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ASIA

PAKISTAN

World Bank Group

COUNTRY CLIMATE AND DEVELOPMENT REPORT

Executive Summary

November 2022



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EXECUTIVE SUMMARY

In 2022, Pakistan endured devastating heat, droughts and floods that destroyed lives, assets, infrastructure and livelihoods on a massive scale. A severe heatwave resulted in crop losses, power outages, and forest fires. This was followed by unprecedented monsoon rains, which left one-third of the country under water, over 1,700 casualties, and more than 33 million people affected. The Post-Disaster Needs Assessment (PDNA) estimates that the floods will require US\$16 billion in recovery and reconstruction costs, the secondary impacts from disease, lack of food and clean water are yet to come. The PDNA estimates that as a direct consequence of the floods, the national poverty rate will increase by 3.7 to 4.0 percent points, pushing an additional 8.4 - 9.1 million people into poverty. Attribution analysis shows that climate change is responsible for the intensity of the early season heatwave as well as the unusual pattern of the monsoon. But the devastating effects are, at least in part, also the result of past policy and investment choices and governance shortfalls. Many of the underlying concerns raised after the similar 2010 floods were not addressed, including outdated river management systems and drainage networks, deforestation and land degradation, the proximity of people, infrastructure and farmland to flood plains, the lack of disaster preparedness and of other systematic mainstreaming of adaptation interventions, such as early-warning and rescue systems.

Pakistan is among the group of countries most vulnerable to climate change and extreme weather events are likely to become more frequent and intense in the coming decades, making urgent action on climate resilience imperative. This must be done in a manner that is inclusive and sustainable.

This report proposes a way forward to address these challenges. Given Pakistan's constrained fiscal resources, substantial additional international financial and technical assistance as well as private investment will be required. Implementing the report's recommendations will require smart and tough decisions on optimizing revenue use, contending with important tradeoffs, and increasing domestic revenue generation while creating an enabling environment to attract more private finance and actions to increase international finance. In addition to maintaining macroeconomic stability, this will require a fundamental shift in the country's policies and institutions toward greater equity, efficiency, and accountability, which in turn will require addressing the underlying political economy constraints that have limited the implementation of similar recommendations in the past.

Development and Climate Context

Pakistan's economy is characterized by macro-fiscal vulnerabilities and low and volatile growth.

Pakistan's striking past success in reducing extreme poverty is at risk of reversal. More than 48 million Pakistanis have come out of extreme poverty (US\$1.90 per person per day) over the past two decades. Poverty has also declined significantly at the lower middle-income country poverty line (US\$3.20 per person per day) from 73.5 percent in 2001 to 34.3 percent by 2018–19. This makes Pakistan the most successful country in reducing extreme poverty in South Asia. This decline was driven primarily by the expansion of off-farm economic opportunities and an increase in out-migration, with its associated foreign remittances. However, these gains are at risk of reversal in the medium term due to the country's low human capital accumulation, high fertility rate, underlying macro-fiscal risks, and—as discussed in this report—the impacts of climate change.

Pakistan's macro-fiscal fragility is of great concern in this context. The economy's frequent boom and bust cycles pose a serious constraint on the country's ability to sustain growth and consolidate development gains. Growth in per capita GDP has been volatile and low over the past two decades, with the economy growing at only 2 percent per year, on average, less than half the pace of the rest of

South Asia. Structural issues, such as the 'circular debt'¹ in the energy sector, the low tax to GDP ratio, and large and unproductive subsidy regimes, have limited economic growth and constrained investment in human capital and basic infrastructure.

Unproductive and inequitable subsidy regimes in the energy, agriculture, and water sectors contribute significantly to chronic fiscal stress and macro instability. Energy subsidies account for 2.6 percent of the country's GDP, with two-thirds supporting the consumption of electricity, and a third supporting the consumption of natural gas.² This level of subsidy is the highest in the region, and combined with tariffs that are below cost recovery levels, operational inefficiencies within distribution companies and the recent increases in the cost of imported fossil fuels, has exacerbated the country's already large circular debt. At the end of June 2022, the total circular debt stood at US\$19.1 billion, of which US\$11.6 billion was in the electricity sector and US\$7.5 billion in the gas sector.³ The agriculture and irrigation sectors are also awash with regressive subsidies and forgone revenue streams. For example, the cumulative outstanding debt from just the wheat commodity operations is close to US\$4.5 billion⁴—creating another circular debt-like situation.

Low investment and inadequate tax collection add to the fiscal stress. In FY21, Pakistan's investment accounted for only 14 percent of GDP, and public expenditure on health and education were low, at 1.2 percent and 1.8 percent of GDP, respectively. The tax base also remained thin, with tax revenues accounting for only 10 percent of GDP. Together these macroeconomic challenges distort the economy and reduce fiscal space to invest in critical human capital needs and basic infrastructure and services, let alone transformative climate actions. Macro-fiscal stability, resource generation, and the efficient use of available resources are necessary for the critical investments in climate and development recommended in this report. Without these, no climate action plan will be implementable and access to global capital markets is also likely to remain limited, constraining finance for climate actions.

Pakistan ranks among the top 10 countries most affected by climate change and extreme weather events, underscoring the urgent need for prioritizing adaptation and resilience.

The negative effects of climate change are already being felt largely through the increased incidence of extreme events, changes in water resource availability, the accelerated melting of glaciers and sea level rise. Progressive warming and periodic heatwaves are likely to reduce harvests, reduce the availability of water, and impact health. More variable monsoon seasons and increasing frequency and intensity of erratic extreme weather events will likely lead to floods, droughts, and landslides. Continued and accelerating sea level rise is likely to cause the ocean to encroach on coastal settlements, infrastructure, and ecosystems. Furthermore, climate change and deposits of anthropogenic black carbon (BC) are hastening the melting of the glaciers, with serious impacts on Pakistan's economy and ecology.

Pakistan is heavily impacted by the loss of biodiversity and ecosystem services, further increasing the adverse effects of climate change. Deforestation, unmanaged grazing, urban sprawl and excessive use of chemical fertilizers and pesticides have damaged and depleted forest, land, and freshwater resources. These are compounded by pollution from industries, untreated wastewater, and poor solid waste management (SWM). In addition, Pakistan has the world's fourth-worst air pollution, which has reduced average life expectancy in the country by 4.3 years.⁵

1 Pakistan's circular debt is the shortfall between the relatively low revenue generated from the distribution of electricity and the high cost of producing and delivering it. The reference to circularity captures the fact that the arrears keep getting passed from one power sector to the next, cascading from the distribution sector to the central power purchaser, and then to the power producers and fuel suppliers, eventually arriving back at the distribution sector.

2 IMF, Fossil Fuel Subsidies Database (Washington, DC: International Monetary Fund, 2022), <https://www.imf.org/en/Topics/climate-change/energy-subsidies>. Note that this figure includes only "explicit subsidies." The IMF also provides an estimate for "implicit subsidies" that takes account of the underpricing of externalities. Total energy subsidies, including both explicit and implicit, are estimated at 11.9 percent for 2020. For further details about the IMF's research, see Ian Parry, Simon Black, and Nate Vernon, *Still Not Getting Energy Prices Right: A Global and Country Update of Fossil Fuel Subsidies* (Washington, DC: International Monetary Fund, 2021), <https://www.imf.org/en/Publications/WP/Issues/2021/09/23/Still-Not-Getting-Energy-Prices-Right-A-Global-and-Country-Update-of-Fossil-Fuel-Subsidies-466004>.

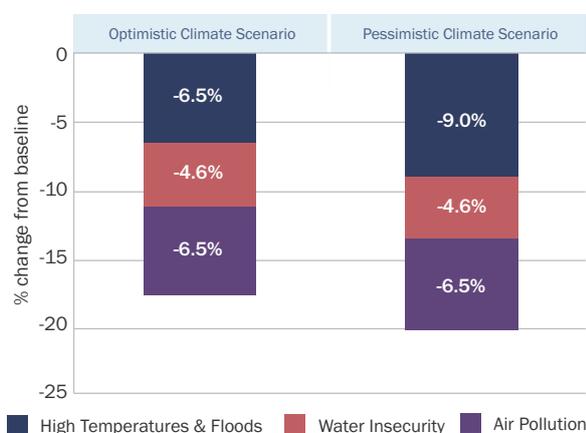
3 At the end of FY2022, Pakistan's total circular debt was PKR 2,253 billion in the electricity sector and PKR 1,500 billion in the gas sector. The exchange rate: US\$1 = 200 PKR.

4 This is around PKR 800 billion. The exchange rate was US\$1 = PKR 177.81 in FY21/22, according to the IMF.

5 The Air Quality Life Index (2020), <https://aqli.epic.uchicago.edu/wp-content/uploads/2020/07/PakistanFactSheet2020.pdf>.

The combined risks from the intensification of climate change and environmental degradation, unless addressed, will further aggravate Pakistan's economic fragility, and could ultimately reduce annual GDP by 18 to 20 percent per year by 2050. Between 6.5 and 9.0 percent of GDP will likely be lost due to climate change (the optimistic and pessimistic scenarios, respectively) as increased floods and heatwaves reduce agriculture and livestock yields, destroy infrastructure, sap labor productivity, and undermine health.⁶ Additionally, water shortages in agriculture could reduce GDP by more than 4.6 percent, and air pollution could impose a loss of 6.5 percent of GDP per year.

Figure 1: Aggregated impact on GDP associated with climate and environmental threats by 2050



To put this in perspective, just a 9 percent reduction in GDP would be enough to completely undo hard-fought gains in poverty reduction. Under a counterfactual scenario with no climate change-related impacts and the continuation of current growth rates and policy, poverty (at US\$3.20 per person per day) can be expected to decline from 35 percent to 19 percent by 2050. But when selected threats under the pessimistic climate scenario are considered, poverty could be as high as 30 percent in 2050. This analysis suggests that in the absence of actions to address the climate crisis, the pace of poverty reduction will stall. There are also significant social and spatial differences in exposure to climate damage, with the poorest areas often at the highest risk. Beyond 2050, the scale of economic losses and poverty impacts are expected to be significantly higher as climate change impacts intensify.

Although Pakistan is a relatively minor contributor to climate change, it should seize the opportunity of global decarbonization efforts to help decouple its socio-economic growth from costly, polluting and carbon-intensive fossil fuels.

In 2018, the country's total annual greenhouse gas (GHG) emissions were estimated at 499 million metric tons of carbon dioxide equivalent (MtCO₂e), including land use and forestry.⁷ Emissions are driven by two sectors: agriculture, forestry, and other land use (AFOLU) (46 percent) and energy (45 percent). The leading contributors to AFOLU-related emissions are livestock, managed soils, and land use, while energy-related emissions come from manufacturing industries and construction, transport, and energy consumption. Currently, Pakistan contributes to less than 1 percent global GHG emissions. However, in view of Pakistan's large population, high energy intensity and growth aspirations, future emissions will become globally material unless actions are taken to curb the growth rate of emissions.⁸

⁶ This illustrative estimate does not capture the simultaneous occurrence of multiple hazards or the interaction between climatic and non-climatic risks which could cause large-scale disruptions, with cascading impacts across many sectors of the economy, compounding the overall risk. Only a subset of the transmission channels of climate risks are covered: these include flood impact on selected capital stock and infrastructure, heat impact on agricultural crops and livestock, and heat impact on labor productivity and health.

⁷ Global Change Impact Studies Centre, National Greenhouse Gas Inventory Information for Pakistan.

⁸ See World Resources Institute, "Global Historical GHG Emissions," CLIMATEWATCH (2022), https://www.climatewatchdata.org/ghg-emissions?end_year=2018®ions=PAK&start_year=1990. The total GHG emissions estimated by Climate Watch for Pakistan in 2018 was 428.62 MtCO₂e. This is slightly lower than Pakistan's own estimate, prepared by GCISC.

Pakistan has already made enhanced commitments in its 2021 Nationally Determined Contribution (NDC), notably on strengthening resilience and accelerating energy decarbonization.

The 2021 NDC represents a shift toward an inclusive, innovative, and whole-of-economy approach to addressing climate change. Pakistan has committed to reducing its GHG emissions from a business-as-usual scenario (BAU) by 15 percent by 2030 using its domestic resources. It has also committed to an additional 35 percent reduction target conditional upon receiving further international support. The NDC also proposes the development of a National Adaptation Plan (NAP) to provide the framework for mainstreaming climate actions into national sectoral policies, strategies, and programs.

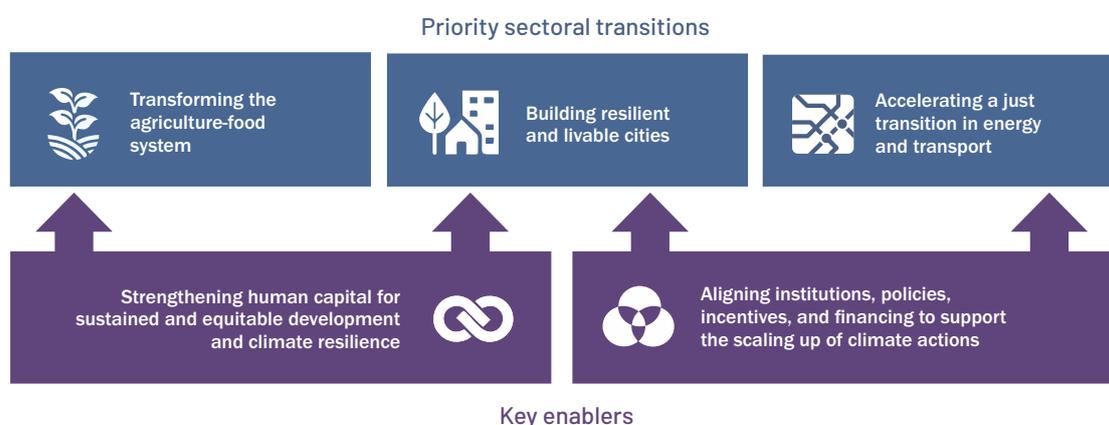
Under the global Methane Pledge (MP), Pakistan has also committed in 2021 to reducing its methane emissions by 30 percent, from 2020 levels, by 2030. Methane, a potent, short-lived climate pollutant, accounted for 28 percent of the country's total annual GHG emissions in 2018. Given methane's high contribution to Pakistan's total emissions, curbing methane emissions will be critical.

Development and Climate Policy Priorities

Action to build resilience and adapt to climate risks is imperative for Pakistan—and is an integral part of a sustainable and equitable national growth strategy. The CCDR focuses on the critical policy pathways for achieving this needed transformation in three priority areas: (1) Transforming the agri-food system; (2) Building resilient and livable cities; and (3) Accelerating a just transition in energy and transport. These pathways prioritize actions that contribute simultaneously to closing critical development gaps, building resilience in the face of climate risks, reducing macro-fiscal fragility, and protecting and enhancing equity. Many of the proposed actions also reduce emissions, although in light of Pakistan's high climate vulnerability, the emphasis in this report is placed on climate adaptation.

To achieve its climate and development goals, Pakistan additionally needs to work on two key enablers: improving human capital and strengthening governance. Improving human capital is necessary for growth as well as building resilience, for which two priorities stand out: (i) accelerating the decline in total fertility toward replacement fertility levels; and (ii) addressing child stunting by expanding access to safe water, sanitation and hygiene (WASH) facilities. Second, improving economic governance is crucial for aligning economic incentives with climate and development imperatives and facilitating the mobilization of finance, including substantive international support.

Figure 2: Climate Transitions for Pakistan



Priority Sectoral Transitions

Priority #1: Transforming the Agriculture–Food System

A transformation of the agri-food system will bolster rural incomes, strengthen food and water security, and underpin a sustainable and climate-resilient rural economy and environment.

Pakistan's agri-food system is vital to the nation's economy, yet productivity has been chronically low, and the sector faces significant new risks from climate change. Agriculture accounts for 23 percent of the country's GDP⁹ and is the largest source of export earnings. Over 63 percent of Pakistan's people¹⁰ and four out of five poor households reside in rural areas and are largely dependent on agriculture. The country is also the single-largest employer (40 percent), including the vast majority of employed women. It has the world's fifth-largest beef herd and produces 6 percent of the world's milk supply. Agriculture is therefore critical for food security, economic growth, and poverty reduction. However, sectoral growth, at 2.1 percent per year, has been sluggish over the last decade. Labor productivity in agriculture has also been virtually stagnant over the past three decades due to the very low productivity of crop agriculture and livestock. The yields of major crops are 1.5 to 4.2 times below their field potential, and 2.1 to 5.6 times below international best practice. Unsurprisingly, rural poverty has also declined much more slowly, opening up a large rural-urban poverty gap. Under a pessimistic climate scenario, crop yields could decline further by up to 50 percent, posing an extreme threat to food security. The extreme climate vulnerability of the food system became all too evident in the devastating floods of 2022.

Agriculture-linked degradation is pushing water and land resources beyond the threshold of safe use and causing ecosystem decline across landscapes. This has substantially diminished the agri-food system's contribution to sustainable growth, poverty reduction, and food security. There has been extensive deforestation and land degradation over the past few decades resulting from the expansion of crop agriculture into pastures and rangelands, the excessive and inefficient use of surface and ground water, the overuse of chemical inputs and agronomic practices like monocropping and leaving soils bare. Such practices promote neither climate resilience nor enhanced productivity. Soils even in the most fertile areas of the Punjab are now showing low to extremely low fertility. Some 35 percent of irrigated land is also water-logged, and another 30 percent is highly saline, making it unfit for agricultural production. Rangeland productivity has also slumped to just 25–50 percent of its potential, diminishing a wide range of other ecosystem services.

The irrigation and drainage system that undergirds agriculture is in disrepair and ill-equipped to manage climate extremes. The sector absorbs over 85 percent of all water withdrawn but has extremely low water productivity. Under a high global warming scenario (3 °C by 2047), agriculture will need to release one-tenth of current irrigation withdrawals—about 12 billion cubic meters—to meet industrial and domestic needs. The over-abstraction and contamination of ground water reserves are reaching a tipping point. Maintaining current levels of groundwater overuse in agriculture will severely limit its role as a buffer in water-scarce and drought years. Excessive surface water withdrawals and use of agro-chemical contaminants have also affected river ecology, and the degradation of wetlands and marine-coastal ecosystems reducing the productivity of delta marine fisheries. Mangrove forests, critical for coastal resilience and biodiversity, are under threat. The cost of environmental damage to the Indus River delta is estimated at US\$1–2 billion annually.

The agri-food system is awash with inefficient, costly, and inequitable subsidies that are an economic burden and create a distorted incentive structure, which plays a significant role in the sector's poor performance. In recent years, direct and indirect subsidy support to agriculture and irrigation in Punjab and Sindh has accounted for about US\$2.2 billion to US\$2.7 billion in public spending per year. This includes direct subsidy programs, tax relief for inputs, import and export subsidies, and revenue

⁹ World Bank, "Agriculture, forestry, and fishing, value added (% of GDP) – Pakistan" (World Bank website, 2021), <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=PK>.

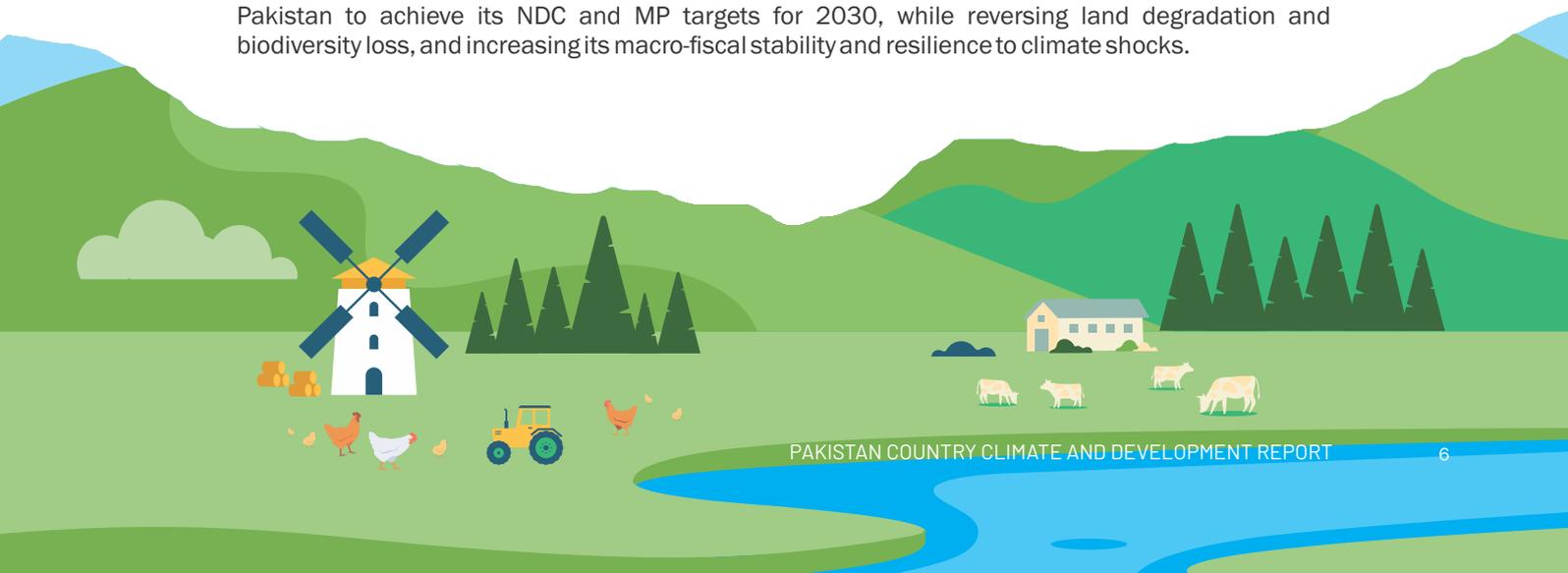
¹⁰ World Bank, "Rural Population (% of total population) – Pakistan" (World Bank website, 2021), <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=PK>.

gap financing. The water tariff (*abiana*) for irrigation, for example, which is levied per unit of cultivated area, cannot support even routine maintenance of the Indus Basin Irrigation System (IBIS). Additionally, the *abiana* collection system is archaic and non-transparent, leading to annual forgone revenue of US\$66 million. Additionally, there is no charge for the extraction of ground water. Fertilizer subsidies cost another US\$1.1 billion per year yet do not benefit smallholder farmers or the productivity of agriculture. The procurement of wheat, as noted above, is also regressive and costly; and has created another circular debt-like situation, which benefits only commercial banks, millers and large farmers. Sugarcane and the production of sugar are also subsidized through high import duties, export subsidies, and licensing restrictions, which prevent the free entry of new millers, effectively binding farmers to sell to the regional mill under quasi-monopoly conditions. This not only increases post-harvest losses due to high wait periods to access mills, but also carries high environmental costs since sugarcane has the highest per hectare water requirement and fertilizer use. It has also contributed to the public health crisis in the country. Pakistan has the highest rate of diabetes globally. The consumption of sugar and processed foods containing sugar has risen significantly across the country at the expense of more diverse, more nutritious, and environmentally less damaging foods.

At the same time, the services essential for increasing productivity—research, extension, and the development of markets—have been neglected. This has limited the options for diversification into more climate-resilient and higher-value crops and climate-resilient agricultural practices. There has been virtually no improvement in seed quality, production methods, farm machinery or technology. Post-harvest losses add to resource waste and reduce access to food, particularly for the poorest. Some 35–40 percent of harvested fruits and vegetables, 10–15 percent of cereal grains, and 20 percent of milk never reach the market due to the lack of development of value chains. A disproportionate focus on irrigated crop agriculture has also limited investment in the management of rangelands, wetlands and marine landscapes and consequently limited their contribution to the agriculture-food system.

Skewed land ownership and tenure insecurity are further impediments on the path toward a more sustainable and climate-resilient agriculture. Land ownership is extremely concentrated in Pakistan. The Gini index of land is close to 0.70 and has remained quite stable over time, particularly in Sindh and South Punjab where there are still large landholders who hold thousands of acres of land while the vast majority of farmers are landless, share-rent, or fixed-rent tenants on tenuous contracts. The insecurity of tenure is accentuated by the lack of alternative employment and educational opportunities in rural areas, which makes landless or land-poor farmers dependent on their landlords. It also reduces the willingness and ability of smallholder tenants to make the needed on-farm investments to adopt climate smart agriculture (CSA) practices, especially where the capital cost is high.

Despite these challenges, the agri-food sector provides perhaps the strongest case for a development-resilience-mitigation triple win. Improvement in agricultural productivity will require a sharp focus on restoring soil and improving water management and water use practices through the application of climate smart and regenerative practices. Done well, this could catalyze an inclusive growth process driven by the rural economy, which would boost productivity and exports, improve dietary diversity and quality, enhance farmer incomes and resilience, and reduce emissions through carbon sequestration in soil and a reduction in methane emissions through better livestock management. The transformation of the agri-food system presents perhaps the fastest route for Pakistan to achieve its NDC and MP targets for 2030, while reversing land degradation and biodiversity loss, and increasing its macro-fiscal stability and resilience to climate shocks.





Policy Recommendation #1: Repurpose existing subsidies to introduce efficiency and use freed-up resources to provide support to vulnerable subsistence farmers and remove barriers to transformative, climate-smart, on-farm investment and value-chain improvements.

Repurposing existing subsidies is necessary for growth and climate resilience. To do this effectively, historical experience highlights the need for careful communication and the phasing of reform efforts to ensure a gradual process that has political and social acceptance, as well as the protection of poor households and farmers, especially during the transition. Key recommendations include: (i) Phase down the wheat support system; (ii) Gradually remove the power tariff subsidy to electric tubewells, and pilot new models for the solarization of tubewells and incentivize water conservation to avoid an adverse impact on groundwater sustainability; (iii) Gradually phase down the natural gas subsidy for chemical fertilizer production so that agricultural production is not adversely affected by a rise in the cost fertilizers during the transition, as farmers shift to natural fertilizers, biofertilization and other climate-smart soil management practices; (iv) Implement reforms in the sugar sector; and (v) Re-channel fiscal savings from the reform of long-standing subsidies as “smart subsidies” to poorer farmers to promote resilient farming practices. Removing perverse incentives in the agriculture sector must be introduced as part of a portfolio of measures where farmers are provided technical and financial support to enable the transition.



Policy Recommendation #2: Support the sustained adoption of CSA and regenerative agriculture practices.

Climate-smart and regenerative agricultural practices could reverse the decline in productivity, enhance the viability of the agri-food system, and reverse ecosystem degradation. Key actions for a broad adoption of such practices include: (i) Invest in research on context-specific methods for scaling up climate-smart and regenerative farming; and improve coordination between research and dissemination; (ii) Modernize extension services and improve access to credit, machinery, and technology; and (iii) Invest in the development of sustainable value chains with a focus on access by smallholder farmers, potentially through participatory multi-stakeholder forums.



Policy Recommendation #3: Improve and modernize irrigation and drainage to provide climate-resilient, predictable, and flexible services in response to changing demand.

The services of the IBIS are poorly designed to deal with current hydrology and demand patterns; and the system is financially unsustainable. The distribution of water is highly imbalanced. This results in overuse of water, which has left 35 percent of irrigated land waterlogged, while many farmers at the tail end of canals are deprived of reliable access to surface water. The immediate objective should be to make the surface-water system more demand-responsive to allow for better conjunctive management of surface and ground water. Relatedly, there is also a need to secure financing to implement the national flood protection plan while taking into account the need to operationalize the recently adopted National Water Policy, National Climate Change Policy, and National Food Security Policy. Key recommendations include: (i) Invest in infrastructure to improve hydraulic control and flow measurement on all tiers of the distribution network; (ii) Improve water allocation practices and water measurement, billing, and collection, starting with the digitization and automation of the water tariff (*abiana*); and (iii) Expand high efficiency irrigation system to conserve water and leave more water for environmental use. This, along with functioning drainage systems and better management of flood plains, has become imperative after the devastation created by the 2022 flood.



Policy Recommendation #4: Strengthen ecosystems and landscape restoration.

Unmanaged grazing is impairing the health of rangelands and diminishing a wide range of other critical ecosystem services, including the regulation of water flow, conservation of soil and biodiversity, protection from land erosion, and carbon sequestration. Rangeland productivity has slumped to just 25–50 percent of its potential, and desertification has currently affected 43 million hectares. Key recommendations include: (i) Support smallholder farmers to improve their livestock productivity; (ii) Strengthen economic incentives for community action to conserve and restore ecosystems; and (iii) Build institutions and capacity on climate-smart livestock systems and landscape restoration.

Priority #2: Building Resilient and Livable cities

Making Pakistan's cities more climate-resilient and livable will enhance their competitiveness and lower emissions, but this requires investment in, and improved management of, municipal services.

Pakistan's cities are caught in a cycle of unplanned urbanization and sprawl, continually outstripping the central and municipal governments' fiscal and logistical capacity for city planning, development of needed infrastructure, and provision of municipal services. Today, nearly 40 percent of Pakistan's population lives in urban areas; this proportion is expected to rise to nearly 60 percent by 2050. Pakistan's major cities are among the least livable in the world, with substantial portions of their populations deprived of basic municipal services like water, sanitation, and waste removal, which poses grave threats to public health. Unplanned urban sprawl and congestion are the result of outdated land use planning and control practices, the uneven and patchy implementation of existing regulations, weak municipal governance, and the near-complete reliance of city finances on fiscal transfers from the central government.

The way cities have developed and are managed also makes them highly vulnerable to climate disasters. Temperatures in urban areas routinely reach life-threatening levels because of the urban heat island effect, the absence of adequate green cover and the loss of natural ecosystems, which intensifies the infrastructural thermal effect, amplifying health and productivity losses. Many cities are also highly exposed to flood risk. Karachi, the country's largest city and business center, stands out in this regard. Floods routinely cause massive damage to infrastructure and loss of lives and livelihoods in the city. Karachi has been experiencing monsoon floods with rising frequency and intensity, largely due to poor planning. Half of Karachi's population lives in temporary settlements, lacking any services, and many live in close proximity to natural drainage channels which have been blocked by unplanned, and often illegal construction, making them highly exposed to pluvial floods.

Cities are also major contributors to GHG emissions and have high levels of air pollution. Cities account for a large share of emissions, from energy use, transport, industry, and waste management, which contributes significantly to air pollution. Pakistan's ten largest cities all exceed the World Health Organization (WHO) threshold for air pollution by more than 10 times. Air pollution poses a significant threat to the health and productivity of urban dwellers. If Pakistan reduced air pollution to internationally established standards, premature deaths from the effects of pollution could decline by up to 53 percent by 2030 and be fully eliminated by 2040, significantly cutting health costs while achieving climate mitigation benefits.

There is an urgent need to strengthen the institutional and revenue generation capacity of local governments for improving service provision and attracting private investment. Cities need to prioritize actions that create sustainable revenue streams for investment in resilient infrastructure and improved delivery of basic municipal services. They also need to provide targeted incentives to attract private sector participation. The Urban Immoveable Property Taxes (UIPTs) normally an important source of local revenue, is at 0.13 percent of GDP in Pakistan and very low compared to other low- and middle-income countries. City governments rely on intergovernmental fiscal transfers and have limited space for generating own-source revenues. This creates a constrained fiscal space

with a low capacity to plan and finance climate-smart infrastructure at the levels needed. Public-Private Partnerships (PPPs) and subnational financing mechanisms could be crucial instruments for mobilizing additional financing for urban resilience but the policy frameworks for these need to be strengthened.

The heightened climate vulnerability of many Pakistani cities means that the synergy between positive climate action and urban development objectives is very strong. Climate action therefore needs to be integrated into broader, holistic improvements in urban planning and management, infrastructure investment, and service provision in both primary and secondary cities.



Policy Recommendation #5: Strengthen urban planning and management capabilities.

High-density expansion is essential for the emergence of the “agglomeration economies” necessary to create more productive cities and reach critical levels of productivity. Low-density makes the provision of utilities and other services more costly per person. But most Pakistani cities are experiencing lower-density expansion on their fringes. The average city has grown spatially at 6.8 percent annually with a 1.9 percent growth in population.¹¹ Improved land use planning would not only create more sustainable and livable cities, but it would also allow for more options for building city resilience cost effectively and achieving greater reductions in emissions. Key recommendations include: (i) Modernize urban land management systems to incentivize urban densification; and (ii) Enforce land regulation and land use planning and control measures.



Policy Recommendation #6: Pursue green urban mobility.

It is estimated that inefficiencies in the urban transport sector already cost Pakistan 4 to 6 percent of its GDP every year. Due to a growing population with a high demand for mobility, the number of vehicles is expected to more than double in most cities by 2050. This will further aggravate congestion, worsen air quality, and amplify health risks. A shift to greener urban transport presents an opportunity for climate mitigation, which could also help reduce air pollution and its associated health and productivity costs.¹² Priority actions in this area include: (i) Large-scale investment in mass transit solutions; (ii) Incentivizing a shift to pedestrian mobility and non-motorized transport; (iii) Shifting all motorized shared transport vehicles, including 2- and 3-wheelers to zero emissions vehicles; and (iv) Shifting 60 percent of the bus fleet to zero emissions by 2030, with the aim of replacing 100 percent of the fleet with zero emissions vehicles by 2050.



Policy Recommendation #7: Promote climate-smart municipal services and circularity.

Improving municipal services could make a significant contribution to both mitigation and adaptation targets. Specifically, if waste dumping were reduced by 25 percent, overall total emissions from SWM would fall 50 percent by 2035. Improving SWM would contribute to adaptation by reducing the clogging of drains and thereby flood risk. Modeling shows that clearing storm water drains in Karachi would reduce the annual average damage resulting from flooding by more than 30 percent.¹³ Better SWM would also reduce health risks. Key recommendations include: (i) Strengthening regulations for SWM and a transition to low-emissions waste management; and (ii) Expanding water and wastewater treatment capacity and rehabilitation of water supply infrastructure.

¹¹ World Bank, *Secondary Cities Analytics* (Draft). (Washington DC: World Bank Group, 2021)

¹² A clean air scenario that substantially reduces emissions of both BC and CH₄ may also improve the yield of stable crops, even in the heavily air-polluted Indo-Gangetic Plain.

¹³ To identify the impact of solid waste and debris blocking the channels, this assessment was done using a HEC-RAS hydraulic model to calculate a first-order estimate of damage and potential reductions from the clearing of stormwater drains for various return periods. Two scenarios were modeled: a) a baseline scenario estimating inundation and damage, with reduced conveyance capacity of drains; b) an improved scenario reflecting reasonably free-flowing drains without blockages.



Policy Recommendation #8: Create sustainable revenue streams for green and resilient urbanization.

Enhancing Own Source Revenues (OSRs) of local governments is important for ensuring sustainability. However, OSRs only account for just one-third of revenues at the provincial level, and city governments have extremely limited regulatory capacity for revenue mobilization. This is insufficient for a credible improvement in municipal services for city residents let alone the financing of climate-resilient infrastructure at a scalable level.¹⁴ Analysis from Sindh and Punjab indicates that the collection of UIPTs could double, and increase sixfold over time, with well-designed and targeted interventions.¹⁵ Key recommendations include: (i) Strengthening cost recovery for urban municipal services; (ii) Strengthening the legal and regulatory framework for PPPs; and (iii) Developing a performance-based, climate-resilient and grant-financing mechanism.

Priority #3: Accelerating a Just Transition in Energy and Transport

Pakistan's energy and transport sectors are highly polluting and a drain on the country's foreign exchange reserves. Transitioning to sustainable energy and transport is feasible and would contribute significantly to development and climate goals.

Pakistan's energy sector is a critical enabler of economic development and poverty reduction, but it is currently a huge drain on public finances and foreign exchange. It delivers poor outcomes in terms of affordability and reliability; and is the second-largest contributor to GHG emissions. Imported fossil fuels provide 43 percent of the country's energy supply and cost the country US\$13 billion annually. Electricity costs are high, but reliability and quality of supply are poor, and there are gaps in access to electricity and clean cooking fuel, particularly in rural areas. Inefficiencies in distribution, poor planning and management, and badly targeted subsidies have led to huge fiscal deficits that create barriers to future investment. Similar issues can be seen in the natural gas sector, where a long-term decline in domestic production has led to an increase in costly imports. Pakistan has significant potential for solar and wind power development, but so far both have been largely neglected. Instead, successive governments have opted to invest in new coal and gas capacity with inflexible contracts, adding to the sector's financial predicament. Furthermore, while total installed capacity on the national grid exceeds 40 gigawatts (GW), the “peak capability”, which takes account of plant and fuel availability and a host of other technical factors, is currently just under 28 GW against a peak summertime demand of over 30 GW. This, along with the high cost of fuel, and the losses associated with supplying non-paying consumers, was the cause of the extensive scheduled power cuts over the course of 2022.

Resolving the energy sector's debt requires the government to maintain its commitment to comprehensive reforms and transition away from fossil fuels. Needed reforms in the power sector include setting cost-reflective tariffs, improving the targeting of subsidies, reducing the cost of generation and addressing inefficiencies in distribution. As part of the power sector reforms supported by the World Bank, the government has introduced changes to the tariff structure for domestic consumers to ensure better targeting of the subsidies, ensuring that a higher portion flow to lower-income households. Central to reducing costs, in addition to ongoing renegotiation of the power purchase agreements for legacy generation projects, is an immediate and rapid scale-up of renewable energy, which is now the least-cost mode of power generation. This is already recognized in the government's least-cost plan for the expansion of generation capacity, which is revised annually and calls for the development of over 17 GW of solar and wind capacity—in addition to 22 GW of hydropower capacity—by 2030. No additional fossil fuel capacity is envisaged beyond those plants that are already committed. Finally, the publicly owned electricity and gas distribution companies suffer from chronic inefficiencies, including outdated metering practices, low collection rates, high technical

¹⁴ Given the country context, local government green bonds and green taxes also have limited potential in the short to medium term.

¹⁵ World Bank (2021), *Overview of the Urban Immovable Property Tax in Pakistan and Revenue Simulations (Draft)*. (Washington DC: World Bank Group, 2021).

losses, rampant theft, and gas leakages as a result of old and poorly maintained pipelines and sabotage.

Pakistan will also need to improve demand-side efficiency, with special attention to industry and transport in light of their significance for energy consumption and long-term decarbonization. The energy intensity of Pakistan's GDP is higher than other low- and middle-income countries, indicating enormous potential for energy efficiency and conservation measures targeting appliances, buildings and industry. The industrial sector is particularly energy-intensive and is reliant on imported coal, which creates additional pressure on fuel imports and contributes to air pollution. Together, industry and transport account for 67 percent of Pakistan's energy consumption and are responsible for most of the country's coal and oil consumption. The transport sector faces the triple challenge of worsening urban congestion, poor air quality, and rapidly growing GHG emissions. Passenger trips and intercity freight are the fastest-growing contributors to sectoral emissions.

An energy transition based on the measures outlined in this report would reduce emissions and improve the sector's financial sustainability and performance. Most of these measures make economic sense even without consideration of climate change. They would reduce consumer energy costs over the long run, improve the government's fiscal space, lessen the burden on foreign exchange reserves, and could also be a strong driver of growth, job creation, and poverty reduction. A reformed energy sector, based on cost-reflective tariffs, transparent and least-cost contracting, and efficient distribution companies could eliminate the circular debt and attract significant private investment. Reducing reliance on fossil fuels through the scale-up of renewable energy is the least-cost pathway that could result in immediate fuel savings, especially if combined with energy efficiency and conservation programs targeting low-hanging fruit. Analysis shows that a sustainable energy transition, and the application of a carbon tax, would support higher growth, reduce emissions and pollution and, with the right policies, protect the poor. A transition to greener industrial and transport sectors would further reduce emissions and significantly improve air quality, making cities more livable, and would boost the country's export competitiveness— a key driver of growth, job creation, and poverty reduction.



Policy Recommendation #9: Transition away from fossil fuels.

Based on the government's least-cost capacity expansion plan for the power sector, and supported by the World Bank's own analysis, there is no justification for further investment in fossil fuel capacity, even before considering GHG emissions and other environmental externalities. The scale-up of solar and wind power is long overdue and needs to be prioritized to reduce the cost of generation and move away from fossil fuels. Key recommendations include: (i) Accelerate the development of renewable energy capacity, starting with the immediate procurement of 2 GW of solar and wind capacity, through competitive bidding by the middle of 2023, followed by annual rounds of procurement to meet the government's targets; and (ii) No further development of fossil fuel power plants, reflecting the conclusions of the government's own least-cost plan and building on the moratorium on plants using imported coal, along with the possible utilization of climate finance to support early retirement of existing plants.



Policy Recommendation #10: Improve supply-side efficiency.

Improving supply-side efficiency is critical for stemming commercial and technical losses and introducing greater financial discipline and transparency. This will involve a politically difficult restructuring of tariffs and state-owned distribution companies, without which the sector will continue to bleed resources and provide poor services to households and firms. Key recommendations include: (i) Fully implement tariff and subsidy reforms to ensure full cost recovery in the electricity and gas sectors; (ii) Introduce private-sector participation in the management of the power distribution companies; (iii) Ensure the successful introduction of a competitive wholesale power market to bring greater transparency to future contracting; and (iv) Increase public and private investment in the transmission and distribution infrastructure.



Policy Recommendation #11: Place greater emphasis on enhancing demand-side efficiency.

Reducing the country's reliance on imported fuels and mitigating the impact of high prices on consumers can be made much easier by pursuing demand-side efficiency, with an immediate focus on measures that reduce peak demand for electricity and gas. Key recommendations include: (i) Target quick wins in order to generate national support and build early momentum, such as setting minimum performance standards for mass-market appliances and improving the energy efficiency of existing and new buildings in the commercial and residential sectors; (ii) Shift to electricity where economically and technically feasible, such as for space and water heating; (iii) Launch commercially driven replacement or exchange programs for inefficient older appliances, such as fans and incandescent lighting; and (iv) Develop the market for energy service companies to mobilize private-sector investment.



Policy Recommendation #12: Decarbonize the industrial and transport sectors.

The industrial sector has many economically beneficial opportunities for raising energy efficiency and adopting technological improvements. Achieving deeper decarbonization, however, will require fuel switching where this is feasible, process changes (for example, in cement manufacture), and the potential deployment of carbon-capture technology. Concessional climate finance will be required to help pilot and scale-up interventions that are not yet commercially viable, supported by regulation and private sector investment. In the transport sector, the urgent priority is to avoid hard-to-reverse lock-in effects by investing now in mass transit and ensuring a revival of railway freight. Key recommendations include: (i) Incentivizing decarbonization and efficiency improvements in industrial energy use through regulations, fiscal incentives, and improved access to financing; (ii) Supporting the electrification of the industrial and transport sectors, and fuel switching from coal where feasible, including to green hydrogen and bioenergy; (iii) Accelerating large-scale investment in mass-transit solutions; (iv) Modernizing the freight sector; and increasing the market share of rail freight; and (v) Enhancing private sector participation in Pakistan Railways, which chronically runs deficits.



Policy Recommendation #13: Ensure a “just” energy transition.

Any national development transition of this magnitude will likely face resistance, not only from vested interests but also because it could result in lost jobs and livelihoods as industrial, commercial, and public sector organizations modernize and adapt. It is important that Pakistan ensures a just energy transition, which should include efforts to tackle remaining gaps in access to modern energy services. Key recommendations include: (i) Have a clear understanding of those who might stand to lose politically and financially and avoid disproportionately favoring some interest groups over others; (ii) Protect the poor and vulnerable through targeted retraining and financial support; and (iii) Achieve universal access to modern energy by 2030, with a particular focus on rural households and on the uptake of off-grid electrification and clean-cooking solutions.

Key Enablers of the Climate Transition

Priority #4: Strengthening human capital to achieve sustained and equitable development and climate resilience

To sustain economic progress and the transition to a green and resilient economy, Pakistan needs to address its human capital crisis.

One of the highest-priority needs facing Pakistan is to improve the population's health status, particularly child stunting, which affects 40 percent of the population. The impacts of child stunting include reduced educational attainment, lifelong health challenges, and cognitive deficits that can significantly influence lifetime earnings.¹⁶ These health and productivity challenges weaken the capacity of the economy to grow sustainably and benefit from the employment opportunities that will emerge with a transition to a greener economy. They also make those affected more vulnerable to the physical damage from a changing climate and increase the risk of a further deepening of inequality and poverty. Access to safely managed water and sanitation is a critical factor in addressing child stunting, and improving health status across the board. However, currently up to half of all potable water sources in Pakistan are contaminated with pathogens. The near absence of the safe treatment of waste has intensified fecal contamination. This needs to be addressed urgently, with the goal of bringing child stunting down to 5 percent by 2050. This report shows that this would boost GDP by increasing labor market participation, raising labor productivity and quality, and hastening the decline in the poverty rate. Such a policy would achieve its strongest effects if combined with investments in education that ensure universal schooling up to matriculation.

An accelerated decline in the fertility rate would have similarly large benefits for both equitable growth and resilience. Pakistan's fertility rate is still at 3.3 births per woman, making it an outlier in a region where fertility rates are now generally at or near 2 (the replacement level). Accelerating the fertility decline in Pakistan to reach replacement levels by 2035, instead of the currently projected timeline of 2050, would reduce its expected population in 2050 from 336 million to about 303 million. This would have multiple positive effects: it would increase the prospects for food and water security, reduce the stress on natural capital and biodiversity, enhance urban resilience and basic service provision, reduce fiscal stress and macro-fiscal fragility, lessen emissions, and have large beneficial impacts on gender and socioeconomic equity.

Economic growth and the decline in poverty associated with strengthening human capital would, however, be accompanied by a rise in emissions as households coming out of poverty begin to demand and consume more energy. To counter the effects of this, it is even more important that the share of fossil fuel in the energy mix be further reduced between 2030 and 2050 in line with the recommendations above.



Policy Recommendation #14: Ensure universal access to safely managed WASH and family planning services.

Key recommendations include: (i) Provide equitable and sustainable access to safely managed water supply and sanitation, as per Sustainable Development Goal 6, to all households; and (ii) Invest in family planning to reduce the fertility rate to replacement levels by 2035.

¹⁶ Mansuri et al., *When Water Becomes a Hazard: A Diagnostic Report on The State of Water Supply, Sanitation, and Poverty in Pakistan and Its Impact on Child Stunting* (working paper) (Washington DC: World Bank Group, 2018), <https://openknowledge.worldbank.org/handle/10986/30799?show=full>.



Policy Recommendation #15: Build a shock-responsive social protection system.

A more shock-responsive national social protection system would help build the resilience of poor and vulnerable households to prepare for, cope with, and adapt to climate shocks. Such a social protection system could support households in the face of climate change and related risks by reducing poverty and vulnerability and increasing their coping capacity before the arrival of a shock. It would provide a steppingstone toward climate-resilient livelihoods and support inclusive disaster preparedness and disaster response and recovery. Based on the recent flood relief process, it is evident that the current National Socio-Economic Registry (NSER) cannot support most Pakistani households in the informal sector. These are households that fall outside existing risk-sharing and risk-mitigation mechanisms and are not eligible for existing safety net programs targeted to the very poor, nor covered by social insurance, including formal pensions. Key recommendations include: (i) Establish a policy framework for shock-responsive social protection, including ex-ante actions to reduce risk; (ii) Shift to a dynamic NSER as an integral element of an adaptive social protection delivery system; and (iii) Expand the coverage of the poor and vulnerable by social protection programs, and increase benefit adequacy.

Priority #5: Aligning financing policies, incentives, and institutions to support the scaling up of climate actions

Implementation of such a broad and transformative set of policies and investments will require a smart financing strategy, greater private sector involvement and strengthened institutions.

The total investment needs for a comprehensive response to Pakistan's climate and development challenges between 2023 and 2030 amount to around US\$348 billion (or 10.7 percent of cumulative GDP for the same period).¹⁷ This consists of US\$152 billion for adaptation and resilience and US\$196 billion for deep decarbonization. This figure is enormous in comparison with the historic average development budget at the federal and provincial levels and with currently available finance. However, this estimate is likely an underestimation due to the unavailability of data on the investment needs for key transition, such as the transformation of the agri-food system, investment in flood risk management, shock-responsive social protection, and climate-resilient rural connectivity.

These estimates suggest that the country's climate and development financing needs are much larger than Pakistan's current fiscal space. With current levels of funding, Pakistan could potentially deliver around US\$39 billion from public resources (including concessional development financing) between now and 2030. It could crowd in an additional US\$9 billion from private sector investments, through public-private partnerships and other modalities. This will clearly not be enough to address the priority transitions identified above.



While Pakistan seeks additional international financing, the government is encouraged to explore the repurposing of subsidies in the energy, agriculture and water sectors and looks for ways to improve tax and tariff collection. This can be done while protecting the poorest and most vulnerable through well-targeted programs and transfers. Regarding the first, Pakistan could maintain its commitment to energy decarbonization and accelerate a comprehensive reform in the energy sector, and pilot the implementation of carbon pricing instruments.¹⁷ If fully implemented, the combined revenue of these measures could amount to around US\$10 billion per year.¹⁸

Regarding the second, there is also enormous room for improved tax and tariff collection. These reforms would not only create substantial fiscal space for climate actions, but they would also signal Pakistan's commitment to addressing its chronic fiscal stress and governance gaps that have undermined investment in the past. The full implementation of these reforms will undoubtedly take time and there is no question that Pakistan needs immediate international support to manage the rehabilitation and reconstruction costs of the flood and kick-start critical policy reforms to build a more climate-resilient and productive economy. However, getting started in earnest in a few priority areas will provide the needed signals to both domestic investors and global financial institutions that Pakistan is taking the necessary steps to strengthen its own economy, making it easier to unlock more domestic and global climate resources.

A comprehensive climate-financing strategy will need to be developed with higher domestic resource mobilization, more accountable and impactful allocation of public spending, and higher levels of international climate finance. Key elements of this include optimizing the utilization of domestic resources by removing inefficiencies and inequities in both spending and revenue collection; mobilizing additional domestic finance by widening the tax base and recovery of service delivery costs; and creating a policy environment, including the development of innovative financing mechanisms, to crowd in private investment and strengthen the country's capacity to access international climate finance.

Domestic revenue mobilization and private and international finance are complementary. Cost recovery, predictable tariffs, and sustainable fiscal and debt management policies will lower the risks for private investors and reduce overall costs. Regulations to limit pollution, mandate reporting, and account for climate risks on corporate and financial sector balance sheets would enhance the business case for green investments. PPPs and innovative financial instruments could attract private funding for adaptation and mitigation investments. Given the size of the expected climate shocks, greater concessional international finance will be essential. Pakistan can and should forcefully make its case for this, but donors may be more willing to offer sustained support if it is perceived that revenue leakage and governance issues are being systematically addressed.



Policy Recommendation #16: Align institutions, policies, incentives, and financing to scale up climate actions.

Action will be needed to refine, prioritize, and sequence investments. The government should prioritize interventions that simultaneously deliver development outcomes and climate benefits and sequence policy actions realistically, based on their overall impact and relative urgency. However, as the magnitude of the recent floods shows, the government may also be forced to evaluate some hard trade-offs between investing in climate adaptation and other development interventions. Immediate recovery and reconstruction spending, as well as needed investments to build resilience to future climate extremes, will require significant international support in addition to Pakistan's own efforts to enhance revenue mobilization and reduce macroeconomic imbalances.

Institutional capacity needs to be strengthened to implement this agenda. The NAP proposed under the NDC ought to be developed and implemented. Mainstreaming climate priorities into broader development plans is a critical starting point. Furthermore, climate and disaster risk screening

¹⁷ This aggregate number is very preliminary, built up on uneven data, and would need to be further refined as a priority. However, it is consistent with the orders of magnitude included in Pakistan's NDCs, which have an estimated financing need of US\$200 billion over the same period (about \$100 billion each for mitigation and for adaptation).

¹⁸ This will require a careful evaluation of international best practices.

and climate budgeting should be embedded within the public financial management system to improve the transparency and efficiency of public spending on climate actions.

Key recommendations include: (i) Set up systematic metrics and measurement and reporting systems for climate actions; (ii) Introduce climate-risk screening and climate-informed public financial management at the federal and provincial level; (iii) Develop and implement a climate and disaster resilience framework and financing strategy, including innovative financing mechanism such as green bonds and carbon pricing schemes; (iv) Finalize and implement the proposed NAP and Provincial Action Plans to mainstream climate and broader environmental actions into development planning; (v) Green the financial sector, including through financial regulation, taxonomies, reporting and disclosure standards, and the development of green financial tools and instruments; and (vi) Strengthen the institutional and regulatory framework to attract private investment for adaptation and resilience.

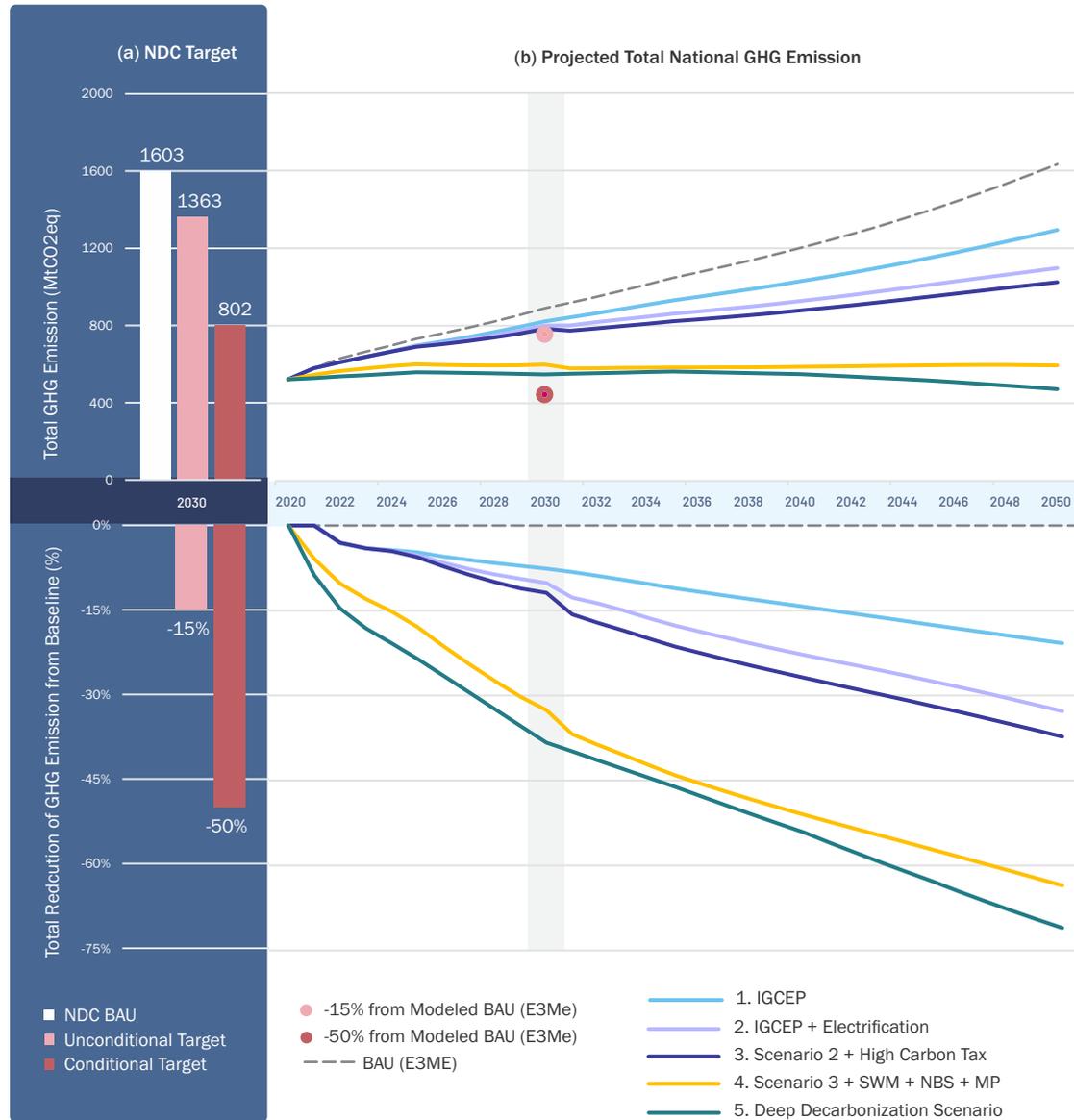
Modeling the Effects of Key Climate Transitions

Integrated low-carbon and human-centric climate policies could boost economic growth, labor productivity and poverty reduction, while tackling climate and environmental challenges. The modelling conducted for this report revealed three things: First, that the implementation of Indicative Generation Capacity Expansion Plan for 2021-30 (IGCEP) alone will lead to a moderate boost in GDP and substantially reduce GHG emissions and air pollution. Depending on how the investment is financed, there could be a modest increase in tariffs. This may require targeted transfers to protect poor households to avoid any increase in poverty. Second, if the more ambitious plan of fuel switching is also implemented, which shifts the country away from coal by increasing the share for renewable electricity, then the initial boost to GDP will be higher and GHG emissions and air pollution levels will fall more sharply, but again, depending on how the investment is financed, if there is a rise in tariffs to pay off the investment, poverty could rise unless compensating transfers are in place to protect poor consumers. Third, if carbon taxes are implemented concurrently with IGCEP and expanded electrification, there is a significant boost to GDP through the decade of the 2040s. In this case also, carbon tax revenues will need to be used in part to protect poor households from rising energy bills.

A climate-resilient, low-carbon and equitable development pathway would enable Pakistan to reach its NDC targets. Figure 3 shows that by 2030 the low-carbon transition of the energy sector through implementing the IGCEP, promoting electrification, increasing transmission and distribution efficiency, and establishing a carbon tax could help Pakistan reduce emissions by 12 percent from BAU. Investing in SWM, completing the NBSs identified in the NDC, and achieving the MP could lead to further emission reductions of 21 percent.

The CCDR also explored an aspirational deep decarbonation scenario. This was based on a continuation of the above-mentioned policies but accompanied by a more aggressive industrial and transport decarbonization schedule, including the adoption of green hydrogen and commercially viable carbon capture, utilization and storage technology in the cement sector, further improvement in the supply- and demand-side energy mix and energy efficiency as well as augmented implementation of NBSs to reach 15 percent forest cover. This more ambitious scenario would allow Pakistan's emissions to peak around 2035-40, decline to 40 percent below BAU by 2050, and achieve net zero status by 2070. This pathway could be economically and technically feasible but would be very challenging and would require that Pakistan attract very significant international support in the form of low-cost financial assistance, technology transfer and capacity building. As Pakistan embarks on prioritizing resilience and win-win mitigation priorities in the coming years, it should also deepen its analysis of the feasibility and implications of such a longer-term pathway because the benefits would be extensive and far-reaching.

Figure 3: Aggregated GHG Emissions Impacts of Different Policy Scenarios for 2020–2050 (right panel)¹⁹ in Comparison to the NDC Target for 2030 (left panel)



¹⁹ **IGCEP:** Rapid expansion of RE including wind, solar and hydropower, reaching a total of 63 percent production by 2030, per the IGCEP 2021-2030. **Electrification:** Electricity as a percentage of final energy consumption increases from 20 percent in 2020 to 28 percent by 2030. **Carbon Tax:** Rate of US\$2–US\$10/tCO₂ in 2025 gradually increasing to US\$40/tCO₂ by 2050. Revenues from taxes are recycled as (a) rebates to hard-to-decarbonize industries, and (b) transfers to the poorest 50 percent of households. **SWM:** The high emissions abatement scenario assumes reducing dumping by 5 percent by 2025, 25 percent by 2030, and 50 percent by 2035. **NBS:** Implementation of the Billion Trees Afforestation Project and the TBTP, which together will sequester CO₂ around 500 million MtCO₂e by 2040 per the NDC. **MP:** In 2021, Pakistan signed the MP to curb its methane emissions by 30 percent, to about 99 MtCO₂e, by 2030. It is assumed that the government will maintain this same amount of methane emissions between 2030 and 2050.

The Imperative of Action: Toward a Climate-Resilient, Low-Carbon and Equitable Development Pathway

The heat wave and devastating floods of 2022 call for urgent climate action in Pakistan. The policy recommendations presented in this report for domestic reforms as well as international climate finance are even more pressing in the face of this wake-up call. The level of damage sustained is clearly the result of intensifying climate change, but it also highlights the lack of investment in adaptation and the concentrated exposure of people and vulnerable assets in high-risk areas. The government needs to leverage integrated planning and coordinated investments to build back better and increase its capacity at all levels for risk-informed decision making. This needs to be complemented with a robust disaster risk management framework and contingent finance mechanisms. As the country struggles to recover, the response will present challenging tradeoffs, especially in terms of fiscal space and implementation capacity, but it will also present important opportunities. Considering the scale of the shocks, Pakistan will need increased international support in order to build longer-term resilience or else its hard-won development gains and future aspirations could be in jeopardy. The country cannot afford the consequences of inaction—its own or that of the international community.





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