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Impact Policy Paper, September 2024

MOBILISING FINANCE FOR NET ZERO ENERGY SYSTEMS

KEY ISSUES, BARRIERS, AND POLICY PRIORITIES

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IMPACT POLICY PAPER

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ACKNOWLEDGEMENTS

Our sincere appreciation goes to the following industry contributors: Tamar Joulia-Paris, Senior Advisor at the International Association of Credit Portfolio Managers (IACPM), and Juliane Saary-Littman, Senior Director of Research at IACPM; Daniel Borrego, Head, Debt Mobilisation Product Development at the European Bank for Reconstruction and Development (EBRD); Chris Clubb, Managing Director at Convergence; Bertrand Le Nézet, Chief Market Intelligence Officer at Viridios AI; Adrian Rimmer, Director Sustainable Finance & Investment at London Stock Exchange Group (LSEG). We would also like to thank Evangelos Drellias and Aditya Mori from the Qatar Centre for Global Banking and Finance at King's Business School for excellent research assistance. All errors remain our own.

EXECUTIVE SUMMARY

At the December 2023 COP28 summit in Dubai, the UN Environment Programme Finance Initiative (UNEP FI), King's College London's Net Zero Centre, and King's Business School's Qatar Centre for Global Banking and Finance jointly organised a roundtable on the topic: "How to mobilise capital to invest in decarbonisation technologies towards net zero?". In this paper, we draw on the discussion at this roundtable and set out three priority areas where opportunities exist to scale up finance to invest in net zero energy systems.

First a look at the financing that confronts us. To achieve net zero by 2050, annual financing needs for energy and land-use systems are estimated at US\$9.2 trillion (McKinsey (2023)). The majority of this funding will need to come from private financial institutions, including banks, insurance companies and pension funds, asset managers, and other specialised investors including private equity, venture capital, and private credit. This represents a significant financial opportunity for the financial industry in the years ahead.

Financial regulation is reshaping the way the financial industry can mobilise funds to meet these financing needs. Despite accounting for around 70% of financing in Europe, banks face challenges such as meeting Basel III requirements for stronger balance sheets. Nevertheless, there remain opportunities for banks to play a full role in financing the energy transition. One route is for banks to expand their use of synthetic risk transfers to gain capital relief, expanding their lending capacity. Another is for banks to engage in strategic partnerships with private credit asset managers and institutional investors like pension funds, enabling them to raise dedicated funds for innovative energy and infrastructure projects.

A second area of opportunity is in scaling up blended finance, which leverages public and philanthropic capital to catalyse private sector investment in sustainable development projects, particularly in developing countries. By mitigating risks through first-loss guarantees and concessional loans, this approach enables significant investments in renewable energy and low-carbon technologies that would not otherwise attract commercial funding. Initiatives like the SDG Loan Fund and EBRD partnerships demonstrate the potential for blended finance, helping to mobilise \$2 billion in private investments in 2023.

The third area of opportunity is via the expansion of carbon markets, which serve as crucial financial mechanisms for incentivising the reduction of greenhouse gas emissions while becoming a source of revenues for governments and fundraising to invest in the energy transition. This requires building the market efficiency and market infrastructure required to scale up carbon markets. It also necessitates linking carbon markets across borders to increase market depth and liquidity, i.e. the full operationalisation of Article 6 of the Paris Agreement. Carbon markets need a performance-based approach to incentivise carbon reduction to broaden the investor base and attract capital to projects that drive environmental impact. Finally, a key barrier to expanding these markets is the need for greater regulatory oversight to ensure verification.

POLICY RECOMMENDATIONS

We offer the following policy recommendations aimed at fostering these opportunities:

- 1. To expand the scale of commercial bank lending for decarbonisation and adaptation projects, governments should consider providing unfunded loan guarantees for eligible projects.**

A back-of-the-envelope estimate suggests that a £1 billion investment in the junior tranche of a pool of loans to decarbonisation projects might be expected to generate additional lending capacity for banks of around £8.5 billion.

- 2. To allow multilateral development banks to play a larger role in providing catalytic or concessional finance, their shareholders should update these institutions' capital adequacy policies and risk appetite protocols.**

As others have argued before us, this would enable multilateral development banks to use greater balance sheet leverage and adopt a less risk-averse approach to project selection. The scale of impact here is striking: multilateral development banks could increase their financing of development assets by hundreds of billions of dollars while retaining their AAA credit rating.

- 3. Governments should take steps to link emissions trading systems across jurisdictions to enhance price discovery, increase liquidity, and reduce decarbonisation costs.**

One example of such a linkage is the 2020 agreement between the EU and the Swiss government. A clear “low-hanging fruit” in this regard would be to link the UK and EU emission trading systems, as was envisaged in the Brexit agreement.

- 4. To enhance credibility and confidence in voluntary carbon markets, regulators and market participants need to work collaboratively to establish stricter market-wide regulations and build robust market infrastructures.**

Singapore, Indonesia, Malaysia, and Japan are leading the way in this regard.

- 5. Policymakers need to develop a roadmap for integrating voluntary carbon markets with established emissions trading systems.**

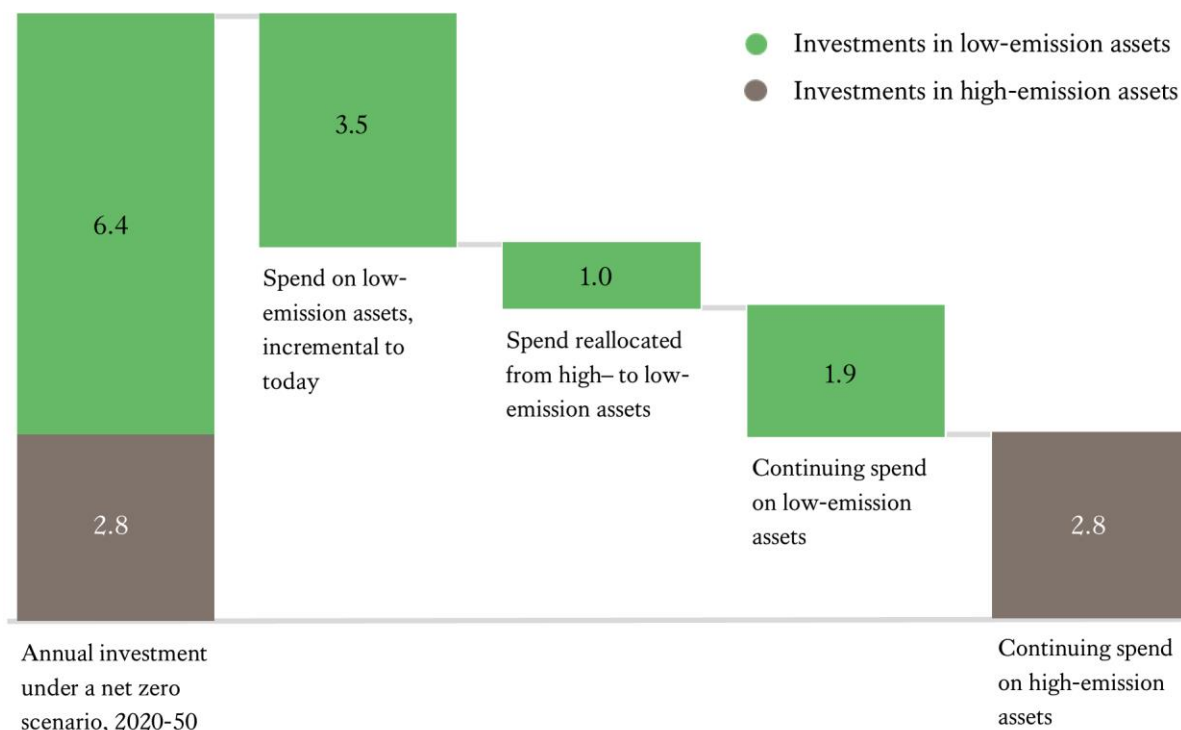
An example of such an approach is the UK's efforts to integrate greenhouse gas removals into its emissions trading system. The resulting increase in the demand for carbon credits would increase their price, incentivising greater emissions reductions, promoting clean technology, and increasing the market value of natural capital.

1. INTRODUCTION

The discussion at COP28 in Dubai highlighted the urgency of unlocking capital markets to meet net zero targets in energy systems, scaling up blended finance solutions to source investable projects, and enhancing the role of multilateral development banks (MDBs) in transition finance. Financial innovation is essential to act as a catalyst alongside emerging sustainable infrastructure platforms in the private sector.

It is estimated that achieving net zero emissions requires a \$275 trillion investment in physical assets from 2021 to 2050, approximately \$9.2 trillion annually – a 30% increase from the current \$5.7 trillion (Figure 1). More than 85% of the required investment in low-emission assets, around \$170 trillion, will target just three sectors: transport and mobility, power, and buildings. In developed economies, the primary focus will be on transport and mobility, whereas emerging markets and developing economies must prioritise decarbonising their power sectors.

Figure 1: Average annual investments under the NGFS’ Net Zero 2050 Scenario, 2020-50, \$ trillions.



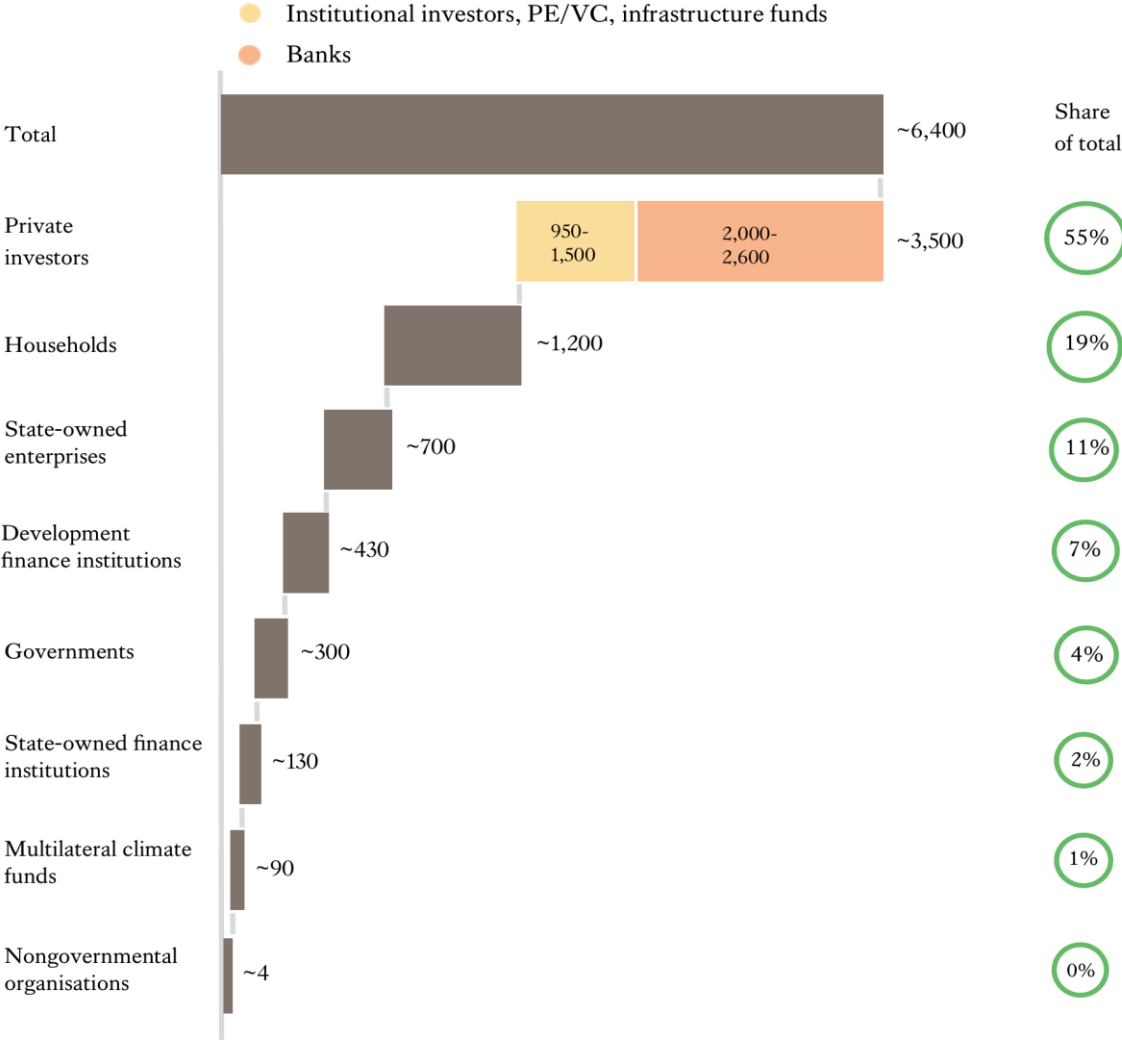
Source: Financing the net-zero transition: From planning to practice. McKinsey & Company, IIF Institute of International Finance. January 2023. Visit the [McKinsey & Company website](#) to view the report.

In the transport and mobility sector, approximately \$62 trillion will support electric vehicles (EVs), alongside \$3 trillion required for EV and hydrogen infrastructure. The power sector requires an estimated \$57 trillion, covering generation, storage, transmission, and distribution, including upgrading existing transmission and distribution grids. This investment is pivotal, especially considering the anticipated global rise in gas consumption

over the next decade and its role in decarbonising the transport and mobility sector. In the buildings sector, 17% of global investment in low-emission assets, totalling \$46 trillion, is designated for developing heat pumps, district heating technologies, and upgrading heating and cooking equipment. These technologies, currently in their early stages, are projected to mature by 2040.¹

These substantial funding needs present a significant opportunity for financial institutions, especially since the majority of this investment must be front-loaded within the next five to ten years. Under a net zero scenario by 2050, it has been estimated that private financial institutions will need to finance \$3.5 trillion in low-emission investment annually – 55% of the overall investment required (Figure 2). Of this, commercial banks could capture an annual opportunity ranging from \$2-\$2.6 trillion, while asset managers, private equity, and venture capital funds could capture between \$950 billion and \$1.5 trillion annually.

Figure 2: Average annual investment needs for low-emission assets, 2022-50, \$ billions



Source: Financing the net-zero transition: From planning to practice. McKinsey & Company, IIF Institute of International Finance. January 2023. Visit the [McKinsey & Company website](https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/financing-the-net-zero-transition-from-planning-to-practice) to view the report.

¹ McKinsey, IIF Institute of International Finance (January 2023), *Financing the net-zero transition: From planning to practice*, McKinsey & Company. Available at: <https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/financing-the-net-zero-transition-from-planning-to-practice>.

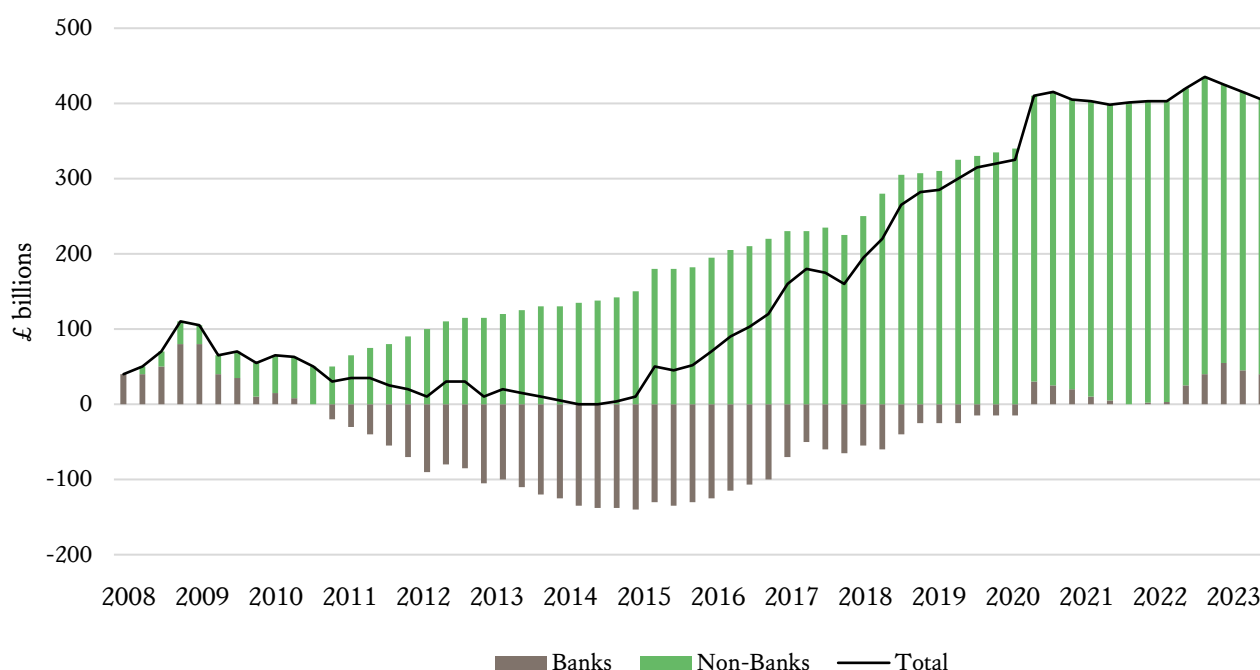
To unlock this private finance, collaboration among multiple stakeholders is essential. This includes proactive involvement by governments and regulators, who can use fiscal and regulatory tools to incentivise capital deployment. Moreover, MDBs have a vital role to play in using risk management tools, credit enhancements, and guarantees to mobilise funds to emerging markets and developing economies. More generally, urgent action is needed to foster public-private partnerships across industries, connecting technical solutions with real-world implementation through clear, stable regulatory frameworks and a supportive financial environment. Discussions underscore the potential of global carbon markets in both reducing emissions and financing the energy transition. Achieving this requires seamless integration of technological innovations with robust, long-term policies.

Nevertheless, several questions arise. How can funds be efficiently mobilised – from both commercial investors and concessionary and philanthropic capital – to meet the net zero energy systems demands? How can an ecosystem be developed to connect innovation in emerging technologies with available capital? What frictions impede that process? What challenges do banks encounter in offering sustainable lending, and are changes in regulatory requirements required to address them? Finally, what is the future of carbon markets in decarbonisation and as a complementary financing source?

2. THE ROLE OF BANKS IN FINANCING DECARBONISATION TECHNOLOGY

Banks have an integral role to play in financing the transition to a low-carbon economy for customers who do not have access to capital markets. This is especially the case in Europe where they still account for around 70% of financing. At the same time, they face significant ongoing obstacles in financing large-scale sustainable infrastructure and energy transition projects – including the finalisation of Basel III, which will be phased in within the European Union (EU) starting January 2025.² In this section, we discuss the opportunities that are available for banks in squaring the circle between satisfying regulatory demands for stronger capital ratios while also stepping up to the plate in financing decarbonisation technologies.

Figure 3: Cumulative change in UK companies' net borrowing



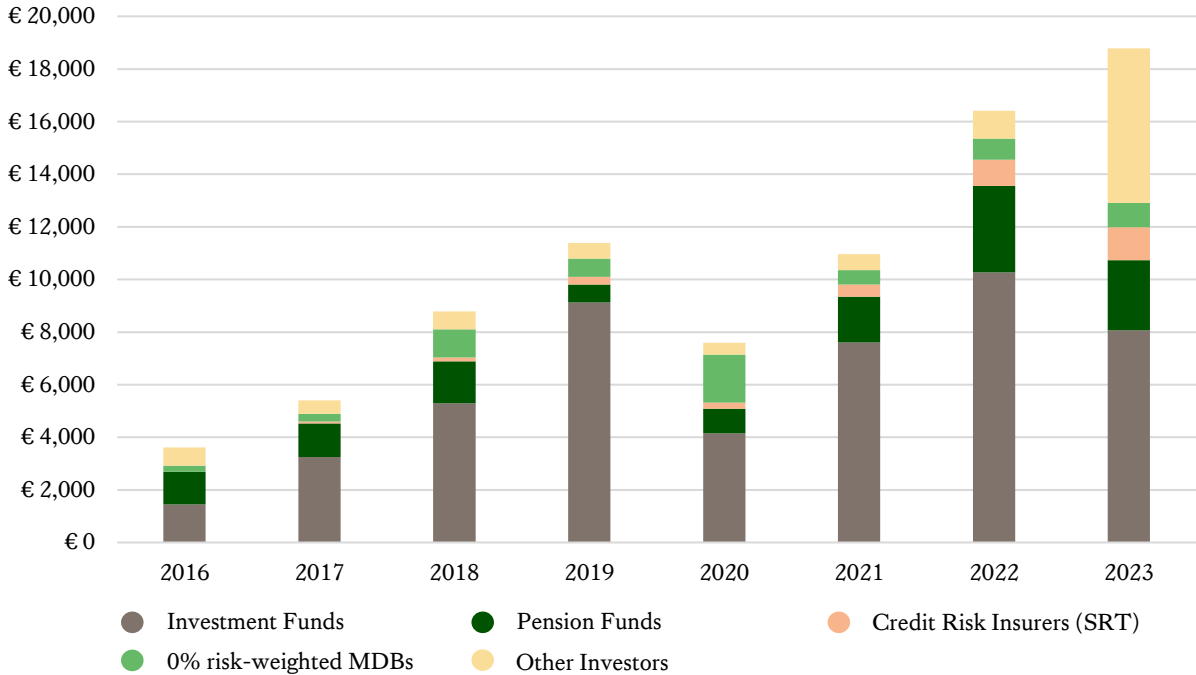
Source: Bank of England.

In aggregate terms, banks have been reigning back on the financing they provide to real economy borrowers for some years now. Figure 3 shows the remarkable fact that, over the last fifteen years, UK banks have not increased their lending to UK corporates at all in net terms. Instead, the £400 billion increase in net borrowing over this period has been financed directly by non-bank financial intermediaries (non-bank lenders, private credit, pension funds, insurance companies, and other investment vehicles) and bond markets.

² This package, known as Basel 3.1 in the European Union and the United Kingdom, and the Basel III Endgame in the United States, is set out in "Basel III: Finalising post-crisis reforms Bank for International Settlements", December 2017. Available at: <https://www.bis.org/bcbs/publ/d424.pdf>.

Recognising these headwinds, one solution we see is for banks to partner with institutional investors and specialised asset managers in offering private credit solutions to new decarbonisation technologies. As reported by Pitchbook, banks like JP Morgan,³ Citigroup,⁴ and Barclays⁵ have all either launched or are in the process of launching private credit initiatives – partnering with specialised private credit players or establishing their own investment fund platforms for alternative credit, using their own capital.⁶ One advantage of this approach vis-à-vis solo bank funding is that private credit loans are typically funded with long-term capital in closed-end fund structures, thereby limiting maturity transformation and rollover risks. This is an attractive funding model given the long-duration nature of low-carbon technology assets.

Figure 4: Synthetic securitisation trade flow: protected tranche volume at inception, by investor type



Note: the “Other Investors” category includes 0% risk-weighted international organisations, funded insurance companies, and central governments and central banks.

Source: IACPM Synthetic Securitization Global Bank Data Report 2016 - 2023. Visit the [International Association of Credit Portfolio Managers \(IACPM\) website](https://www.iacpm.com/) for more information.

³ See Hannah Levitt and Paula Seligson (2024), ‘JPMorgan Hunts for Private Credit Firm to Grow in Hot Sector’, *Bloomberg UK*. Available at: <https://www.bloomberg.com/news/articles/2024-05-23/jpmorgan-hunts-for-private-credit-firm-for-asset-management-arm> and Shanny Basar (2024), ‘JP Morgan Targets Private Credit for Growth’, *MarketsMedia*. Available at: <https://www.marketsmedia.com/jp-morgan-targets-private-credit-for-growth/>.

⁴ See Citi (2024), *Citi and LuminArx Capital Announce the Launch of Strategic Private Lending Vehicle*, *Cinergy*, Citigroup Inc. Available at: <https://www.citigroup.com/global/news/press-release/2024/citi-and-luminarx-capital-announce-the-launch-of-strategic-private-lending-vehicle-cinergy>.

⁵ See Barclays and AGL (2024), *AGL Credit Management announces the launch of AGL Private Credit Platform and exclusive Cooperation Agreement with Barclays*, Barclays. Available at: <https://home.barclays/news/press-releases/2024/04/agl-credit-management-announces-the-launch-of-agl-private-credit/>.

⁶ Marie Kemplay (2024), ‘Will more banks join the private credit fray in 2024?’ *PitchBook*. Available at: <https://pitchbook.com/news/articles/banks-private-credit-debt-2024>.

A second solution is for banks to expand their use of significant risk transfer (SRT) via either cash or synthetic securitisations to de-risk their balance sheets and generate additional lending capacity without having to raise new equity. Synthetic SRT securitisations account for the majority of such transactions.⁷ By providing external credit protection to junior tranches, they mitigate expected and unexpected credit losses, leading to lower risk-weighted assets and hence lower capital. Investment funds are the main investors and primary providers of credit protection in the first loss and mezzanine tranches of these transactions, albeit with increasing direct participation from pension funds and unfunded credit risk insurers (Figure 4). Pension funds typically invest in first-loss tranches, while credit insurers protect upper mezzanine tranches on an unfunded basis.

In 2023, the International Association of Credit Portfolio Managers (IACPM) reported that such “private risk-sharing” had surpassed €1 trillion, with over 500 synthetic SRT transactions issued between 2016 and 2023. Over €200 billion in new synthetic securitisations were issued in 2023 alone. By risk sharing in this way, synthetic securitisations have released over \$50 billion of bank equity capital requirements for new lending over that period.⁸ Banks in the EU accounted for around half of the market in synthetic securitisations last year; of the €102 billion in transactions issued, half qualified as “Simple, Transparent and Standardised” (STS) securitisations, permitting the issuer to benefit from more favourable capital treatment. The share of sustainability-linked trades is also gradually increasing, mainly in Europe, reaching 11% of transactions in 2023, up from 6% in 2022.

What role, if any, could governments play in incentivising banks to scale up their funding of decarbonisation technologies? One policy proposal to consider, which would work with the grain of the risk-sharing developments described above, would be for governments to provide banks with unfunded credit protection for the junior tranches of loans to certain decarbonisation projects or new decarbonisation technologies in return for a fee.⁹ If this insurance were priced below market rates or provided in larger quantities than available privately, this would amount to a subsidy for financing such projects – a subsidy that could be warranted if, say, market failures were thought to be generating a sub-optimal level of

⁷ In synthetic securitisation, banks use credit derivatives or financial guarantees to transfer the credit risk component of their exposures to third parties. In contrast to traditional securitisation, the loans remain on banks’ balance sheets and the banks thereby benefit from any returns that accrue. For further details, see Fernando González and Cristina Morar Triandafil (2023), ‘The European Significant Risk Transfer Securitisation Market’, *ESRB: Occasional Paper Series 2023/23*, No 23. Available at: <https://ssrn.com/abstract=4590507>.

⁸ See IACPM, *Private Risk Sharing Protected €18.5 Billion of Banks’ Junior Tranches in Synthetic Securitizations in 2023*, International Association of Credit Portfolio Managers. Available at: <https://iacpm.org/private-risk-sharing-exceeded-e1-trillion-of-cumulated-volumes-between-2016-and-2023-despite-ongoing-uncertainties-in-final-regulatory-treatment/>.

⁹ This is akin to the approach adopted by many governments during the COVID period, where governments provided guarantees for various emergency loans required to provide liquidity to companies and households (e.g. the bounce-back loan scheme). It has the benefit of leaving the existing capital framework untouched, where risk weights reflect the Probability of Default (PD), Loss Given Default (LGD), and Exposure at Default (EAD) on the loan in question.

innovation in these sectors.¹⁰ In a UK context, the new Labour government's National Wealth Fund could take on the role of credit guarantor in this way through the UK Infrastructure Bank.

To give a back-of-the-envelope sense of the scale of funding that could be achieved, if the government were to invest, say, £1 billion in the junior tranche of a pool of loans to decarbonisation projects, this might be expected to reduce bank capital requirements on such loans by around £650 million, generating additional lending capacity for banks of around £8.5 billion.¹¹ Before embarking on such a scheme, several issues would require further analysis, including the extent to which market failures are leading to suboptimal credit provision to such climate change mitigation projects at present, the terms on which credit protection should be offered, and the criteria for project inclusion.

If governments do see a need to boost credit provision to decarbonisation projects, we see the approach described above as preferable to adjusting the regulatory framework by introducing an ad hoc “green-supporting” or a “brown penalising” risk-weight factor, as has occasionally been mooted.¹² To the extent that climate risks materially influence the default probability or loss given default on particular exposures, they should of course factor into risk-weighting calculations. However, a factor applied to certain asset classes that is not grounded in the underlying risk of the exposures would distort the capital framework. Decisions to subsidise or tax certain asset classes are best left to governments given their inherent political nature.

¹⁰ To find out more about how innovation market failures can interact with carbon externalities, see Adam B. Jaffe, Richard G. Newell, and Robert N. Stavins (2005), ‘A tale of two market failures: Technology and environmental policy’, *Ecological Economics*, 54, 164-174.

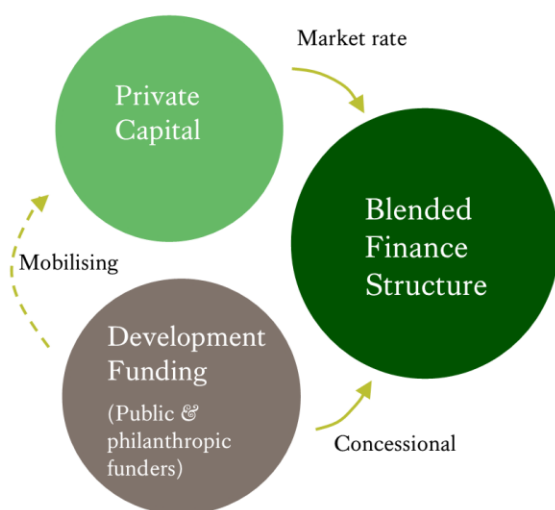
¹¹ The details of this calculation are as follows. We assume the thickness of the junior tranche is 8.5%, meaning a £1 billion junior tranche can support an overall loan pool of £11.77 billion (i.e. £1 billion/0.085). We assume the risk weight on the overall loan pool is 50%, so if the bank's capital target is 15%, its capital requirement prior to SRT is £883 million ($15\% * 50\% * £11.77 \text{ billion}$). Now assume the bank transfers a junior tranche of £1 billion to the government. If the risk weight on the senior tranche is 15%, its new capital requirement will be £242 million ($15\% * 15\% * (1 - 0.085) * £11.77 \text{ billion}$). The capital saving is therefore £640 million (£883 million - £242 million), which can support new lending of £8.54 billion (£640 million / (15% * 50%).

¹² European Commission Vice President Valdis Dombrovskis suggested that a ‘green supporting factor’ could reduce risk weights applied to banks' exposures to certain types of green assets.

3. BLENDED FINANCE: THE ROLE OF MULTILATERAL DEVELOPMENT BANKS

Blended finance is the use of catalytic capital from public or philanthropic sources to increase private sector investment and mobilise additional funds for sustainable development, primarily in developing countries. In a typical blended finance structure, public and private capital providers partner with catalytic and concessional capital from public and philanthropic funders with the aim of the latter taking a risk profile the former is unable or unwilling to take, or pricing credit at below-market terms (Figure 5). These structures can take numerous forms, including grants, concessional loans, guarantees, risk-sharing facilities, and concessional equity.

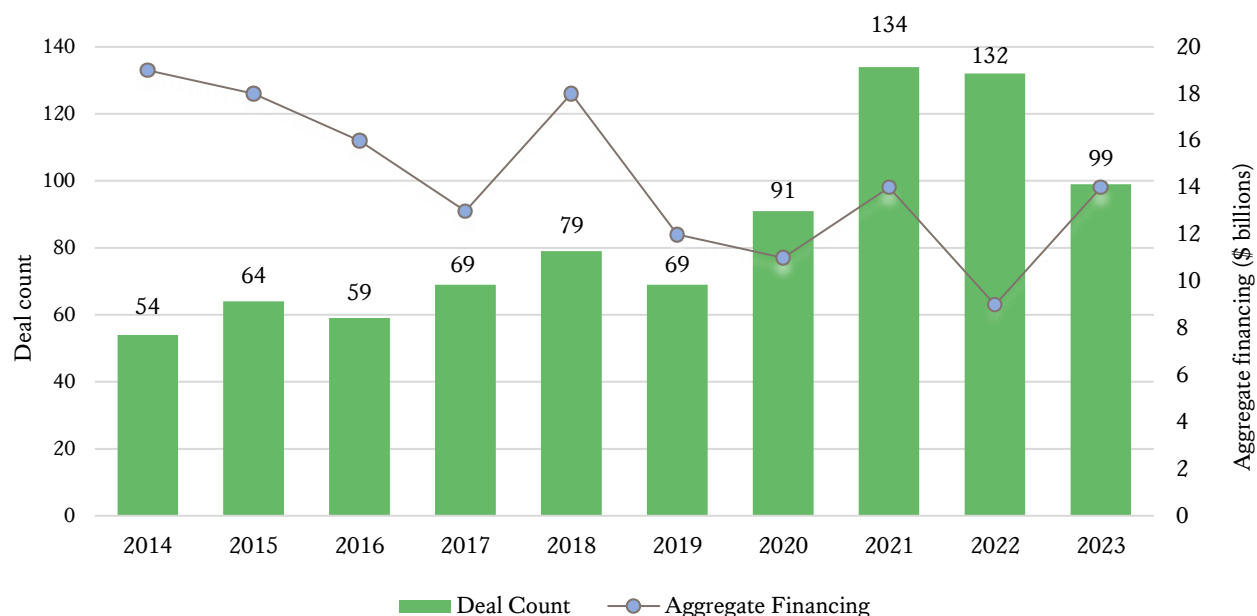
Figure 5: Typical blended finance mechanics and structures



Source: Converge State of Blended Finance 2024.

By combining concessional finance with commercial capital, blended finance mechanisms can unlock investments in renewable energy and low-carbon technologies that may not otherwise occur because of their perceived risk-return profiles and lack of proven cash flows. In recent years, investments in projects such as solar photovoltaics, wind farms, batteries, and hydrogen electrolysis have all benefitted from being scaled up through blended finance deals, driving the deployment of sustainable energy solutions. According to Convergence’s State of Blended Finance 2024 report, in 2023 blended finance saw a significant resurgence, with total financing rising by 71% to \$15 billion, up from \$9 billion in 2022. This increase occurred despite a 25% drop in the number of deals, suggesting a trend towards larger transactions (Figure 6). Notably, climate blended finance now represents 49% of the overall blended finance market by deal count and 57% by aggregate financing.

Figure 6: Overall blended finance market, 2014-2023



Source: Converge State of Blended Finance 2024.

A recent example of a blended finance structure used for sustainability purposes is the first loss guarantee provided by FMO Investment Management for the SDG Loan Fund in November 2013.¹³ As a result of this guarantee, supplemented by a \$25 million guarantee from the MacArthur Foundation, this fund successfully mobilised \$1.1 billion in private capital, making it one of the largest blended finance funds launched in the market to date. The fund’s first loss guarantee enabled insurance companies to rate it internally at investment grade, reducing their capital reserve requirements and facilitating a larger capital allocation than would otherwise be possible. Managed by Allianz and the sourcing provided by FMO Investment Management, the fund aims to deploy 100-120 loans over the next 25 years, targeting investments between \$3 million and \$20 million that advance Sustainable Development Goals 8 (Decent Work and Economic Growth), 10 (Reduced Inequality), and 13 (Climate Action).

Another example is the May 2023 partnership between the European Bank for Reconstruction and Development (EBRD), the EU, and the emerging market asset manager ILX Management, which aims to boost private-sector financing in southern and Eastern Europe, southern and eastern Mediterranean, and Central Asia.¹⁴ This collaboration aims to mobilise up to €300 million over three years from Dutch and other European pension funds focusing on financing climate-smart solutions, digital transformation, and financial inclusion. Supported by EU guarantees through the European

¹³ Allianz (2023), *SDG Loan Fund mobilises USD 1.1 billion of investor capital*, Allianz SE. Available at: <https://www.allianz.com/en/press/news/commitment/environment/231201-allianz-sdg-loan-fund-mobilizes-over-usd-one-billion-of-investor-capital.html>.

¹⁴ Volker Ahlemeyer (2023), ‘EBRD, EU and ILX start joint initiative to boost private-sector finance’, *European Bank for Reconstruction and Development*. Available at: <https://www.ebrd.com/news/2023/ebrd-eu-and-ilx-start-joint-initiative-to-boost-privatesector-finance.html>.

Fund for Sustainable Development Plus (EFSD+) Guarantee Programme, allowing ILX to co-invest with the EBRD under the same risk-return profile, this initiative aligns with the EU Global Gateway's goal of mobilising significant private sector capital.

A third example is the pledge made at COP28 in Dubai by the Asian Development Bank (ADB), Global Energy Alliance for People and Planet (GEAPP), and the Monetary Authority of Singapore (MAS) to establish a blended finance partnership to accelerate the energy transition in Asia. This initiative aims to de-risk projects and attract global private investment to fund energy transition projects, including the early phase-out of coal assets and the implementation of renewable energy and decarbonisation projects in hard-to-abate sectors. The partnership aims to raise US\$2 billion in concessional and commercial capital, with the ADB providing origination, transaction, and technical support.¹⁵

Despite its potential, the blended finance market is currently far too small to meet the financing needs discussed in the introduction to this paper. One problem is the lack of commercial capital being mobilised: one recent report estimated that 70% of public sector concessional funding allocated to blended finance was being provided to development financial institutions (DFIs) with little private sector investment and that the ratio of private investment to concessional funding was less than 2 (Convergence (2024)). Moreover, from 2017-2022, financing by MDBs declined by 3%.¹⁶

If the blended finance market is to fulfil its potential, MDBs will need to scale up their involvement significantly and expand their reach through strategic leveraging and stronger partnerships with the private sector. We discuss two avenues through which this could occur.

First, there is significant scope for MDBs to increase the quantum of financing they provide to development assets. It is instructive to think about this as having two components: the headroom that MDBs possess to grant additional financing while maintaining their current AAA credit ratings; and incremental to this, the additional financing that could be provided were MDBs to permit their credit ratings to fall from AAA to AA. According to the G20 Review of MDB Capital Adequacy Frameworks, there is significant potential for MDBs to increase their leverage while still maintaining their AAA credit ratings.¹⁷ For example, the International Finance Corporation (IFC) could increase its leverage from 1.5x to 4x. Based on this analysis, MDBs can increase the stock of development assets they finance by around

¹⁵ MAS (2023), *ADB, GEAPP, and MAS to Establish Energy Transition Acceleration Finance Partnership in Asia*, Monetary Authority of Singapore. Available at: <https://www.mas.gov.sg/news/media-releases/2023/adb-geapp-and-mas-to-establish-energy-transition-acceleration-finance-partnership-in-asia>.

¹⁶ Convergence Blended Finance (2024), *The State of Blended Finance 2024*, Convergence Report. Available at: <https://www.convergence.finance/resource/state-of-blended-finance-2024/view>.

¹⁷ GOV.uk (2024), *Multilateral Development Bank Callable Capital: joint statement*. Available at: <https://www.gov.uk/government/news/joint-statement-on-multilateral-development-bank-callable-capital#:~:text=The%20G20%20Independent%20Review%20of,resources%20and%20pursuing%20innovative%20measures>.

\$1.2 trillion without harming their current credit ratings (Table 1).¹⁸ Furthermore, if MDBs operated under an AA rating instead of AAA, their financing capacity would increase by a further \$1–1.2 trillion, significantly boosting their development and financial impact.¹⁹

Table 1: Multilateral Development Bank's current and potential financing capacity

MDB	Shareholders Equity	Development Assets	Actual Leverage	Likely Leverage Possible	Maximum Development Assets	Head Room	Capital Utilisation: Actual Relative Maximum
AfDB	11	34	3.1	5	55	21	62%
ADB	53	133	2.5	5.5	292	159	46%
AIIB	20	8	0.4	6	120	112	7%
CAF	13	29	2.2	6	78	49	37%
CDB	1	1	1	5	5	4	20%
EBRD	22	41	1.9	5.5	121	80	34%
IDB	34	106	3.1	6.5	221	115	48%
IBRD	40	211	5.3	6.5	260	49	81%
IDA	168	168	1	4	672	504	25%
IDB Invest	2	4	2	4	8	4	50%
IFC	25	47	1.9	4	100	53	47%
IsDB	13	25	1.9	5	65	40	38%
NDB	10	7	0.7	6.5	65	58	11%
Total	412	814	2.1		2,062	1,248	39%

Note: This table shows an estimate of the leverage that would be possible while maintaining current risk ratings. European Investment Bank (EIB) is not included, as just 10-14% of its balance sheet is for low-income countries (LICs) and middle-income countries (MICs).

Source: G20 2022 Independent Capital Review.

Second, there is significant scope for MDBs to achieve greater “bang for their buck” by increasing the scale of private capital they mobilise per dollar of capital they invest. At present, MDBs and DFIs report mobilising some \$23 billion annually from private investors and other development finance institutions deemed to operate on commercial terms (e.g. IFC mobilising the Dutch Entrepreneurial Development Bank, FMO).²⁰ A reasonable estimate of the actual quantum of private investment is probably closer to \$15 billion per annum. This yields a rather modest 11% mobilisation ratio from their total financing

¹⁸ Similarly, a 2020 ODI report identified an extra \$750 billion financing is possible. See Chris Humphrey (2020), ‘All hands on deck: how to scale up multilateral financing to face the Covid-19 crisis’, ODI. Available at: <https://odi.org/en/publications/all-hands-on-deck-how-to-scale-up-multilateral-financing-to-face-the-covid-19-crisis/>. See also Minister of Economy and Finance (2022), *Independent Review of Multilateral Development Banks’ Capital Adequacy Frameworks: final report published*, Department of the Treasury. Available at: https://www.dt.mef.gov.it/en/news/2022/news_caf.html.

¹⁹ Independently, a 2020 report by the Overseas Development Institute (ODI) identified that MDBs could expand their development assets by at least \$1.3 trillion at an AA+ rating.

²⁰ International Finance Corporation et al. (2024), *Mobilization of Private Finance by MDBs and DFIs, Joint Report 2022*. Available at: <https://www.ifc.org/content/dam/ifc/doc/2024/2022-joint-report-mobilization-of-private-finance-by-mdbs-dfis.pdf>.

commitments of approximately \$130 billion.²¹

There is an opportunity to increase this ratio substantially and with it the amount of private capital that can be channelled into development projects alongside MDBs' own contributions. Doing so will require a significant change in the operating model of MDB project finance. While at present, MDBs typically prioritise lower-risk projects to support mandates of macroeconomic stability and growth, this tends to duplicate the role of commercial banks. In contrast, MDB capital is most needed for riskier projects that support the transition.²² This change in risk appetite is critical if MDBs are to play a transformative role in scaling up finance to low and middle-income countries. These countries often have credit ratings that fall outside most investors' fiduciary and regulatory investment obligations. To attract large-scale private investment, significant de-risking measures are required.²³ The Multilateral Investment Guarantee Agency (MIGA) stands out in this regard as it explicitly offers de-risking as a main product. However, MIGA's involvement typically accounts for only 3% of the annual commitments from development finance institutions.

²¹ Low returns eight years following the MDB's 2015 report. See World Bank Group et al. (2015), *From billions to trillions: MDB contributions to financing for development report*, World Bank Group. Available at: <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/602761467999349576/from-billions-to-trillions-mdb-contributions-to-financing-for-development>.

²² This echoes remarks by Mr Ravi Menon at the Green Swan conference in May 2023. See MAS (2023), *A Supervisory Push for Transition Planning and Blended Finance*, Monetary Authority of Singapore. Available at: <https://www.mas.gov.sg/news/speeches/2023/a-supervisory-push-for-transition-planning-and-blended-finance>.

²³ For example, Convergence reports that the median credit risk rating of the 142 low and middle-income countries it surveyed is B-. According to the sovereign ceiling convention, most investment opportunities in developing countries would therefore have implied ratings of B and CCC.

4. GLOBAL CARBON MARKETS: THE NEW FRONTIER IN FINANCING DECARBONISATION

Carbon markets have an important role to play in achieving net zero emissions across the economy. These markets allow entities to trade carbon credits, which represent a reduction or removal of one metric ton of carbon dioxide equivalent. By putting a price on carbon, they create economic incentives for businesses and governments to invest in clean technologies and implement carbon pricing policies. In addition, carbon markets serve as a significant source of funding and government revenue, which can be used to provide financial support for projects that reduce or remove carbon emissions.

They come in two forms: compliance schemes, where firms are required to buy allowances to emit a certain amount of carbon under a regulated cap or pay a carbon tax, and the voluntary carbon market, where entities can purchase and trade carbon offsets generated by projects that reduce or remove greenhouse gases, often to meet sustainability goals or to align with future regulations.

In this section, we discuss initiatives geared towards scaling up activity in these markets.

COMPLIANCE SCHEMES: EMISSIONS TRADING SYSTEMS AND CARBON TAXES

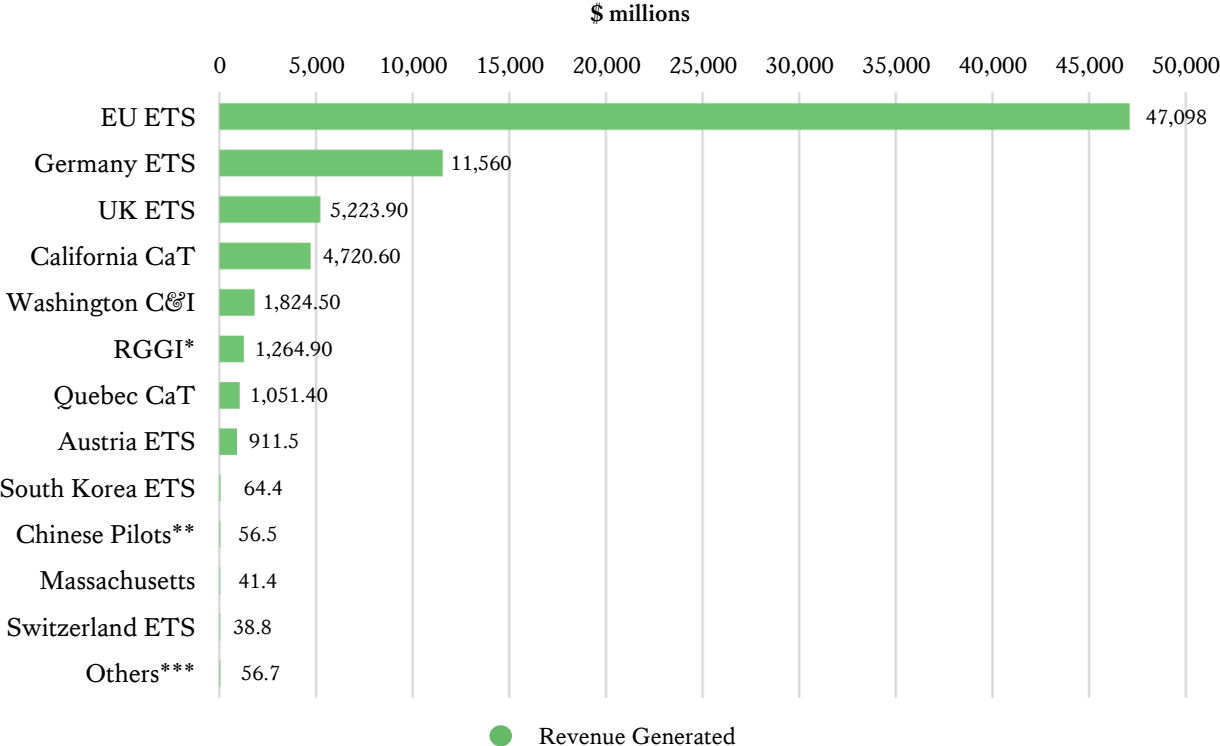
Emission Trading Schemes (ETSs), also known as cap-and-trade systems, are market-based mechanisms aimed at reducing greenhouse gas (GHG) emissions. The primary objective of an ETS is to incentivise businesses and industries to lower their emissions by setting a cap on the total allowable carbon emissions. This cap is reduced over time to decrease overall emissions. Firms receive or buy emission allowances that they can trade. Those who can reduce emissions at lower costs can sell their excess allowances to those facing higher reduction costs, promoting overall economic efficiency. The price of these allowances, effectively a cost for emitting carbon, fluctuates based on the supply and demand within the market, providing a dynamic pricing signal that influences emission reduction activities.

An alternative mechanism for establishing a carbon price is to impose a carbon tax. Carbon taxes operate by imposing a fee on the carbon content of fossil fuels, effectively charging emitters for the greenhouse gases they release into the atmosphere. They differ from ETSs in that they control the carbon price directly providing cost certainty for firms but leaving the quantity of emission reduction uncertain (the converse is true for ETSs). Examples of carbon taxes are Singapore, Japan, Chile, Colombia, and South Africa.²⁴ At the time of writing, there are 75 carbon pricing schemes worldwide, of which 36 are ETS markets.

²⁴ For more details, see Fundi Maphanga (2023), 'VCM Credits Eligible for Compliance Tax Schemes', *Allied Offsets*. Available at: <https://blog.alliedoffsets.com/vcm-credits-eligible-for-compliance-tax-schemes>.

Income from auctioned allowances on ETS markets or from carbon taxes is a source of revenue for governments. In 2023, global emissions trading systems raised nearly \$74 billion in revenue.²⁵ The EU ETS generated the highest revenue at \$47 billion, while the UK ETS, established in 2021 after the UK's exit from the EU, generated a little over \$5 billion (Figure 7).

Figure 7: Revenue generated by ETS worldwide in 2023, by jurisdiction
\$ millions



* RGGI: Regional Greenhouse Gas Initiative is a cooperative effort among the following states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia.

** Chinese Pilots include Shanghai pilot ETS, Hubei pilot ETS, Chongqing pilot ETS, and Tianjin pilot ETS.

*** Others (including Nova Scotia, New Zealand, Montenegro, and Newfoundland and Labrador OBPS).

Source: International Carbon Action Partnership; ID 1325989 Statista 2024.
Visit the [Statista website](#) for more information.

There is significant scope to expand ETS markets globally. One approach to doing so would be to link existing ETS markets across regions and countries, increasing opportunities for cost-effective emissions reductions while also expanding the market depth and liquidity. An example of such a scheme is the agreement in 2020 between the European Union’s ETS and the Swiss ETS – the world’s first international treaty linking ETSs. Under this agreement, participants in the Swiss ETS can use allowances from both

²⁵ See World Bank (2024), *State and Trends of Carbon Pricing 2024*, World Bank annual report. Available here: <https://openknowledge.worldbank.org/entities/publication/b0d66765-299c-4fb8-921f-61f6bb979087>. Also see the World Bank Group’s accompanying interactive website, to access the State and Trends of Carbon Pricing Dashboard.

their own system and the EU's ETS to cover their carbon emissions and vice versa. Moreover, participants in one ETS are entitled to take part in auctions for allowances in the other ETS.

We believe there would be significant benefits to linking the UK and EU ETS markets.²⁶ A larger integrated market with seamless trade of CO₂ permits would enhance market efficiency leading to stronger price discovery and liquidity, while also reducing decarbonisation costs in both economies. Moreover, the linking of ETS markets is a necessary condition for exempting UK exports from the EU's Carbon Border Adjustment Mechanism (CBAM). A further benefit would be lowering the costs associated with monitoring, reporting, and verification (MRV) requirements, thereby ensuring greater transparency and compliance. Without this linkage, UK exporters will face new administrative burdens and costs. Post-Brexit the divergence in ETS designs and the resulting price discrepancies between UK and EU carbon permits complicate the potential for linking these schemes. While these economic differences present challenges, the primary barrier to linking the UK and EU ETS remains political.

VOLUNTARY CARBON MARKETS

The Voluntary Carbon Market (VCM) aims to provide a robust financial mechanism that rewards projects focused on carbon removal, such as afforestation, technologies like Carbon Capture and Storage (CCS) and Carbon Capture, Utilisation, and Storage (CCUS), as well as carbon reduction efforts, including renewable energy adoption, energy efficiency improvements, and forest conservation projects (projects reducing emissions from deforestation/degradation like REDD/REDD+).²⁷ Developers issue "carbon credits" verified by independent agencies, which can then be traded to fund additional decarbonisation efforts. These unregulated markets aim to provide an innovative, performance-based approach to fundraising, incentivising projects that reduce carbon emissions.

At present, the VCM remains small relative to the regulated compliance market. According to Viridios AI, VCMs retired carbon credits valued at \$0.93 billion in 2023. The majority of this capital (\$0.81 billion) was directed towards avoidance credits to prevent greenhouse gas emissions, whilst Nature-based Solutions (NbS) accounted for \$0.52 billion. A key factor hindering the development of these markets is the asymmetric information that exists between suppliers of carbon offset projects and potential buyers.

²⁶ Indeed, the EU-UK Trade and Cooperation Agreement included the following clause that left open the possibility of future EU and UK regulatory convergence: "*The Parties shall cooperate on carbon pricing. They shall give serious consideration to linking their respective carbon pricing systems in a way that preserves the integrity of these systems and provides for the possibility to increase their effectiveness*". Article 392 (6) of the EU-UK Trade and Cooperation Agreement (TCA).

²⁷ The REDD framework, which stands for "Reducing emissions from deforestation and forest degradation in developing countries", was established to protect forests as part of the Paris Agreement. For details, see United Nations, *What is REDD+?*. Available at: <https://unfccc.int/topics/land-use/workstreams/redd/what-is-redd>.

If VCMs are to play a significant role in reducing carbon emissions, they will need to operate at a far greater scale than they do currently, increasing both supply and demand. This requires establishing sound mechanisms for price discovery, liquidity, and effective risk management for this asset class. Achieving this entails building a robust market infrastructure to enhance confidence, compliance, and transparency. Additionally, international cooperation is essential to deepen and improve market efficiency. The overarching challenge lies in developing infrastructure that provides greater information about projects, the quality of credits, and the objectives of credit purchasers.

For VCMs to scale, it is crucial to have clear integrity and quality guidelines for carbon credits. The Core Carbon Principles developed by the Integrity Council for the Voluntary Carbon Markets (ICVCM) are an example here. This is a set of ten principles for identifying high-quality carbon credits, with guidelines over governance, transparency, additionality, permanence etc.²⁸ On the demand side, establishing clear rules on carbon credit usage (e.g. allowing compensation for up to 50% of scope 3 emissions) and implementing more bridges between compliance mechanisms (ETSs and carbon taxes) and the VCM are essential. Initiatives like Carbonplace, which aims to establish VCM trading infrastructure for banks, can play a pivotal role in this development.²⁹

As carbon markets expand, stricter regulations are necessary to establish a credible, investment-grade trading market. The development of market infrastructure, such as the London Stock Exchange's VCM Designation, enables investment into the projects that generate carbon credits, supporting primary market financing and bringing the investments under the oversight of the UK Financial Conduct Authority. However, the uptake of this designation has been disappointingly weak since its launch in October 2022, in part due to issues in the wider listed-funds market that have arisen from changes to accounting treatment, combined with the higher interest rate macroeconomic environment. One initiative to foster growth is the London Stock Exchange's collaboration with financial institutions, such as the June 2024 partnership with Mizuho, providing clients access to VCM-designated investment funds and companies. Another avenue for expansion involves cooperation with stock exchanges in Asia, potentially enhancing market size, price discovery, and transparency. Specific examples of these initiatives are discussed below.

In the realm of carbon finance, the Association of Southeast Asian Nations (ASEAN) countries present an opportunity for scaling up voluntary carbon markets.³⁰ Countries like Singapore, Indonesia, Malaysia, and Japan are leading the way in establishing robust trading infrastructures and leveraging stock exchanges to enhance market efficiency and

²⁸ See IC, *The Core Carbon Principles*, The Integrity Council. Available at: <https://icvcm.org/core-carbon-principles/>.

²⁹ See the [Carbonplace website](#).

³⁰ For further discussion, see Raúl Rosales, et al. (2021), 'Voluntary Carbon markets in ASEAN: Challenges and Opportunities for Scaling Up', *Imperial College Business School*. Available at: <https://www.imperial.ac.uk/business-school/faculty-research/research-centres/centre-climate-finance-investment/research/voluntary-carbon-markets-asean-challenges-and-opportunities-scaling/>.

transparency in the secondary market for carbon credits. For example, Singapore's Climate Impact X (CIX) serves as a global carbon exchange and marketplace, whilst Indonesia's recent launch of its carbon emission credit trading platform demonstrates a commitment to funding greenhouse gas reduction projects.³¹ Similarly, Malaysia's Bursa Carbon Exchange (BCX) and Japan's Exchange Group (JPX) are pioneering efforts to create efficient and liquid markets for carbon credits.³² For instance, the Japan carbon credit market opened on October 2023 as an official market of JPX, providing a place to trade carbon credits in Japan and boost liquidity in this newly set up carbon market.

KEY TAKEAWAYS FOR VOLUNTARY CARBON MARKETS

To truly scale VCMs, it is essential to not only leverage existing exchanges to build up carbon finance markets, but also to establish comprehensive carbon tax frameworks, to embed carbon prices in portfolio management, and to operationalise Article 6 of the Paris Agreement through agreements with other countries.³³ Setting up a global standard for the financial accounting of certified carbon offset credits is also crucial. Accurate financial accounting for carbon credits underpins the market infrastructure needed for transparency and credibility, ensuring that these markets can scale effectively and contribute significantly to global carbon reduction goals.³⁴ The International Organization for Standardization (ISO)'s upcoming standard for net zero organisations, recently announced in June 2024, will consolidate existing frameworks, enhancing best practices for carbon accounting, target-setting, and climate strategy disclosure, thereby facilitating the scale-up of Voluntary Carbon Markets.³⁵

By learning from the integration and infrastructure strategies applied in the UK and EU ETS linkage, countries can better position their VCMs to succeed and grow. The continued development and refinement of market infrastructure, coupled with innovative approaches to carbon finance, will be pivotal in realising the full potential of voluntary carbon markets in this region and beyond.

³¹ For details of Indonesia's scheme, see Stefano Sulaiman (2023), 'Indonesia's president launches carbon emission credit trading', *Reuters*. Available at: <https://www.reuters.com/sustainability/sustainable-finance-reporting/indonesias-president-launches-carbon-emissions-trading-2023-09-26/>.

³² For details of the Malaysian and Japanese schemes, respectively, see the [BCX website](#) and Ivy Yin (2023), 'Japan initiates effort to boost liquidity in newly set up carbon market', *S&P Global*. Available at: <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/112723-japans-carbon-credit-market-tests-to-introduce-market-makers-to-enhance-liquidity>.

³³ For a discussion of the implications of carbon prices for asset valuation, see David Blitz and Tobias Hoogteijling (2021), 'Factoring carbon taxes into a Value strategy', *Robeco*. Available at: <https://www.robeco.com/en-uk/insights/2021/12/factoring-carbon-taxes-into-a-value-strategy>.

³⁴ For further discussion, see Raúl Rosales and Maria Angeles Peláez (2022), 'Financial Accounting for Carbon Finance: A New Standard For a New Paradigm', *Imperial College Business School*. Available at: <https://www.imperial.ac.uk/business-school/faculty-research/research-centres/centre-climate-finance-investment/research/financial-accounting-carbon-finance-new-standard-new-paradigm>.

³⁵ See REP (2024), *ISO to launch umbrella standard for net-zero entities*, Real Economy Progress. Available at: <https://real-economy-progress.com/uncategorized/iso-to-launch-umbrella-standards-for-net-zero-entities/>.

In Southeast Asia, Singapore is leading the development of international carbon markets. Its innovative International Carbon Credit (ICC) framework allows domestic carbon-taxable companies to purchase eligible ICCs generated via mitigation projects outside of Singapore to offset up to 5% of their taxable emissions; ICCs are required to meet internationally recognised principles to demonstrate high environmental integrity. The recent agreements between Singapore and Papua New Guinea in December 2023 and between Singapore and Ghana in May 2024 are examples of the approach.³⁶ These agreements are significant milestones as they operationalise Article 6 of the Paris Agreement, creating a framework for generating and transferring carbon credits between the two countries, enabling cost-effective emission reductions and encouraging investments in sustainable projects.³⁷ Moreover, initiatives like the Climate Action Data Trust (CAD Trust), established by the World Bank, the International Emissions Trading Association (IETA), and the government of Singapore aim to consolidate all carbon credit projects and data in one platform, enhancing market transparency and efficiency.³⁸

³⁶ These agreements have similar structures. Project developers source local eligible climate mitigation projects, and receive financing from Singaporean companies via ICCs. In return, they must commit to deploying 5% of the proceeds for local climate adaptation projects. Project developers are required to cancel 2% of the carbon credits authorised at first issuance to ensure projects deliver additionality. See MTI (2023), *Singapore signs first Implementation Agreement with Papua New Guinea to collaborate on carbon credits under Article 6 of the Paris Agreement*, Ministry of Trade and Industry Singapore. Available at: <https://www.mti.gov.sg/Newsroom/Press-Releases/2023/12/Singapore-signs-first-Implementation-Agreement-with-Papua-New-Guinea>.

³⁷ Under Article 6 of the Paris Agreement, countries are permitted to pursue voluntary cooperation in transferring carbon credits to meet their respective climate targets.

³⁸ See Susanna Twidale and Simon Jessop (2022), 'World Bank, partners launch tracking system to clean up carbon markets', *Reuters*. Available at: <https://www.reuters.com/markets/carbon/world-bank-partners-launch-tracking-system-clean-up-carbon-markets-2022-12-07/>.

5. CONCLUSION

To achieve net zero emissions and address the very large and urgent need for investment in energy systems, collaboration and financial innovation across the entire financial sector will be key. In this article, we have highlighted three areas where opportunities exist for scaling up finance to support decarbonisation initiatives: in banking, in blended finance, and in carbon markets.

Despite the headwinds they face associated with Basel III, banks have significant opportunities to support their energy transition. Our recommendations include developing strategic partnerships with non-bank specialised funds and expanding the use of synthetic risk transfers to enhance lending capacity while meeting regulatory demands. Governments can expand the scale of commercial bank lending capacity available for decarbonisation projects by providing unfunded loan guarantees for eligible projects. In a UK context, the new Labour government could do this by instructing the National Wealth Fund to take on the role of credit guarantor via the UK Infrastructure Bank.

Blended finance can be instrumental in financing decarbonisation projects, leveraging public and philanthropic capital to catalyse private sector investments in renewable energy and low-carbon technologies with a whole systems approach. MDBs and DFIs have a critical role to play in supporting this market. For this to happen, these institutions should be given key performance indicators to mobilise private investment as a core activity (e.g. most MDB and DFI transactions can mobilise third-party private investment, but Convergence estimates less than 10% currently do). They should also enhance their current capital adequacy frameworks and adopt a less risk-averse approach to scale up their lending capability and unlock private sector investments in sustainable development projects.

Carbon markets represent the cutting edge of capital market innovation in financing the transition. These markets have a key role to play in incentivising efficient emissions reduction, while also being a source of revenue and funding. For carbon markets to play this role to full effect, there is an urgent need to enhance market depth and liquidity – ambitions that require greater cross-border collaboration, as per the emphasis these issues will receive in Baku for COP29. We suggest that the UK and EU ETS markets should be linked to enhance transparency, liquidity, price discovery, and market efficiency. Singapore's initiatives in VCM, exemplified by its collaborations with Papua New Guinea and Ghana, demonstrate the potential for leveraging these markets to promote sustainable development and offset emissions. There is also an urgent need to support initiatives to verify the integrity of carbon credits.

If we are to be successful in navigating the complexities of the transition to a low carbon global economy, there is an urgent need for policymakers around the world to work with all these elements of the financial system to provide the appropriate incentives for capital allocation, ensuring that sustainable finance makes sense on traditional risk-return grounds.

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MOBILISING FINANCE FOR NET ZERO ENERGY SYSTEMS

IMPACT POLICY PAPER

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MOBILISING FINANCE FOR NET ZERO ENERGY SYSTEMS

IMPACT POLICY PAPER

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Raúl is a Professor of Practice in Net Zero Asset Management at King's College London within the Faculty of Natural, Mathematical & Engineering Sciences. At King's, he leads research on carbon markets and is instrumental in developing the Net Zero Centre and its financial and industry ecosystem. He also serves as a Senior Executive Fellow at Imperial College Business School, where he played a pivotal role in launching the Singapore Green Finance Centre (SGFC) in 2020. He currently serves on the SGFC management committee.

Since 2014, Raúl has been working as a Senior Advisor for Orchard Global Asset Management in London, focusing on transformational capital solutions for banks through risk-transfer solutions and partnerships for dedicated investment strategies, particularly in infrastructure and energy debt funds (private credit). He previously held roles as a Senior Banker for Energy at the European Bank for Reconstruction and Development (EBRD) and as Global Head of Multilateral Development Banks at BBVA.

With a career spanning 30 years in the financial industry, Raúl holds a PhD in Civil Engineering, specialising in sustainable infrastructure and energy project financing, from Universidad Politécnica de Madrid, Spain (2013).

DAVID AIKMAN

David joined King's Business School in April 2020 as Professor (in Practice) of Finance and as the inaugural Director of the Qatar Centre for Global Banking and Finance. Alongside Richard Barwell, David co-organises the Bank of England Watchers' conference and co-edits a blog dedicated to financial stability policy. (Visit the [Macprudential Matters website](#) to read the latest blog articles.) He is also currently co-editing a new Research Handbook of Macprudential Policy, with Prasanna Gai, which will be published by Edward Elgar. In January 2023, David was Visiting Professor at Keio University, Tokyo. He has recently been an external expert at the Central Bank of Ireland, where he advised on a review of the central bank's macroprudential policy framework, and in 2024 he will be a special departmental advisor at the Bank of Canada.

Prior to joining King's, David spent 17 years working as an economist at the Bank of England – most recently in the role of Technical Head of Division in the Financial Stability, leading the Bank's work on various macroprudential issues. He represented the Bank of England in various international fora, including meetings of the Financial Stability Board, the Basel Committee, and the European Systemic Risk Board. Between 2013 and 2015, David was seconded to the Board of Governors of the Federal Reserve System in Washington DC, working as an advisor in the Division of Financial Stability. In 2008, David was a Visiting Scholar at the Bank of Japan's Institute for Monetary and Economic Studies.

He is the author of various research papers on financial stability and macroprudential policy, and has a PhD in Economics from the University of Warwick.

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