Recent Developments in Climate Finance

Implications for Pakistan

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Impact

The Ministry of Finance (MoF) is interested in exploring and accessing international sources of finance tied to climate change initiatives. To date, Pakistan's access to international climate finance (CF) has been very limited. Furthermore, recent global trends show that the volume of concessionary finance has been modest. The report summarizes Pakistan's climate targets and associated costs for meeting green house gas (GHG) reduction, assesses available concessional CF options, and recommends policy action for accessing CF. To meet its climate action targets under the Nationally Determined Contributions (NDC) 2021, it will be important for Pakistan to pursue nature-based bonds, work with potential investors to use cross-border carbon-trading provisions in the Paris Agreement to de-commission coal plants, encourage more domestic issuance of green bonds, invest in better planting technologies, improve its framework for public-private partnerships, and reduce investor perceptions of country risk.

This report has been prepared by the International Growth Center (IGC) and the Consortium for Development Policy Research (CDPR).[1] The Principal Investigators were William P. Mako (CDPR fellow, former Lead Specialist, World Bank) and Ijaz Nabi (IGC Country Director, CDPR Fellow and former Sector Manager, World Bank) with support from Amna Mahmood (IGC Country Economist) and Shehryar Khan (CDPR RA).

About the project

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In brief

- The Government of Pakistan (GoP) has ambitious plans for reducing 2030 greenhouse gas emissions to 50% of baseline projected levels. These plans anticipate USD 151 billion of investment just for energy sector mitigation projects by 2040. In the GoP's view, any 50% reduction below baseline projected emissions should be financed 15% from domestic sources and 35% from international sources. International financing should be mostly on a concessional basis.
- Despite Pakistan's relatively high emissions and relatively low GDP per capita, accessing concessional international climate finance (CF) will require meeting stringent qualifying criteria. Globally, the volume of concessionary finance is modest. Of the total CF of USD 632 billion in 2019-20, USD 65 billion was concessionary finance by multinationals to East Asian economies and only USD 20 billion was grants to the poorest countries. The Ukraine war clouds prospects for substantial increase in overall volume of funds.
- Of about USD 325 billion in recent worldwide annual funding for renewable energy (RE), the great majority was private equity and market-rate debt. With decreases in per-KWH costs to within the range for fossil fuel alternatives, RE is now expected to cover its costs and provide an adequate return on investment (ROI). By contrast, only 13% of recent CF came in the form of concessional debt or grant financing – focused on more challenging geographies (e.g., Sub-Saharan Africa) and sectors (e.g., agriculture, forestry, or other land-use projects).
- This suggests developing a strategy to target private external CF both for RE and for other climate change investments. Concessional CF may well be limited to non-remunerative climate mitigation projects (e.g., agricultural, or electricity transmission system upgrades to accommodate Variable Renewable Energy (VRE)), climate adaptation projects, or components (e.g., safety nets for laid-off coal sector or fuel sector workers) of otherwise remunerative mitigation projects that cannot be expected to earn a profit.

[1] The IGC is a policy research consortium managed by the London School of Economics and Oxford University. Research funds are provided by the UK government. CDPR is located in Lahore, Pakistan.

www.cdpr.org.pk. +924235778180 admin@cdpr.org.pk

International Growth Centre

Key Recommendations

1. Convert Pakistan's 2021 Nationally Determined Contributions (NDCs) into a comprehensive document for climate investors. Show specifically what changes would be needed in Pakistan to reduce 2030 emissions to 50% below the baseline projection. Identify specific projects as well as the projected investment and emissions cut contribution for each. Group projects by suitability for non-concessional vs. concessional CF.
2. Refine domestic guidelines for green bonds to minimize burdens on investors, while assuring that green bond sale proceeds contribute to climate mitigation or adaptation.
3. In order to attract private domestic or foreign investment for RE, continue to improve Pakistan's legal and institutional framework for public-private partnerships (PPPs).
4. Enhance Pakistan's competitiveness vis-à-vis other major claimants on private investment by improving its country risk rating, through improvements in macroeconomic and financial sector stability as well as rule-of-law indicators.
5. Reach out to multilateral/ bilateral development financial institutions (DFIs) to seek concessional CF for appropriate climate projects: e.g., agriculture, VRE-capable electricity transmission.
6. Work with conservation financiers to organize nature-based debt swaps, e.g., to accelerate the tree planation/ reforestation program.
7. Work with innovative multilateral/bilateral DFIs to use cross-border mitigation investment and carbon-trading provisions in the 2015 Paris Agreement to financing the de-commissioning of some major coal plants.
8. Stress environmental/ climate change priorities in sectoral strategies to identify emissions reducing opportunities such as mitigating crop burning via investment in better planting technologies.

I. Context and Pakistan's Goals/ Plans

Climate finance (CF) is "local, national or transnational financing…that seeks to support mitigation and adaptation actions that will address climate change."[2] This report focuses on efforts to mitigate climate change through reductions in greenhouse gas (GHG) emissions.

GHG emissions, and thus the source of climate risk, vary widely. For example, 2018 emissions of CO_2 (an important GHG) ranged from 10 thousand tons for Tuvalu to over 10 billion tons for China.[3]

Pakistan recently ranked 27th among the world's top CO_2 emitters. In 2018, Pakistan accounted for just 0.6% of global emissions (Exhibit 1).

Exhibit 1: CO2 Emissions by Top Countries, 2018 (million tons)

China	10,313	Indonesia	583	U.K.	359	Malaysia	240
U.S.	4,981	Canada	574	Italy	325	Kazakhstan	220
India	2,435	Saudi Arabia	515	Poland	313	Pakistan	208[1]
Russia	1,608	Mexico	472	France	310	Subtotal	29,214
Japan	1,106	South Africa	433	Spain	258	Other	4,827
Germany	710	Brazil	428	Thailand	258	World Total	34,041
Korea	631	Turkey	413	Vietnam	258		
Iran	630	Australia	387	Egypt	246		

Source: http://data.worldbank.org.

[1] Per a broader measure for all greenhouse gases (GHG), including methane, Pakistan emitted 490 million tons of CO_2-equivalent in 2018.

[2] "Introduction to Climate Finance," United Nations Framework Convention on Climate Change (UNFCCC), accessed June 20, 2022, https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance.
[3] "CO2 emissions (kt)," The World Bank Data, accessed June 20, 2022, https://data.worldbank.org/indicator/EN.ATM.CO2E.KT?most_recent_value_desc=false&view=chart.

With no new initiatives, Pakistan's annual GHG emissions are projected to more than triple by 2030. In 2018, GHGs totaled 490 million tons of CO_2-equivalent ($MtCO_2$-e). Pakistan's projected in 2016 a GHG trajectory leading to emissions of 1,603 $MtCO_2$-e by 2030. Consistent with current Paris Agreement goals to limit temperature increases to 1.5 to 20 C, in preparation for the 2021 UN Climate Change Conference (COP26) in Glasgow UK, the Government of Pakistan (GoP) identified initiatives to support "a cumulative ambitious aim of conditional and voluntary contributions of overall 50% reduction of its projected emissions by 2030, with a 15% drop below business as usual (BAU) from the country's own resources, and an additional 35% drop below BAU subject to international financial support." Reductions would amount to 240 $MtCO_2$-e per year with the 15% drop and an additional 561 $MtCO_2$-e per year with the 35% drop, for a maximum combined drop of 801 $MtCO_2$-e. Thus, under the fullest implementation of the 2021 Nationally Determined Contributions (NDCs), Pakistan's annual GHG emissions would nevertheless increase 64% to 802 $MtCO_2$-e by 2030.[4]

Total costs to achieve 50% emissions cut by 2030 are projected at USD 101 billion just for energy transition.[5] The energy sector accounted for 41% of Pakistan's 2018 GHG emissions.

Coal usage is heading in the wrong direction. Coal consumption has tripled over the past five years to 21.5 million tons/ year because of increases in both cement production (discussed later) and coal-fired electricity generation. The GoP expects "the share of electricity generation from coal… to increase from 21% in FY21 to 31% by FY25."[6] Total investment of USD 6.6 billion in five coal-fired electricity generation public-private partnerships (PPPs) since 2016 have added MW 4,290 of capacity (Exhibit 2). These five electricity generation PPPs could emit 18.6 million tons of CO_2 per year or more.[7]

Exhibit 2: Pakistan's Coal-Fired Electricity Generation Public-Private Partnerships (PPPs)
(Investments in USD millions)

PPP	Financial close	Capacity (MW)	Contract term (years)	Contract type	Total invest-ment	Equity invest-ment	Majority equity investor	Loans	Lenders
Engro Thor-1	2016	660	20	BLT	1,108	227	Engro Powergen	831	CDB; CCB; ICBC; Sindh Public Bank; Soneri Bank
China Power Hub	2017	1,320	20	BOT	1,940	440	China Power Investment Corp.	1,500	CDB; China Ex-Im; ICBC; CCB; Bank of Communications
Lucky Electric	2018	660	30	?	1,080	270	Lucky Cement	810	Habib Bank; United Bank Ltd.; National Bank of Pakistan; Askari Bank; Soneri Bank; Bank of Punjab
Thar Block-II	2019	330	25	BOT	520	130	Hub Power Co. Ltd.	390	CDB; Habib Bank
Thar Block-I	2020	1,320	25?	BOT	1,912	478	Shanghai Electric	1,434	China Ex-Im; CDB; ICBC; Habib Bank
TOTALS		4,290			6,560	1,595		4,965	

Source: https://ppi.worldbank.org/en/ppidata.

[4] Government of Pakistan, Pakistan: Updated Nationally Determined Contributions 2021 ("NDC"), 14

[5] NDC, 10.

[6] Ibid, 27.

[7] Assumes 50% capacity utilization. Author's estimate based on: U.S. Environmental Protection Agency, Greenhouse Gas Reporting Program Industrial Profile: Power Plants, September 2019, 1. https://www.epa.gov/sites/default/files/2020-12/documents/power_plants_2017_industrial_profile_updated_2020.pdf ; and U.S. Energy Information Administration, Annual U.S. Coal-Fired Electricity Generation Will Increase for the First Time Since 2014, 18 October 2021. https://www.eia.gov/todayinenergy/detail.php?id=49996

The GoP contemplates major – but indeterminate – increases in renewable energy (RE). RE accounted for just 5% of electricity generation in 2019.[8] NDC 2021 proposes 60% RE by 2030.[9] The 2019 Alternative and Renewable Energy (ARE) Policy, however, "mandates 30% solar, bagasse, and wind by 2030. Yet, the most recent Indicative Generation Capacity Expansion Plan stipulates that the energy mix should have 65% RE (hydropower, solar, wind, and bagasse) by 2030, reversing the large dependence on imported fuel. Given system constraints, solar and wind will only begin to accelerate after 2030 in Pakistan."[10]

Hydropower potential is both enormous and underutilized. "Pakistan has an estimated hydropower potential of around 60,000 MW, out of which approximately 14% is currently exploited."[11] Thus, 51,600 MW of potential hydropower capacity remains. "Hydropower development in Pakistan is critical for the energy transition, as it can even out the volatility of high shares of solar and wind. It is estimated that 42% of total installed capacity in 2030 will be hydropower in the base case scenario. Large number of projects are focused on clean hydropower, where more than 12 GW are under construction."[12]

Similarly, Pakistan has enormous solar and wind potential, but cost is an obstacle. If Pakistan's solar power potential (mainly in Balochistan) "is utilized, all of Pakistan's current energy needs can be met with solar power alone."[13] In addition, Pakistan "has a significant untapped potential for wind power generation, mainly in the coastal areas of Sindh and Balochistan."[14] Pakistan could come "close to 100% no-carbon but at a highly unaffordable cost, as transitioning to the proposed energy mix will require investments to the grid, changes to operational procedures, and proper planning of Variable Renewable Energy (VRE) expansion with storage facilities."[15] The GoP emphasizes the need for an electricity transmission system upgrade, in part to accommodate greater VRE usage.

The GoP contemplates energy sector investments of USD 101 billion by 2030[16] and USD 151 billion by 2040 (Exhibit 3). Mitigation investments for other sectors are mostly unspecified. In addition to measures to mitigate the rise in temperatures, the GoP has identified a need for investments of USD 7-14 billion for adaptation, to make Pakistan more resilient against the effects of climate change.[17]

[8] NDC, 27.
[9] Ibid, 11 and 27.
[10] The IGCEP total would include 1% bagasse, 8% wind, 8% solar, and 46% hydro. NDC, 27 and 64.
[11] NDC, 27.
[12] Ibid, 28.
[13] Ibid, 27.
[14] Ibid.
[15] Ibid, 28.
[16] Ibid, 10.
[17] Ibid, 64.

Exhibit 3. Emissions and Proposed Mitigation Initiatives/ Investments, by Sector

Sector	CO_2-e, 2018 (MT)	Major proposed actions	Projected investments by 2040 (USD billions)
Energy	219	• Complete more than 12 GW of hydro (and coal?) projects under construction • Expand RE (including hydro) to at least 30% of capacity by 2030 • Upgrade of transmission by 2040; higher if a higher proportion of variable solar/wind power • Buy out 2 relatively new coal thermal plants and the Thar coal mines • Replace coal power plants with solar • Set Minimum Energy Performance Standards (MEPS) for electric motors, air conditioners and LED lights	• 20.0 • 80.0 • 20.0+ • 18.0 • 13.0
Agriculture	199	• Complete ban on open burning of rice stubble, etc. • Improve disposal of crop residue	• ?
Transport	51	• Increase electric vehicle sales to 30% and 90% of passenger vehicles and heavy-duty truck, respectively, by 2030 and 2040 • Adhere to Euro emission standards, including Euro 5	• ?
Industry	26	• Incentivize carbon trading between industrial firms • Promote/ develop plans for emission reductions from major sectors, especially cement and textiles	• ? • ?
Land-use, Land-use Change, and Forestry (LULUCF)	25	• Complete Ten Billion Tree Tsunami Program (TTBTP) • Conserve existing forests and increase tree cover through community participation • Identify policy priorities for protecting soil quality	• 0.8 • ? • ?
Waste	19	• Encourage conversion of animal waste into methane for household/ urban transport fuel • Promote source reduction and re-use of waste	• ? • ?
Totals	539		151.8+

Source: NDC 2021, 30-31 and 63-64.

Potential CF financiers might appreciate a more fully developed presentation of energy sector plans.[18] Goals for RE are unclear, as mentioned earlier, as are plans for coal.[19] More detail (e.g., specific projects) on the required estimated investment of USD 80 billion by 2040 in hydropower would be useful. The claim that "buying out the relatively new coal power projects, including the local Thar coal mines, would upfront an estimated cost of USD 18 billion"[20] seems incredible. Investment in the five electricity generation PPPs that reached financial close since 2016 totaled only USD 6.6 billion (Exhibit 2).

[18] Perhaps, however, other GoP documents provide a more complete and analytical perspective.

[19] "From 2020 onwards, a moratorium is in place on new imported coal-based power plants and no generation of power through imported coal, [and] plans for two new coal-fired power plants have been shelved in favor of hydro-electric power." But "priority actions" that are "in progress" include "about USD 20 billion for Coal and Hydro projects." NDC, 62-63.

[20] Ibid, 64.

- **Other discussions in NDC 2021 are less developed but contain some items of interest.** For e.g.:

- Agriculture is the second biggest emitter (37%) of GHGs. The GoP is focused on a "complete ban on open burning of rice stubble, solid waste, and other hazardous materials" and "disposal of crop residue in an environmentally friendly manner." In contrast to RE, such initiatives seem unlikely to provide much (if any) return on investment.

- Transportation (9%): While mentioning urban mass transit, the GoP's goal is for electric vehicles (EVs) to comprise 30% of vehicle sales (passenger vehicles and heavy trucks) by 2030 and 90% by 2040.[21] Except for government procurement of EVs for the government's own use, most EV purchases will presumably be by businesses and households. The GoP may or may not wish to provide some incentive (e.g., tax credit) to encourage early adoption of EVs. A more complete transition to EVs would likely reduce fuel sector employment, requiring sector planning and perhaps transitional safety nets.[22]

- Industry (5%) accounts for 73% of coal consumption (which has tripled since 2016), "of which the cement sector constitutes 65% of industrial coal consumption."[23] "Cement is incredibly dirty to produce. . . If the [global] cement industry were a country, it would rank as the world's fourth largest GHG emitter."[24] GoP priorities for industry mitigation emphasize "clean production technologies," eco-standards, incentivization of carbon trading between industries, and bottom-up planning by the private sector to reduce emissions.[25] More specific measures may be warranted to cut cement industry GHGs.[26]

- Land Use, Land-Use Change, and Forestry (5%) initiatives feature the Ten Billion Tree Tsunami Program (TBTTP), which is expected to "sequester 148.76 $MtCO_2$-e over the next ten years. The estimated project cost of about USD 800 million is being met nationally from indigenous sources."[27] Pakistan has increased mangrove coverage from 477 km^2 in 1990 to about 1,464 km^2 in 2020, which now stores about 21.8 million tons of organic carbon (or 76.4 $MtCO_2e$). "A rapid assessment report has found using the terrestrial forest price of carbon credits of USD 3 and aspirational blue carbon prices of USD 12 to15, revenue generated would be USD 75 million and USD 300 to 500 million, respectively. Carbon removals would continue beyond 2050 sustaining ongoing revenue."[28] It is not clear, however, the extent to which carbon sinks can generate carbon reduction revenue (see Section II.D).

- Waste disposal (4%) initiatives seem to focus on turning animal waste into methane for use as a fuel for rural households and urban transportation. Methane accounts for almost 90% of this sector's GHG emissions. Such fuel projects might earn a profit and be expected to earn an investment return, but that start-up might be challenging.

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[21] Ibid, 26.

[22] As of 2018, Pakistan's fuels sector accounted for almost 1,123,000 jobs. "Since the fossil fuel industry is a major employer of local communities, any plans for phasing out fossil fuels from the economy will require sector planning." Ibid, 31.

[23] Ibid, 27.

[24] Veena Singla and Sasha Stashwick, "Cut Carbon and Toxic Pollution, Make Cement Clean and Green," NRDC blog, January 18, 2022, https://www.nrdc.org/experts/sasha-stashwick/cut-carbon-and-toxic-pollution-make-cement-clean-and-green.

[25] NDC, 30.

[26] These could include, for instance, "reducing the overspecification of cement in concrete mixes and encouraging the use of supplementary cementitious materials…to partially replace cement," requirements to make cement kilns more fuel-efficient, and greater reliance on RE electricity. Veena Singla and Sasha Stashwick, "Cut Carbon and Toxic Pollution, Make Cement Clean and Green," NRDC blog, January 18, 2022, https://www.nrdc.org/experts/sasha-stashwick/cut-carbon-and-toxic-pollution-make-cement-clean-and-green.

[27] NDC, 63.

[28] Ibid, 71.

NDC 2021 provides little visibility on how Pakistan would achieve its overall GHG reduction goals by 2030. Selective cuts are mentioned.[29] But these would come nowhere near the GoP's overall goal of reducing annual GHG emissions by 240 or 801 $MtCO_2$-e by 2030.

The GoP notes that "financing the mitigation and adaptation gap will be a challenge." Against the USD 151 billion purportedly needed for energy sector mitigation, the GoP cites a recent GDP of USD 284 billion.[30]

Hence, the GoP asserts that concessional international CF will be "key."[31] Whether Pakistan reduces its GHG emissions trajectory by 204 or 801 $MtCO_2$-e per year by 2030 will supposedly hinge on the availability of concessional international CF.

Thus far "Pakistan has enjoyed very limited access to international climate finance." This includes one project from the Adaptation Fund, three from the Green Climate Fund (totaling USD 122 million), and 19 projects approved by the Global Environment Fund. "Pakistan has thus far not accessed Climate Investment Funds (CIFs), major bilateral climate funds, or facilities," except for one project. In addition, Pakistan has received support to explore options for carbon pricing and may be exploring a "debt-for-nature" swap.[32] Pakistan has also had 18 energy projects approved by the Clean Development Mechanism (CDM), for which it receives carbon credit income (Section II.D).

In laying claim to concessional international CF, the GoP places high hopes on international agreements:

> "Pakistan will require finance, technology transfer, and capacity building in line with Article 4 of the United Nations Framework Convention on Climate Change (UNFCCC) and Articles 9, 10 and 11 of the Paris Agreement to fully implement the climate change actions contained in these NDCs. These articles are explicit on supporting developing countries to implement climate change actions and increasing mitigation ambition…Paragraph 5 of Article 4 of the Paris Agreement specifically committed that 'support shall be provided to developing country Parties for implementation of this Article…recognizing that enhanced support for developing country Parties will allow for higher ambition in their actions'."[33]

In addition, Pakistan is exploring market and non-market-based approaches [to] help in diversifying the funding sources for commissioning capital intensive projects. These include green bonds, nature performance bonds, carbon pricing instruments, and blue carbon.

Pakistan has just started to develop green bonds. The Water and Power Development Authority (WAPDA) raised USD 500 million, at a 7.5% market yield, in May 2021 in Pakistan's first green bond issue.[34] Subsequently, in September 2021, the Securities and Exchange Commission of Pakistan (SECP) approved national guidelines for green bonds. These SECP guidelines recognize the International Capital Market Association (ICMA) principles for green investment, but require more work for the issuer and regulator. The SECP Guidelines also require the issuer to compile an "Environmental Risk Management System and/ or National/ International environmental and social safeguards" and to map these "to the UN's Sustainable Development Goals (SDGs)" ("Framework"). In addition, the issuer "must

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[29] E.g., it is expected that the TBTTP will sequester 148.76 MtCO2-e over the next ten years. Other estimated savings include 1.7 MtCO2-e from two shelved coal power plants, 24 MtCO2-e from the take-up of EVs, and 22 MtCO2-e from "stabilizing energy mix 40-60 in favor of renewable energy." Ibid, 63.

[30] Ibid.

[31] Ibid.

[32] "Based on an earlier experience with the Government of Italy, Pakistan is engaged with several bilateral and other development partners to channel outstanding payments into conservation and climate-related instruments via [the National Bank of Pakistan]." Ibid, 70-71.

[33] Ibid, 64.

[34] Web Desk, "Pakistan's WAPDA Raises USD 500m in Country's First Green Bond Issuance," Business Recorder, 28 May 2021, https://www.brecorder.com/news/40095710.

prepare a 'Project Evaluation and Selection Policy' describing the criteria and procedures for evaluation, selection and financing of projects to be included in the asset pool of the green bond," and essentially requiring an expert independent review. In addition to required disclosures in the offering prospectus, the green bond issuer should disclose on its website several items including the "external review report on the Framework."[35]

The GoP is also pursuing conservation and exploring conservation finance, a subset of CF. The TBTTP is a major conservation initiative. This effort seems related to a nature performance bonds initiative. "Building on an earlier experience with the Government of Italy, Pakistan is engaged with several bilateral and other development partners to channel outstanding payments into conservation and climate-related investments via [the National Bank of Pakistan]."[36]

Given the current concentration of GHG emissions in certain sectors, notably including coal-fired electricity generation and cement, carbon pricing applications could be helpful. "A range of activities have commenced including capacity building on carbon pricing/ trading, national consultation on carbon pricing, and scoping of pricing instruments in [the] Pakistani context. The aim is to explore options for the introduction of domestic Climate Policy Initiatives (CPIs) to manage the cohort of large-scale emitting installations, representing around 27% of domestic emissions, as well as an opportunity for similar or related instruments for the transport sector."[37]

Section II summarizes recent developments – financial flows and institutions – in CF, from which Section III suggests implications for Pakistan.

[35] Securities & Exchange Commission of Pakistan, Guidelines – Issuance of Green Bonds," 2021. https://coalwww.secp.gov.pk/document/green-bonds-guidelines/?wpdmdl=42537&refresh=62407a452ca7b1648392773 (downloaded 27 March 2022).
[36] NDC, 71.
[37] Ibid.

II. Recent Developments in Climate Finance (CF)

International agreements provide general support for GoP claims on concessional CF. According to the 1992 UNFCCC, developed country signatories "shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations."[38] The 2005 Kyoto Protocol and the 2015 Paris Agreement further "call for financial assistance from Parties with more financial resources to those that are less endowed and more vulnerable."[39]

To support these from-richer-to-poorer financial flows, as contemplated in 1992,[40] a "Financial Mechanism" evolved. The Financial Mechanism's "operating entities" include both funds as well as "flexible mechanisms" for carbon trading established by the Kyoto Protocol.

Funds

- The Global Environment Fund (GEF), established in 1992;
- The Green Climate Fund (GCF), established in 2010;
- Two subsidiary funds – the Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF) – managed by the GEF; and
- The Adaptation Fund, established in 2001, to be funded by a tax on Kyoto-related carbon trading

Flexible mechanisms

- Joint Implementation (JI), whereby any party from an OECD or Economy in Transition (i.e., Eastern Europe/ Central Asia) country can earn Emission Reduction Units (1 ERU = 1 ton of CO2-e) from a mitigation project in that region;
- CDM, whereby a party from any country can earn Certified Emission Reductions (1 CER = 1 ton of CO2-e) from a mitigation project in a less developed country; and
- International trading of ERUs or CERs, which can now be traded on the European Union Emissions Trading System (EU-ETS) and a certain amount of which can be used by over 11,000 EU "operators" (e.g., factories, thermal power plants) to offset their emissions.

According to the UN's most recent review, the Financial Mechanism's contributions to CF are marginal. While noting that "there exists no comprehensive system or methodology or definition of CF and that data are not always harmonized," the review concludes that "the operating entities remain a small part of the overall CF architecture…The finances being provided to recipient countries through the Financial Mechanism continue to represent a very small proportion of overall CF." The review recognizes the increasingly important role for private participants in CF: "An assessment of the adequacy of resources that looks only at the operating entities of the Financial Mechanism will be misleading because of its narrow scope. In addition, the adequacy of resources will ultimately depend heavily on enabling environments that allow for the effective use of funds as well as leverage public funding by co-financing from the private sector. This poses a challenge to a quantitative assessment of the adequacy of funds."[41] Indeed, recent grants from the funds may represent only about 6% of total CF grants and 0.3% of total CF flows worldwide,[42] while contributions from Kyoto's "flexible mechanisms" have dwindled (as discussed Section II.E).

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[38] United Nations Framework Convention on Climate Change (UNFCCC), United Nations Framework Convention on Climate Change (UNFCCC), 1992, https://unfccc.int/resource/docs/convkp/conveng.pdf

[39] "Introduction to Climate Finance," United Nations Framework Convention on Climate Change (UNFCCC), accessed June 20, 2022, https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance.

[40] United Nations Framework Convention on Climate Change (UNFCCC), Framework Convention on Climate Change, 19 September 2011, https://unfccc.int/resource/docs/2011/cop17/eng/07.pdf

[41] United Nations Framework Convention on Climate Change (UNFCCC), Technical Paper on the Sixth Review of the Financial Mechanism. SCF/TP/2017/1: UNFCCC, 2017. Digital. https://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/tp_6th_review_31oct_1130.pdf. (June 20, 2022)

[42] Author's estimates based on: Global Environment Facility (GEF), https://www.thegef.org/ (Accessed June 20, 2022); "Global Environment Facility", Wikimedia Foundation, June 19, 2022, 3:59 https://en.wikipedia.org/wiki/Global_Environment_Facility; Green Climate Fund, https://www.greenclimate.fund/ (Accessed June 20, 2022); "Global Environment Facility", Wikimedia Foundation, June 19, 2022, 3:59 https://en.wikipedia.org/wiki/Green_Climate_Fund; and Exhibits 4 and 8.

The remainder of this section summarizes recent developments in: (A) CF flows and green bonds; (B) conservation finance, a subset of CF; (C) brownfield de-commissioning; (D) the CDM; and (E) carbon trading.

A. CF Flows and Green Bonds

1. CF Flows

Total global CF for 2019-2020 averaged an estimated USD 632 billion per year (Exhibit 4). Of this amount, 93% went for mitigation and just 7% for adaptation. While 74% above 2012, the recent total represents just about 15% of estimated needs put at USD 4.5 to 5.0 trillion per year.

Exhibit 4: Worldwide CF, Annual Averages 2011-2020 (USD billions)

2011-2012	364
2013-2014	365
2015-2016	463
2017-2018	574
2019-2020	632

Source: Climate Policy Initiative, Global Landscape of Climate Finance 2021 ("CPI"), December 2021, 2.

Over three-quarters of this CF remained domestic. Thus, USD 481 billion (76%) of annual CF during 2019-2020 originated from domestic sources (Exhibit 5). However, recent international inflows have reached or exceeded half of CF for several regions: Sub-Saharan Africa (90%), South Asia (65%), Latin American/Caribbean (54%), Middle East/North Africa (50%).

Exhibit 5: Source of Annual CF, by Region, 2019-2020 (USD billions)

Region	Domestic	International	Totals
East Asia & Pacific	270	22	292
Western Europe	74	31	105
US/Canada	76	7	83
Latin America/Caribbean	16	19	35
Eastern Europe/Central Asia	17	15	32
South Asia	11	20	31
Sub-Saharan Africa	2	18	20
Middle East/North Africa	8	8	16
Oceana	7	2	9
Transregional	0	9	9
Totals	481	151	632

Source: CPI, 29; and author's estimates.

Thus, the trend is toward domestic sourcing of CF – except for the world's poorest regions or countries. This suggests "the continuing need to strengthen national policies and domestic regulatory frameworks to encourage domestic investments and address risks."[43]

[43] Climate Policy Initiative (CPI), Global Landscape of Climate Finance 2021, 29.

Just over half (USD 321 billion per year) of recent CF has come from public institutions (Exhibit 6). Most of the CF from national development finance institutions (DFIs) was in East Asia, and directed domestically. "Many multilateral DFIs are committing that up to 50% of their financing will be climate-related by 2025."[44] Almost all known CF by State-owned Financial Institutions (SOFIs) in 2019-2020 was directed toward the energy sector.[45]

Exhibit 6: Public CF Sources, Annual Averages 2019-2020 (USD billions)

National (domestic) DFIs	120
Multilateral DFIs	65
SOFIs	45
Governments	38
Bilateral (international) DFIs	35
State-owned enterprises (SOEs)	13
Other	5
Total	321

Source: CPI, 11.

As for the other half of recent CF from private investors (USD 310 billion per year), 79% came from commercial financial institutions or corporations (Exhibit 7). This CF from commercial financial institutions went 75% toward RE – e.g., biomass, solar voltaic cells, on-shore or off-shore wind, hydropower, or concentrating solar power (CSP). Similarly, 75% of this amount from corporations went for RE, with another 20% for transport (mainly electric vehicles) and 5% for other. The amount of corporate CF financing (i.e., from retained earnings or other equity investment) has dropped because banks are becoming more willing and providing increased CF.[46]

Recent "other" private CF includes USD 3.2 billion from institutional investors and USD 5.3 billion from Environmental, Social and Governance (ESG) funds or other institutional funds. Most of these amounts went for RE. These institutions' "share of total private climate finance remains marginal (at 3%) due to several barriers such as low risk appetite, a need for larger project size, and lack of policy incentives."[47]

Exhibit 7: Private CF Sources, Annual Averages 2019-2020 (USD billions)

Corporations	124
Commercial financial institutions	122
Households/Individuals	55
Other	9
Total	310

Source: CPI, 12.

[44] CPI, 11.
[45] Ibid.
[46] Ibid, 12.
[47] Ibid, 13.

Recent CF is mostly for project finance, while concessional debt or grant financing is rare and focused on challenged countries or non-remunerative sectors. For equity and at market-rate debt CF for which breakouts are available, 58% is characterized as project-level (Exhibit 8). This suggests an important role for PPPs, typically where a private-majority-owned project company obtains the debt financing; designs, builds, and operates the infrastructure; and sells the related infrastructure service (e.g., electricity) to a "contracting agent" of its government partner. PPPs have become common in the electricity sector, and increasingly so in RE. Indeed, 75% of recent equity CF and 57% of market-rate debt CF has been for RE.

Exhibit 8: CF Instruments, Annual Averages 2019-2020 (USD billions)

Debt	384	
Market rate	*337*	• 57% for RE • 69% project-funded – of which 75% by public institutions, mostly bilateral and multilateral DFIs • 31% from general corporate funding, mostly for RE, financed 65% from commercial financial institutions and 32% from SOFIs
Concessional	*47*	• Mostly from public DFIs
Equity	206	
Project-level	*51*	• 75% for RE, 13% for transport, and 12% other
General corporate equity	*155*	• 65% from private firms and 35% from households/individuals • 60% for energy, 31% for transport, and 9% for buildings/infrastructure
Grant	36	• 36% domestic, of which 37% for electric vehicles • 56% international, of which 28% for Sub-Saharan Africa and 22% for AFOLU • 8% unknown source
Unknown	6	
Total	632	

Source: CPI, 15-17.

By contrast, concessional debt or grant CF is relatively rare, and focused on challenged countries and/ or non-remunerative sectors. Only about 13% of recent 2019-2020 CF came in the form of concessional debt or grant financing (above, Exhibit 8). Such concessional CF focuses on "more challenging sectors and geographies."[48] For example, of an average of USD 20 billion of international grant funding during 2019-2020, 28% went to Sub-Saharan Africa and 22% for agriculture, forestry, or other land-use (AFOLU) projects.

Concessional CF can be critical to de-risk, leverage, and mobilize additional CF. Multilateral and bilateral DFIs have identified priority areas for concessional CF. These include sustainable forest and ecosystem and bio-diversity management; resilient urban development and infrastructure; low-carbon transportation; energy efficiency; climate risk insurance and financing; disaster risk reduction; and policy support and capacity building. For example, the Asian Development Bank (ADB) committed USD 4.3 billion in 2021 for mitigation (69%) and adaptation (31%), of which about USD 90 million has been earmarked for grants. The UN Green Climate Fund (GCF) disbursed USD 2.1 billion in 2021, including 52% for mitigation and 48% for adaptation, of which USD 882 million was allocated for grants. Of the Euro 5.2 billion committed by French aid agencies in 2020, Euro 260 million were for grants. Similarly, the World Bank Group, European Union, U.K., German aid agencies, and Japan International Cooperation Agency provide grants for mitigation and adaptation (for more details, see Annex).

Incomplete sector data likely understates recent CF for industrial and land-use mitigation projects. Industry and domestic-public CF for these mitigation in these sectors is not tracked (Exhibit 9). Of USD 632 billion per year in recent CF, USD 78 billion was for climate adaptation or other non-mitigation purposes.

[48] Ibid, 17.

Exhibit 9: Average Annual CF, by Source and Sector for 2019-2020 (USD billions)

	Energy	Transport	Buildings/ Infrastructure	Industry	Land use	Adaptation	Other	Total
Private	224	73	10	?	?	1	2	310
International public	56	84	13	9	10	26	33	231
Domestic public	54	16	5	?	?	15	1	91
Total	334	173	28	9	10	42	36	632

Source: CPI, 5; and author's estimates

Thus, of the USD 554 billion CF for mitigation, 60% (USD 334 billion) was for the energy sector. Of this energy total, 97% was for RE, including 88% for solar or wind power (Exhibit 10).

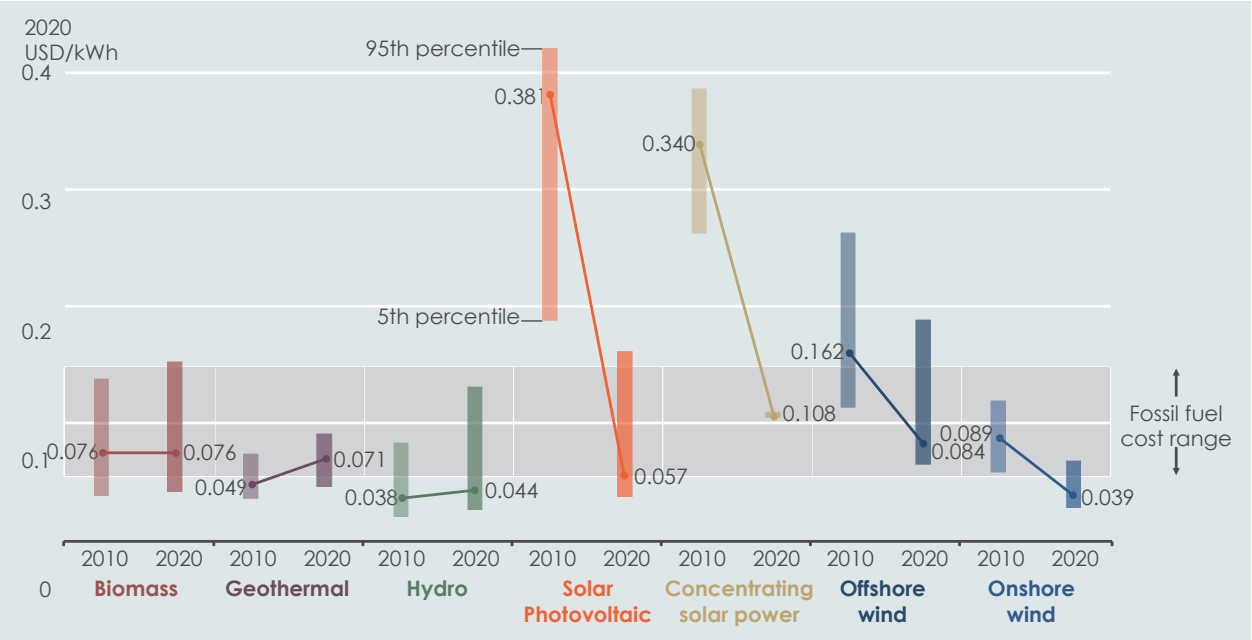
Exhibit 10: Average Annual CF in the Electricity Sector, 2019-2020 (USD billions)

Solar (photo voltaic)	137
On-shore wind	126
Off-shore wind	31
Biomass	8
Hydropower	8
Solar (concentrated)	2
Other	12
RE subtotal	*324*
Transmission and distribution	8
Other	2
Total	334

Source: CPI, 18-19.

Domination of electricity sector CF by the private sector (67%) reflects substantial improvements in the economics of RE. By 2020, the cost per kilowatt-hour (KWH) for biomass, geothermal, hydro, solar, and wind power were all within the per-KWH range for fossil fuel alternatives (Exhibit 11).[49] This makes RE technologies "particularly attractive for private investors, irrespective of public support."[50]

Exhibit 11: Global Levelized Cost of Electricity from Newly Commissioned Utility-Scale RE Generation Technologies vs. Fossil Fuel: 2010 vs. 2020



Source: CPI, 19.

[49] Ibid, 18.
[50] Ibid, 20.

Electricity transmission and distribution seem a likely exception to private dominance of CF for electricity. Developed and developing countries both tend to require substantial upgrades to transmission/ distribution. "As the share of VRE in power systems increases, power system flexibility components (such as smart grids, storage technologies, demand side management, and sector-coupling, among others) will be critical." The natural monopoly nature of electricity transmission/ distribution, however, tends to militate against private equity investment and control. Thus, recently, SOEs and national DFIs accounted for almost 50% of the CF in electricity transmission/ distribution, followed by multilateral DFIs.[51]

Transportation CF, the fastest-growing mitigation sector, is dominated by privately financed household/ business acquisition of EVs. EVs and battery charging stations have recently accounted for almost half of investment in climate-mitigating transportation (Exhibit 12). Only 10% of these investments have been financed via government subsidies. The rest have been financed privately, including 58% by household or business payments and 27% by auto loans from commercial banks. By contrast, investment in rail or public transport has been financed 69% by public entities, including a mix of governments and bilateral/ multilateral DFIs.

Exhibit 12: Annual Transportation CF, 2019-2020

Sub-sector	USD billions	CF source (%)
EVs and battery charging stations	82.5	10 Government incentives
		32 Household down-payments
		26 Corporate fleet additions
		27 Commercial bank auto loans
		5 Other
		100
Rail/public transport	13.4	31 Private investors
		69 public investors:
		25 Bilateral DFIs
		19 Governments
		19 Multilateral DFIs
		37 Other
		100
Other/unspecified	77.2	
Total	173.1	

Source: CPI, 22.

Subsidies for EV purchases pose an issue for governments. This includes questions as to whether to provide subsidies, how much, for how long, and for what types of EVs. Subsidies become fiscally draining as the market expands. Thus, many advanced countries are reducing or eliminating subsidies to encourage EV purchases. For e.g.:

- China "has been phasing out direct-purchase support for EVs since 2018 and plans to fully end its subsidies" in 2023.
- The U.K., "has steadily reduced EV subsidies, which are now down to GBP 1,500 (about USD 2,000) for fully electric vehicles and have been eliminated for plug-in hybrids."
- "Austria has just announced plans to fully end subsidies for passenger EVs this year to shift support toward heavier vehicles."[52]

While incomplete, recent bilateral/ multilateral DFI CF funding for AFOLU mitigation has averaged USD 10 billion. This includes USD 3.4 billion for forestry projects and USD 2.3 for agriculture (e.g., sustainable crops, agro-forestry, and livestock production).

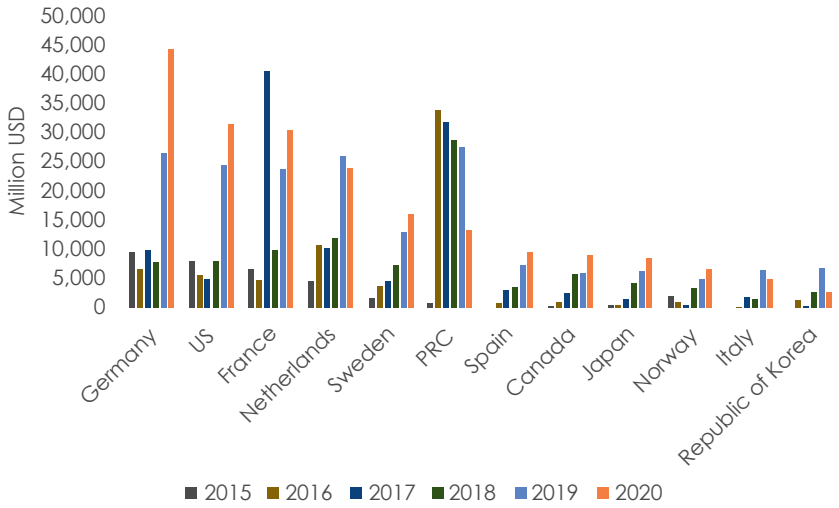
[51] Ibid, 21.

[52] Colin McKerracher, "The U.S. Zigs While the Rest of the World Zags on EV Subsidies," Bloomberg Green, March 8, 2022. https://www.bloomberg.com/news/articles/2022-03-08/carmakers-grapple-with-ending-ev-subsidies-accelerating-sales

2. Green Bonds[53]

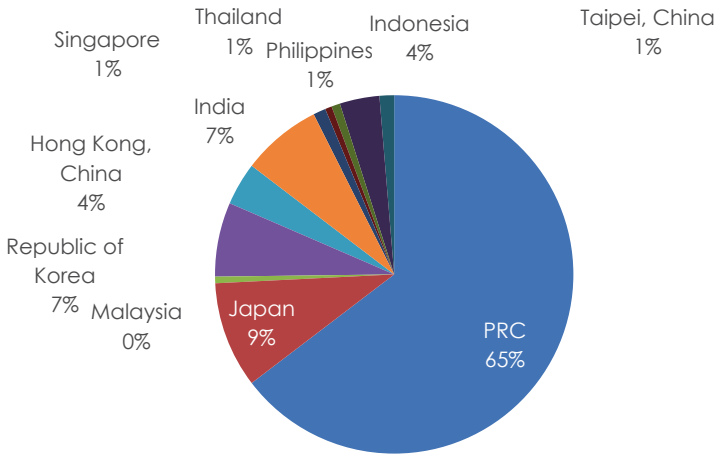
Worldwide, green bond issuance has grown rapidly, increasing perhaps 13 times from its 2013 level to about USD 250 billion in 2020. "The PRC, France, Germany, the Netherlands, and the U.S. are the largest green-bond-issuing nations, followed mainly by the European economies and two Asian economies, specifically Japan and the Republic of Korea (Exhibit 13). In the rest of Asia, India; Indonesia; Hong Kong, China; Malaysia; and Singapore are the regional leaders (Exhibit 14). Given its vast territory and growing population, the Asian region has the potential to accelerate its green bond issuance."[54] The first green bond issuance in Pakistan occurred in 2021.

Exhibit 13: Green Bond Issuance: Selected Countries, 2015-2020



Source: D. Azhgaliyeva and Z. Kapsalyamova, 5.

Exhibit 14: Issuance of Green Bonds in Asia, 2015 – 2020



Source: D. Azhgaliyeva and Z. Kapsalyamova, 6.

[53] A green bond pays interest and is used to fund projects that offer environmental and/ or climate benefits. The issuer should follow defining principles relevant for its jurisdiction, such as the International Capital Market Association's Green Bond Principles.

[54] Dina Azhgaliyeva and Zhanna Kapsalyamova, "Policy Support in Promoting Green Bonds in Asia," Asian Development Bank Working Paper Series. 1275, July 2021, https://www.adb.org/publications/policy-support-promoting-green-bonds-asia (accessed June 20, 2022).

Worldwide, green bonds are mainly issued by governments/ financial institutions and used for energy or buildings mitigation projects (Exhibit 15). Government issuers (at 33%) are presumably providing debt financing for a host of mitigation projects (e.g., electricity, transport) as well as for less-remunerative projects (e.g., water, climate adaptation, waste, land use). Financial institutions (at 33%) are presumably using green bond proceeds to finance a variety of mitigation projects, including green buildings. Green bonds issued by utilities (18% of total) seem likely destined for electricity mitigation projects. Interestingly, it appears that the governments of wealthier countries are turning to bond markets to finance less-remunerative projects (e.g., climate adaptation).

Exhibit 15: Worldwide Green Bonds: By Issuer and Use, 2018-2020 (%)

By issuer		By use	
Governments	33	Energy (e.g., electricity)	38
Financial institutions	33	Green buildings	18
Utilities (e.g., electricity, water)	18	Transport	16
Consumers	5	Water	14
Industrials	4	Climate adaptation	6
Energy (e.g., oil/gas)	2	Waste	6
Other	5	Land use	2
	100		100

Source: D. Azhgaliyeva and Z. Kapsalyamova, 6.

Incentives for green bonds investors and users vary. Socially conscious investors may simply wish to ensure that their investment goes to finance climate mitigation or adaptation. Other investors may seek the tax advantages (e.g., interest income exemption or tax credit) available for green bonds in some jurisdictions.[55] Such tax advantages may lead the green bond issuer to reduce the coupon (interest) rate paid to green bond buyers/ holders. This would reduce the interest expense for a mitigation project and improve its profit prospects. Green bond tax advantages, however, would also represent a tax expenditure (fiscal cost) for the jurisdiction wherein the issuer is domiciled. Thus, legislatures and tax authorities may wish to ensure that the climate mitigation benefits of any green bond issued in their jurisdiction accrue only to their jurisdiction.

Thus, mitigation projects in less developed countries may not be able to access the lower interest rates that might otherwise result from tax-advantaged green bonds issued in more developed countries. Less developed countries may wish to band together to press for access to any tax advantages from green bonds issued in more developed countries. Meanwhile, they can continue to develop their domestic green bond markets, as many Asian countries are doing (Exhibit 14).

Questions have been raised about the green credentials of certain bonds, either the projects financed or the issuer. For example, to avoid accusations of "green washing," the Climate Bonds Initiative refused in May 2017 to list a green bond issued by Spain's Repsol to finance efficiency gains in its oil and gas production.[56] Green bond issues in China have financed "clean coal" projects that "generally do not meet international standards," while a green bond issue by China's Three Gorges Dam has been used to back wind power projects in Europe. For this last-mentioned bond, "the problem lies not in the project itself but with the issuer. The Three Gorges Dam has been criticized for years for water pollution and damage to the surrounding ecosystem."[57]

[55] Troy Segal, "What Is a Green Bond? Investopedia, March 4, 2021, https://www.investopedia.com/terms/g/green-bond.asp.

[56] Andrew Whiley, "An Oil & Gas Bond We Knew Would Come Eventually: Repsol: Good on GBPs, Not So Sure on Green Credentials," Climate Bonds Initiative, May 23, 2017, https://www.climatebonds.net/2017/05/oil-gas-bond-we-knew-would-come-eventually-repsol-good-gbps-not-so-sure-green-credentials

[57] Yusuke Matsuzaki, "Environmental Bonds Stained by 'Green Washing'," Nikkei Asia, March 3, 2018, https://asia.nikkei.com/Business/Markets/Capital-Markets/Environmental-bonds-stained-by-green-washing#:~:text=TOKYO%20%2D%2D%20The%20popularity%20of,%2C%20if%20any%2C%20environmental%20benefit.

Desires for reasonable assurance among bond investors and tax authorities that green bond proceeds are actually going for climate projects has encouraged the development of standards for the definition of green bonds and the use of green bond proceeds. For e.g.:

- The Green Bond Principles ("Principles") of ICMA, which has broad international membership beyond the EU and the U.S., includes four core components:

(1) Use of proceeds: Eligible "Green Projects" categories include renewable energy; energy efficiency; pollution prevention and control; environmentally sustainable management of living natural resources and land use; terrestrial and aquatic biodiversity; clean transportation; sustainable water and wastewater management; climate change adaptation; recycling; or green buildings.

(2) Process for project evaluation and selection: The issuer should disclose "the environmental sustainability objectives" of its Green Projects, "the process by which the issuer determines how the projects fit within the [aforementioned] Green Projects categories, and complementary information. ICMA notes that "there are many institutions that provide independent analysis, advice, and guidance on the quality of different green solutions and environmental practices."[58]

(3) Management of proceeds: "The net proceeds of the green bond, or an amount equal to these net proceeds, should be credited to a sub-account or otherwise tracked by the issuer in a formal internal process linked to the issuer's lending and investment operations for eligible Green Projects." The issuer should provide ongoing visibility for the use of proceeds through the term of a green bond.

(4) Reporting: "The annual report should include a list of the projects to which green bond proceeds have been allocated, as well as a brief description of the projects, the amounts allocated, and their expected impact." For impact, the Principles "recommend the use of qualitative performance indicators and, where feasible, quantitative performance measures and disclosure of the key underlying methodology and/ or assumptions used in the quantitative determination."[59]

- The Principles note that "there are several current international and national initiatives to produce taxonomies and nomenclatures, as well as to provide mapping between them to provide comparability. These may give further guidance to the green bond issuers as to what may be considered green and eligible by investors.[60] For example, to guide investors and policy-makers, a July 2020 EU taxonomy establishes six environmental objectives:

(1) climate change mitigation,
(2) climate change adaptation,
(3) sustainable use and protection of water and marine resources,
(4) transition to a circular economy (e.g., recycling),
(5) pollution prevention and control, and
(6) protection and restoration of biodiversity and ecosystems. The status of nuclear energy is undecided.[61]

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[58] Based on the issuer's disclosures, investors or external validators (e.g., the Climate Bond Initiative) may then determine whether the issuer's bond meets their own definition of a green bond.

[59] International Capital Market Association, "Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds," 4-6, International Capital Market Association, June 2021, https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Green-Bond-Principles-June-2021-140621.pdf (downloaded 27 March 2022).

[60] Principles, 5.

[61] "EU Taxonomy for Sustainable Activities," European Commission, accessed March 27, 2022 https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

B. Conservation Finance[62]

Current estimates of the overall volume of conservation finance range from USD 124 to 143 billion annually, with 80-86% coming from the public sector.[63] The size of this flow relative to CF suggests a broad definition of conservation finance. Main funders likely include multilateral and bilateral financial institutions.

The current volume of private funding is estimated at USD 18 billion per year. Only a portion of this has recently been in the form of return-seeking investments. Companies seeking to increase the environmental sustainability of their business operations seem recently to have been the biggest private investors. Last year's private conservation financing included USD 15.7 billion for "supply chain investments, carbon markets, and payments for ecosystem services." Another USD 2.3 billion came from NGOs and philanthropies (mainly grants).[64]

Last year "saw an increase in the number of major institutional players and asset managers entering the market, demonstrating a growing interest in conservation finance." For e.g.:

- HSBC Pollination Climate Asset Management announcement of a USD 1 billion asset management venture focused on natural capital;
- Launch of Lombard Odier's Natural Capital Strategy in November 2020;
- Sustainable Markets Initiative's Natural Capital Investment Alliance, with HSBC Pollination Capital Asset Management, Lombard Odier, and Mirova Natural Capital as founding members; and
- The Finance for Biodiversity Pledge, in September 2020, by 55 private banks, insurers, asset managers, and pension funds with combined Euro 9 trillion of assets under management.[65]

At present, the conservation finance market is dominated by investors from Asia/ Western Europe, with almost half the investments going to sustainable agriculture:

- Conservation finance is originating mainly in Asia (75%) and Western Europe (22%).
- Investment targets are balanced among Africa (26%), Asia (24%), and Latin America/ Caribbean (22%), with the remainder destined for Oceana (17%), Europe (9%), or North America (3%).
- Investments are focused on sustainable agriculture (49%), forests and terrestrial ecosystems (19%), and oceans and coastal areas (17%).[66]

Return-seeking investments in conservation are increasing. This increase is "driven mostly by greater investor awareness…and an increasing number of professionals with relevant skills across the conservation and finance sectors." Reported asset contributions are overwhelmingly real estate, supplemented with some cash or cash equivalents. The origin of return-seeking investments seems to be about 54% borrowing from private institutions, 34% private equity, and 12% borrowing from public institutions.[67]

Financial flows are highly concentrated. Recently, 99.7% of all reported investments in conservation finance originated from seven countries: Australia, Germany, Netherlands, South Korea, Switzerland, U.K., and U.S.[68]

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[62] Conservation finance is defined as the "protection, care, management, and maintenance of ecosystems, habitats, wildlife species, and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence." International Union for Conservation of Nature, https://www.iucn.org/our-work/protected-areas-and-land-use

[63] Coalition for Private Investment in Conservation (CPIC), Conservation Finance 2021, An Unfolding Opportunity, September 2021, 12.

[64] Ibid.

[65] Ibid.

[66] Based on survey results summarized in CPIC, 4 and 18-22. See also case studies on Smallholder Forestry Vehicle in Kenya, Sustainable Water Impact Fund projects in Chile and Peru, and blended finance solutions for marine conservation and vulnerable coastal fishing communities in eight developing countries.

[67] CPIC, 4.

[68] Ibid.

The growth of conservation finance is now limited by unsuitable deal structures, lack of market data, and challenges in measuring conservation impacts. Deal sizes mostly remain small, with 85% of reported deals being under USD 5 million. "Blended finance accelerators, like the Nature+ Accelerator Fund or Convergence's Asia Natural Capital Design Funding Window, can help stimulate the creation of investable conservation projects." Potential project developers often lack understanding of investors' goals. Difficulties in measuring conservation impacts include the high cost of quantifying impacts (cited by 70% of survey respondents) and the lack of standardized metrics (cited by 48%). These difficulties may vary by sector, with survey respondents perceiving that investments in forests/ terrestrial ecosystems generated more effective environmental impacts – especially compared with sustainable agriculture and oceans/ coastal areas (Exhibit 16).[69]

Exhibit 16: Perceived Effectiveness of Conservation Projects

Type of project	Highly effective	Somewhat effective	Somewhat ineffective
Forests & terrestrial ecosystems	72	22	6
Freshwater management	67	22	11
Sustainable agriculture	41	41	18
Oceans, coastal areas and fisheries	38	50	13

Source: CPIC, 5.

Supply chain conservation investments are expected to increase significantly. A growing number of corporations (e.g., Apple, L'Oreal) have created funds for nature investments. "With bigger financial commitments, broader scopes, and the backing of company-wide biodiversity and climate targets, these funds will contribute significantly to the expected increase in the private capital available for investments in conservation."[70]

But not all conservation finance transactions are small. A notable exception is the recent USD 365 million blue bond ocean conservation debt swap, organized by The Nature Conservancy (TNC) for Belize (Exhibit 17). This is "one of the biggest-ever debt restructurings meant to aid the environment in an agreement that remedies the nation's latest default."

Exhibit 17: Belize's USD 364 Million Blue Bond, November 2021

Based in Arlington VA, TNC has loaned the Government of Belize (GoB) USD 364 million, most of which will be used to buy back GoB bonds. The resulting reduction in GoB's total debt burden will free up USD 4 million per year, which the GoB will allocate for marine protection, "tripling Belize's budget for ocean conservation over the next two decades. As part of the deal, Belize has agreed to protect 30% of its ocean territory."

The buy-back involves a GoB bond due 2034, which had traded at 65 cents on the dollar in March 2020. Covid strictures led to a June default, Belize's fifth in 15 years. The market value of these bonds stabilized at about 40 cents in September 2021.

Transaction structure highlights:

- On behalf of TNC, Credit Suisse Group AG issues a USD 364 million blue bond, purchased by investors.
- TNC lends the resulting bond proceeds to GoB for 19 years at a yield of 6.1%.
- GoB uses about USD 304 million of the TNC loan to buy back USD 553 million of the 2034 GoB bonds at 0.55 of Face Value.
- The resulting reduction in GoB's total debt burden will free up USD 4 million per year for ocean protection.
- TNC will use debt service payments from the GoB to repay its blue bond investors.
- TNC's blue bond is guaranteed by the U.S. International Development Finance Corporation (IDFC).

Source: Bloomberg, November 5, 2021

[69] Ibid, 5.
[70] Ibid.

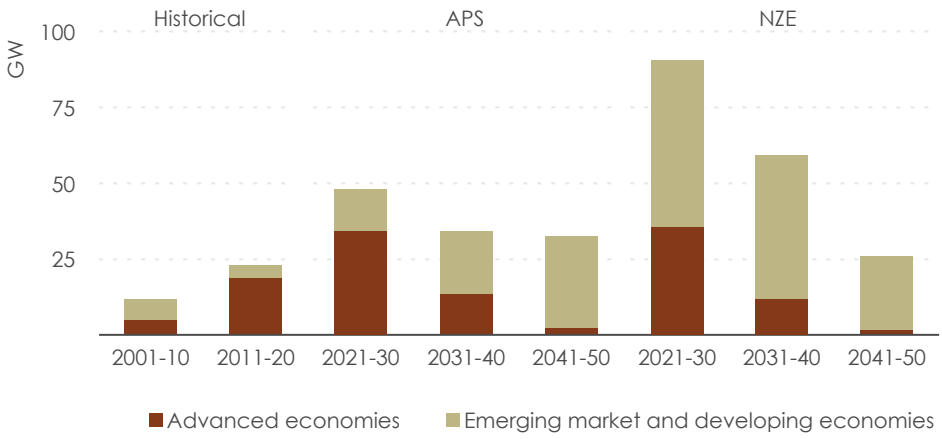
Despite risks and possible complications, such debt swaps may become more common. Both the sponsor (e.g., TNC) and blue bond investors are exposed to default risk. Moreover, "bond buybacks tend to be difficult to execute, and unlike in Belize, many nations have more than just a single foreign bond to negotiate." Nonetheless, TNC has been in talks with at least five other governments for similar marine-linked debt deals." Proponents argue that such debt restructurings "could be the next boom area."[71]

C. Coal Generation De-commissioning

The phase out of coal-fired generation will need to accelerate, even just to achieve announced emission cut pledges. During 2011-2020, worldwide retirements of coal-fired plants averaged about 24,000 MW per year (Exhibit 18). About 80% of these retirements were in advanced economies. This is not surprising, given the higher average age of coal-fired plants in the U.S., Russia, and Europe (30-40 years) versus Southeast Asia, India, and China (10-15 years).[72] To achieve emission cut Announced Pledges (APS), however, the annual rate of coal plant retirements will need to roughly double overall (to almost 50,000 MW per year) during 2021-2030. Retirements in emerging markets and developing economies would need to increase to about 11,000 MW per year. To achieve Net Zero Emissions (NZE), annual retirement rates during 2021-2030 would need to be even higher: to at least 8,000 MW overall, including about 3,500 in emerging markets and developing countries.

Exhibit 18: Announced Average Coal Power Plant Retirements:

Historical vs. Announced Pledges and Zero Net Emissions by 2050 Scenarios



Source: International Energy Association, World Energy Outlook 2021, October 2021, 58.

Despite being "an even more crucial component of climate action," early retirement of coal plans is "a much trickier challenge for public policy. Given the dependence of a number of countries and regions on coal, the closure or repurposing of coal mines and power plants could have significant economic and social consequences. Coal-dependent regions are often highly specialized 'mono-industry' areas, where the economy and the local identity are closely tied to the coal value chain. Managing closures appropriately and successfully depends on planning for the impacts on affected workers and communities, and on the repurposing and reclamation of affected land. This is likely to entail long-term engagement by many different parts of government, as well as local businesses."[73]

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[71] Sydeny. Maki, "Belize Cures USD 553 Million Default with a Plan to Save Its Ocean," Bloomberg, November 5, 2021, https://www.bloomberg.com/news/articles/2021-11-05/belize-cures-553-million-default-with-a-plan-to-save-its-ocean.

[72] International Energy Agency, World Energy Outlook 2021, 59.

[73] Ibid, 58.

D. Clean Development Mechanism (CDM)

The CDM has strong logical appeal. It has allowed richer countries to fund GHG-reducing projects in poorer countries, and then claim the emission savings as part of their own efforts to meet international emissions targets. While it is generally cheaper to undertake mitigation projects inside poorer countries, the resulting emission reductions benefit the global atmosphere and climate. Thus, "the CDM allows industrialized countries to buy CERs and to invest in emission reductions where it is cheapest globally."[74]

The CDM approval process, however, has been complex and sometimes cumbersome. An industrialized country seeking carbon credits from a CDM project "must obtain the consent of the developing country hosting the project and their agreement that the project will contribute to sustainable development. Then, using methodologies approved by the CDM Executive Board (EB)," the industrialized country applying "must make the case that the carbon project would not have happened anyway (establishing additionality), and must establish a baseline estimating the future emissions" without the project. "The case is then validated by a third-party agency, called a Designated Operational Entity (DOE), to ensure the project results in real, measurable, and long-term emission reductions. The EB then decides whether or not to register [approve] the project. If a project is registered and implemented, the EB issues" CER (where 1 CER = 1 ton of CO2-e) "to project participants based on the monitored difference between the baseline and the actual emissions, verified by the DOE."[75] These CERs may then be traded on international carbon trading markets, such as the EU-ETS.

The CDM has, however, faced significant implementation challenges. For e.g.:

- Additionality: Without additionality, the CDM becomes simply an income transfer to developing country "free riders." Additionality from investments in new energy projects is, however, difficult to prove, and its verification can impose delays and large transaction costs.[76]

- Risk of fraud: "The most common practices are covering up the fact that the projects are financially viable by themselves and that the emission reductions acquired through the CDM-project aren't additional. Exaggerating the carbon benefits is also a common practice….Sometimes a company even produces more [emissions] to receive more CERs."[77] One study calculated that almost all CDM hydropower projects were under construction and over one-third were already completed at the time of CDM registration.[78]

- Perverse incentives: The CDM rewards emission reductions, but does not penalize emission increases. This can create perverse incentives for firms to raise their emissions in the short term in the hope of obtaining credits for emission reductions over the long term.[79]

- CDM governance and conflicts: Some have suggested that the EB is "a highly politicized body," staffed not by "independent technocrats" but by "representatives of their respective countries," leaving them vulnerable to pressure and the potential to favor "political-economical over technical or scientific considerations." In addition, "the verification of a project is often

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[74] Michael Grubb, "The Economics of the Kyoto Protocol," World Economics, July-September 2003.

[75] "Clean Development Mechanism," Wikimedia Foundation, June 19, 2022, 3:59 https://en.wikipedia.org/wiki/Clean_Development_Mechanism.

[76] Jean-Marc Burniaux, Jean Chateau, Rob Dellin, Romain Duval, and Stephanie Jamet, "The Economics of Climate Change Mitigation: How to Build the Necessary Global Action in a Cost-Effective Manner," OECD Economics Department Working Paper 701, June 2009, 40; Michael Gillenwater, "What is Additonality? Part 1: A Long Standing Problem," Greenhouse Gas Management Institute Discussion Paper 1, January 2012.

[77] Clean Development Mechanism," Wikimedia Foundation, June 19, 2022, 3:59 https://en.wikipedia.org/wiki/Clean_Development_Mechanism.

[78] Barbara Haya, "Failed Mechanism: How the CDM is Subsidizing Hydro Developers and Harming the Kyoto Protocol," International Rivers, November 2007, https://archive.internationalrivers.org/sites/default/files/attached-files/failed_mechanism_3.pdf.

[79] Burniaux, et al, 41.

outsourced to companies that also deliver services…to the enterprises setting up these same projects. In this way, the verifiers have serious incentives to deliver a positive report to the EB."[80]

- Reduced growth in investors' home jurisdiction: Investment by rich-country investors in mitigation projects in poorer (and cheaper) countries instead of at home would tend to reduce growth in the home jurisdiction. For example, one analysis estimated that full use of the CDM (developing countries) and JI (Eastern Europe/Central Asia) would reduce OECD Europe GDP by 0.2 to 0.7 percentage points.[81]

- Lower participation by developing countries: Several CDM decisions have had a disproportionately negative impact and resulted in lower participation by developing countries:
- **(i)** Carbon baseline calculations for developing countries have been low, making it difficult to show additionality.
- **(ii)** Forestry projects, agriculture, and other carbon sinks have been excluded.
- **(iii)** High transaction costs and CDM processing requirements have been more burdensome for poorer than for richer countries.[82]

- Hydropower projects: Hydropower projects larger than 20 MW must document that they follow the World Commission on Dams or similar guidelines for associated CERs totrade on the EU ETS.[83]

- Forestry projects and carbon sinks: Forest conservation and avoided deforestation were excluded from the first commitment of the Kyoto Protocol. "There is so far no international agreement about whether projects avoiding deforestation or conserving forests should be initiated through separate policies and measures or stimulated through the carbon market."[84] To some extent this reflects the uncertain contribution from forests. "Forests will generally add small amounts of carbon on an annual net basis over time. Growth through photosynthesis will sequester carbon dioxide, but harvesting, death and decay, fire or deforestation will partially counteract that and emit carbon dioxide."[85]

- High transaction costs: A limited survey suggests that about 30% of the money spent on buying CERs in the open market goes to market intermediaries, in part as compensation for the risk of a project not delivering.[86]

CDM registration proceeded slowly, peaked in 2013, and collapsed thereafter, with almost all CERs going to just a few countries. Registries numbered less than 100 per month until 2011 (Exhibit 19). After a huge peak in 2012, at the end of the Kyoto commitment period, CDM registrations basically stopped. By 14 September 2012, 4,626 projects had been registered by the CDM EB and the board had issued 1 billion CERs: 60% to China, 15% India, 9% South Korea, 7% Brazil, 2% Mexico, and 5% other. Pakistan registered just 18 RE projects for almost 1.4 million CERs annually (Exhibit 20).

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[80] Michael W. Wara and David G. Victor, "A Realistic Policy on International Carbon Offsets," Stanford University, Program on Energy and Sustainable Development, Working Paper 74, (April 2008), https://law.stanford.edu/wp-content/uploads/sites/default/files/publication/258646/doc/slspublic/Wara%20Victor%20Realistic%20Policy.pdf ; Florens Flues, Axel Michaelowa, and Katharina Michaelowa, "UN Approval of Greenhouse Gas Emission Reduction Projects in Developing Countries: The Political Economy of the CDM Executive Board," University of Zurich and Center for International and Comparative Studies, 2008, https://www.peio.me/wp-content/uploads/2014/04/Conf1_Flues.Dreher.Michaelowa_UN.GHG_.Reduction.pdf ; summarized in https://en.wikipedia.org/wiki/Clean_Development_Mechanism.

[81] Intergovernmental Panel on Climate Change (IPCC), Climate Change 2001 – Synthesis Report, 2001.

[82] World Bank, 10 Years of Experience in Carbon Finance: Insights from Working with the Kyoto Mechanisms, 2010.

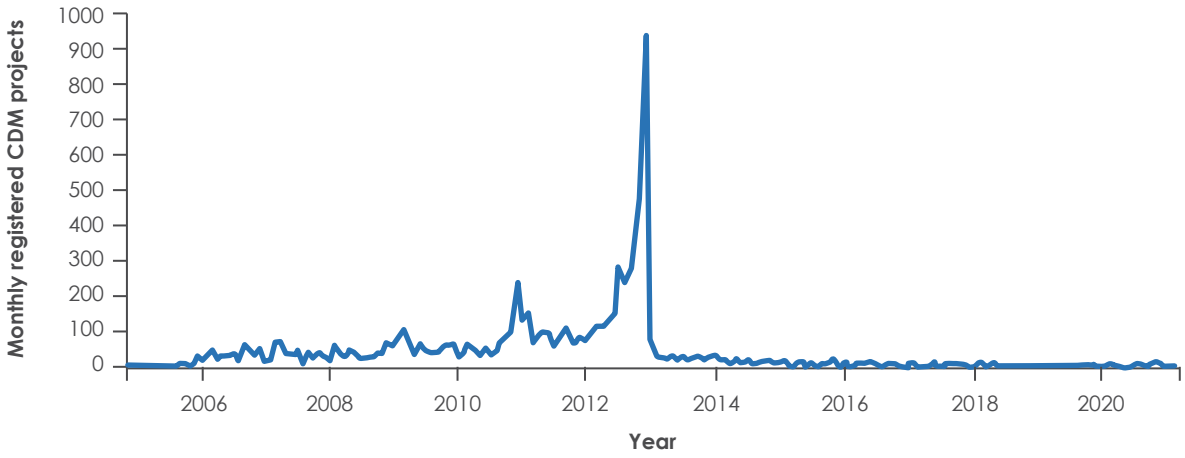
[83] Lawrence Haas, Jamie Skinner, and Marek Soans, "Hydropower Sustainability Assessments Can Unlock Carbon Financing," International Institute for Environment and Development (IIED), November 2015, https://pubs.iied.org/sites/default/files/pdfs/migrate/17330IIED.pdf?

[84] "Clean Development Mechanism," Wikimedia Foundation, June 19, 2022, 3:59 https://en.wikipedia.org/wiki/Clean_Development_Mechanism.

[85] Dean Takahashi, Executive Director, Carbon Containment Lab, School of the Environment, Yale University, personal correspondence with the author, 28 March 2022.

[86] Damian Kahya, "30% of Carbon Offsets Spent on Reducing Emissions," BBC News, December 7, 2009, http://news.bbc.co.uk/2/hi/business/8399740.stm.

Exhibit 19: Monthly Registrations of CDM Projects, 2005-2021



Source: UNFCCC exhibit in https://en.wikipedia.org/wiki/Clean_Development_Mechanism.

Exhibit 20: Pakistan's Registered CDM Projects

RE type	# Projects	Capacity (MW)	Approved annual CERs
Wind	8	406	709,287
Biomass	8	190	550,000
Small hydro	1	15	76,000
Solar	1	50	33,000
Totals	18	661	1,368,287

Source: https://www.aedb.org/ae-technologies/carbon-credit/clean-development-mechanism-cdm, accessed 31 March 2022.

By 2010, the World Bank anticipated that CDM revenues could exceed concessional aid flows. "Between 2001, the first year CDM projects could be registered, and 2012, the end of the Kyoto commitment period, the CDM is expected to produce some 1.5 billion tons of [CO_2-e] emission reductions." This could raise USD 15 to 24 billion in direct carbon revenues for developing countries, "depending on the price of carbon." By contrast, "official development assistance for the mitigation was about USD 19 billion over 2002-07."[87]

Ongoing CER sales revenue depends on carbon prices, however, which can be highly volatile. Most of the demand for CERs comes from the EU-ETS, the world's largest carbon market. CER prices dropped to a record low of Euro 2.67 (USD 3.30) in July 2012 (about 40% of the EUA spot price), tracking a 75% drop in EU Allowances (EUA), from Euro 28.09 in June 2008 to Euro 7.16 in July 2012.[88] Factors hurting EUA prices included "a massive overhang" of surplus EUAs issued by the EU authorities and flagging demand for carbon permits due to an economic slowdown in Europe.[89] In September 2012, The Economist characterized the CDM as "a complete disaster in the making" and "in need of radical overhaul."[90]

[87] World Bank, World Development Report 2010: Development and Climate Change, 2010.

[88] "EU Carbon Permits," https://tradingeconomics.com/commodity/carbon.

[89] It was estimated the over-supply of EUAs to EU-ETS countries exceeded 1 billion EUS, an oversupply that was expected to last at least through 2020. Reuters Staff, "Update 1-UN Carbon Credits Fall to New Record Low," Reuters, July 30, 2012, https://www.reuters.com/article/carbon-market-idUSL6E8IU8Q820120730

[90] "Carbon Markets: Complete Disaster in the Making," The Economist, September 15, 2012, https://www.economist.com/finance-and-economics/2012/09/15/complete-disaster-in-the-making

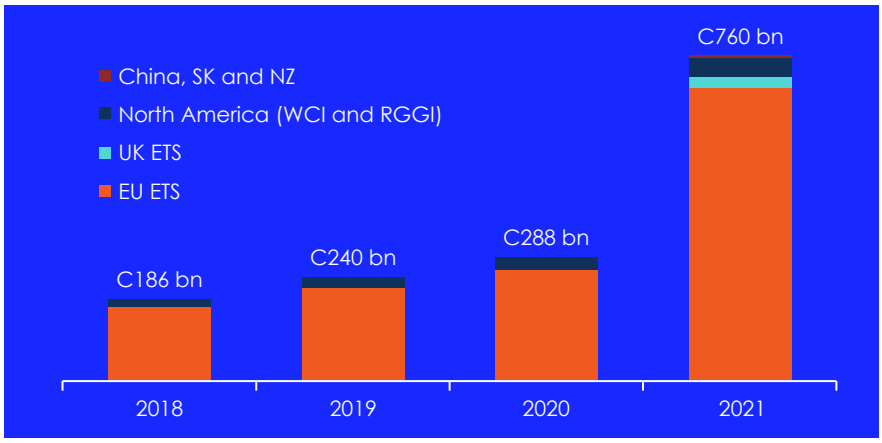
Future CERs from registered CDM projects can be traded on a forward basis at a discount, which can vary widely. "The price depends on the distribution of risk between the seller and buyer. The seller could get a very good price if it agrees to bear the risk that the project's baseline and monitoring methodology is rejected; that the host country rejects the project; that the CDM EB rejects the project; that the project for some reason produces fewer credits than planned; or that the international transaction log (the technical infrastructure ensuring international transfer of carbon credits) is not in place by then. The seller can usually only take these risks if the counterparty is deemed very reliable, as rated by international rating agencies."[91]

Despite the CDM's past travails, the 2015 Paris Agreement extended authorization for a mechanism to allow the cross-border trading of carbon credits from mitigation projects. "The use of internationally transferred mitigation outcomes to achieve NDCs under this Agreement shall be voluntary and authorized by participating Parties" (6.3). "A mechanism to contribute to the mitigation of GHG emissions and support sustainable development is hereby established…It shall be supervised by a body designated by the Conference of the Parties" (6.4).[92] Hopefully lessons learned from CDM's past implementation can be applied to realize more of the logical potential for reducing GHGs through cost-effective investments in developing countries.

E. Carbon Trading

The worldwide carbon market is hot. Global trading volume increased an average of almost 25% in 2019 and 2020, followed by a 164% increase to Euro 760 billion (USD 851 billion) in 2021 (Exhibit 21). The EU-ETS accounted for about 90% of 2021 trading. Meanwhile, prices for EUAs have risen 16-fold, from Euro 4.87 on 5 April 2017 to Euro 76.99 at end-March 2022 (Exhibit 22). Explanations include expectations of tighter carbon caps resulting in increased demand for permits; likely increased coal usage due to higher natural gas prices and the Ukraine conflict; and the Paris Agreement on using out-of-area GHG cuts to count toward emission caps. The European Commission's "Fit for 55" proposal would reduce GHG emissions by at least 55% below 1990 levels, rather than the 40% previously envisioned.[93]

Exhibit 21: Global Volume of Carbon Trading, 2018-2021 (Euro billions)



Source: Refinitiv.

[91] "Clean Development Mechanism," Wikimedia Foundation, June 19, 2022, 3:59 https://en.wikipedia.org/wiki/Clean_Development_Mechanism.

[92] United Nations, Paris Agreement, 2015, https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

[93] Anders Nordeng, "Carbon Trading: Exponential Growth on Record High," Refinitiv, February 18, 2022, https://www.refinitiv.com/perspectives/market-insights/carbon-trading-exponential-growth-on-record-high/.

Exhibit 22: EU-ETS EUA Prices (Euros)

Source: https://tradingeconomics.com/commodity/carbon

III. Implications

Recent CF developments have major implications for Pakistan, as discussed below. Despite Pakistan's emissions/income profile, a global scarcity means that concessional CF is likely to be limited to non-remunerative mitigation projects, adaptation projects, or side costs (e.g., safety nets for laid-off fuel sector workers) for remunerative RE projects. Hence, achievement of its CO_2-e reduction targets will require Pakistan to attract substantial quantities of private CF, especially for RE-based mitigation projects. Hence, it will likely be important for Pakistan to improve its framework for public-private partnerships, encourage more domestic issuance of green bonds, reduce investor perceptions of country risk, pursue nature-based bonds, including for the TBTTP and agricultural projects, and work with potential investors to use cross-border carbon-trading provisions in the Paris Agreement to de-commission coal plants, as discussed below.

A. Prospects for Concessional CF

Pakistan's prospects for attracting concessional CF for mitigation appear mixed. On the one hand, Pakistan emits enough GHG to be a problem and is relatively poor. But the great majority of Pakistan's planned mitigation spending is for RE, for which non-concessional market-based financing has become the norm.

Of 41 "middle-tier emitters," Pakistan ranks at the bottom in terms of GDP (Exhibit 23). This group ranges from South Korea (ranked 7th in 2018, at 631 $MtCO^2$) to Turkmenistan (48th in 2018, at 72 $MtCO^2$). Logic suggests that the larger top-tier emitters should draw the largest share (e.g., 62%, or more) of mitigation-oriented CF, while the bottom-tier emitters may not pose enough climate risk to warrant any of the world's scarce supply of mitigation CF – neither concessional nor market-based. Thus, the poorest of the world's middle-tier emitters (e.g., Pakistan, Uzbekistan, Bangladesh, Nigeria, Iran) may be able to attract the bulk concessional mitigation-oriented CF based on their threat to the climate and their relative poverty.

Exhibit 23: Middle-Tier CO_2 Emitters, Ranked by GDP per capita
(GDPPC in USD)

	2018 $MtCO_2$	2020 GDPPC		2018 $MtCO_2$	2020 GDPPC
Netherlands	151	52,397	Argentina	177	8,579
Australia	387	51,693	Turkey	413	8,536
Qatar	90	50,124	Mexico	472	8,329
Belgium	93	45,159	Turkmenistan	72	7,612
Canada	574	43,295	Thailand	258	7,187
U.K.	359	41,059	Brazil	428	6,797
France	310	39,030	South Africa	433	5,656
UAE	200	36,285	Colombia	79	5,335
Italy	325	31,714	Iraq	188	4,146
Korea	631	31,632	Indonesia	583	3,870
Spain	258	27,063	Ukraine	185	3,725
Kuwait	89	24,812	Egypt	246	3,569
Czech R.	102	22,931	Algeria	152	3,307
KSA	515	20,110	Philippines	142	3,299
Venezuela	138	16,055	Vietnam	258	2,786
Poland	313	15,721	Iran	630	2,423
Oman	73	14,485	Nigeria	131	2,097
Chile	87	13,232	Bangladesh	83	1,962
Romania	75	12,896	Uzbekistan	112	1,751
Malaysia	240	10,412	**Pakistan**	**208**	**1,189**
Kazakhstan	220	9,122			

Source: http://data.worldbank.org.

Prospects for concessional mitigation CF are clouded, however, by the "bankability" of the RE energy projects emphasized by GoP. Per-KWH costs for hydro, wind, solar, or biomass power have decreased to the cost-range for fossil fuels.[94] Thus, it should be possible for new RE projects to achieve full cost-recovery and provide an adequate risk-adjusted return for equity investors and lenders.

B. Public-Private Partnerships

Moreover, Pakistan has extensive and successful experience with private participation in infrastructure (PPI), especially in the electricity sector. Since 1990, 118 PPI projects involving USD 33.2 billion of investment have reached financial closure in Pakistan (Exhibit 24). The great majority of activity – 102 projects for USD 29 billion of investment – have been in the electricity sector. Investment in these electricity projects have averaged USD 284 million. Only one project, representing 0.5% of country investment, has been cancelled. Some of Pakistan's electricity PPI projects involved divestiture (i.e., privatization) or development of electricity transmission/ distribution.

Exhibit 24: Pakistan: Private Participation in Infrastructure Projects by Sector, 1990-2021

Sector	# Projects Reaching Financial Closure	Investment (USD millions)	Average investment (USD millions)
Electricity	102	28,992	284
Seaports	9	2,755	306
ICT	3	1,358	453
Airports	1	40	40
Waste treatment/disposal	2	30	15
Natural gas	2	30	15
Total/average	118	33,226	282

Source: https://ppi.worldbank.org/en/snapshots/country/pakistan

Pakistan's 76 electricity generation PPPs have emphasized fossil fuels. RE projects (i.e., 47 biomass, hydro, nuclear, solar, waste, or wind projects) account for only 34% of added capacity and 48% of investment (Exhibit 25). The rest comes from 29 coal, diesel, natural gas, or oil-fueled electricity generation PPPs. Of the 8 coal-fired plants, 5 have achieved financial closure since 2015.

Exhibit 25: Overview of 76 Electricity Generation PPPs, 1997-2021

Technology	# Projects	Known contract type(s)[1]	Contract terms (years)	Total capacity (MW)	Total investment (USD millions)	Average capacity (MW)	Average investment (USD millions)
Biomass	4	BOO	3	99	334	25	84
Coal	8	BOT, BOO, BLT	25-30	4,905	7,059	613	882
Diesel	11	BOO	3-25	1,901	1,251	173	114
Hydropower	6	BOT, BOO	25-30	1,941	4,663	324	777
Natural gas	8	BOO, rental	3-30	1,642	1,537	205	192
Nuclear	1	BOT	20	330	559	330	559
Oil	2	BOO	25	400	439	200	220
Solar PV	5	BOT, BOO	25	462	414	92	83
Waste co-gen	1	BOO	10	27	8	27	8
Wind	30	BOO, BOT	10-25	1,715	3,344[2]	57	111
Total/average	76			13,422	19,608	177	258

Sources: https://ppi.worldbank.org/en/customquery ; https://www.nishat.net/businesses/power-generation ; and author's estimate for 1 wind farm.

[1] Contract types listed by frequency. BOO = build-own-operate; BOT = build-operate-transfer; BLT = build-lease-transfer.
[2] Assumes consistent investment outlay for one 150 MW plant.

[94] See Exhibit 11.

Thus, to hedge against the unavailability of concessional CF for RE, the GoP may wish to improve Pakistan's attractiveness to potential RE investors. This could involve improvements in both Pakistan's framework for PPP projects and country risk profile.

Pakistan scores well in its PPP framework, but improvements seem possible. Pakistan's overall PPP rating exceeds the average for South Asia and is about on par with the average for high-income countries (Exhibit 26). Larger emitters – such as China, the U.S., South Korea, Australia, or the U.K. – may seem more attractive to RE investors, however, both because of their emission magnitudes and some advantages in their PPP frameworks.

Exhibit 26: Ratings for Key Aspects of PPP, Selected Countries (0-100)

	Pakistan	High income	South Asia	Slovakia	U.K.	Australia	U.S.	China	Korea
Preparation	55	50	45	**82**	**82**	**87**	61	54	61
Procurement	74	73	59	**95**	**77**	71	63	**80**	59
Contract management	74	64	62	77	85	**87**	58	**81**	70
Unsolicited proposals	42	63	54	NA	NA	**67**	**100**	50	**75**
Average	61	63	55	85	81	78	71	66	66

Source, World Bank and Australia Aid, Benchmarking Infrastructure Development 2020.

The GoP may wish to exchange information with countries that seem to excel in particular aspects of PPPs. For e.g.:

- Project preparation – Australia, UK, or Slovakia;
- Procurement (including selection of PPP equity sponsors) – Slovakia or China;
- Contract management – Australia or China; and
- Treatment of unsolicited proposals – the US, Korea, or Australia.

C. Green Bonds

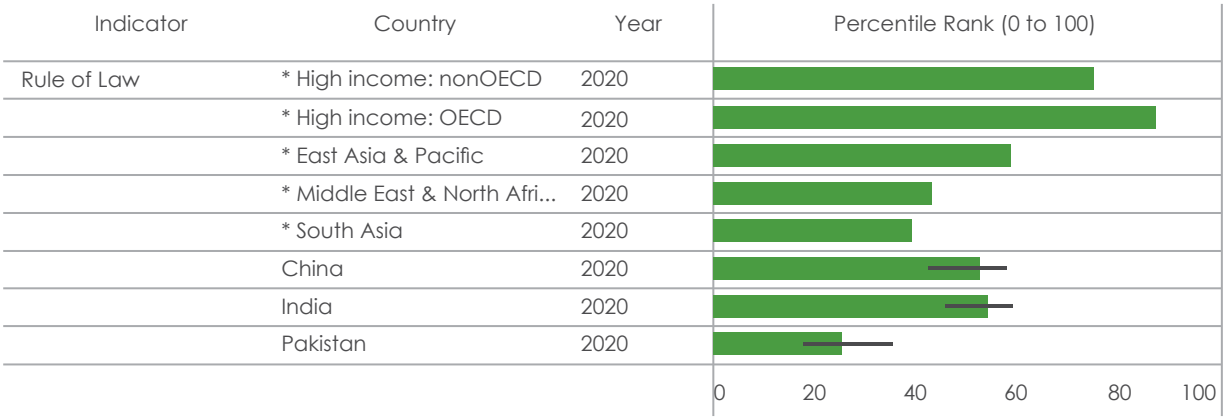
The GoP may wish to review and perhaps reduce the requirements it places on green bond sponsors and their regulators. As noted earlier, disclosures required by the SECP Green Bond Guidelines – which seemingly must be reviewed and approved by the SECP – go beyond those of the ICMA. Consistent with its overall approach to securities regulation, the SECP may wish to bring green bond disclosures into line with ICMA requirements and ensure simply that required disclosures are included in each green bond prospectus, leaving it then to potential investors to make their own assessments about a bond's "greenness."

D. Country Risk

To raise Pakistan's attractiveness to potential foreign PPP sponsors, GoP could work to improve Pakistan's country risk rating, especially regarding "rule of law." A host country's country risk rating can affect the overall credit rating for a PPP project company, and hence the cost of its debt and therefore the rate at which it can profitably sell an "infrastructure service" (e.g., electricity) within the host country. "'In emerging markets especially, the operating environment can result in a lower rating profile by one to two notches, depending on the level of challenge posed by that environment'. Thus, for example, a higher risk country environment could reduce a corporation's credit rating from BBB (investment grade) to BB+ (below investment grade." Rating agencies assess multiple factors. For example, Fitch assesses economic factors that might cause a sovereign default, financial factors that might presage a banking or capital market crisis, and governance factors. Half of Fitch's governance sub-assessment "reflects a 'rule of law' sub-sub-assessment, which measures perceptions of the extent to which economic agents can have confidence in contract enforcement, property

rights, and physical security."[95] For rule of law, Pakistan currently ranks at about the 25th percentile from the bottom (Exhibit 27), well below the averages for South Asia and other regions or the country ratings for such key competitors for mitigation CF as India and China.

Exhibit 27: Rule of Law Rank: Selected Regions & Countries, 2020



Source: http://info.worldbank.org/governance/wgi/Home/Reports.

E. Conservation Finance

Nature conservation projects, such as the TBTTP, could potentially be financed via a debt swap. This seems a more promising route than carbon credits/ trading, given previously mentioned concerns about the reliability and sustainability of carbon sinks. Thus, for example, a debt swap for the USD 500 million of GoP bonds due April 2051 could potentially fund 5.74 billion trees over the next twenty-eight years (Exhibit 28).

Exhibit 28: Hypothetical Debt-for-Nature Swap

Between 1 July 2019 and 31 March 2021, 814,671,000 trees were planted at a total cost of PKR 14,670,654,000,[1] – i.e., PKR 18 per tree, or USD 0.0976 per tree at the 1 April 2022 exchange rate.[2]

Assume 2 billion trees have been planted, leaving an additional 8 billion to be planted.

In April 2021, the GoP issued USD 500 million of 30-year bonds, due in April 2051, with an annual coupon of 8.875%.[3] Thus, annual interest payments total USD 44.375 million. Current bids for these April 2051 bonds are at 0.69459 of Face Value.[4]

Pakistan now has a B- Standard & Poor's rating,[5] as did the Government of Belize (GoB) in November 2021,[6] when it borrowed USD 364 million from The Nature Conservancy (TNC) for 19 years at a rate of 6.1%. Repayment by the GoB to TNC was guaranteed by the U.S. Development Finance Corporation (DFC).

Allowing for an increase in interest rates since then and longer maturity, assume that the GoP borrows USD 375 million in April 2023 at 6.5% annual interest (i.e., USD 24,375,000 a year) for 28 years, until April 2051. Assume then that the GoP uses the USD 375 million in bond proceeds to redeem the outstanding April 2051 GoP bond at 0.7 of Face Value.

If the GoP amortizes the new bond over 28 years, it would save USD 14,955,105 per year (= USD 44,375,000 old bond interest – USD 29,419,895 amortization of new bond).

If, instead, the GoP plans to roll over the new bond in April 2051, in which case it would not need to amortize bond principal, it would save USD 20,000,000 per year (= USD 44,375,000 old bond interest - USD 24,375,000 new bond interest).

Over 28 years, at the current cost/tree, these debt service savings could finance the planting of 4.29 billion or 5.74 billion trees.

[1] Government of Pakistan, Finance Division, Pakistan Economic Survey 2020-21, 322-323.
[2] https://www.xe.com/currencyconverter/convert/?Amount=1&From=USD&To=PKR, accessed 1 April 2022.
[3] Pakistan Economic Survey, 196.
[4] https://bondevalue.com/webapp/home, accessed 1 April 2022.
[5] http://www.worldgovernmentbonds.com/, accessed 1 April 2022.
[6] https://www.theglobaleconomy.com/Belize/credit_rating/, accessed 1 April 2022.

[95] William P. Mako, The Bankable SOE: Commercial Financing for State-Owned Enterprises, Asian Development Bank, September 2021, 17-19. Cites Fitch, Corporate Rating Criteria, 2020, 3.

F. De-commissioning of Coal-Fired Generation

Improved arrangements for cross-border mitigation/carbon-trading, under the Paris Accord, seem an ideal way to finance the de-commissioning of heavily polluting coal-fired electricity generation. Old Kyoto-era questions about additionality and ongoing contributions should quickly fade away. Who would de-commission a new coal-fired plant without some sort of concessional financing? As for the ongoing emission reductions, it should be simple enough to measure annual emissions from a plant that is currently operating and – reasonably enough – to assume that these annual savings would continue for however many years remains in the expected life of the plant or the term of a PPP contract. Given reasonable assumptions about expected investor returns, plant utilization and emissions, de-commissioning costs, and the future value of carbon credits, it should be possible to borrow enough from multilateral DFIs to (i) buy out the investors for a large coal-fired plant and pay de-commissioning costs, and (ii) rely on the revenue from future carbon credits to amortize this DFI borrowing (Exhibit 29).

Exhibit 29: Hypothetical Coal-Generation De-commissioning

Assumptions: (i) A 1,320 MW coal-fired electricity generation plant achieved financial close in 2020. (ii) This is a B-O-T PPP, with a 25-year term. (iii) The equity sponsor invested USD 478 million, on which it expects a 15% return from the time the plant begins operating. (iv) Banks have loaned a combined USD 1,434 million at annual interest of 5%, with principal payable at the end of the PPP contract term. (v) After 1 year of construction, the plant began operating in April 2021, and is expected to operate for 24 years until April 2045. (vi) Utilization will average 50% of capacity.[1] (vii) The plant will emit 0.99 metric tons of CO2 per MWH.[2] (viii) Under the Paris Agreement, the price of carbon credits for mitigation projects in developing under will be USD 68 per ton of CO[3]. (ix) The cost to de-commission a coal-fired plant, net of scrap value, is USD 134,000 per MW.[4] (ix) The goal is to achieve financial close in April 2023 to finance the de-commissioning of this plant.

Thus, (i) The plant was expected to operate 24 years, from April 2021 until April 2035. (ii) Over this period, to achieve a 15% equity return, the equity investor expected annual net income of USD 73,946,314. In April 2023, the Present Value of the remaining 22 years of expected net income will equal USD 468,292,073. (iii) Debt of USD 1,434,000 will remain outstanding in April 2023. (iv) It will cost USD 176,880,000 (= USD 134,000/MW x 1,320 MWs) to de-commission this plant. (v) Total amount needed in April 2023 to pay off investors and fund de-commissioning is USD 1,902,293,314 (= 468,292,703 + 1,434,000 + 176,880,000). (vi) Shutting down the plant will reduce CO2 emissions by 5,723,784 tons per year. (vii) The resulting 22 years of 5,723,784 Paris Agreement Emission Credits (PAECs?) can be sold each year on the EU-ETS.

If the GoP can borrow USD 1.9 billion from a consortium of multilateral lenders (e.g., the European Investment Bank, Asian Development Bank, and World Bank) at 5% annual interest, annual interest payments and amortization of principal (over a 22-year period) would equal USD 144,343,966. Thus, assuming that PAEC's remain at 40% of the value of EUAs, any EUA price in excess of Euro 63.05 would suffice to pay off the USD 1.9 billion debt. Except for a short drop at the beginning of Russia's invasion of Ukraine, EUA prices have remained above Euro 63.05 since 5 November 2021.

Source: Author's estimates based on the following:
[1] U.S. Energy Information Administration, "Annual U.S. Coal-Fired Electricity Generation Will Increase," 10/18/21.
[2] U.S. Environmental Protection Agency, "Greenhouse Bas Reporting Program: Power Plants," September 2019.
[3] https://tradingeconomics.com/commodity/carbon, and author's assumptions based on past CRE/EUA ratio.
[4] Daniel Rami, Decommissioning U.S. Power Plants, Resources for the Future, October 2017, 3.

Any such borrowing would need to be accompanied by additional risk mitigation measures. For example, a consortium of multilateral/ bilateral risk guarantee agencies could guarantee against a demise of the Paris Agreement mechanism for cross-border mitigation/ carbon credits or carbon trading markets. In addition, there would likely need to be some hedging of carbon credit prices – e.g., perhaps by selling call options and buying put options on EUA spot prices.

G. Ameliorating the burning of rice stubble

Globally, agriculture contributes 13 percent of GHG's, a much higher 42 percent in Pakistan. Burning of crop stubble contributes a small share of this. However, addressing crop stubble burning has the twin benefits of reducing global carbon emissions as well as improving immediate local health outcomes. Success with abatement of stubble burning will have great visual impact and this and the associated immediate health benefits will facilitate implementation for the more complex and expensive climate change initiatives such as reducing transport and construction related pollution. It will also help with accessing climate finance both locally and as well as globally by clearly demonstrating the ability to improve compliance with pollution abatement regulation and improving socially desirable health outcomes. (The principals of a potential debt swap /roll over are given in Exhibit 30 - the financials can be worked out).

For three weeks straddling October and November, Punjab farmers (in Pakistan and India) resort to stubble burning of the harvested rice crop to prepare the fields for wheat sowing. In the past, rice was harvested by human labor which would remove the stubble but due to rising wages farmers increasingly use harvesters that results in greater crop residue, or stubble. The cheapest way to get rid of it in time for sowing wheat is to burn it.

As a consequence of crop burning (but also low-grade fuel, industrial emissions and dust particles), many Punjab cities experience a sharp deterioration in air quality. Lahore, with a population of more than 10 million people, now ranks among the most polluted cities in the world while Pakistan came third in the list of the most polluted countries in 2021.[96]

PM2.5 constitutes the most egregious pollutant. These are tiny particles—smaller than tenth the diameter of a hair strand—which easily enter the bloodstream when inhaled. Looking at all the Pakistani cities where air quality is formally measured, the annual average PM2.5 levels in 2021 exceeded the WHO standard by a considerable margin. Lahore's daily PM2.5 levels went up to almost 13 times the local standard while its annual average levels stood at almost 10 times the WHO standard. In winter, biomass burning contributed to 17 per cent PM10 and 26 per cent PM2.5.

As stated in Singh, Siddharth, "The Great Smog of India",[97] "the burning of one tonne of rice crop residue releases about 13 kg of particulate matter, 60 kg CO, 1460 kg CO2, 3.5 kg NOx and 0.2 kg SO2.5. One study from Harvard University's Atmospheric Chemistry Modeling Group using satellite data collected between 2012 and 2016 estimated that nearly half of Delhi's air pollution in this season is due to crop burning".

Exposure to such dangerously high levels of pollution carries significant health and non-health impacts. The evidence on the detrimental impact of poor air quality on health and other human capital outcomes in Pakistan is scarce. The Air Quality Life Index—developed by the Energy Policy Institute at the University of Chicago—shows that reducing the existing air quality down to the WHO standard can improve the average life expectancy of a Pakistani by 2.7 years and of a Lahori by 5.3 years.

Studies carried out in the US show that the 15-year decline in carbon monoxide from 1982 – 2003 led to USD 720 million in lifetime earnings owing to improvements in birth weight and USD 2.2 billion owing to reduced infant mortality for the 2003 birth cohort. Studies also show gains in productivity, reduction in school absence, improvements in child health.

The previously quoted Sidharth study on India states, "Another study estimated 42,000 premature deaths in 2010 were attributable to crop residue burning alone. The burning of crop residue also releases black carbon, which is a sooty black material released due to the incomplete burning of organic matter and fossil fuels. This black carbon has been found to reduce agricultural yields in India and also blacken glaciers in the Himalayas, therefore accelerating their melting. It is one of the most important contributors to climate change".

One known technology for eliminating stubble burning is the "happy seeder", which can plant wheat without removing the stubble, but it is expensive and uses a lot of fuel. However, the cost is mitigated by the reduced labor and fertilizer expense. Even so, small farmers can't afford it so a subsidy will likely be required. It is estimated that Indian Punjab needs 15,000 such seeders (costing about Indian Rs 1.5 lakh each). The larger Pakistan Punjab will need more. Assuming 25,000 seeders will be needed at the price of USD 4,000 each, the total cost is USD 100 million. Extending the program to the rice growing areas of Sind with similar rice-wheat cycle would increase the capital cost to USD 150 million. The annual fuel cost for operating the seeder would also need to be factored in. Another approach would be to pay farmers a premium price for rice if they don't burn stubble. The price could be structured as in the better cotton initiative in which case the price premium would be paid by buyers of rice in the importing country. Satellite imagery could be used to certify zones by stubble burning practice.

[96] IQAir. World Air Quality Report 2021

[97] Siddharth Singh, The Great Smog of India (Gurugram: Penguin Random House India Private Limited, 2018).

Once the cost estimates are known, TNC could be approached, as in the case of the Belize ocean initiative and the hypothetical Pakistan tree planation scheme (discussed in Exhibit 28 and 29) for a similar debt swap arrangement that will yield enough surplus to fund the crop stubble burning abatement program. To secure even more attractive terms, concessionary CF could be approached by emphasizing the twin benefits of curtailing crop stubble burning: the global benefit by reducing CO_2 emissions and the immediate local benefit of improving health outcomes especially for the low-income households since they spend a disproportionately large share of income on health costs associated with poor quality air.

Exhibit 30: CF for reducing air pollution associated with crop stubble burning

One known technology for eliminating stubble burning is the "happy seeder", which can plant wheat without removing the stubble but it is expensive and uses a lot of fuel. However, the cost is mitigated by the reduced labor and fertilizer expense. Even so, small farmers can't afford it so a subsidy will likely be required. It is estimated that Indian Punjab needs 15,000 such seeders (costing about Indian Rs 1.5 lakh each). The larger Pakistan Punjab will need more. Assuming 25,000 seeders will be needed at the price of USD 4000 each, the total cost is USD 100 million. Extending the program to the rice growing areas of Sind with similar rice-wheat cycle would increase the capital cost to USD 150-USD 200 million. The annual fuel cost for operating the seeder would also need to be factored in. Another approach would be to pay farmers a premium price for rice if they don't burn stubble. The price could be structured as in the better cotton initiative in which case the price premium would be paid by buyers of rice in the importing country. Satellite imagery could be used to certify zones by stubble burning practice.

Once the cost is known, TNC could be approached, as in the case of the Belize ocean initiative and the hypothetical Pakistan tree planation scheme (discussed in Box 1 and 2) for a similar debt swap arrangement that will yield enough surplus to fund the crop stubble burning abatement program. To secure even more attractive terms, concessionary CF could be approached by emphasizing the twin benefits of curtailing crop stubble burning: the global benefit by reducing CO2 emissions and the immediate local benefit of improving health outcomes especially for the low-income households since they spend a disproportionately large share of income on health costs associated with poor quality air.

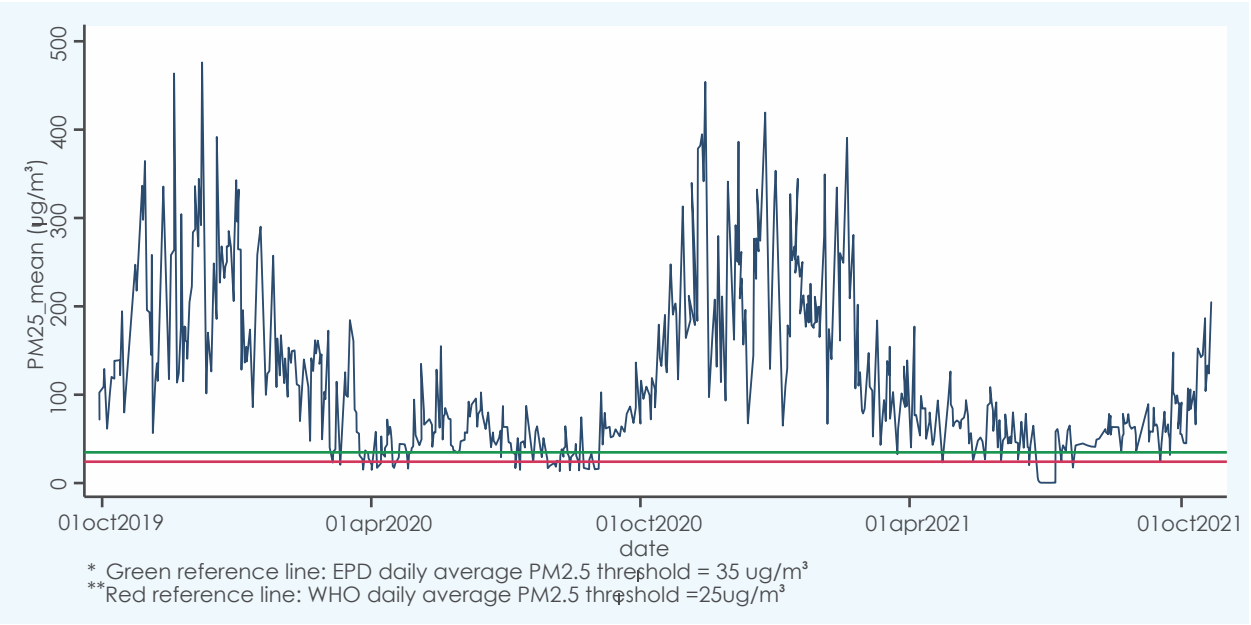
Exhibit 31. Satellite Image of rice stubble burning in Indian and Pakistani Punjab

Exhibit 32: Air Quality Life Index (Pakistan)

Province	District	Population (Millions)[1]	$PM_{2.5}$ Concentration (ug/m³)		Life Expectancy Gain (Years) from Reducing $PM_{2.5}$ from 2016 Concentration		
			2016	After 32% Reducing	To WHO Guideline of 10ug/m³	To National Standard of 15ug/m³	By 32%[2]
All Pakistan		203.2	37	25	2.7	2.2	1.2
Sindh	Karachi City	22.4	16	11	0.5	0.1	0.5
Punjab	Lahore	9.4	64	43	5.3	4.8	2.0
Punjab	Faisalabad	8.1	59	40	4.8	4.3	1.8
Punjab	Gujranwala	5.1	58	40	4.7	4.3	1.8
Punjab	Rawalpindi	4.9	41	28	3.0	2.5	1.3

Source: EPIC. https://aqli.epic.uchicago.edu/country-spotlight/pakistan/.

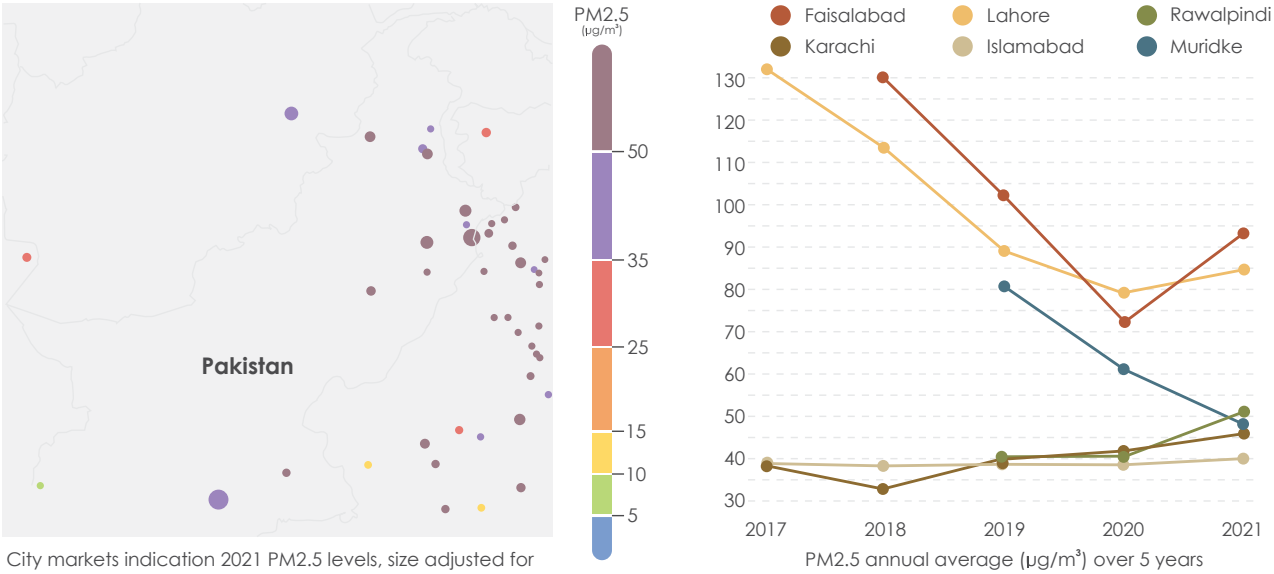
Exhibit 33: Lahore's daily PM2.5 levels



* Green reference line: EPD daily average PM2.5 threshold = 35 ug/m³
**Red reference line: WHO daily average PM2.5 threshold =25ug/m³

Source: AirNow (courtesy Mahnoor Kashif).

Exhibit 34: Overview of Pakistan's PM2.5 levels



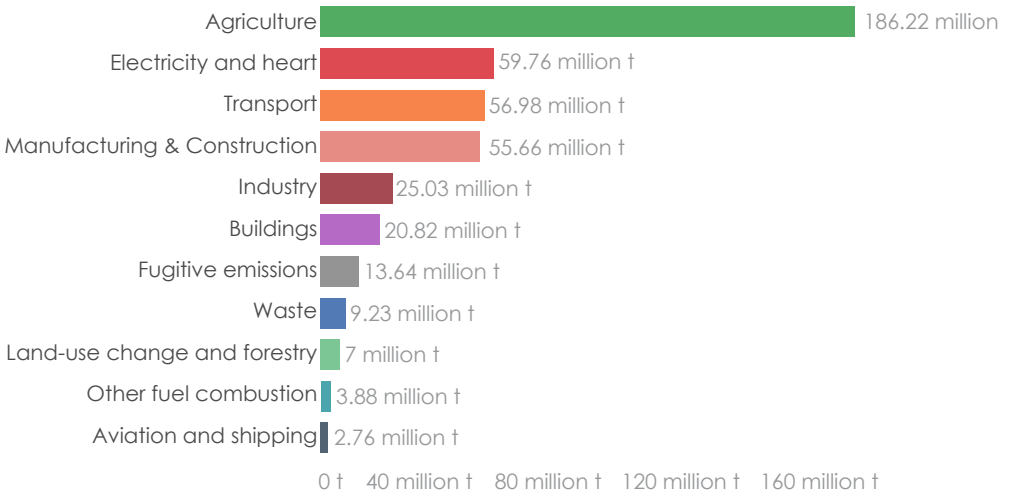
City markets indication 2021 PM2.5 levels, size adjusted for population

PM2.5 annual average (µg/m³) over 5 years

Source: IQAir 2021 World Air Quality Report. https://www.iqair.com/us/world-air-quality-report

Exhibit 35. Greenhouse Gas Emissions by Sector, Pakistan 2018

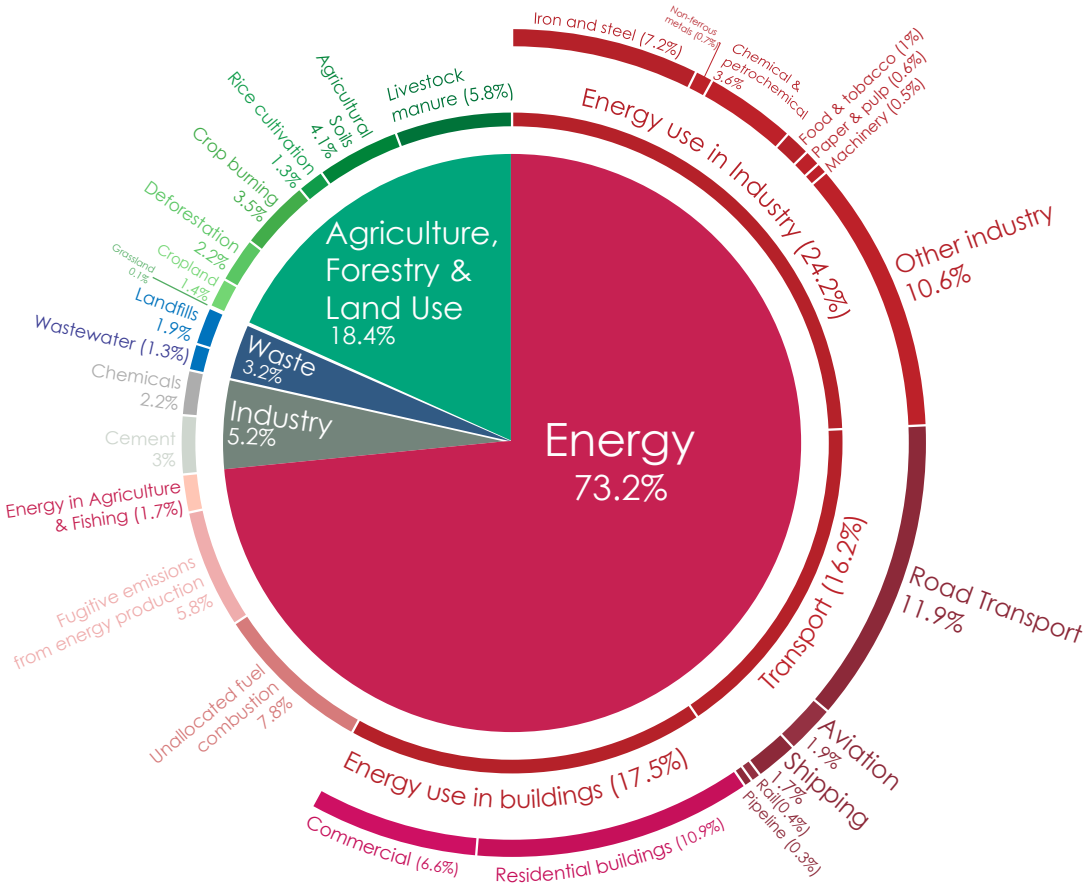
Greenhouse gas emissions are measured in tonnes of carbon dioxide-equivalents (CO_2e)



OurWorldinData.org.
Source: CAIT Climate Data Explorer via Climate Watch. https://ourworldindata.org/co2/country/pakistan

Exhibit 36. Global Greenhouse Gas Emissions by Sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes in CO_2e



OurWorldinData.org.
Source: Climate Watch, the World Resources Institute (2020). https://ourworldindata.org/emissions-by-sector

Annex: Major Donors for Climate Finance[98]

1	Asian Development Bank
Long term commitment of USD 100 bn (2021-2030)	

Commitment (2021)	• Total: USD 4.294 bn
	  • Mitigation: USD 2.968 bn
	  • Adaptation: USD 1.327 bn

Instruments (202?)	• Loans: 96.1% • Grants: 2.1% • Others 1.8%
Region (202?)	• Central and West Asia: 34.2% • South Asia: 29.3% • Southeast Asia: 22% • East Asia: 10.4% • Pacific: 2.5% • Other 1.6%
Projects	Pakistan: • Greater Thal Canal Irrigation Project (https://www.adb.org/projects/49372-002/main) – USD 200 mn • Energy Sector Reforms and Financial Sustainability Program (Subprogram 2) (https://www.adb.org/projects/53165-002/main) – USD 300 mn • Preparing Climate-Resilient Agriculture and Natural Resources Development Projects (https://www.adb.org/projects/55225-001/main) - Technical Assistance Special Fund USD 2.25 mn, Climate Change Fund USD 750,000 • Preparing Kurram Tangi Integrated Water Resources Development Project (https://www.adb.org/projects/52051-003/main) – USD 5 mn

1.1	Asian Development Fund
Commitment	
Regional Eligibility	Poor countries of Asia-Pacific
Instruments	• High-risk countries: 100% grant • Medium-risk countries: 50% grant • Low-risk countries: Loans
Priority Areas	Poverty reduction and improvement in quality of life: • Infrastructure • Policy support and policy reform • Production capacity, human development and environmentally sustainable investments • Good governance and capacity building for development management • Regional cooperation
Funding Conditions	Determined through a formula that ensures the proportion of assistance provided as grant financing is contingent on the country's risk of debt stress (determined by a forward-looking debt sustainability analysis.

1.2	Asia Pacific Climate Finance Fund
Commitment	
Regional Eligibility	All ADB developing member countries
Instruments	

Priority Areas	Financial risk management:
	• Financial risk management products to scale-up the adoption of climate mitigation and adaptation technologies
	• Risk management products:
	•
	  • oto mobilize new sources of private climate finance
	  • oto support investments in climate sensitive sectors
	  • for extreme weather events to protect climate vulnerable, poor people

[98] Information collated from agency websites.

1.3	**Asian Development Bank** Under this partnership, the relevant funds active are: Asian Clean Energy Fund (ACEF), Canadian Climate Fund for Private Sector (CCFPS), Clean Energy Fund (CEF)
Commitment	
Regional Eligibility	All ADB developing member countries
Instruments	• Grants • Loans

Priority Areas	• Enhance sustainable development
	• Catalyze greater private investments in climate mitigation and adaptation
	• Promote clean energies
	• Financial risk management products to scale-up the adoption of climate mitigation and adaptation technologies
	• Risk management products:
	  • oto mobilize new sources of private climate finance
	  • oto support investments in climate sensitive sectors
	  • for extreme weather events to protect climate vulnerable, poor people

Funding Conditions	

1.4	**Climate Change Fund (CCF)**
Commitment	
Regional Eligibility	All ADB developing member countries
Instruments	• Grants • Loans • Technical assistance
Priority Areas	Support low-carbon, climate resilient development (Oct 2017) USD 60.4 mn allocated to 86 projects: • Clean energy: 38 • Adaptation: 38 • REDD and land use: 9 • Climate finance readiness: 1
Funding Conditions	

1.5	**Urban Environmental Infrastructure Fund (UEIF)**
Commitment	
Regional Eligibility	All ADB developing member countries
Instruments	• Grants • Loans
Priority Areas	• Climate change mitigation and adaptation • Urban environmental transportation services • Urban environmental water and wastewater services
Funding Conditions	

1.6	**Urban Climate Change Resilience Trust Fund (UCCRTF)**
Commitment	
Regional Eligibility	Bangladesh, India, Indonesia, Myanmar, Pakistan, The Philippines, and Vietnam.
Instruments	Grants
Priority Areas	Building climate resilience in medium sized cities, with focus on urban poor: • Infrastructure development • Policies and institutional interventions • Knowledge development and capacity building • Networking
Funding Conditions	

2	UN Green Climate Fund

Commitment (2021)	• Mobilized: USD 6.1 bn
	• Disbursed: USD 2.1 bn+
	  • Mitigation: USD 1.5 bn
	  • Adaptation: USD 535 mn

Regional Eligibility	All developing countries party to the Convention At least 10% earmarked for LDCs Small developing Island States and African countries
Instruments (2021)	• Loans: 43.4% • Results based payments: 5% • Grants: 41.6% • Guarantees: 2.4% • Equity: 7.6%
Priority Areas	• Low-emission energy access and power generation • Low-emission transport • Energy efficient buildings, cities and industries • Sustainable land use and forest management • Enhanced livelihoods of the most vulnerable people, communities, and regions • Increased health and well-being, and food and water security • Resilient infrastructure • Resilient ecosystems
Funding Conditions	Determined by a formula that ensures that the proportion of assistance provided as grant financing is contingent on the country's risk of debt distress, which is determined by the result of a forward-looking debt sustainability analysis
Projects	Pakistan: • Transforming the Indus Basin with Climate Resilient Agriculture and Water Management (Adaptation) – USD 47.7 mn value, 17.3 mn beneficiaries • Green BRT Karachi (Mitigation) – USD 583.5mn, 2.6mn tonnes of emissions avoided • Scaling-up of Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan (Adaptation) – USD 37.5 mn, 29.2 beneficiaries
3	**Japan International Cooperation Agency (JICA)**

Commitment (2020)	• Total: Yen 939.57 bn
	  • Mitigation: Yen 515.36 bn
	  • Adaptation: Yen 389.9 bn
	  • Cross-cutting: Yen 25 bn

Regional Eligibility	Government (national, sub-national), international, regional and non-government entities
Instruments	• Technical cooperation • Official Development Assistance (ODA) loans • Private sector investment finance • ODA grants
Priority Areas	• Promoting low-carbon climate resilient urban development and sustainable infrastructure investment (energy efficiency, transportation, resilience planning) • Enhancing comprehensive climate risk management • Supporting climate policy and institutional development (national, sub-national) • Enhancing sustainable forest and ecosystem management • Aligning climate and development planning • Building of partnerships and alliances
Funding Conditions	
Projects	Pakistan: • Introduction of Clean Energy by Solar Electricity Generation System – Yen 448 mn • Improvement of Water Supply in Faisalabad II and The Extension of Water Supply System in Faisalabad – Yen 5.2 bn

4	German Aid Agencies	
Commitment (2020)		• Total: Euro 7.8 bn
Projects		In September 2021, German government has committed to providing all-out technical and financial support for the implementation of various environmental and climate change-related initiatives of the Government of Pakistan.
4.1	**Federal Ministry for Economic Cooperation and Development (BMZ)**	
Commitment		
Regional Eligibility		World-wide focus: government (national, sub-national), non-government entities and private sector
Instruments		• Grants • Concessional loans
Priority Areas		• NDC support • Energy and climate • Energy efficiency • Low-carbon transportation • Migration and climate • Cities and climate • Water and climate • Agriculture and climate • Forests and climate • Oceans and climate • Climate risk management • Climate risk insurance • Climate finance.
Funding Conditions		
4.2	**German Corporation for International Cooperation (GIZ)**	
Commitment		
Regional Eligibility		World-wide focus (approx. 120 countries): government (national, sub-national), non-government entities and private sector
Instruments		• Grants • Concessional loans • An own contribution is usually expected
Priority Areas		• Rural development: Agricultural policy, rural development, land management, food and nutrition, security/right to food, fisheries, aquaculture, coastal development, etc. • Sustainable infrastructure: Sustainable sanitation and water supply, water policy, water resource management, basic energy supply services etc. • Emergency aid and disaster risk management. • Environment and climate change: Climate change (implementation of the UN Framework Convention on Climate Change), integrated ozone and climate protection, forest policy and sustainable forest management, combating desertification, waste management, environmental finance, green economy etc. • Economic development and employment: Rural finance, financing agriculture; insurance; financial sector stability and capital market development etc. • Within the Climate Finance Readiness Programme, GIZ focuses on three main areas: • Support for national climate finance institutions that can be accredited to the GCF • Providing strategic and conceptual advice on how to further develop NAMAS or NAPs so that countries can get the financial support that they need, and how to align climate and development planning • Global sharing of experience. Activities in these fields are carried out by means of technical and process advisory services, the assignment of long-term and short-term experts, training courses and financial support.
Funding Conditions		

4.3	KfW Bank Group	
Commitment		
Regional Eligibility		World-wide focus: government (national, sub-national), non-government entities and private sector KfW usually does not accept unsolicited proposals but works with partners to identify possible funding opportunities. A main entry point would be either the KfW country/regional program or the specialized program managers.
Instruments		• Grants • Concessional loans • Blended finance • Equity • Guarantees
Priority Areas		• Renewable energies • Energy efficiency • Early warning & disaster risk reduction • Resilient infrastructure • Adaptation in agriculture, fisheries, and water • Sustainable land management • Climate risk insurance and risk financing • Climate financing
Funding Conditions		
5	**French Aid Agencies (AFD and Proparco)**	

Commitment		• Total: Euro 5.2 bn
		  • Mitigation: 49%
		  • Adaptation: 39%
		  • Public-policy loans: 11%
		  • NGO projects: 1%

Regional Eligibility		
Instruments		• Grants (5%) • Loans to states, non-subsidized (26%) • Delegated loans and grants (6%) • Financing of companies and local authorities, subsidized (14%) • Financing of companies and local authorities, non-subsidized (21%) • Loans to states, subsidized (28%)
Priority Areas		Biodiversity conservation through integrated territorial development operations or sector-based approaches (e.g., for drinking water, agriculture and fisheries), which promote nature-based solutions
Funding Conditions		
6	**World Bank Group (WB)**	
Long term commitment		WBG Climate Change Action Plan, seeks to integrate climate throughout development efforts, with a focus on greenhouse gas reduction and successful adaptation. The plan commits WBG to 35 percent of Bank Group financing having climate co-benefits over the next five years; 50 percent of IBRD and IDA climate financing will support adaptation and resilience. World Bank will align all financing with the goals of the Paris Agreement starting on July 1, 2023. For IFC and MIGA, 85 percent of Board-approved real sector operations will be aligned starting July 1, 2023, and 100 percent starting July 1, 2025.
Commitment (2021)		Disbursement (?): USD > 26 bn
Regional Eligibility		
Instruments		
Priority Areas		Support transformative public and private investments in five key systems: • Energy • Agriculture, food, water and land • Cities • Transport • Manufacturing Where possible, WBG will also supporting natural capital and biodiversity—to deliver impactful country operations and programs, including public and private sector investments, guarantees, and advisory services.
Funding Conditions		

6.1	Global Partnership for Social Accountability (GSPA)
Commitment	
Regional Eligibility	CSOs of 52 countries that have opted-in to the GSPA (Pakistan is currently not on the list)
Instruments	Grants
Priority Areas	Projects that address governance and development problems through social accountability processes, including climate policies. Proposals to the GPSA must address the priority themes that have been identified per country (these priorities can be found on the GPSA website).
Funding Conditions	CSOs have to fulfill the following criteria: • Legal status • External audit report • Bank account • Representative with legal authority to sign grant contract with WB • 3-5 years relevant experience (provide information about ongoing and previous projects; three references)
6.2	**Small Grant Program (SGP) of Global Environmental Facility (GEF)**
Commitment	
Regional Eligibility	Developing countries and economies in transition in order to meet the objectives of International Environmental Conventions and Agreements
Instruments	Grants
Priority Areas	Supports low-carbon and climate resilient development projects: • biodiversity • international waters • land degradation • chemicals and waste • climate change • cross-cutting issues like sustainable forest management; GEF seeks to enhance transboundary cooperation and the management of shared water resources in order to mitigate water pollution and to build capacity and cooperation across river basins, aquifers, and seas.

Funding Conditions	• Country is eligible for funding if it: i) has ratified the Conventions that GEF serves; or ii) already eligible to receive WB funds or is recipient of technical assistant from UNDP
	• Project must:
	  • be country-driven, consistent with national policies, and supports sustainable development
	  • address one or more GEF focal areas
	  • involve public in project design and implementation and follow the Public Involvement policies and guidelines
	• Only incremental costs of measures to achieve global environmental benefits will be covered by GEF

6.3	**Climate Investment Fund (CIF)** CIF is composed of four programs: Clean Technology Fund (CTF), Pilot Program for Climate Resilience (PPCR), Scaling Up Renewable Energy in Low Income Countries (SREP) and Forest Investment Program (FIP)
Commitment (202?)	• CTF investment: USD 5.6 bn • PPCR commitment: USD 1.2 bn • SREP commitment: USD 780 mn • FIP investment: USD 775 mn
Regional Eligibility	• CTF: middle-income countries • PPCR: developing countries • SREP: world's poorest nation • FIP: developing countries
Instruments	• Concessional loans • Grants
Priority Areas	• CTF: scale-up the demonstration, deployment, and transfer of renewable energy, energy efficiency, and sustainable transportation technologies. • PPCR: integrate climate resilience into development planning and support public and private sector investments for implementation activities. • SREP: deployment of renewable energy solutions to foster access to energy and economic growth • FIP: reduce deforestation and forest degradation and support the promotion of sustainable forest management for emission reductions and the enhancement of forest carbon stocks (REDD+).
Funding Conditions	• Countries access CIF through MDB
7	**Islamic Development Bank (IsDB)**
Long term commitment	IsDB has an objective to mainstream climate action in its operations, with a target of 35 percent climate finance by 2025, and plans to align with the objectives of the Paris Agreement

Commitment (2020)	• Total: USD 261 mn
	  • Mitigation: USD 171 mn
	  • Adaptation: USD 90 mn

Regional Eligibility	IsDB provided USD 259 mn to low/middle income economies, and USD 2mn to high income economies
Instruments	
Priority Areas	
Funding Conditions	
Projects	Pakistan: • Mohmand Damn and Hydropower Project, in Khyber Pakhtunkhwa which will lead to access and provision of clean portable water to 2 mn residents of Peshawar city and supporting irrigation of 6,773 ha of new farmland – USD 180mn

8	**UK Donor Agencies** International Climate Finance (ICF) is Official Development Assistance (ODA) from the UK to support developing countries. The ICF portfolio of programmes is delivered by three UK government departments: i) Foreign Commonwealth and Development Office (FCDO) ii) the Department for Business, Energy and Industrial Strategy (BEIS) iii) Department for Environment, Food and Rural Affairs (Defra).

Long term commitment	Doubling ICF to GBP 11.6 bn between April 2021 and March 2026, compared with the previous 5-year commitment of GBP 5.8 bn between April 2016 and March 2021.
Commitment (2021)	GBP 8bn
Regional Eligibility	ICF has world-wide focus.
Instruments	• Grants • Concessional loans • Equity • Guarantees
Priority Areas	• The ICF priorities are: • Supporting sustainable and inclusive economic growth • Building resilience to manage risks • Improving stewardship of natural resources • FCDO climate change programs prioritize: • Green growth and low carbon development • Climate adaptation • Climate risk reduction and risk transfer, including climate risk insurance • Sustainable infrastructure development • Energy efficiency, renewable energies, and sustainable transportation
Funding Conditions	
Projects	Pakistan: • Sustainable Energy and Economic Development (SEED): https://devtracker.fcdo.gov.uk/projects/GB-GOV-1-300141/summary • Water Resource Accountability in Pakistan (WRAP): https://devtracker.fcdo.gov.uk/projects/GB-GOV-1-300724/summary • Building Resilience and Addressing Vulnerability to Emergencies (BRAVE): https://devtracker.fcdo.gov.uk/projects/GB-GOV-1-300798/summary

9	**European Union (EU) Institutions** The European Union (EU) executes its international climate finance commitments via the: i) European Commission (EC); ii) European Investment Bank (EIB); and iii) Global Climate Change Alliance+ (GCCA)
Long term commitment	Provide USD 100 bn by 2025.
Commitment (2019)	• EU: USD 5.6 bn • EC: USD 2.5bn • EIB: USD 3.1 bn
Regional Eligibility	World-wide focus; major beneficiaries are Least Developed Countries and Small Island Developing States (SIDS), and Africa.
Instruments	• Grants to the poorest and most vulnerable countries • Grant funding to leverage private investment by combining grants with loans and equities from public and private sources, including bilateral and multilateral development banks
Priority Areas	• EC: • Climate adaptation • EIB: • Energy efficiency and renewable energy projects in Africa and other regions • GCCA: • Adaptation • Disaster risk reduction • REDD+ • Clean Development Mechanism (CDM) • Mainstreaming climate change • Global conferences • Regional workshops • Technical support • EU priority sectors: • Agriculture (15%) • Water and sanitation (14%) • Energy (13%) • Social services (10%)
Funding Conditions	• Projects tagged in the OECD's Creditor Reporting System (CRS) database with the Rio markers for climate change mitigation and/or climate change adaptation. Projects can be tagged with either or both markers. Each marker has three possible scores: **1. Principal,** for projects in which climate change mitigation or adaptation is a fundamental and explicitly stated goal; **2. Significant,** for projects in which climate change mitigation or adaptation is not a key driver but still an explicitly stated goal; or **3.Not targeted,** meaning the project does not address climate change mitigation or adaptation. • Projects not screened against the Rio markers fall into the 'not screened' category.
Projects	
10	**USAID** USAID is the primary ODA providing agency of USA. Environment and global climate change is one of the ten thematic priorities of USAID.
Long term	Mobilize USD 150 billion in public and private climate finance by 2030.

Commitment (2019)	• Total: 931mn
	  • Mitigation only (39%)
	  • Adaptation only (36.6%)
	  • Cross-cutting (24.4)

Regional Eligibility	USAID has world-wide focus.
Instruments	
Priority Areas	
Funding Conditions	
Projects	

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