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The finance gap challenge: mobilising opportunities for clean energy growth

***Suzi Kerr and Xian Hu*[1]**

Abstract

A holistic approach – instead of tackling problems incrementally – must play a pivotal role in the climate transition. Transitioning to a low-carbon economy requires multifaceted strategies that encompass pricing, planning, regulation and institutional mechanisms. Current approaches are not mobilising sufficient action and investment. We highlight the importance of leveraging all sources and instruments, including public funds, private investments, carbon markets and philanthropy, to fill the climate finance gap and seize the huge opportunity to support economic development and promote climate stability. We introduce the idea of the "mitigation avocado", where individual projects are complemented by infrastructure, institutions and regulations that create an improved investment environment, and a large-scale systems approach ensures integrity in rewards for change observed at the system level. We suggest that holistic approaches and large-scale international carbon market agreements can jointly mobilise private finance and unlock the potential capacity of the global south for climate action and sustainable development.

1. Introduction[2]

Climate change constitutes a global challenge that necessitates a collective, humane, imaginative and intelligent response. Failure to address it could result in catastrophic consequences, endangering all that humanity has accomplished. The world has made significant progress in climate finance, with climate finance flows reaching US$1.3 trillion as an annual average over 2021–2022, according to estimates by the Climate Policy Initiative (CPI 2023). This amounts to almost a doubling compared to 2019–2020 levels.[3] Estimated investment needs, to mitigate climate change and meet Paris Agreement goals, are around US$8.4 trillion per year until 2030, implying an annual finance gap of roughly US$7.2 trillion. It is imperative that we accelerate investment – and we need innovative strategies and global efforts to bridge this gap.

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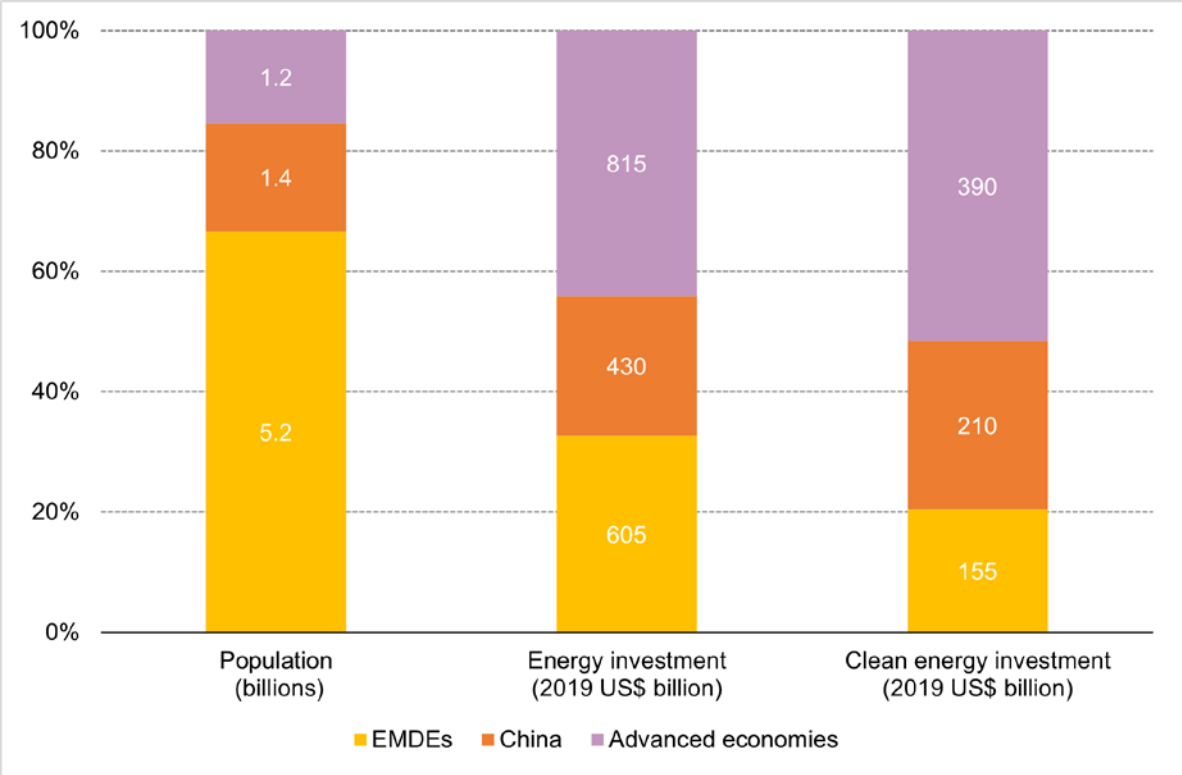
2 The authors would like to thank Anshuman Tiwari and Aurora Barone for their invaluable assistance and insightful comments to this research.

3 Nearly 28% (US$173 billion) of the climate finance increase in 2021–2022 is attributable to improved data.

The distribution of climate investments worldwide remains uneven. Emerging markets and developing economies (EMDEs) excluding China already account for two-thirds of the world's population and are expected to experience substantial economic development in the next few decades. As a result of this growth, and low levels of current energy efficiency, three quarters of the mitigation efforts necessary to achieve global net-zero emissions that must be accomplished annually by 2030 would most efficiently occur within developing countries.[4] EMDEs now face the challenge of developing in a way that meets the aspirations of their citizens while avoiding the high-carbon pathway that other countries have pursued in the past. The falling cost of key clean energy technologies offers a tremendous opportunity to chart a new, lower-emissions pathway for growth and prosperity. However, as shown in Figure 1, only one-third of the total energy investment and a mere 20% of global investments in clean energy technologies are directed towards these regions (IEA 2021). The International Energy Agency (IEA 2023) estimates that US$200 billion per year is needed in Africa alone to achieve all energy-related development goals, but the continent received well below US$54 billion in 2022.[5] This stark disparity highlights a critical issue: there is not enough clean energy investment where it counts.

This note aims to demonstrate how use of international carbon markets and comprehensive systemic solutions can create a more favourable environment for climate investments. This, in turn, will mobilise greater private sector investments, facilitate the development of emissions reduction initiatives in more developing countries and ultimately bridge the investment gap while achieving global climate goals.

Figure 1: Key indicators for clean energy investment for EMDEs in 2021



Source: IEA 2021

4 Authors' calculations based on data from Keramidas et al. (2021).

5 Africa and the Middle East received a combined US$54 billion in total climate finance in 2022 (CPI 2023).

2. International carbon markets as part of the solution

Carbon markets in their broadest sense represent a mechanism for transferring resources from those who possess them to those who need them to accelerate mitigation, fostering mutual benefit and climate ambition. Carbon revenues can substantially raise the returns on clean investments, because investors can earn revenue by selling carbon reduction credits as well as, for example, renewable electricity. International carbon markets have the potential to play a pivotal role in bridging the finance gap for climate action, as well as helping meet the diverse economic development, carbon reduction and political needs of different regions.

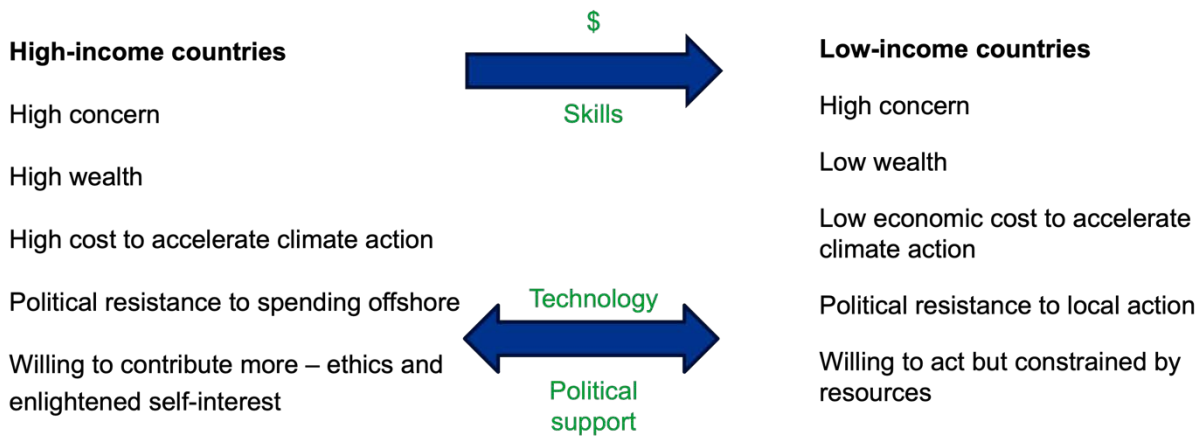
2.1 The foundation of international carbon markets

Shared climate needs and disparities in resource endowments present an opportunity for international climate cooperation in the form of carbon markets. Developed regions exhibit a high level of concern for climate issues alongside relatively high abatement costs but substantial wealth to fund mitigation. Developing regions share a high level of climate mitigation and adaptation concern, but although they have lower abatement costs, their mitigation is hindered by limited financial resources and capacity constraints.

Moreover, international carbon markets can provide political support for increased climate ambition in developed and developing regions. While developed regions are willing to contribute beyond their boundaries for both ethical and enlightened self-interest reasons, they may face political resistance to offshore spending as foreign aid. Conversely, developing regions willing to take action may encounter political resistance to local initiatives due to resource constraints and concerns about competition between climate mitigation and development objectives. Collaborative efforts through carbon emission reduction projects and transfer of carbon credits can effectively address these challenges, fostering mutually beneficial outcomes.

International demand for carbon credits comes from both compliance and voluntary carbon markets, including Article 6 of the Paris Agreement and the Carbon Offsetting and Reduction Scheme for International Aviation. Supply of carbon credits can originate from individual projects, a historically common practice, or broader jurisdictional and sectoral initiatives that are emerging, particularly in the context of forest conservation and sustainable energy transitions.

Figure 2: Drivers and flows in an international carbon market



Source: Authors

A carbon market is frequently viewed as a commodity market focused on the transfer of carbon credits. More broadly, a carbon market can encompass diverse contractual arrangements, including large-scale jurisdictional, sectoral and even national agreements and government-to-government relationships. Climate investments to transform systems extend beyond constructing specific facilities, such as renewable power plants or energy-efficient buildings. They involve aspects such as labour force transitions and skills training, social protection, capacity building for climate policy and grid management, and systemic reforms (e.g. power sector reform).

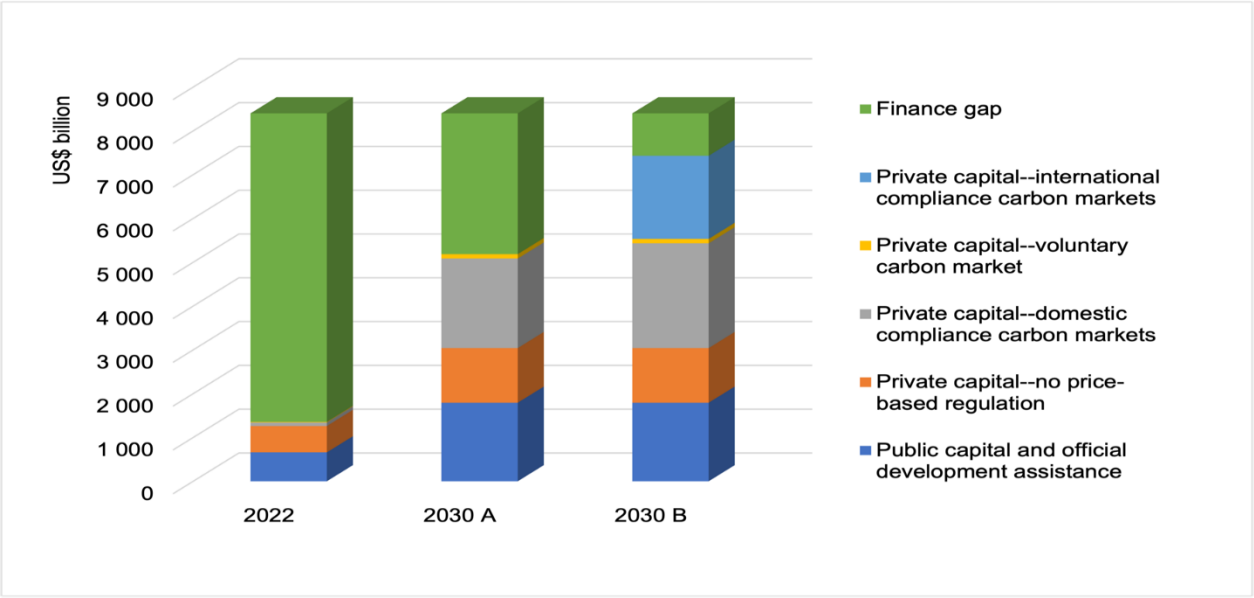
To address these multifaceted challenges, innovative contracts can be designed between carbon credit buyers and sellers. These contracts may include provisions for advance payments and approaches to mitigate and allocate investment risks, whether these stem from political instability or uncertainties in project delivery. Advance payments motivated by expected recognition for contributions to global mitigation (possibly in the form of carbon credit revenue) can be allocated as insurance coverage or as equity stakes, thereby facilitating more conventional private sector investments. Additionally, such contracts can incorporate pricing mechanisms that share the carbon price risk, mitigating the impact of lower-than-expected prices while sharing gains in times of high carbon prices.

Large-scale sectoral agreements with carbon credit rewards for reductions measured at a sectoral scale can support systemic changes. By creating a conducive economic and regulatory environment that offers higher returns (e.g. through domestic compliance pricing), lower risks, and increased technical and political support, these markets can effectively mobilise private capital, accelerating the transition to a sustainable and low-carbon future.

2.2 Carbon markets can help fill the gap

All estimates suggest that trillions of investment capital are needed annually by 2030 to meet Paris Agreement goals but there is no clarity on how to achieve this. Based on data and estimates from diverse sources, we present two scenarios that illustrate potential market-based approaches to filling the global climate finance gap shown in the first column in Figure 3. We divide the drivers of finance into public funding, private funding not driven by carbon pricing, capital mobilised by domestic and international compliance pricing, and the voluntary carbon market (VCM). These are not predictions or optimal scenarios. We aim only to show the potential scale of the mobilisation of finance by each driver and highlight the need to use all instruments to drive finance, including ones that are emerging now.

Figure 3: Three scenarios of current and future global climate finance drivers



Source: Authors, using various data sources and assumptions

The dark blue segment represents public finance, including contributions from governments, state-owned agencies, multilateral development banks and official development assistance. It is no surprise that developing countries rely heavily on public funding for their climate finance needs. Public finance is currently about 51% of total climate finance and accounted for US$660 billion in climate finance for mitigation in 2022. Public funding is assumed to grow to nearly US$1.8 trillion in 2030.[6]

The orange segment represents private capital mobilised without price-based regulation. This might result simply from the investments turning profitable as costs fall; from voluntary efforts driven by environmental, sustainability and governance concerns; or as a result of non-price regulatory factors. Private capital includes funds from non-financial corporations, commercial financial institutions, and individual and institutional investors. Our simple projection for 2030 assumes that private finance will continue to grow at the cumulative average rate since 2011 to reach nearly US$1.25 trillion in 2030.[7] We then exclude from this total the private capital flows that might be attributed to carbon pricing.

The grey segment is estimated as capital that was in 2022 and could in future be mobilised by domestic carbon pricing instruments, such as carbon taxes or emissions trading systems (ETS). This rough estimate is based on several simple assumptions: currently carbon price policies (ETS plus tax) cover 23% of global greenhouse gas emissions (World Bank 2023), with average global carbon prices (including a wider range of pricing instruments such as renewable portfolio standards and fossil fuel subsidies) estimated at US$18.5/ton of CO_2 by Carbon Barometer (2021).[8] We use a long-run semi-elasticity, with a low estimate of 0.28, based on an Organisation for Economic Co-operation and Development (D'Arcangelo et al. 2022) report to estimate

6 This is the long-term compound annual growth rate from 2011 to 2022 with data from CPI (2021 and 2022). Growth in the last two years has been faster so this estimate may be conservative.

7 See footnote 4 for explanation. The private capital estimate is adjusted to account for changes in methodology that lead to higher climate finance estimates.

8 We realise that these are not consistent but want to recognise a wide set of carbon price instruments.

emission reductions driven by carbon prices. We then mimic a private sector claim that every dollar spent on buying emissions reduction credits mobilises US$10 in private capital.[9] For 2022 we subtract this estimate of capital mobilised from the total measured private climate finance. For 2030 A, we assume that compliance carbon pricing will be set at US$80.7 for greenhouse gas pricing coverage, reaching 30% in countries with existing pricing systems plus an additional 30% of new coverage in developing countries at a low price of US$10.[10] This could mobilise over US$2 trillion annually in private capital.

The yellow segment is the contribution of the VCM to mobilising capital. We calculate this by multiplying current payments for VCM credits (around US$1.3 billion in 2022, according to Trove Research 2023) by the assumption of US$10 of capital mobilised per dollar of credit payment. For 2030 we use the low estimate from Trove Research (2021), which suggests this market could grow to US$10–40 billion and mobilise ten times the capital. Morgan Stanley (2023) projects the VCM to grow to about US$100 billion by 2030 and US$250 billion by 2050, which is rather ambitious and optimistic.

The light blue part in Scenario 2030 B represents potential capital mobilisation through perfectly functioning international carbon markets enabled by Article 6 of the Paris Agreement (Piris-Cabezas, Lubowski and Leslie 2023).[11] The estimates by Piris-Cabezas, Lubowski and Leslie suggest that a perfectly functioning market consistent with meeting a 2° target would involve carbon payments between countries of over US$200 billion annually and therefore might achieve additional annual capital mobilisation of US$2 trillion by 2030. We assume that this international support could, among other things, enable an increase in the ambition of domestic carbon pricing in developing countries from US$10 to US$35, so US$348 billion of this additional capital mobilisation is attributed to that segment.

These scenarios show that relying solely on public funding and the voluntary market is highly unlikely to be sufficient. They indicate the critical role of international Article 6 transfers, which can complement direct public funding. Both avenues should be used in complementary ways. They also show the importance of both domestic non-price regulations and carbon pricing mechanisms, which can also be supported by international transfers.

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9 This leverage factor is synthesised from a review of various industry websites and sources. Although no existing paper or report provides an exact leverage factor derived through model simulation or empirical analysis, our assumptions regarding the factor and corresponding estimation results are intended to illustrate the crucial role of carbon pricing in mobilising private finance, rather than to forecast specific capital amounts.

10 The US$80.7 price is a global price required in 2030 to be on track to achieve 2° of global warming with use of REDD, which stands for ‘Reducing emissions from deforestation and forest degradation in developing countries’ (Piris-Cabezas, Lubowski and Leslie 2023). The coverage is consistent with the Global Carbon Pricing Challenge, which was launched in 2021 at COP26 and sets a collective goal for carbon pricing to cover 60% of global emissions by 2030 (Canada.ca 2021). We assume that the 30% carbon pricing coverage in developing countries with a low price may be implemented in diverse forms and is less stringent than the global average.

11 US$80.7 is based on prices required to achieve National Determined Contributions that are sufficient to achieve a 2° climate target. This is probably an underestimate as we use their estimates of trade volumes, 2.6 gigaton of CO_2 equivalent per year, consistent with trade to meet current Nationally Determined Contributions.

3. Holistic strategies and the “mitigation avocado”

The CPI identifies three key actions that are essential to bridge the finance gap to address climate change: adopt holistic sectoral strategies, shift to a new integrated finance paradigm, and coordinate public and private actors using innovative financial mechanisms.

Holistic sectoral strategies consider the entire sector’s transformation (and even that of the economy and society), instead of solving issues incrementally, to ensure a more comprehensive and effective climate mitigation approach. A coordinated set of actions and decisions is necessary, including reducing technology costs, promoting innovation, scaling up proven technologies, and establishing stable and predictable environments that accelerate the transition to a net-zero economy. Successful climate action also requires a foundation of trust in a common vision and approach. Modelling that is developed and explored collaboratively and transparently can help build this common vision and encourage people (including politicians, the private sector, and civil society in both host and supporting countries) to buy in to the changes and provide support as needed. Robust domestic policies and international agreements are then needed to transfer resources (cash, capital and capability), mobilise private finance and implement effective change.

Creating enabling environments to mobilise private finance is critical. This involves a coordinated effort between public and private sectors, along with the implementation of innovative financial mechanisms. Rather than approaching climate finance as separate efforts through distinct agencies (e.g. international development agencies, multilateral development banks, private initiatives and philanthropic groups), there is a need to integrate finance from different sources into cohesive packages, leveraging their different strengths to complement each other and maximise impact.

For instance, multilateral banks, private investors, insurance companies, developed countries and host countries can jointly act to amplify the impact of each other’s efforts. Private investors can refocus their attention on the potential for profitable investments in energy transition in developing countries, apply innovative solutions to emerging financing challenges and more carefully assess the real risks and hence returns required in markets previously unexplored. Insurance companies can offer investors new products that target risks specific to the climate transition. Multilateral development banks could provide guarantees or subsidies to reduce or offset private financing risks. Host governments, possibly with international support, can provide a more conducive investment environment for the energy transition by increasing capacity, enacting policies (possibly including carbon pricing) to facilitate the integration of renewable energy into the grid and encourage end-users to accelerate the green transition. To fulfill their obligations under the Paris Agreement or voluntary climate commitments, developed countries and companies could negotiate carbon credit trade agreements with host (developing country) jurisdictions, sectors and companies. These credit contracts would provide higher investment returns and strong incentives for jurisdictions to support implementation, thereby making private investments more attractive. Together, by simultaneously reducing, reallocating and subsidising the management of risk, and by reducing barriers to success and increasing returns, energy investments that are currently impossible on a large scale can become feasible, even with the limited support currently available from multilateral development banks, foreign aid, carbon markets and philanthropy.

These components can work in harmony to create what we call a “mitigation avocado” (or pick your favourite stone fruit) with its seed, flesh and skin: an appealing package comprising incentives and resources in the form of policies and actions needed at each level from individual firms up to the production sector, finance providers and host (implementing) and partner (supporting) countries. The large-scale and coherent package provides integrity and climate effectiveness that voters, businesses and governments can support with confidence, and that can mobilise more profitable private sector investment.

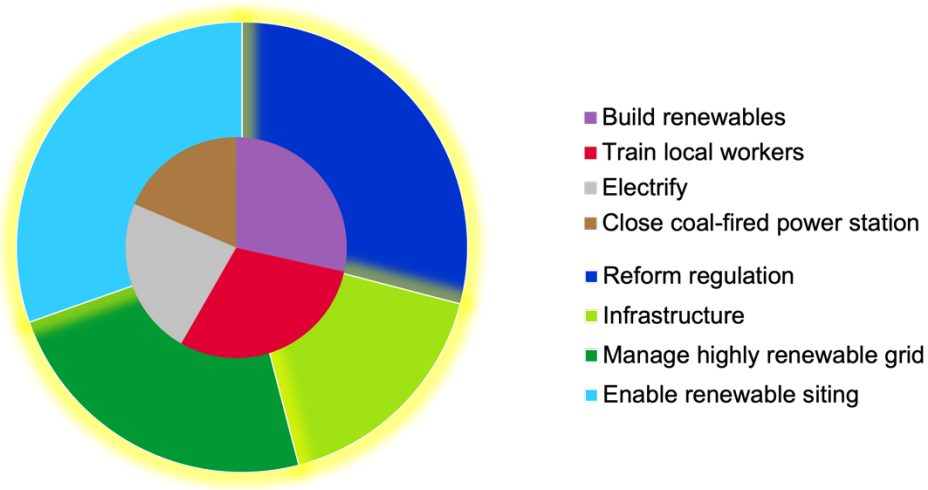
Around half of the global emission reductions required by 2030 could come from the electricity sector, and reliable, clean, low-cost electricity is key to decarbonizing the rest of our economies (Keramidas et al. 2021). The ‘seeds’ are individual components: building renewable energy and storage facilities, expanding the transmission grid, electrifying end-users like industry and transportation, improving the efficiency of existing fossil-fuel-based facilities that must continue to operate during the transition, and accelerating the closure of inefficient plants. As well as profits, co-benefits such as jobs or improved air quality arising from emission reduction activities can justify contributing resources at a local level, with local governments or federal governments stepping in to provide funding. Government climate policies, such as carbon pricing and regulatory mandates, and voluntary carbon market projects can further mobilise private financial resources.

However, similar to when planting a seed, it is also essential to create an environment conducive to growth and sustainability. This entails regulatory reforms that encourage profitable generation of renewable electricity and ensure its dispatch during peak times. It requires developing infrastructure and grid management skills to manage a renewable grid effectively to provide reliable electricity. Building a skilled workforce and supporting workers and communities affected by closing fossil fuel plants is crucial for enabling a just transition.

A set of simultaneous actions at multiple levels that complement each other can shift the system as a whole, creating equitable and enduring change. But how can this attract international funding and private finance? The holistic plan and the large-scale effort can provide assurance that additional effort funded through international carbon markets is really making a difference – or that it is indeed ‘additional’. If countries and finance providers develop an agreement for large-scale change that transparently measures and rewards progress at a system level, relative to an agreed and already ambitious system-level baseline, this can provide a ‘skin’ that gives the whole package integrity.[12] This can give seller countries confidence that if they implement ambitious, politically risky climate policies they will be rewarded with significant support, motivate buyer countries to pay for carbon reductions by helping them overcome scepticism and resistance from their citizens and fear of international criticism, and provide private actors with the confidence they need to invest.

[12] This type of agreement can be implemented under the rules of Article 6.2 of the Paris Agreement.

Figure 4: Electricity sector "mitigation avocado"



Source: Authors

4. Conclusion

Climate change is a major global challenge that requires a collective effort from all of humanity to be addressed. The annual finance needed to mitigate climate change is now over US$8.4 trillion; the existing contributions from public and private sources and mobilised through voluntary markets fall well short. We must accelerate policy and financial innovation efforts to massively increase investment and bridge the current financing gap of over US$7 trillion annually. The challenge of climate change is immense, and we must unite, collaborate and help each other to jointly address this global issue.

While climate finance discussions are a critical part of global negotiations, it is important to recognise that the majority of the capital required for the climate transition must come from the private sector, as that is where financial resources are concentrated. By effectively harnessing the potential of carbon markets, we can enhance returns, improve risk management and create a conducive economic environment for climate-related investment. This, in turn, can mobilise private capital and help close the finance gap.

The current barriers to decarbonisation often extend beyond the profitability of individual clean facilities such as renewable power plants or energy-efficient buildings. Frequently, the challenges lie in areas such as securing an adequate workforce, ensuring social protection for vulnerable households and undertaking necessary regulatory system reforms. A holistic approach to each energy system – rather than a focus only on individual emission reduction projects and attempts to create trade in carbon reductions as a commodity – is necessary to ensure a sustainable transition and equitably address climate change.

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