

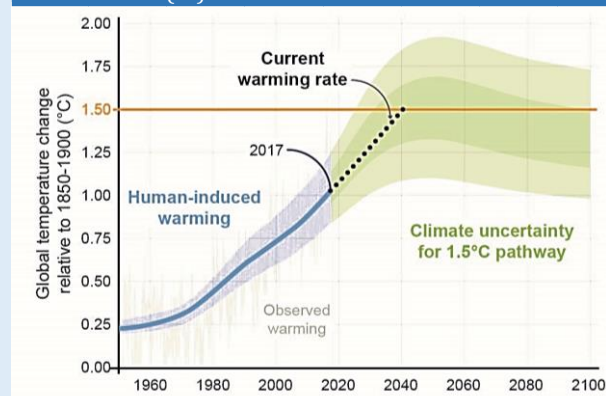
Box 4.1 Climate Change and Financial Stability

Climate change is one of the greatest challenges faced by the world today; its implications embrace all spheres of human life including physical wellbeing and very survival of humanity as well as the economic and financial stability of nation states. Developing countries are more vulnerable to climate change and they could further be affected as they lack the capacity and technical infrastructure to cope with this threat. Adverse weather phenomena is a direct threat to financial stability as it causes destruction in business sectors to which banks are exposed such as agriculture, or the transition to a low-carbon economy could also impact certain economic sectors such as fossil fuel companies, energy-intensive sectors, utilities, transport and building companies. Banks therefore need to take adequate action to manage their exposures to such sectors. Many economists have also maintained that climate change will have direct consequences for macroeconomic stability through its impact on different sectors, e.g. food and energy prices. These factors will directly influence price stability, and therefore they warrant deliberation by central banks when considering long-term inflation.

The Earth is now in a period of rapid climate change, with global temperatures rising because of increase in greenhouse gas (GHG) emissions⁹³ caused by human activities. According to the report by Intergovernmental Panel on Climate Change (IPCC), the human-induced warming has already reached about 1.0°C above pre-industrial levels⁹⁴, and at the current warming rate, it is expected to reach

the level of 1.5°C⁹⁵ in around 2040⁹⁶ (Chart 4.1.1). The IPCC report also highlighted that for the past 50 years most regions have been warming faster than the global average and many have already exceeded 1.5°C above pre-industrial levels. Over 20 percent of the global population live in regions that have already experienced warming that is greater than 1.5°C above pre-industrial levels (in at least one season).

Chart 4.1.1: Global Temperature Change relative to 1850-1900 (°C)



Source: IPCC Special Report Global Warming of 1.5C (SRIS- 2018)

Since climate change has direct consequences for macroeconomic and financial stability through its impact on different sectors, e.g. food and energy prices, performance of businesses, as well as soundness of the financial institutions, central banks need to consider the climate change as a key factor in their long-term planning on inflation⁹⁷ and financial stability. Moreover, financial institutions need to take adequate set of actions to manage their exposures to sectors exposed to the climate

⁹³ A GHG is any gas in the atmosphere that absorbs and re-emits heat, and thereby keeps the planet's atmosphere warmer than it otherwise would be.

⁹⁴ The period 1850–1900 represents pre-industrial temperature because it is the earliest period with near-global observations and is the reference period used as an approximation by the experts.

⁹⁵ The 1.5°C target is an average of the rise in global temperatures. While different countries are warming at

different rates and may fall below or above the target, the target is an **average across the world**.

⁹⁶ [FAQ Chapter 1 — Global Warming of 1.5 °C \(ipcc.ch\)](#).

Accessed on April 30, 2022

⁹⁷ On The Role of Central Banks in Enhancing Green Financing - UNEP Inquiry Working Paper 17/01 (2017)

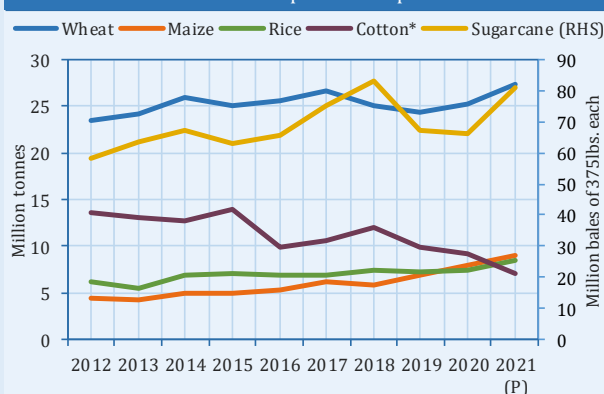
change and also adopt the lending and business practices which are environment friendly.

Climate Change and Pakistan – the country is one of the most vulnerable countries...

Although Pakistan contributes less than 1% to global emissions, yet it is one of the 10 most vulnerable countries because of its topography and geography.⁹⁸ Pakistan is ranked 151st on the ND-GAIN Country Index that ranks 182 countries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. The country has faced catastrophic floods, droughts, and cyclones in recent years that have killed and displaced thousands, destroyed livelihoods, and damaged infrastructure and assets.

According to Pakistan Bureau of Statistics, agriculture contributes about one fifth of GDP and accounts for around 38 percent of employed labor force.⁹⁹ In the past few years multiple factors including climate related physical events such as floods and droughts have adversely affected the crops production with no major growth in the output (**Chart 4.1.2**).

Chart 4.1.2: Production of Important Crops



Source: Pakistan Bureau of Statistics

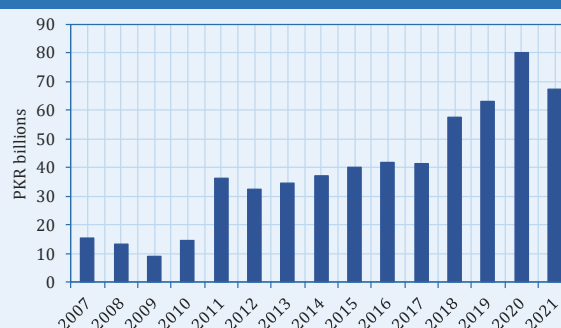
The floods and droughts either completely damage the crops or affect their production as

⁹⁸ Germanwatch. Accessed on March 31, 2022

⁹⁹ PBS' Labor Force Survey - [Percentage Distribution of Employed Persons 10 Years of Age and Over by Major](#)

well as the processes of the dependent sectors which impact the borrowers' ability to pay their debts. This inter alia is also result in an increase in non-performing loans (**Chart 4.1.3**).

Chart 4.1.3: Agribusiness Non-Performing Loans



Source: SBP

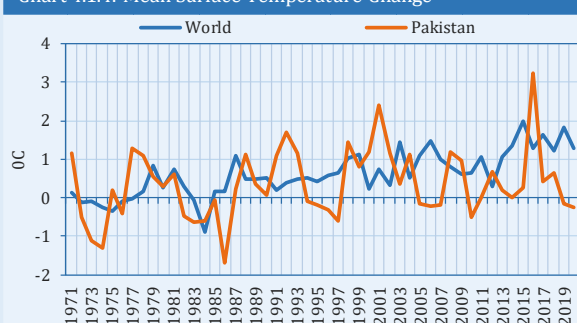
Though agri-related loans constitute only 8.1 percent of the total exposure of financial institutions, , on average (CY19-CY21, the agri-dependent sectors such as textile, sugar and leather combined account for 17.8 percent of the entire loans portfolio and 28.2 percent of total NPLs, on average (CY19-CY21). Agriculture has significant forward and backward linkages with the manufacturing and service sector. It provides inputs for food processing and textile industries, conversely the industrial sector provides inputs like pesticides, machinery, fertilizers to the agricultural sector. As such, all sectors in turn have further high linkages with the rest of the domestic economy.

According to Asian Development Bank, Pakistan's annual mean temperature has increased by roughly 0.5°C in the last 50 years (**Chart 4.1.4**), and the number of heat wave days per year has increased nearly fivefold in the last 30 years (Chaudhry, 2017).¹⁰⁰

[Industry Division, Occupation Groups and Sex 2020-21](#). Accessed on May 15, 2022

¹⁰⁰ Chaudhry, Qamar uz Zaman (2017); Climate Change Profile of Pakistan (ADB)

Chart 4.1.4: Mean Surface Temperature Change



Source: Food and Agriculture Organization Annual Mean Global Surface

The sea level along the Karachi coast has risen approximately 10 centimeters during the last 100 years, and it is likely to rise by a further 60 centimeters in the next 80 years. These fundamental climate change events have led to decline in agricultural land per capita, soil erosion, abnormal rainfalls and pest attacks (Ali et al, 2017).¹⁰¹ Further, under future climate change scenarios Pakistan may experience increased variability of river flows due to increased variations in precipitation and the melting of glaciers. Demand for irrigation water may increase due to higher evaporation rates, and lack of water availability may result in decline in production of wheat and basmati rice. Pertinent to note that per capita water availability in Pakistan has reduced significantly from over 5,260 cubic meters per person per year in 1951 to 935 cubic meters per person in 2021.¹⁰² The hydropower generation may also decline due to less water. On the other hand, demand for energy may rise due to increased air conditioning requirements, construction and chemical & metal industries. Increased air conditioning may, in turn, further increase average temperatures in Pakistan going forward.

¹⁰¹ [Foods | Free Full-Text | Climate Change and Its Impact on the Yield of Major Food Crops: Evidence from Pakistan \(mdpi.com\)](#). Accessed on March 31, 2022

¹⁰² [Water proceeding Book August 2021.pdf \(pcrwr.gov.pk\)](#). Accessed on March 31, 2022

Climate change impacts the businesses and soundness of financial institutions through two channels i.e. physical damages to assets and the impacts of transition to new technologies...

a) **Physical Risks** arises from the damages to the assets of economic agents due to severe weather events like torrential rains, floods, drought and other natural disasters. Damages in turn can incur losses on financial institutions such as banks, insurance companies, and other financial intermediaries. The mortgage, commercial real estate, business, and agricultural loans are prone to severe weather events and other environmental changes. Climate change events could decrease the value of damaged assets and put a pressure on borrowers' ability to repay—leading to defaults and losses on credit portfolios. This risk further increases where these same assets are used as collateral to secure the credit exposure of the financial institutions. Stress at a systemically important financial institution or correlated strain across smaller institutions could transmit the pressure throughout the financial system.

According to the Global Climate Risk Index annual report for 2021, Pakistan has lost 0.52 percent per unit GDP, suffered economic losses worth US\$ 3772 million and witnessed 173 extreme weather events from 2000 to 2019.¹⁰³ Insurance companies are also most directly exposed to the physical risks of climate change due to the fact that their main business line requires them to guarantee losses on physical assets and property. Although insurance sector of Pakistan has one of the lower overall penetration in the region i.e. less than 1 percent of GDP, it still remains vulnerable to the climate change risk. Stress at a major insurance company due to an unexpected climate shock

¹⁰³ [Global Climate Risk Index 2021 - World | ReliefWeb](#). Accessed on March 31, 2022

has the potential to transmit to other financial institutions.

b) Transition Risks are posed by changes in public policy (e.g. carbon tax¹⁰⁴), technology, and investor and consumer sentiment towards greener environment necessary for transition to an ecofriendly economy. The transition will consequently lead to decline in the value of the carbon-sensitive assets and thus placing losses on the investors and financial intermediaries holding them. Losses could cascade throughout the financial system, creating instability and leading to severe knock-on effects to the real economy. This sudden drop in asset prices, triggered by the bursting of the carbon-price bubble, can have implications for overall financial stability.

Changes in regulatory policies, technology and customers' preferences drive the financial risks...

Regulatory Policies aimed at transition towards green economy may affect the corporations through changes in their production, sales and profitability, subsequently affecting creditworthiness of the firms. Empirical evidence suggests that following the 2015 Paris Agreement the firms with “high carbon footprints tend to have lower credit ratings and higher yield spreads, particularly when located in a state with stricter regulatory enforcement”.¹⁰⁵ The carbon tax will cause the carbon-sensitive assets lose their value resulting in reduced balance sheets and income of firms, thereby increasing the likelihood of firm’s default on its financial obligations to banks.

Technological changes play an essential role in mitigating climate change risks and achieve sustainability goals by target dates. The brown as well as and non-green technologies can

become more expensive if carbon taxes or more stringent regulations are introduced by countries, consequently leading to the firms that use carbon-intensive technology become less competitive. For example, the companies that are unable to produce environment friendly vehicles efficiently may suffer decline in profitability in carbon-neutral economies. The financial institutions with exposures to such firms may experience higher credit-related losses.

Customers and investors’ preferences are fast changing in the wake of rising threats of climate change and disasters happening around the world, as well as climate change advocacy and ambitious sustainable finance targets by central banks are influencing people to increasingly prefer greener products and investments. For example, consumers may prefer sustainable homes and buildings instead of concrete/cement, or prefer cars with lower GHG emissions. Consequently, traditional manufacturers may see the future demand of their products decline, irrespective of government regulations or technical initiatives. The depositors and investors of financial institutions may also ask them to invest the funds in projects with positive environmental impact.

The impacts of climate change reflects in the traditional financial risk

It is difficult to predict the magnitude of risks to banks from climate change, however it is certain to say that there will be more frequent and intense extreme weather events and higher average temperatures, which in turn are likely to reduce the value of banks’ assets and income streams.¹⁰⁶ Climate change risks can transpire in the traditional financial risk categories of financial institutions; i.e. climate risk drivers

¹⁰⁴ A tax levied on the carbon emissions required to produce goods and services to offset environmental and social costs felt indirectly, for instance, more severe weather events and health problems.

¹⁰⁵ Seltzer, Lee and Starks, Laura T. and Zhu, Qifei, [Climate Regulatory Risks and Corporate Bonds](#) (April 20, 2022).

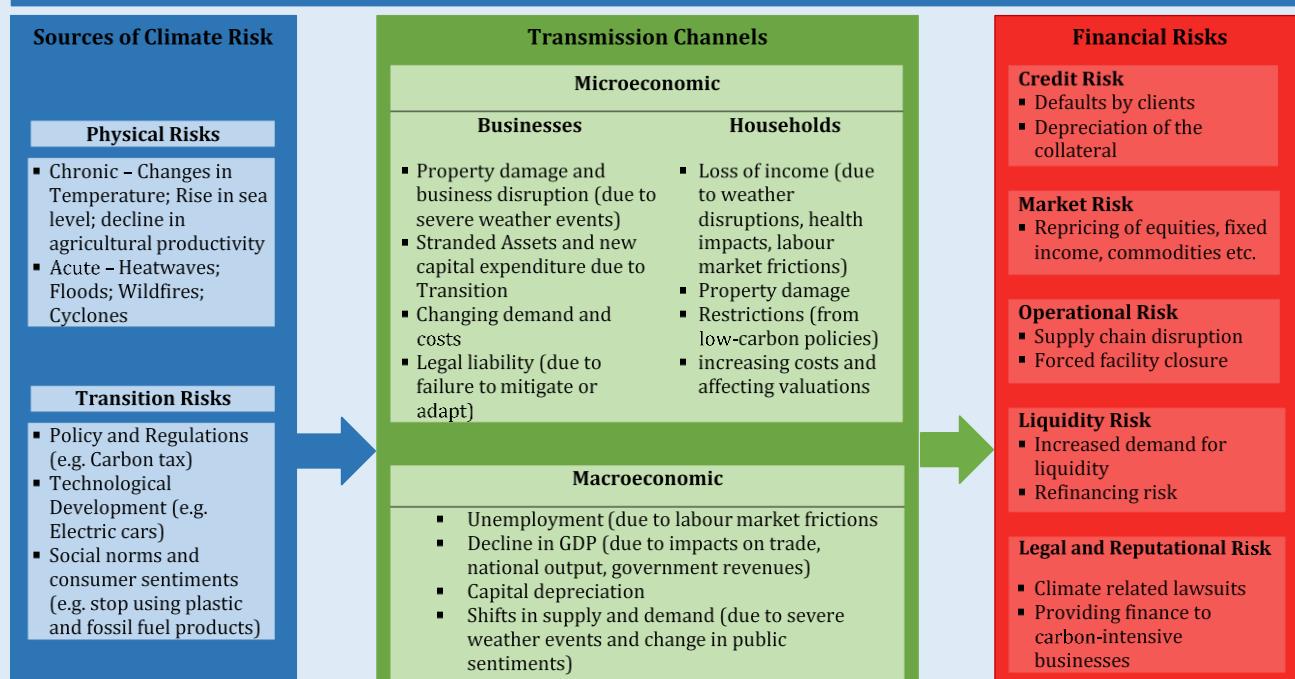
Nanyang Business School Research Paper No. 20-05, FRB of New York Staff Report No. 1014, Accessed on May 15, 2022.

¹⁰⁶ Climate related risk drivers and their transmission channels – (BIS, 2021)

can increase banks' a) credit risk through impacts on its borrowers and counterparties, b)- market risk through the change in the value and prices of financial assets, c)- liquidity risk through deposits withdrawal, funding costs and drawdowns of credit or liquidity lines, d)- operational risk by disruption in banks' operations, and e)- legal and reputational risk through climate related lawsuits and financing to carbon-intensive sector (**Chart 4.1.5**).

The Financial Stability Board (FSB) notes that immense magnitude of estimated losses due to climate change risks could have a severe impact on financial institutions and markets. On the flip side, financial institutions can also exacerbate those risks by continuing to provide substantial financing to carbon-intensive activities.¹⁰⁷

Chart 4.1.5: Financial Risks from Climate Risk Drivers through Transmission Channels



Central banks can play important role in achieving the policy objective on climate change by guiding and influencing the allocation of resources to environment friendly projects...

Central banks have important role in achieving the policy objectives on environmental and social sustainability. Finance is critical to achieving net-zero¹⁰⁸ emissions target, therefore it is vital that the financial industry contributes in transition towards sustainable finance. Besides using the direct powers to issue formal directions and limits, central banks

can also use moral suasion to encourage financial institutions to consider climate and environmental risks in their operations and develop capacities to tackle them.

Central banks can take multiple actions such as developing roadmap for the financial industry, devising green credit allocation policies, developing green taxonomy, and issuing guidelines for FIs on disclosure requirements in line with Taskforce on Climate-related Financial Disclosures recommendations and integrating

¹⁰⁷ [The Implications of Climate Change for Financial Stability \(fsb.org\)](#). Accessed on March 15, 2022.

¹⁰⁸ Net-zero refers to the balance between the amount of greenhouse gas emissions produced by human activity

and the amount removed from the atmosphere, targeted to be achieved by 2050.

Environmental, Social and Governance (ESG) into their business strategy.

Government of Pakistan is actively engaged in tackling the climate change risks

Since 1990s, the government has taken various measures to address environmental concerns including new legislation and institutions such as the Pakistan Environment Protection Council. The Ministry of Climate Change (**MoCC**), formed in August 2017, is a dedicated ministry in the Government of Pakistan concerned with climate change in the country. The government launched the ‘Clean Green Pakistan Movement’ on 8 October 2018 to help create a clean and green environment of Pakistan. The country has in place a number of acts, rules, regulations and policies to protect

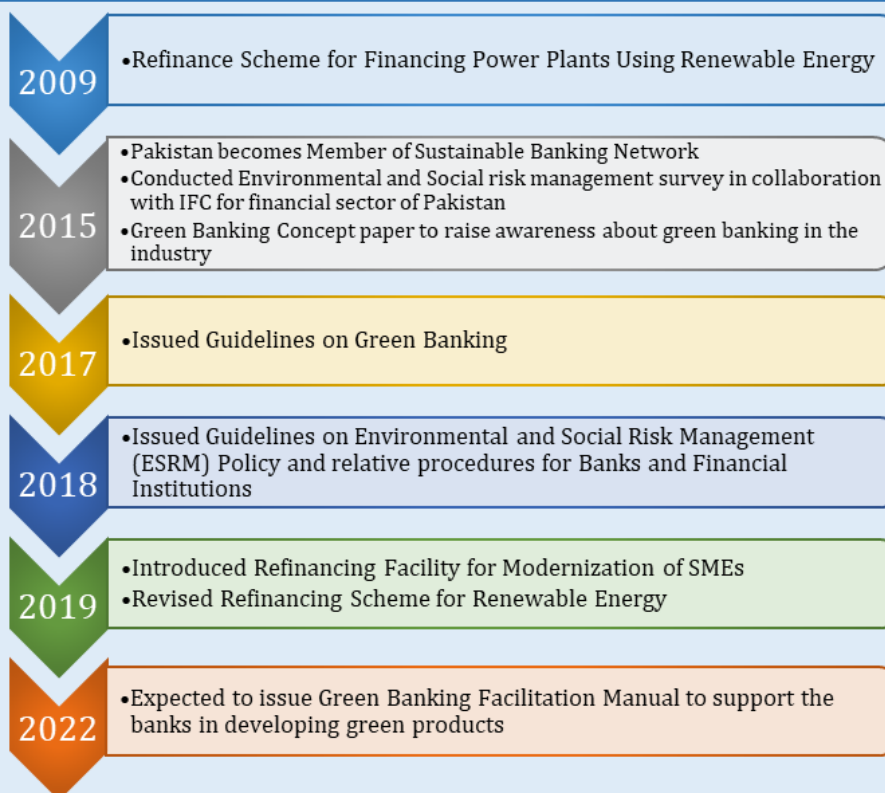
the environment and mitigate the adverse impact of climate change in Pakistan.¹⁰⁹

In addition, Pakistan is also signatory to various multilateral environmental agreements, conventions and protocols, such as United Nations Framework Convention on Climate Change (**UNFCCC**), Kyoto Protocol, Paris Agreement, and Vienna Convention for the Protection of the Ozone Layer, and has ratified all of them.

SBP is endeavoring to promote sustainable finance and helps the financial institutions in coping with the climate change risk...

The State Bank of Pakistan has been playing a crucial role in successful implementation of green banking initiatives and achieve sustainable financing objectives in the country since 2009 (**Chart 4.1.6**).

Chart 4.1.6: State Bank of Pakistan Green Finance Initiative



¹⁰⁹ For further details please refer to [Ministry of Climate Change](#)

SBP introduces schemes for renewable energy

Since 2009, SBP has introduced various conventional as well as Islamic refinance schemes, with varying scope, for financing the projects that use renewable energy.¹¹⁰ The schemes aim at providing financing to address dual challenge of energy shortage and climate change through promotion of renewable energy. As of Feb-22, total disbursements of PKR 79.7 billion have been made under the SBP Financing Scheme for Renewable Energy.

The brick kilns affect urban and sub-urban settlements and are a major source of air pollution and smog. In 2019, SBP introduced refinance facility for modernization of brick kilns¹¹¹ with the objective to limit emissions from conventional brick kilns by adoption of the new zigzag technology.¹¹² The scheme refinanced purchase of plant and machinery for upgradation of existing conventional brick kilns and establishment of zigzag technology based brick kilns.

SBP issued guidelines for Efficient Water Management Financing

In 2011, SBP issued *Guidelines for Efficient Water Management Financing* to help farmers to adopt modern water management systems and ensure optimal water utilization to address the challenge of wastage of water and depletion of the underground water.

SBP is a member of Sustainable Banking and Finance Network (SBFN)

SBP joined SBFN in 2015. In collaboration with the International Finance Corporation, SBP conducted an environmental and social risk management survey for financial sector of Pakistan in the same year and published a

Green Banking Concept paper to raise awareness about green banking in the industry.

SBP's Guidelines on Green Banking

In 2017, SBP issued *Guidelines on Green Banking* aimed at safeguarding the financial institutions against risks emerging from environment and climate change, also to facilitate the FIs to invest in energy-efficient projects and to re-engineer their internal controls to reduce adverse impact on the environment and society.¹¹³ These Guidelines comprehensively covered three main areas of (i) risk management, (ii) business facilitation, and (iii) reducing impact on the environment and society.

SBP issued policies for Environment and Social Risk Management¹¹⁴

SBP issued policies and procedures for E&S Risk Management under the Financial Inclusion and Infrastructure Project in 2018. The main objectives of the policy for the participating financial institutions were to (a) set out applicable E&S requirements for all business activities, (b) strengthen their Environmental and Social Management Systems (ESMS), (c) fully implement and comply with national requirements for E&S risk management, and (d) promote greater transparency and accountability on E&S issues.

In addition, SBP has issued guidance for the banks to evaluate the resilience against adverse shocks from natural disasters in their stress testing models. SBP has also been advising the financial institutions to increase the use of digital channels for provision of financial services to their customers. This initiative will reduce the use of paper and make banking transactions fast and environment friendly. To minimize the use of paper and commuting, the

¹¹⁰ [SMEFD Circular No. 19 of 2009](#)

¹¹¹ [IH&SMEFD Circular No. 9 of 2019](#)

¹¹² Stacking the bricks in a zig zag pattern instead of straight line. This method leads to better, more efficient fuel combustion and increases energy efficiency.

¹¹³ [IH&SMEFD Circular No. 08 of 2017](#)

¹¹⁴ AC&MFD Circular No. 01 of 2018 - [Annexure 2: Environmental and Social Risk Management Guidelines](#)

banks have commenced digital onboarding of customers since Sep-21.

Way forward...

According to SBN's Global Progress Report published in Oct-21, Pakistan falls among 22 countries who have progressed within the same sub-stage the 'Implementation Stage', the next and final stage will be the 'Maturing Stage'.

Going forward, SBP aims to:

- Develop the capacity to assess:
 - possible impact of climate change on financial stability;
 - potential effect of its policies and procedures on climate change;
- Develop long-term strategic plans to identify, assess and manage financial risks arising from the climate change;
- Issue Green Banking Facilitation Manual to support the banks in developing green products that will address climate change in Pakistan;
- Develop policies for E&S risk management, requiring FIs to include climate risk into their disclosures and report on their carbon-intensive exposures;
- Conduct supervisory review of financial institutions' policies and practices for including climate risks into their risk frameworks;
- Assess the efficacy of measures taken so far, and use this assessment to set measurable goals for future and systematically monitor them;
- Develop climate-related financial risks literacy programs to educate the government, businesses and the public about how their policies, operations and consumption decisions affect the environment, monetary and financial stability.