highlighting the need for expanded international support.

In EM&DEs, energy transition asset finance stayed essentially flat in 2021 compared to the year prior, but jumped 28% in developed countries. EM&DEs saw energy transition asset financing sink 9% from a peak of \$73 billion in 2018 to just under \$67 billion in 2021. Meanwhile, in richer nations investment jumped 53% over the same period. The share of global energy transition asset finance flowing into EM&DEs reached the lowest level recorded in 10 years, with just 8% of the total in 2021, compared to a peak of 20% in 2012.

³ International Energy Agency's (IEA) report <u>Financing Clean Energy Transitions in Emerging and Developing</u> <u>Economies</u>

⁴ The New Energy Outlook (NEO) is BloombergNEF's annual long-term scenario analysis on the future of the energy economy. Click <u>here</u> for more details.

⁵ Figures from the <u>Climate Policy Initiative's (CPI) Global Landscape of Finance 2021</u>. CPI investment numbers are an average of 2019 and 2020.

Renewable energy technologies – wind and solar primarily – attracted 80% of the total EM&DE energy transition investment in 2021 and 85% of the 2012-2021 total (Figure 9). During this period, renewable investment grew 19% from \$45 billion in 2012 to \$53 billion in 2021.

Figure 8: Global energy transition asset finance



Figure 9: Energy transition asset finance in EM&DEs

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Source: BloombergNEF. Note: EM&DEs categorization according to IEA. Energy transition technologies include renewable energy, carbon capture and storage (CCS), electrified heat, electrified transport, energy storage, hydrogen and nuclear. It includes both equity and debt.

In wealthier nations, renewable energy technologies also account for most of energy transition financing, but other sectors have grown fast as well. In 2021, renewable energy projects represented 53% of the investment in developed nations, while electrified transport represented 36.6% and electrified heat 6.3%. The trends of electrifying four-wheeled transportation and heating have been confined thus far almost entirely to wealthy nations (Figure 10).

Figure 10: Renewable energy asset finance



Source: BloombergNEF. Note: EM&DEs categorization according to IEA. Renewable energy technologies include solar, wind, biofuels, biomass and waste, geothermal, marine, power transmission and small hydro.

The rich-poor gap only looks wider when income levels of nations are examined more granularly. To date, global energy transition asset finance has been highly concentrated in high and upper-

middle income countries⁶ and shown consistent growth over 2013-2021. Over the period, investment jumped 2.6 times in high-income nations to \$456 billion in 2021, or 58% of the total (Figure 11).

Upper-middle income nations followed with \$293 billion. However, 91% of that went exclusively to China. Excluding China, the other 54 countries categorized as upper-middle income attracted together just \$27 billion in 2021. Lower-middle and low-income countries accounted for just 4.2% and 0.03% of 2021 global energy transition investment, respectively.

EM&DEs energy transition investment is concentrated in just a handful of countries

Among EM&DEs exclusively, energy transition investment is highly concentrated in a rather small number of countries. In 2021, the top 10 markets attracted \$50.4 billion, or 76% of the EM&DE total. India alone accounted for 22%, followed by Brazil (12%), and Vietnam (10%). The remaining \$16.1 billion was spread among 60 countries that received some capital last year (Figure 12).

Figure 11: Energy transition asset finance by World Bank income group and China



Figure 12: Energy transition asset finance in EM&DEs by country

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Source: BloombergNEF. Note: EM&DEs categorization according to IEA and income level categorization according to the <u>World</u> <u>Bank</u>. China is designated as upper-middle income by the World Bank but not included in that category in this chart because it is shown on its own. Energy transition technologies include renewable energy, CCS, electrified heat, electrified transport, energy storage, hydrogen and nuclear. Investment numbers includes both equity and debt.

2.1. Foreign direct investment for renewables in EM&DEs sank to a four-year low in 2021

The majority of foreign direct investment (FDI) for renewable energy projects has always been directed to richer nations, but in 2021 it shifted even more sharply away from EM&DEs. Global FDI for renewables reached \$69 billion in 2021, down from a peak of \$73 billion in 2018. Developed nations accounted for over three quarters of that (77%), while EM&DEs attracted \$15 billion, or 22%, their lowest share since 2016 (Figure 13).

⁶ The World Bank assigns the world's economies to four income groups – "low", "lower-middle", "upper-middle", and "high" – based on gross national income (GNI) per capita in current US dollars. Click <u>here</u> for World Bank income level classification methodology and <u>here</u> for full country list.

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Both public and private foreign capital flows in support of renewables in EM&DEs have plummeted since 2019

Private FDI for EM&DEs sank to its lowest level since 2016 while public flows plummeted to their lowest in 10 years at a mere \$2 billion. Public foreign funds accounted for just 13% of the total while private investment represented 87% (Figure 14).

Figure 13: Global renewable energy foreign direct investment by recipient group



Figure 14: Renewable energy foreign direct investment to EM&DEs by type of investor

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Source: BloombergNEF. Note: EM&DEs categorization according to IEA. China is part of non-EM&DEs country group. Excludes undisclosed data. Investment numbers includes both equity and debt.

> Over the past decade, project developers, international utilities and development banks have been by far the largest foreign direct investors with 76% of total investment. In 2021, utility companies and project developers together accounted for over half of the total FDI for renewable energy projects in EM&DEs. They were followed by commercial banks (13%) and private equity firms (13%). Development banks reached their lowest level of FDI provided to renewable energy projects in EM&DEs since 2014 with just \$1.9 billion or 5% of the total (Figure 15).

Figure 15: Renewable energy foreign direct investment to EM&DEs by type of investor



Source: BloombergNEF. Note: excludes undisclosed data. EM&DEs categorization according to IEA. China is not included. Investment numbers include both equity and debt.

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\$ billion

Renewable energy investment from domestic sources increased since 2019 and reached a new high in 2021

While FDI to renewables in EM&DEs has plummeted since 2019, domestic lenders and investors have stepped up, helping close the gap. Domestic investment into renewable energy plants in EM&DEs jumped 19% in 2020-2021, reaching new highs and recording the highest increase since 2015 (Figure 16)

Over 95 EM&DEs recorded some flow of domestic capital into clean energy capacity from 2017-2021. However, 10 markets accounted for more than 83% of all domestic capital allocated to renewables. India, Vietnam, and Brazil led the way, combining for half the total (Figure 17).

Figure 16: Renewable energy investment into EM&DEs by type of investor

Figure 17: Renewable energy investment to top 10 EM&DEs for domestic investment by type of investor, 2017-2021

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Source: BloombergNEF. Note: EM&DEs categorization according to IEA. China is part of non-EM&DEs country group. Excludes undisclosed investment data. Investment numbers include both equity and debt.

Domestic investors can play a key role in scaling renewables deployment in EM&DEs. Some national commercial or development banks, for example, have in-depth knowledge of local clean energy sectors and are well connected to foreign investors. They can act as financial intermediaries and collaborate with international debt or equity providers. In markets where local players are unfamiliar with the renewables energy sector, development finance institutions or private investors can benefit from the support of domestic banks⁷.

A shrinking project pipeline helps explain investment decline since 2019

Renewable energy auctions have proven to be the most successful mechanism for ensuring a healthy pipeline of financeable projects in EM&DEs. Auctions for long-term power delivery contracts can provide projects much needed revenue certainty, drive clean energy investment, and reduce the cost of capital for renewable power project developers. Competitive allocation through auctions also produces tariffs that reflect the most current technology costs. Unfortunately, however, uncertainty caused by the Covid-19 pandemic appears to have prompted a significant slowdown in auction activity.

⁷ BloombergNEF report <u>"Multiplying the Transition: Market-based solutions for catalyzing clean energy</u> <u>investment in emerging economies"</u>

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Figure 18: EM&DE annual capacity awarded via auctions

and number of countries holding auctions

Figure 19: EM&DE ex-India annual capacity awarded via auctions and number of countries holding auctions



Source: BloombergNEF. Note: EM&DEs categorization according to IEA. China is not included.

In 2020, only 13 EM&DEs contracted capacity through auctions, compared to a peak of 22 in 2019. Total capacity awarded plummeted 56%, from 35.1GW in 2019 to 15.6GW in 2020, with 94% of that contracted in India (Figure 18). Excluding India, the other 12 countries contracted only 0.9GW via auctions compared to 8.5GW in the previous year. In 2021, activity has picked up but the total number of countries holding auctions has slipped to its lowest level since 2014 as many smaller renewable energy markets have yet to resume using the mechanism. Excluding India, the other nine countries contracted 5.6GW in 2021 (Figure 19). This smaller project pipeline helps explain overall investment decline. The lack of auctions may also foreshadow weak build going forward. The next few years could continue to be slow for utility-scale clean energy build.

Figure 20 illustrates the key role auctions play in driving clean energy deployment in EM&DEs. It compares wind and solar capacity added over 2014-2021 in main auction markets to wind and solar power-delivery contracts awarded via auctions over the same period. Total capacity contracted via this policy mechanism in these 10 economies was equivalent to 84% of the total capacity added. Because auctions fundamentally foreshadow future activity, in some of the nations depicted, total volumes contracted exceed total volumes actually built to date. This has been the case in India, Argentina, UAE and Colombia, for instance.

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Figure 20: Wind and solar capacity additions in select countries and total capacity awarded via auctions, 2014-2021



Source: BloombergNEF. Note: Volumes awarded exceed capacity in some nations where auctions have been held recently, contracts have been signed, but projects have yet to be completed.

Investor confidence in EM&DEs overall has sagged since the start of the pandemic

Energy is hardly the only industry to have felt pinched in the last few years. The macro investment climate for EM&DEs overall has chilled on recession fears, rising inflation and, most recently, higher interest rates. Overall FDI into EM&DEs slipped from 2019-2020 (Figure 21). The Bloomberg Global Emerging Markets Sovereign Index, which tracks the performance of major sovereign bonds in EM&DEs, is off 18.7% since 2019 (Figure 22).

Figure 21: Overall foreign direct investment inflows in EM&DEs by country

Figure 22: Bloomberg Global Emerging Markets Sovereign Index



Source: Bloomberg, World Bank. Note: Index follows major sovereign EM&DEs bonds.

Investment for fossil-fuel fired power continues,

challenging EM&DEs' decarbonization goals

Despite their climate commitments, EM&DEs⁸ continued to build out their fossil-fueled power plant fleets in the past decade. These nations built over 540GW of net fossil fuel-fired capacity in a decade. (Figure 23). Natural gas accounted for 47.5% at 249GW, followed by coal with 40% (209GW). The balance was oil-fired power-generating capacity.

A total of 48 EM&DEs grew their fossil-fuel matrices by at least 1GW over 2012-2021. But just six accounted for more than half the growth: India (22%), Egypt (7%), Saudi Arabia (7%), Indonesia (6%), Vietnam (4%) and Iraq (4%) (Figure 24). India led on coal installations with 107GW added since 2012, followed by Indonesia and Vietnam, with 21GW each. Egypt added more gas plants than any other market, with 36GW of new capacity. China, which is not considered an EM&DE in this report, alone installed 491GW of new fossil-fuel fired capacity over the past 10 years. From this total, coal accounts for nearly 85% at 414GW, followed by natural gas with 76GW.

Figure 23: Annual fossil fuel capacity additions in EM&DEs (ex-China) by technology

2.2.



Figure 24: Top 15 EM&DEs (ex-China) for fossil fuels capacity addition, 2012-2021

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GW India	107	8 115
Egypt	36 38	
Saudi Arabia	19 16 35	
Indonesia	21 8 31	
Russia	5 22 27	
Vietnam	21 23	
Iraq	18 🚺 22	
Pakistan	67 15	
Mexico	13 14	■Coal
Bangladesh	66 13	= Notural Caa
Algeria	12 12	Natural Gas
Thailand	9 10	■Oil & Diesel
South Africa	8 10	Other fossil fuels
Brazil	5 10	
Malaysia	5 9	

Source: BloombergNEF. Note: EM&DEs categorization according to IEA. Numbers refer to net capacity additions. Does not include China.

Investment in renewables jumped over the decade and fossil investment declined

Investment into renewable energy capacity in EM&DEs saw a 41% spike in the five years ending in 2021, compared to 2012-2016. Solar led the growth with a two-fold jump in investment, followed by wind with a 34% increase.

Fossil investment for the five years ending in 2021 was 25% below the investment recorded for 2012-2016. Fossil investment for 2017-2021 was also 15% below the \$242 billion allocated for renewables (Figure 25). This trend is likely to continue in the right direction if investors follow through on public commitments to cease financing coal and other fossil-fuel projects.

⁸ China is not considered an EM&DE in this report

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Figure 25: Fossil fuels and renewable energy investments in EM&DEs

Source: BloombergNEF, Climatescope. Note: fossil fuels investment estimated based on capacity additions by country and capex by technology. Investment numbers includes both equity and debt.

Still, investment in fossil fuels in EM&DEs remains significant. EM&DEs attracted an estimated \$570 billion for new fossil fuel-fired capacity over the past decade, compared to \$490 billion for renewable power plants. Nearly half (46%) of all fossil fuel investment in 2012-2021 went to adding coal capacity.

Financing decisions taken in the past have the potential to lock in carbon emissions well into the future. To have any chance to reach net zero emissions by 2050 (or even 2060 or later), EM&DEs will need to do more than simply slow the rate of new fossil construction; they will need to replace active fossil plants with cleaner generation. Given the sheer volume of new plants built in the last decade and that such projects can operate for up to 50 years, this will not be easy.

Carbon-intensive assets will likely need to be retired early, requiring a transformation of the corporations, utilities, and communities that have historically relied on their operation. Policy makers and investors will need to provide support to ensure phase-out of high emitting sources and manage the impact of the transition on jobs and businesses.

2.3. China's unique story

For the sake of this report, Mainland China is not classified as an EM&DE, but the country has played a crucial and unique role in the global energy transition to date. In 2021, China attracted \$266 billion for these technologies representing roughly one third of all such investment worldwide. In fact, China has been the leader among nations in this category every year for more than a decade and the 2021 figure represents a remarkable 68% year-on-year jump from 2020 (Figure 26). Growth in both renewable energy and electrified transport investment drove last year's investment boom.

Financing for clean energy power plants reached a new high in 2021 at \$147 billion, up 43% from \$102 billion in 2020. Virtually all of this went to solar and wind projects (Figure 29). Unlike in most

EM&DEs, the electrified transport sector has flourished in China in recent years. In 2021, total inflows into this sector more than doubled to \$110 billion from \$48 billion in 2020.

Domestic investors have provided virtually all renewable energy asset finance in the country to date. Over the past five years, foreign investors accounted for less than 1% of the total.

Figure 26: Energy transition asset finance in China



Figure 27: Renewable energy asset finance in China

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Source: BloombergNEF. Note: figures include investment in Mainland China. Investment numbers include both equity and debt.

Investment in renewables has helped drive significant expansion of China's overall powergenerating capacity. Over the past decade, the Chinese power matrix has more than doubled to 2.3 terawatts (TW) at the end of 2021, from 1.1TW in 2012. Zero-carbon power plants, including renewables, large hydro and nuclear, accounted for 65% of all capacity added over the period and wind and solar alone were half the total (Figure 28).

Every year since 2013, China has added more zero-carbon than fossil power-generating capacity. In 2021, zero-emissions technologies accounted for 79% of the 192GW installed in the country, most of it wind and solar. Still, coal capacity has also grown more in China than in any other country. Over the past decade, China's coal fleet expanded 47% with 353GW of new plants connected to the grid.

Figure 28: China power-generating capacity



Figure 29: Share of fossil vs. zero-carbon new capacity added annually in China, 2012-2021



Source: BloombergNEF. Note: Fossil includes coal, natural gas and oil, and diesel. Zero-carbon includes renewables (wind, solar, biomass, small-hydro), nuclear and large-hydro.

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EM&DEs account for just under half of global emissions, but only one quarter of GDP despite being home to two-thirds of the world's population. From 2014-2019, they saw overall emissions grow 10% while energy emissions jumped 7.4%. By contrast, in developed nations, overall and energy emissions slid slightly, by 1.2% and 3.5%, respectively. Emerging nations are expected to continue to see emissions rise significantly in coming decades, barring a major change. Local funding resources are simply insufficient on their own to steer EM&DEs in a dramatically different direction.

The current allocation of energy transition funding is not aligned with decarbonization needs

The top 20 EM&DEs⁹ together account for 29.5% of global energy sector emissions. But investment flows today are hardly aligned with their decarbonization needs. While developed nations attracted on average \$121 million of energy transition investment 2017-2021 for each MtCO2e of energy emissions, the top 20 emitters among EM&DEs attracted just a fifth of that (\$28.8 million) (Figure 31).



Source: BloombergNEF, Climatewatch. Note: China and the US, the world's two biggest emitting nations, were omitted to facilitate visualization, but are included in the trendlines. The top 10 EM&DE emitters are indicated in the chart. The other 10 include: Egypt, Malaysia, Algeria, Kazakhstan, United Arab Emirates, Pakistan, Venezuela, Argentina, Nigeria, and Ukraine. China belongs to the Non-EM&DE category.

⁹ China is not categorized as an EM&DE.

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Figure 30: Share of emissions, population and GDP by country group



EM&DE Non EM&DE China

Source: BloombergNEF, World Bank, Climatewatch. Note: Total emissions include Land Use Change and Forestry (LUCF) and all greenhouse gases (GHG). Emissions data for 2019, population/GDP data for 2021.

3.1. Covid-19's aftermath and current state of emerging markets

Two years after the first coronavirus lockdowns, the global economy continues to grapple with the aftershocks of 2020-21. A sharp consumption drop led to widespread job losses and the deployment of emergency monetary stimuli from central banks in response. Interest rates touched their lowest levels since 2012 to stimulate depressed economies while governments offered fiscal support financed by internal and external debt.

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As restrictions slowly lifted, consumers began to recover and to demand more goods and services. This sudden surge, coupled with supply chain bottlenecks created delays due to lack of transportation, scarcity of raw materials and labor shortages. Virtually overnight, prices surged in EM&DEs and other nations alike. Central banks sprung into action again, this time to tighten monetary supply and combat inflation.

Russia's invasion of Ukraine at the beginning of 2022 provided another unexpected shock to the global economy with the impact felt most acutely in the commodities sector. The ensuing supply chain blockages and sanctions applied on Russia exacerbated the already-high prices of goods and services in much of the world.

Covid-19 and Ukraine invasion affected emerging markets, but some countries are showing resilience

While emerging markets inevitably felt these economic and policy gyrations, the impact was varied. Commodity exporting nations tended to benefit from the general uptick in prices while importers suffered. This was reflected in the Terms of Trade Index (ToT), which shows how prices of commodities that a country exports have increased compared with how import prices have increased. Fuel and mining commodity exporting nations such as Kazakhstan, Egypt, Malaysia, and Indonesia all benefitted (Figure 32). Heavy importers of those same goods such as Philippines, India, Thailand, and Chile all saw their terms of trade sink. The ToT provided an idea of where local-currency investments will flow, especially since the currency will tend to appreciate given the strength in the trade balance, supporting investment and a more confident environment for investors.

The largest emerging economies did return to growth in 2021, according to the International Monetary Fund. But the pace of bounce-back going forward is expected to vary. Kazakhstan, Egypt, Malaysia, Indonesia, India and Philippines are all expected to perform particularly well this year and next (Figure 33). That is largely by virtue of strong commercial activity and the prospect of foreign investment in these countries.

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Figure 32: Citi Terms of Trade index in select EM&DEs (ToT) Figure 33: Annual GDP growth in select countries

3.2. Despite lower costs, barriers to deployment remain

Renewable energy technologies have been the lower-cost option for power generation in much of the world for several years now, including in most EM&DEs. And recent spikes in commodity prices have only improved the economics for clean energy. This is despite an increase in wind and solar costs led by impact of inflation on material, labor and freight costs (Figure 34).

The global benchmark levelized costs for utility-scale PV and onshore wind projects financed in the first half of 2022 were \$40 and \$46 per megawatt-hour (MWh), respectively – around 40% lower than the global benchmarks for new coal-and gas-fired power, at \$74 and \$81 per MWh.





Source: BloombergNEF. Note: LCOE refers to levelized cost of electricity. The global benchmarks are capacity-weighted averages using latest annual capacity additions and country LCOE benchmarks. Offshore wind includes offshore transmission costs. Coal and gas include a carbon price where policies exist. Gas is combined cycle gas turbine (CCGT). LCOEs exclude subsidies. LCOEs shown by financing date.

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Renewables are the cheapest power source in countries where two-thirds of the world lives

Today, two-thirds of the global population lives in a country where either onshore wind or utilityscale PV is the cheapest source of new bulk electricity generation. This set of countries also account for three-quarters of global gross domestic product, worth \$65 trillion, and 90% of world electricity generation (Figure 35). This is also true for many emerging markets, such as Argentina, Brazil and Peru, where wind is the cheapest source of new power generation and Mexico, Colombia, South Africa, Zambia, Kenya, India, Thailand and Vietnam, among others, where solar is least cost. Japan and Indonesia are among the few markets where coal-fired generation today remains cheaper than clean power due to low-cost fuel supply.

Due to rising gas and coal prices, building new wind and solar capacity has also become cheaper than running existing fossil fuel plants in a growing number of countries on an annualized \$/MWh basis. This is already the case in countries making up 58% of the world's population and two-thirds of electricity generation. Brazil, Argentina, Colombia, Chile, Peru, South Africa, Kenya, India, Thailand, Vietnam and Philippines are among the emerging markets that have reached this milestone.

Figure 35: Cheapest source of bulk generation, 1H 2022



Source: BloombergNEF. Note: The map shows the technology with the lowest LCOE for new-build plants in each country where BNEF has data. The dollar numbers denote the per-MWh benchmark levelized cost of the cheapest technology. All LCOEs are in nominal terms. Calculations exclude subsidies, tax-credit or grid connection costs. CCGT is combined-cycle gas turbine.

Barriers limit clean energy deployment in EM&DEs

Despite steep reductions in technology costs, the economic advantages of renewables and other clean technologies are not always captured by developing nations as much as they could be. This is due to a slew of financial, regulatory and policy-related obstacles that can artificially inflate the cost of clean technologies or make them difficult to deploy.

On the financing front, the cost-competitiveness of clean technologies in developing countries has historically been hampered by the fact that local financing costs can be higher than in wealthier nations. Clean technologies, such as wind and PV, have nearly no operating costs meaning their profitability can largely be determined at the time of commissioning with virtually all costs related to capex. Costs of financing a project typically amount to around half of the LCOE both for utility-scale PV and onshore wind projects. This makes access to cheap financing a top priority for developers everywhere. In non-EM&DEs, the benchmark weighted average cost of capital (WACC) BNEF tracked for PV projects in 1H 2022 ranged from 1.7-5.8%. In EM&DEs, the benchmark ranged from 4.7-14.4% (Figure 36).

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Source: BloombergNEF. Note: WACC refers to weighted average cost of capital. Bubble size refers to capacity factor. Units portrayed based on 2021 dollars in real terms. Countries with stronger natural resources (better sun) tend to have higher capacity factors and lower LCOEs.

Other barriers also hamper clean technologies deployment and diminish the competitiveness of low-carbon projects. These include:

- Inconsistent clean energy procurement from state-run utilities
- Ineffective or non-existent transmission infrastructure planning
- Fossil fuel subsidies
- Non-creditworthy offtakers (local utilities, for the most part)
- Currency risk

Adequate climate or sector-specific policies (discussed in the section below) and other mechanisms have the potential to address these and other barriers. That, in turn will offer more attractive and stable opportunities for private investors.

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Section 4. The opportunity for coordinated multi-stakeholder action

Stable, well-defined clean energy enabling environments are critical to kicking off and then accelerating countries' energy transitions. For renewables, these can include policy mechanisms explicitly to accelerate renewables deployment such as auctions, feed-in tariffs, tax incentives, or national targets. But they also include broader power sector policies to foster competition and transparency. Unbundled, not monopolized power markets are best, particularly those in EM&DEs where private players can sign transparent and long-lasting power-purchase agreements (PPAs).

BloombergNEF's annual Climatescope survey evaluates markets' clean energy policy regimes by analyzing the ambition, access, stability and success of each type of policy implemented¹⁰. It illuminates the very clear relationship between good policy-making and strong investment levels.

Conversely, weak policy environments produce few results. For instance, just one of the 15 markets at the bottom of our policy ranking received more than \$2 billion in clean energy investment from 2017-2021. On average, these economies attracted \$385 million over the 5-year period. In contrast, the remaining 108 markets surveyed (excluding mainland China), attracted on average \$12.72 billion over the period, with EM&DE receiving an average of \$3.56 billion and non-EM&DE's \$36.54 billion (Figure 37).

Figure 37: Climatescope policy score vs. 5-year clean energy asset finance in emerging markets



Source: BloombergNEF.

¹⁰ For a complete description of Climatescope's methodology, visit the https://global-climatescope.org/

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Most emerging markets lack conducive policy environments for energy transition

Today, a limited number of EM&DEs have the necessary supportive policies in place. Over 80% of the emerging markets surveyed for Climatescope have clean energy targets in force, but more specific and effective policies are lacking. Auctions have proven to be the most effective policy to boost clean energy investment in developing nations, but are in force in less than half the markets surveyed. The same is true of net metering, which can be critical for driving adoption of rooftop solar systems.

Thanks in part to the global climate talks, a growing number of EM&DEs have made ambitious pledges to cut their CO2 emissions. This, in turn, has prompted some to declare national clean energy goals as well. Unfortunately, there is little evidence that these headline promises have triggered mass implementation of more concrete policies to further clean energy growth. The share of emerging markets with targets in force jumped from 67% in 2019 to 82% in 2021, but implementation of other mechanisms has been weak (Figure 38). The share of developing nations with auctions and feed-in tariffs in force has remained flat compared to 2019 and, as discussed in Section 2, clean energy capacity contracted via auctions has plummeted since 2019. Over the past three years, less than half the emerging markets surveyed in Climatescope had auctions in force and just around a quarter of the total had feed-in tariff mechanisms in place (Figure 39).

Figure 38: Share of emerging markets with a renewable energy policy in place, 2021







Source: BloombergNEF, Climatescope. Note: survey covered 107 emerging markets.

The policy environment for other clean energy sectors in EM&DEs is even less developed. Just 22% of the emerging markets surveyed have clean transport targets in place, for instance, compared to 93% of more developed economies. Direct purchase incentives, which lower upfront costs of buying EVs, are effective at kick-starting markets, but are still limited to a small share of developing nations (Figure 40).

This lack of action is understandable given the current economics of four-wheeled electric transportation. EVs remain too expensive for most consumers to buy and for most governments to subsidize. Supports typically include EV purchase incentives, EV income tax reductions and EV import tax reductions. Charging infrastructure policies help lower EV deployment barriers. Nearly half of developed nations have EV charging infrastructure targets in place, compared to only 15% of emerging markets surveyed. The e-bus sector has been showing signs of ramping up in some emerging markets led by strong municipal-level commitments in big cities. In Latin America, for

example, the e-bus fleet reached 2,000 units in 2021, mostly led by demand from cities in Chile and Colombia.

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Source: BloombergNEF, Climatescope. Note: 107 EM&DEs and 28 non-EM&DEs surveyed for transport policies. 28 EM&DEs and 28 non-EM&DEs surveyed for buildings policies.

In the buildings sector, low-carbon heat targets or roadmaps are the most popular policy mechanisms among countries surveyed. Due to overall warmer temperatures, decarbonizing heating is less relevant in EM&DEs. Still, 28 emerging markets surveyed by Climatescope have cold or mild temperatures and decarbonizing heat in these markets could have significant impact on cutting greenhouse gas emissions. Low-carbon heat targets are present in 82% of developed nations and in 39% of emerging markets analyzed. Grants and loans to purchase heat pumps follow as the second most common policy. The policy is in place in 68% of the developed nations and 21% of the emerging markets (Figure 41).

4.1. The need for public-private engagement to shift direction

Although details can vary by country, most countries have historically passed through three main stages in the process of deploying new clean technologies at scale (Figure 42):

- **Early stage.** Countries have weak enabling environment for a specific technology, including little or no policies, and thus have seen no significant technology deployment. In this stage, policy makers need to begin implementing policies to kick-start activity. Given that many countries have little experience in zero-carbon technologies, there is an important role here for development banks and philanthropic organizations to play in the form of providing technical assistance.
- Enabled for market development. Once appropriate policies and regulations are in place, the country is ready for deployment of the technology. However, unlike in developed nations where first movers usually have advantages, in EM&DEs, the cost of entering a market early presents additional costs. These usually relate to lack of experience from stakeholders and untested policies, regulations and infrastructure. Thus a certain level of funding from governments, development banks or philanthropic organizations is necessary to lower the

first-mover costs, help prove the technology in a specific country and lower risk perception of investors. This support can come in different forms, including blended finance and guarantees. In this stage, it is key for policy makers to carefully ensure that policies do not either trail or get ahead of the market.

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- Enabled for private finance. As the perception of risk diminishes, private investment can quickly flow in to finance the technology. Support from development banks through some mechanisms may remain necessary to continue lowering risk when some external circumstances would push private investors away from the market. This may include, among others, guarantees in case of high political, economic or currency risk.
- As penetration of the technology grows, policy makers remain essential in the maintenance stage to avoid market saturation. This can be done by implementing policies to deploy complementary technologies (which would fall in the early-stage category), such as storage to support wind and solar penetration. They can also ensure that the necessary additional infrastructure is in place, such as power grids.

Figure 42: Energy transition stages



Source: BloombergNEF.

The process of moving from "early stage" through "enabled for private finance" has been seen repeatedly in the world's wealthiest nations. Similar patterns have emerged in EM&DEs, often at much higher speed. Multiple factors influence the pace at which a market advances and matures, but in every case, wise policy making and shrewd investment are critical. As a result, outcomes are fundamentally dictated by how effectively key stakeholders participate. Thus, although stages are the same across EM&DEs, the speed in which a market moves from "early stage" to "enabled for private finance" can vary significantly depending on individual and coordinated actions from each stakeholder.

Coordinated public-private engagement is key to unlock EM&DEs and help markets flourish

Once the appropriate policies and regulations are in force, engagement between public and private stakeholders through catalytic investment is fundamental to help EM&DEs open doors to large pools of private capital. The overall goal of catalytic investment is to leverage as much

capital as possible by attracting private investors to countries and technologies where they would not otherwise invest.

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Development banks, philanthropic organizations and other public institutions can support deployment of less mature technologies by helping finance a project directly or by providing mechanisms that help lower the project or country risk to enhance returns. Project financing from development organizations typically comes as blended finance, at either concessional terms (including below market rates and/or longer repayment times) or on non-concessional terms. Blended finance is a powerful solution to help de-risk a project and/or enhance its returns.

As mentioned above, cost-competitiveness of clean technologies in developing countries has historically been hampered by higher-priced capital and thus concessional blended finance is particularly relevant to enhance a project's return. It has the potential to accelerate the "tipping point" at which a clean technology out competes (under prices) its fossil-fueled rival¹¹. Creative financing solutions are all the more important given the current rising interest rate climate, which has meant higher borrowing costs for developers and entrepreneurs.

Concessional blended finance mechanisms are typically most useful in the "enabled for market development" phase. Once deployment of a specific technology starts to accelerate, risks tend to diminish and technology costs drop. As countries gain experience with a technology and move to "enabled for private finance" stage, support from development banks and other public institutions becomes less necessary. Concessional capital can then be shifted to focus on either other technologies within the same country or to another country entirely.

Financial guarantees are an effective mechanism for lowering country-level risk and allowing private investors to crowd-in. They can boost investor confidence in emerging markets facing economic crises or other non-project risks. Guarantees are legally-binding agreements where development institutions agree to guarantee payment for a clean technology or service that should come from the contracted buyer. Most frequently to date, this has involved the guaranteeing of payments from state-run utilities to the owners of renewable energy projects or batteries. In Argentina, for example, the World Bank-backed Renewable Trust Fund FODER has provided guarantees on contracts signed between renewables developers and the country's utility, Cammesa. This has helped boost clean energy investment in the country, despite Argentina's dire macroeconomic outlook.

In general, mechanisms that aim to de-risk technologies that are newer to markets are necessary only for small intervals of time after which costs start to decline as the country gains experience. However, mechanisms that seek to address broader market concerns might be required for much longer periods as economic and political barriers can be harder to alleviate. Guarantees tend to fall into this second category.

Development finance institutions are mandated to invest in EM&DEs and thus have a clear need to interact with policy makers and other stakeholder to create the right conditions for capital deployment. Private investors seeking to make an impact could explore similar engagement opportunities – particularly if they want to earn adequate long-term returns. They too can work with policy makers, development banks, philanthropic organizations and other stakeholders to support creating of markets with strong enabling environments.

Working in partnership with policy makers and others, private investors have the potential to ignite change and shift capital flows. Together with DFIs and philanthropic organizations, they can

¹¹ In the BloombergNEF report "<u>The Clean Technology Fund and Concessional Finance</u>", BNEF discusses in detail the impact of blended concessional finance in renewable energy in select emerging markets.

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ensure the appropriate use of catalytic finance, which can result in the investment leverage necessary to achieve climate goals. Insufficient stakeholder coordination presents risks to energy transition investment flows. For instance, early investment in countries with inadequate policy environments can translate into limited additional funds leveraged. Development finance, and especially concessional funds allocated to markets already enabled for private investment can distort markets and crowd out private capital.

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4.2. Best practices vary by country, technology and stakeholder

Two factors help dictate where countries fall in the framework above for a given technology and how they can be best supported by public and private stakeholders:

- The local enabling environment, which includes a market's key policies, operating rules and potential barriers to investment.
- Local experience with that technology, including capital deployment from private investors and completion of projects.

While neither of these factors can be comprehensively measured, BNEF has sought to quantify each for individual nations in its annual <u>Climatescope</u> survey. Climatescope has found that for renewables, a strong, stable **enabling environment** includes supportive clean energy policies (including auctions, feed-in tariffs, net metering, tax incentives, etc.), an unbundled, un-monopolized power sector open for private generation, and ambitious renewable energy and emission reduction targets. This has historically proven to be the best formula for welcoming new investment.

Markets with greater **experience** deploying renewables typically offer lower risks, lower technology costs and lower costs of capital. For this analysis, we quantify experience by considering the share of overall capacity a technology accounts for in a country, and the share of private investment in that technology.

The figures below highlight results of this framework for PV (Figure 43) and wind (Figure 44) for select countries. These results allow us to discuss, among other things, actions players can take and have taken to scale energy transition investment in each country.

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Figure 43: Energy transition stages: solar PV in EM&DEs



Figure 44: Energy transition stages: onshore wind in EM&DEs



Source: BloombergNEF, Climatescope. Note: Bubble size refers to the country's total solar PV or onshore wind installed capacity. Enabling environment based on Climatescope 2021 fundamental scores. Experience refers to the share of overall capacity the technology accounts for in a country and the share of private investment in the technology.

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Early stage

A heterogenous collection of nations can be considered to be in the "early stage" of their development, based on the Climatescope analysis. Many tend to be least-developed countries but not all fall into that category.

Indonesia is an enormous nation just embarking on its energy transition. The country has the potential to transform its coal-heavy matrix and open doors for large pools of capital, especially to finance solar projects. However, this can only happen if policymakers take swift, concrete actions to support development of lower-carbon energy sources.

The country aims to reach 23% of renewable energy capacity by 2025. The good news: thanks to the substantial decline in module costs, PV is the most economic technology Indonesia can rapidly deploy. BNEF estimates that the country could meet its target by adding 18GW of new PV capacity though it had just 200MW installed as of end 2021. This would require over \$14 billion in new investment. However, these funds will not be deployed so long as Indonesia's current regulatory environment that favors coal remains in place.

Indonesia has historically carried out tenders to procure power primarily through state-owned utility, Perusahaan Listrik Negara (PLN). Nevertheless, the current power procurement process is opaque, limiting competition and price discovery. Existing regulations also hinder uptake of renewable technologies. Specifically, tariff rules force clean energy to compete against coal, which benefits from heavy subsidies. These must be removed, along with caps that limit the revenues renewable developers can generate. Both have made Indonesia unattractive to potential financiers of renewables and left the market with limited bankable projects.

Enabled for market development

Given its exceptional natural resources, hopes have long been high for **Colombia**'s renewable energy market. But it was only after the government established a clear set of clean energy policies that the market took off and investment started to flow (Figure 45).

In October 2019, Colombia held its first successful long-term wind and solar auction, awarding 15year contracts to 1.3GW of projects due to be online in 2022. That was followed by a second round held in October 2021, which contracted 800MW of solar due online in January 2023. Ahead of the first auction, Colombia also introduced a new policy mandating distributors in the regulated power market to procure 10% clean energy starting in 2022. Distributors are now required to sign contracts – lasting at least 10 years – to meet the targets via specific mechanisms, including auctions.



Figure 45: Colombia utility-scale wind and solar asset finance

Source: BloombergiNEF.

Due to the large pipeline of projects, asset financing for Colombia wind and solar jumped from \$130 million in 2020 to over \$1 billion in 2021. The market is potentially poised for further growth, assuming Colombia's newly elected government continues to hold auctions for clear power-delivery contracts.

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That said, Colombia is not yet a market that can be entirely sustained with private capital. For developers, serious risks remain for getting projects fully permitted and connected to transmission. With still somewhat unsettled market conditions, there remains an important role for development finance institutions to play in Colombia at least in the short-term.

Other nations such as Nigeria and Thailand are in a similar situation. Their markets for zerocarbon power have been sparked but further kindling in the form of DFI help will be required to accelerate growth.

Enabled for private finance

Vietnam offers a clear example of how policies can boost private investment and shift a country from the "early stage" to "enabled for private finance" phase.

From 2010 through 2019, Vietnam's electricity demand grew at a compound annual growth rate of 10.1% as the country scaled up its manufacturing sector. To meet its growing electricity demand, Vietnam's government intensified its focus on renewables through feed-in tariff (FiT) programs.

The FiT schemes successfully attracted investment for Vietnam's utility-scale renewables sector, which grew from virtually zero in 2015 to a peak of over \$9 billion in 2020. For utility-scale solar, the FiT was responsible for over 8GW of PV additions in just two years (2019/2020). For wind it led to over 3.5GW of on-shore and off-shore capacity.

Most recently, however, wind and solar asset finance flows have slowed due to uncertainties over the future of the FiT program. Since the expiration of the solar FiT in December 2020 and the wind FiT in November 2021, the government has not specified how it plans to continue supporting renewables development. It remains unclear when or if investment will rebound from a decline in 2021 (Figure 46).

Figure 46: Vietnam utility-scale wind and solar asset finance



Source: BloombergNEF.

The FiT policy also boosted the small-scale solar market, which saw 9GW of capacity added in 2020, propelling Vietnam to become the third-largest solar market in 2020. This sector alone was responsible for \$9.8 billion in investment in 2020.

Mobilizing Capital Into Emerging Markets and Developing Economies

Maintenance

With excellent natural resources and a strong enabling framework in place, **Chile** typifies an EM&DE that has been fully enabled to attract private finance, but it has also had to deal with grid reliability constraints that risked market saturation.

As wind and solar activity has boomed, it has become the third largest market in Latin America for clean energy investment, despite its small size. In all, the country has attracted over \$24 billion for these technologies since 2004. Chile has also seen a shift in the types of capital it has attracted for its clean energy build-out. In 2014, DFIs primarily underwrote solar projects. By 2016, commercial banks had become more active in the country and had increased their share of PV funding. Since then, DFI support has largely not been needed with international developers and commercial banks willing to invest in what is now a well-established market (Figure 47).





Despite growing investor comfort, the Chile market continues to face challenges that, if not addressed properly, could lead to major market saturation. Transmission bottlenecks and lack of interconnection between the northern and southern grids has caused some solar generation to go unused and certain power prices to collapse. To address this, the country has completed two major transmission lines. The effect has been to alleviate volatility in poorly connected regions where midday prices once averaged \$0.

The large distances between where clean power is generated and where it is consumed in the elongated country mean "curtailment" challenges for projects have not been eliminated entirely, even with the recent transmission updates. Chile now has other grid connections planned. Firms are also rushing to develop large-scale battery or hydrogen projects that could help provide additional power in key hours of the day. This infrastructure update is key to ensure that the country's wind and solar sectors continue to be attractive to private investors.

Source: BloombergNEF.

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Economies

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