

# **Green-Weave Finance Blueprint: Energy Solutions for Pakistan's Textile Exports**



Proposed Financing Mechanism for the Energy Efficiency and the Decarbonization of the Textile Manufacturing Sector in Pakistan under the Government of Pakistan (GOP) Support.

*Green financing if made available to the Pakistani textiles sector can reduce energy consumption by 22%, and will save \$60 million annually in costs, and can eliminate 354,000 tons of CO<sub>2</sub>e<sub>q</sub> in GHG emissions.*

By

Sana e Sakina

Registration No: 328972, MBA (Executive)

NUST Business School (NBS)

National University of Sciences and Technology (NUST)

Islamabad, Pakistan (2024)

**THESIS ACCEPTANCE CERTIFICATE**

Certified that final copy of MS Thesis written by Ms. Sana e Sakina, Registration No: 328972, MBA (Executive) of NUST Business School (NBS) has been vetted by undersigned, found complete in all respects as per NUST Statutes/ Regulations/ Masters Policy, is free of plagiarism, errors, and mistakes and is accepted as partial fulfillment for award of Masters degree. It is further certified that necessary amendments as point out by GEC members and foreign/ local evaluators of the scholar have also been incorporated in the said thesis.

Signature: -----

Name of Supervisor: Dr. Farasat Ali Shah Bukhari

Date: -----

Signature (HoD):-----

Date:-----

Signature (Dean/Principal):-----


Date:-----

## BUSINESS PROJECT ACCEPTANCE CERTIFICATE

It is Certified that final copy of EMBA Business Project written by San E Sakina Registration No. 328972 of EMBA 2K20 has been vetted by undersigned, found complete in all aspects as per NUST Statutes/Regulations/MS Policy, is free of errors, and mistakes and is accepted as fulfillment for award of EMBA degree. It is further certified that necessary amendments as pointed out by GEC members of the scholar have also been incorporated in the said business project.


Signature of Supervisor with stamp: Dr. Farasat Ali Shah Bukhari

Date: \_\_\_\_\_

  
Dr. Farasat Ali Shah Bukhari  
Assistant Professor  
Finance & Investment Department  
NUST Business School, Islamabad

Programme Head Signature with stamp: Dr. Muhammad Fawad Khan

Date: \_\_\_\_\_

  
DR. M FAWAD KHAN  
Assistant Professor  
Program Head (EMBA)  
NUST Business School, H-12, Islamabad

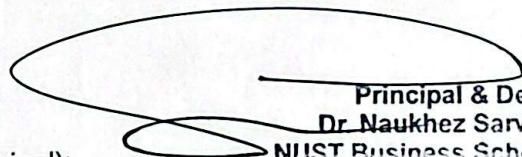
Signature of HoD with stamp: Mr. Saad Al Marwat

Date: \_\_\_\_\_

  
SAAD KHAN ALMARWAT  
HoD, Finance & Investments  
NUST Business School (NBS)  
Sector H- 12, Islamabad  
Tel: 051-90853150

Countersign by

Signature (Dean/Principal): \_\_\_\_\_

  
Principal & Dean  
Dr. Naukhez Sarwar  
NUST Business School

Date: \_\_\_\_\_

**National University of Sciences and Technology**

**MS THESIS WORK**

We hereby recommend that the thesis prepared under our supervision by Ms. Sana e Sakina, Registration No: 328972, MBA (Executive) of NUST Business School (NBS) Titled: Green-Weave Finance Blueprint: Energy Solutions for Pakistan's Textile Exports, be accepted in partial fulfilled the requirements for the award of MS degree.

**Examination Committee Members**

1. Name..... Signature: .....

2. Name..... Signature: .....

3. Name..... Signature: .....

4. Name..... Signature: .....

**Supervisor's Name:** Dr. Farasat Ali Shah Bukhari      Signature: .....

**Head of Department's Signature**..... **Date**.....


**COUNTERSIGNED**

**Principal/Dean**..... **Date**.....

**CERTIFICATE OF APPROVAL**

This is to certify that the research work presented in this thesis, “Green-Weave Finance Blueprint: Energy Solutions for Pakistan's Textile Exports” was conducted by Ms. Sana e Sakina, Registration No: 328972, MBA (Executive) of NUST Business School (NBS) under the supervision of. Dr. Farasat Ali Shah Bukhari, Assistant Professor, NUST Business School. No part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the. NUST Business School (NBS) in partial fulfillment of the requirements for the degree of Master of Science in Field of Business Administration (MBA), at NUST Business School (NBS), National University of Sciences and Technology, Islamabad.

Student Name: **Sana e Sakina**

  
Signature: -----

**Examination Committee:**

a) External Examiner 1: Name----- Signature: -----  
(Designation and Office Address) -----

b) External Examiner 1: Name----- Signature: -----  
(Designation and Office Address) -----


Name of Supervisor: Dr. Farasat Ali Shah Bukhari    Signature:-----

Name of Dean/HOD: -----    Signature:-----

## **AUTHOR'S DECLARATION**

I, Sana e Sakian, hereby state that my MS thesis titled "Green-Weave Finance Blueprint: Energy Solutions for Pakistan's Textile Exports" is my own work and has not been submitted previously by me for taking any degree from National University of Sciences and Technology, Islamabad or anywhere else in the country/ world.

At any time if my statement is found to be incorrect even after I graduate, the university has the right to withdraw my MS degree.

Student Signature: 

---

Name: Sana e Sakian

Date: July 16, 2024

## **PLAGIARISM UNDERTAKING**

I solemnly declare that research work presented in the thesis titled “Green-Weave Finance Blueprint: Energy Solutions for Pakistan's Textile Exports” is solely my research work with no significant contribution from any other person. Small contribution/ help wherever taken has been duly acknowledged and that complete thesis has been written by me.

I understand the zero-tolerance policy of the HEC and National University of Sciences and Technology (NUST), Islamabad towards plagiarism. Therefore, I as an author of the above titled thesis declare that no portion of my thesis has been plagiarized and any material used as reference is properly referred/cited.

I undertake that if I am found guilty of any formal plagiarism in the above titled thesis even after award of MS degree, the University reserves the rights to withdraw/ revoke my MS degree and that HEC and NUST, Islamabad has the right to publish my name on the HEC/University website on which names of students are placed who submitted plagiarized thesis.

Student Signature:



Name:

Sana e Sakian

Date:

July 16, 2024



## Contents

<b>List of Tables</b>	<b>2</b>
<b>List of Figures</b>	<b>3</b>
<b>List of Abbreviations/ Acronyms</b>	<b>4</b>
<b>Executive Summary</b>	<b>5</b>
<b>1 Background</b>	<b>6</b>
<b>2 The Context</b>	<b>6</b>
<b>3 The Goal– The End Objectives</b>	<b>7</b>
<b>4 Areas of Interest</b>	<b>7</b>
<b>5 Green Financing in Pakistan, a Quick Overview</b>	<b>8</b>
<b>6 Development Financing Mechanism in Pakistan</b>	<b>10</b>
6.1 Credit Guarantee in Development Finance in Pakistan	10
6.2 Renewable Energy Concessional Re-Financing by SBP	11
6.3 How Does Renewable Energy Concessional Re-Financing Work?	11
6.4 National Energy Efficiency and Conservation Authority (NEECA) & Projects	12
6.5 The Parallel between Alternate Energy Development Board (AEDB) and NEECA	12
<b>7 Development Financing in Pakistan insights for Structuring the Concessional Financing for Decarbonizing the Textile Sector in Pakistan:</b>	<b>13</b>
1. Refinance Facility for Modernization of SMEs:	14
2. SME ASAAN Finance (SAAF) Scheme:	14
3. SBP Financing Scheme for Renewable Energy:	14
4. Export Finance Scheme:	14
5. Long-Term Financing Facility (LTFF) for Plant and Machinery:	14
<b>8 The Role of Grants and the Rationale</b>	<b>15</b>
<b>9 Concessional Loans Structure – Decarbonizing the Textile Sector</b>	<b>16</b>
<b>10 Recommendations and the Way Forward for the GWFB Fund:</b>	<b>20</b>
<b>11 Green Interventions for Financing: The Local Context:</b>	<b>20</b>
11.1 Economizer / Condensing Economizer	20
11.2 Condensate Recovery System	20
11.3 Waste Heat Recovery Boiler	21
11.4 Heat Exchanger	21
11.5 Switching of Coal Fired Boiler to Biomass Boiler	21
11.6 Mitigation potential:	21
<b>12 Annex 1: GWFB Financial Modeling</b>	<b>i</b>
12.1 GWFB Financial Modeling: Assumption Sheet	i
12.2 GWFB Financial Modeling: Assumption Sheet	ii
12.3 GWFB Financial Modeling: Assumption Sheet	iii
12.4 GWFB Financial Modeling: Calculation Sheet	iv
12.5 GWFB Financial Modeling: Profits / Benefits for Investor, Financial Institute & Grant Fund	v
<b>13 Bibliography</b>	<b>vi</b>





## List of Tables

Table 1: Climate-Related Investment Potential in the Industrial Sector of Pakistan (Source: IFC).....	9
Table 2: Financing Mechanism/ Models for GWFB Fund to Consider (UNDP, 2019).....	14



## List of Figures

Figure 1: SBP Concessional Re-Financing Explained.....	12
Figure 2: Grant Flow Options.....	16
Figure 3: Market Aggregation Model through ESCOs targeting Textile SMEs Going Green .....	18
Figure 4: Operational Structure of the GWFB Fund Pakistan.....	19
Figure 5: Green Financing for Customers not Dealing with the GWFB Partner Bank .....	19
Figure 6: Priority Areas of Investment and Improvements .....	20



## List of Abbreviations/ Acronyms

<b>AEDB</b>	Alternate Energy Development Board	<b>KIBOR</b>	Karachi Interbank Rate
<b>ARE</b>	Alternate Renewable Energy	<b>KVA</b>	Kilo Volt Amperes
<b>BMR</b>	Balancing, Modernization and Replacement	<b>LEED</b>	Leadership in Energy and Environmental Design
<b>BPRD</b>	Banking Policy & Regulations Department of the State Bank of Pakistan	<b>LTFF</b>	Long-Term Financing Facility
<b>BREEAM</b>	Building Research Establishment Environmental Assessment Method	<b>MCGF</b>	Microfinance Credit Guarantee Facility of SBP
<b>BSC</b>	Bachelors of Science	<b>MT</b>	Metric Ton
<b>CGS</b>	Cost of Goods Sold	<b>MW</b>	Mega Watt
<b>CSP</b>	Concentrating Solar Power	<b>NAMA</b>	Nationally Appropriate Mitigation Activities
<b>DAP</b>	Data Acquisition Portal	<b>NBFI</b>	Non-Bank Financial Institutions
<b>DFG</b>	Development Finance Group at SBP	<b>NEECA</b>	National Energy Efficiency and Conservation Authority
<b>DFI</b>	Development Finance Institutions	<b>NEPRA</b>	National Electric Power Regulatory Authority Pakistan
<b>DFID</b>	Department for International Development the UK	<b>GWFB</b>	Green Weave Finance Blueprint
<b>DFSD</b>	Development Finance Support Department at SBP	<b>PKR</b>	Pakistani Rupee
<b>DGNB</b>	German Sustainable Building Council	<b>PMYBL</b>	Prime Minister's Youth Business Loan Pakistan
<b>EDGE</b>	Excellence in Design for Greater Efficiencies (IFC)	<b>PV</b>	Photo Voltic
<b>EE</b>	Energy Efficiency	<b>RE</b>	Renewable Energy
<b>EFS</b>	Export Finance Scheme of SBP	<b>SAAF</b>	SME Asaan Finance Pakistan
<b>ESCO</b>	Energy Service Company	<b>SBP</b>	State Bank of Pakistan
<b>EU</b>	European Union	<b>SDWD</b>	Statistics and Data Warehouse Department
<b>FCDO</b>	Foreign, Common Wealth and Development Office of the UK	<b>SME</b>	Small and Medium Enterprise
<b>FIP</b>	Financial Inclusion Program of SBP	<b>SWH</b>	Solar Water Heating System
<b>GDP</b>	Gross Domestic Product	<b>UK</b>	the United Kingdom
<b>GEF</b>	Global Environment Facility	<b>UNEP</b>	United Nations Environment Program
<b>GHG</b>	Green House Gases	<b>USA</b>	the United States of America
<b>GREEN</b>	Internationally recognized building rating system	<b>USD</b>	the US Dollar
<b>GSP</b>	Generalized System of Preferences	<b>VFD</b>	Variable Frequency Drives
<b>IFC</b>	International Finance Corporation	<b>WWF</b>	World Wildlife Fund



## **Executive Summary**

The objective of this report is to assist the Government of Pakistan in developing a green lending mechanism for the textile sector in Pakistan that is grounded on pragmatic assessments of the financial sector, the plausibility of technologies to be financed, justification on cost-benefit analysis, manufacturers and lending institutions buy-in, and ability to monitor and verify through institutional arrangements. The consultation with the key stakeholders is the cornerstone of the entire exercise.

Unlocking economic potential in Pakistan through sector-wide energy savings could yield USD 10 billion by 2030 (The World Bank, 2019). The industrial sector is the largest consumer of energy in Pakistan, accounting for 37.1% of the country's overall energy consumption but the textile sector after the energy sector is the second most polluting sector contributing 6% of the country's greenhouse gas (GHG) emissions. At the same time, the Pakistani textile industry is the most internationally connected through international trade. The non-compliance of the industry with green production practices has significant implications for Pakistan's economy and more so for the textile industry itself (USAID, 2016).

The Green-Weave Finance Blueprint (GWFB) will mainstream green financing through local banks with an expected Rs. 2 billion funds from the government and donors, mobilizing an additional, at minimum, Rs. 900 million from the local private sector to achieve 354,000 MT of CO<sub>2</sub>e reduction in GHG emissions. This will be achieved by financing equipment, machinery, skills, and technical services across textile manufacturers preferably export-oriented units (WWF - Pakistan, 2023).

The State Bank of Pakistan (SBP) considers environmental risks a threat to the financial sector and issued Green Banking Guidelines (State Bank of Pakistan, 2017). However, there is a need to build capacity within the banking sector to identify green financing opportunities and build a business case. The development financing regime has relied on the SBP's cash refinancing mechanism as the most successful approach to target economic shifts. Typically, SBP provides cash to commercial banks at a 2%-4% cost and allows a profit spread between 2-4% (State Bank of Pakistan, 2019). It never involved banks' capital or deposits to support the lending operation. This led to an unprecedented flow of investment and growth over the years in the targeted sectors. The default risk guarantee mechanism has met with a lukewarm response from banks in general and requires regulatory and legal reforms before becoming a mainstream instrument in development financing.

With the analyses of the financial sector and consultations with relevant partners, we recommend that GWFB Fund should be placed with a bank – following the SBP refinance approach, allowing a spread of up to 4% to the partner bank on saucerful disbursements. The loan default risk will be borne by the bank. Bank will charge concessional market-responsive markup rates on lending. The loans will reduce the carbon footprint of textile manufacturing in Pakistan. The loan tenure may vary between 3–5 years depending on the needs of manufacturers. There is no appetite for credit default risk guarantees (WWF - Pakistan, 2023).

The regulator; NEECA needs capacity to impact the energy efficiency and conservation market. Regardless, NEECA must adopt local best practices (e.g., AEDB) that provide insights into developing inter-institutional coordination, risk sharing, capacity development, and the development of Energy Service Companies (ESCOs).

Grants play a vital role in the development of the private sector market. Cost share grants must be an integral part of the GWFB Fund augmenting the purchase of qualified decarbonization technologies and services and ESCO market development. The grants can be used strategically in enticing the interest of any critical green financing value chain partner to absorb some of the start-up cost or the risk of low return. Another strategic use of the grant will be to hold an annual Green/ Decarbonization Award by category to reward early compliant manufacturers, supporting financial institutions, service providers, public sector regulators, and ESCOs. The awards get media traction, promote healthy competition and accelerate the rate of green technologies adoption.



## 1 Background

To keep the planet from warming more than 1.5°C above pre-industrial levels, most countries have goals to reach net zero by 2050 (WWF-Pakistan, 2021). Net zero means that all greenhouse gas emissions are counterbalanced by an equal number of eliminated emissions. Achieving this will require rapid decarbonization. Decarbonization refers to all measures through which an organization reduces its carbon footprint, primarily its greenhouse gas emissions, carbon dioxide (CO<sub>2</sub>), and methane (CH<sub>4</sub>), to reduce its impact on the climate (USAID, 2016).

The industrial sector is the largest consumer of energy in Pakistan, accounting for 37.1% of the country's overall energy consumption followed by the transport sector (27%) and domestic and commercial sectors (26%). The energy consumption by the industrial sector has increased by 18% over the past 5 years while accounting for 25% of the total electricity consumption (The Ministry of Energy, Pakistan, 2020). The energy consumed for the same purposes in China is 25 to 30 % less. The textile sector in Pakistan employs 40% of the industrial labor force, accounts for 8% of the total gross domestic product (GDP), and is the largest foreign exchange earner i.e., USD 19.33 billion. It is also the second most polluting industrial sector contributing 6% of the country's greenhouse gas (GHG) emissions (The World Bank, 2019).

Within the industrial sector textile industry in Pakistan is the largest consumer and most internationally connected through international trade. The inefficiencies in the energy consumption in the sector have significant implications for Pakistan's economy and more so for the textile industry itself. The evolving international environmental regulations and the possibility of carbon taxation by the G20 countries on all incoming imports will indeed render Pakistani textile exports expensive and non-competitive. It will erode the industry's capacity to integrate into the global supply chain and be less likely to continue export market expansion in the EU post-GPS plus era. It is hence extremely important that local textile production complies with Scope 1, Scope 3, and if possible, Scope 2 standards. The main barriers to a sector-wide transformation towards a greener industry are:

- Weak enforcement of environmental regulations on the local level
- Lack of awareness of the benefits of Green Technologies including resource and energy efficiency (RE & EE) measures
- Inadequate liquidity in textile small and medium enterprises (SMEs) to invest in renewable energy (RE) and energy efficiency (EE) measures, paired with a lack of access to external capital.

## 2 The Context

The objective of this consulting assignment is to assist Pakistan in developing a lending mechanism that is grounded on pragmatic assessments of the financial sector, the plausibility of technologies to be financed, justification of investment on cost-benefit analysis, getting buy-in from manufacturers and lending institutions, and devising monitoring and verification means and institutional arrangement. The consultation with the key stakeholders is the cornerstone of the entire exercise.

Textile industries in Pakistan do not comply with environmental regulations unless linked to international supply chains, where compliance is mandated by the buyers. It also makes business sense; the local market does not offer a premium on compliance and additional compliance cost render the business non-competitive. As a result, the downward spiral continues, and by and large capital formation is slow and private-sector capital is non-existent for investment in green technologies. The situation is further compounded by the general lack of awareness of the financial benefits of shifting to green production practices. The proposed Green-Weave Finance Blueprint (GWFB) aims to promote investments in renewable energy, energy efficiency and conservation, and green technologies to mitigate GHG emissions by providing access to information, locally developed technologies, and finance, and by establishing a local market for resource-efficient technologies establishing a business case for green production.



### 3 The Goal– The End Objectives

The Green-Weave Finance Blueprint (GWFB) will mainstream green financing through local banks with an expected Rs. 2 billion funds from GOP and donors, mobilizing an additional, at minimum, Rs. 900 million from the local private sector to achieve 354,000 MT of CO<sub>2</sub>e reduction in GHG emissions in the Pakistani textile sector. This will be achieved by financing equipment, machinery, skills, and technical services across 150 textile manufacturers preferably export-oriented units. The manufacturer through these freshly injected financial resources will invest in renewable energy, energy conservation, and resource efficiencies. It is expected that the demonstration effect of the project interventions will mainstream green financing that will lead the Pakistani textiles sector in reducing energy consumption by 22 percent, and will save an estimated \$60 million annually in costs as noted by the Ministry of Energy, Power Division in the “Efficiency and Conservation Measures Implementation Roadmap” of October 2022. Moreover, at the end of the NSP, a strong domestic market for energy and resource-efficient technologies will be in place making it easier for local textile manufacturers to acquire technologies that can help save energy and reduce their GHG footprint (WWF - Pakistan, 2023).

**Target Market & Opportunity:** The decarbonization of Export-oriented textile manufacturers will help a larger vendor base in the textile sector, to meet the USA and the EU standards and regulatory requirements paving the way for the GSP Plus status renewal that is due to expire in December 2023. The GSP Plus status allowed Pakistani products to enter the EU markets duty-free, as a result, Pakistani Exports to the EU increased by 166% in the past eight years. *It will also reduce the cost of production of large exporters as they have to invest less in vertically integrating the manufacturing and can rely on outsourcing and move towards an efficient production system.*

### 4 Areas of Interest

Green production is tightly linked to decarbonization; a process of significantly reducing or eliminating carbon dioxide and other GHG emissions that result from human activity i.e., manufacturing. There are three primary areas of interest:

1. **Renewable Energy:** Changing the energy source to renewables offers immediate and measurable benefits in reducing the carbon footprint. It peels away manufacturing from conventional sources of energy and links to cleaner and more renewable sources. Unlike the common notions held there are multiple options available in this area, renewable sources could include (but are not limited to) solar, wind, hydro, biomass, geothermal and tidal. While all renewable projects are eligible climate-smart projects, biofuels play an important role in curbing greenhouse gas emissions by replacing fossil fuels.
2. **Energy Efficiency and Conservation:** Introducing energy efficiency and conservation and capturing additional heat is another area of interest for the decarbonization of the textile industry in Pakistan. Inefficient industrial practices and processes are major sources of greenhouse gas emissions, as they consume more resources. They also put a strain on natural resources. Thus, improvement in industrial processes helps in reducing emissions. Furthermore, if the national grid is dependent on thermal or fossil fuel-based power generation, then higher consumer demand leads to higher greenhouse gas emissions. For the project, eligible Energy Efficiency (EE) project is defined as the measures implemented by a manufacturing entity aimed to improve the energy consumption per unit of output. These measures include acquiring, replacing, redesigning, or refurbishing equipment, systems, and/or contracting services/products, as well as utilizing waste energy and any other measure for efficient use of energy (or reducing specific energy consumption) of the system directly affected by the project based on minimum requirements. Projects can include the financing of energy efficiency measures in manufacturing or processing facilities. The low-hanging fruits for energy conservation are identified lighting, air conditioning, water use efficiency, heating, boilers, elevators, and industrial motors.



3. **Resource Recovery:** Resource recovery is now an integral part of industrial processing; it is no longer a choice since many countries have enacted laws and others have evolved regulations. A typical resource recovery approach covers the activities of separating materials from waste that can be recycled into new products or used as an energy alternative to fossil fuels and is actioned to divert as much waste from landfill as possible. It's a part of an important goal being adopted worldwide which is to secure a waste-free and more sustainable future. The efficient use of resources is what underpins the objective of resource recovery and is shaped by a hierarchy of 3 priorities, which are avoidance, resource recovery, and disposal. This hierarchy is most popularly known by the mantra reduce, reuse and recycle. If we analyze the major inputs of utilities in textile manufacturing it includes water, energy, chemicals, and carbon emissions are directly associated with these utilities. The consumption of these utilities is very much significant in the textile wet processing and finishing segment of the supply chain. The resource consumption profile provides the opportunity for introducing green technologies.

*Decarbonization of the textile industry is not a climate-smart approach but a business-smart approach that promises further integration in to international value chain, export growth and price premium.*

In sum, decarbonization of the textile industry means using the Earth's limited resources sustainably while minimizing impacts on the environment. It allows us to create more with less and to deliver greater value with less input. It supports the shift towards sustainable growth via a resource-efficient, low-carbon economy, creates greater value, opens up new markets for us, and stands out in the international competition hence it is not a climate-smart approach but a business-smart approach as well.

## 5 Green Financing in Pakistan, a Quick Overview

The Central Bank of Pakistan i.e., the State Bank of Pakistan (SBP) considered environmental risks a threat to the financial sector and in 2017 issued Green Banking Guidelines for Financial Institutions. FIs could capitalize on environmental risks emanating from the business operations of their clients and can convert these risks into business opportunities. However, to achieve this, there was a need to build capacity within the banking and Financial Institutions (FIs) to identify climate-related opportunities. SBP issued a manual for banks and FIs to facilitate them in building green portfolios. This manual included the following sections for climate-smart activities:

1. **Classification, Eligibility & Criteria:** covering the basics of climate-smart activities, broad categories of eligible projects, and the minimum benchmarks;
2. **Product Design:** covering the development of financing solutions for banks/ FIs clients;
3. **Case studies:** providing examples of climate-related projects adopted globally that can be easily replicated to scale in various real economy sectors.

These guidelines also provided the investment potential by sector and also indicated the areas of potential investment for the banks and FIs. The estimated climate-related financing market potential in the textile sector is reproduced below in [Table 1](#) alongside other industrial sub-sectors.

The most important aspect of the guidelines is the eligibility criteria for green financing. The guidelines provide broad but targeted insights for banks to self-select projects for financing. For example, the Projects that indirectly contribute to Green House Gas (GHG) reduction can have access to financing for Manufacturing or Supplying – EE Solutions, Energy-efficient technology equipment, or appliance on the verifiable market-based energy-efficient benchmarks. In sum, the projects that meet any one of the following thresholds can qualify for green financing from banks and FIs:

1. Switches to **any** renewable energy source
2. Reduce absolute energy consumption by at least **15%**
3. Reduce GHG emissions by at least **25,000 MT CO<sub>2</sub> e/year**
4. Reduce electricity consumption by at least **50 GWh/year**





5. Reduce Water Consumption by at least **10%**

**Table 1: Climate-Related Investment Potential in the Industrial Sector of Pakistan (Source: IFC)**

Sector	Potential Investment (PKR million)		Available Technology for investment (PKR million)	
	Energy Efficiency (EE)	Renewable Energy (RE)	Energy Efficiency (EE)	Renewable Energy (RE)
<b>Textile</b>	173,000	133,500	Compressor, Heat recovery, Heat transfer, Lights Meters, Motors, Power Factor, Process, Process Control, Steam system, VFD	SWH, Wind power, PV
<b>Sugar</b>	105,000	16,700	Co-generation, Heat recovery, Heat transfer, Motors, Process, Process Control, Steam system, VFD	Biomass, PV
<b>Cement</b>	30,600	33,000	Co-generation, Meters, Motors, Power Factor, Process, Process Control, VFD	Wind power, CSP
<b>Fertilizer</b>	5,800	10,800	Heat recovery, Heat transfer, Process	PV
<b>Other sectors</b>	80,800	52,000	A mix of all technologies	A mix of all technologies

The Green Banking Guidelines have rightly emphasized the building sector since buildings are the essential part of all business structures and the major consumer of energy and related carbon emissions. SBP is promoting Green buildings across the spectrum to promote the efficient use of energy and financing for the construction of commercial or industrial buildings that reduces energy use by at least 20% than baseline building without energy-efficient design are made available. SBP is also encouraging the IFC's Excellence in Design for Greater Efficiencies (EDGE) certificate, Building Research Establishment Environmental Assessment Method (BREEAM) certificate, certificate issued by the EDGE (DGNB), GREEN Star rating, Leadership in Energy and Environmental Design (LEED), or an equivalent internationally-renowned green building certification system.

The details above have covered renewable energy, energy, and water usage efficiency but Green Banking guidelines have also raised the curtain on opportunities that relates to Non-energy GHG emissions. Now, under the green banking guidelines banks can offer financing and more often concessional financing for the following exhaustive list of initiatives as well:

- **Fugitive emissions:** Reduction of gas flaring or fugitive methane emissions in existing oil and gas industry installations.
- **Carbon capture and storage:** Carbon capture and storage projects not involving enhanced oil recovery.
- **Air conditioning and refrigeration:** Replacement of refrigerants with high global warming potential in existing industrial, commercial, or residential infrastructure with solutions with lower global warming potential.
- **Industrial processes:** Reduction in GHG emissions resulting from industrial process improvements and cleaner production (e.g., cement, chemical), excluding carbon capture and storage as defined by the State Bank of Pakistan which is aligned to the Nationally Agreed Mitigation Action (NAMA) plan's approach toward decarbonization.





## 6 Development Financing Mechanism in Pakistan

The at SBP-BSC has been set up to augment the efforts of the State Bank of Pakistan in pursuing the development of an inclusive financial system in the country that can cater to the financial services needs of the economy's different segments (State Bank of Pakistan, 2011). It complements the role of the Development Finance Group (DFG) of the State Bank of Pakistan in:

- monitoring, awareness & information dissemination of various SBP's policies, initiatives, and schemes through different activities and;
- operational management/ implementation of SBP's Export Refinance Schemes (EFS), Credit Guarantees Schemes (CGSs), Prime Minister's Youth Business Loan (PMYBL) Scheme, and other Subsidy Schemes.

Pakistan is not new to the development and implementation of innovative financial products and services, and, over the past decade, many financing programs and mechanisms have been in place to promote investments in different sectors. Development financing in Pakistan saw an improvement on a year-on-year basis, the last review of Development Finance was published in June 2022 by SBP. The development financing continued and focused on SMEs, Agriculture, Housing & Infrastructure, SBP Refinance Schemes for Exporters, and Microfinance. The financing to all five priority sectors including textiles has continued and grown steadily over the years averaging around 14% till June 2019. Some of the financing mechanisms considered relevant to Decarbonization financing are briefly discussed below.

### 6.1 Credit Guarantee in Development Finance in Pakistan

The State Bank of Pakistan (SBP) has a special focus on development finance. Different arrangements have been used since 2008, to facilitate lending to underserved segments such as Micro, Small, and Medium Enterprises (SMEs) and agriculture sectors. SBP introduced credit risk sharing with banks through a credit default guarantee mechanism (State Bank of Pakistan, 2019). UK Department for International Development – DFID (now UK-Aid) initiated a Financial Inclusion Program (FIP) in 2008, partnering with the State Bank of Pakistan (SBP) to increase access to financial services for the poor, and Small and Medium Enterprises (SMEs).

The FIP alongside the institutional and regulatory reforms necessary for financial sector development provided grant funding for two facilities that guaranteed partial repayment to lenders if the borrower defaults. The credit guarantees share the banking sector's risk on delinquent loans to motivate lenders to lend to borrowers who do not, otherwise have access to formal credit. It was assumed that Banks and Development Financial institutions (DFIs) are reluctant to lend to Microfinance Banks (MFBs), Microfinance Financial Institutions (MFIs), SMEs, and small Agribusinesses. SBP relied on the international experience of other countries and hence SBP designed two schemes: Microfinance Credit Guarantee Facility (MCGF) and Credit Guarantee Schemes (CGS) for lending to small, medium, and rural enterprises. Under CGS, SBP shared 40 percent of the credit losses of lending banks on their loans.

The credit guarantee schemes were offered through SBP – Banking Services Corporation (SBP-BSC); established as a subsidiary of the State Bank of Pakistan in January 2002, under the SBP Banking Services Corporation Ordinance 2001. These credit guarantees continued till 2020, before moving out of the SBP's wings. No new disbursements to the SBP have been made since 2014 nor are these guarantees available through any other mechanism.

#### SBP Credit Guarantee Schemes: Lessons Learned

*Guarantee Utilization remained low at around 60% during the currency of MCGF and CGS. The UK Foreign Commonwealth and Development Office (FCDO) Annual Review published on 14 October 2020 notes that the scale of credit available to SMEs and small agriculture farmers did not increase quickly enough. CGS facilitated loans to 47,468 SMEs, representing a 10 percent annual increase. Only 9,000*



*SMEs with less than 100 percent collateral were supported and only 190 loans were issued in 2015. The SBP - BSC's Annual Development Finance Review 2020-21 reported cumulative disbursement of PKR 40 billion that was covered under the guarantee scheme over eleven years from March 2010 to March 2021.*

*The discussions with staff at SBP's Development Finance Group (DFG) highlighted two primary reasons behind guarantee schemes remaining short of achieving the scale and the coverage. First, SBP is legally not allowed to leverage the funds, collateral requirements are also stringent per the SBP governing regulations and hence it was impossible to noticeably increase the scale of guarantee coverage. Finally, the cycle from reporting a non-performing loan to the declaration of default is long so the top management in the banks seemed less interested.*

## 6.2 Renewable Energy Concessional Re-Financing by SBP

The data on green financing is not available, especially on disbursements against RE Financing. SBP in April 2022 directed banks and Development Finance Institutions (DFIs) for the quarterly reporting of Green Banking Statistics. The Statistics and Data Warehouse Department (SDWD) at the State Bank of Pakistan (SBP) will collect, collate and report data on Data Acquisition Portal (DAP). We have reviewed the SBP's report on "Distributed Renewable Energy" generation and learned that SBP has been working closely with the Alternate Energy Development Board (AEDB) for encouraging the use of on-grid renewable energy across domestic, commercial, and industrial sectors. AEDB also promoted renewable energy-based net-metering by improving the NEPRA (Alternative & Renewable Energy) Distributed Generation and Net Metering Regulations, 2015. AEDB has also been carrying certification of service providers, vendors, and installers of solar systems under AEDB (Certification) Regulations, 2018 to facilitate the consumers and electricity distribution companies (DISCOs). The regulations were simplified in August 2021 for the 'Ease of Doing Business. AEDB issued certificates to one hundred one installers between July 2021 to March 2022. Now, 162 AEDB-certified installers are servicing the RE market in Pakistan (The World Bank, 2024).

### SBP RE Financing – An Unparcellled Success of Concessional Finance

*Between July 2021 to March 2022, a total of 10,783 net metering-based systems of 196.77 MW capacity were installed and SBP provided a concessional loan at a 6% p.a. interest rate. The number of net-metering-based solar installations reached 17,950 with a cumulative capacity of 305.79 MW. The estimated investment in these on-grid distributed RE systems is estimated to be PKR 60 billion. It is estimated that banks have offered roughly PKR 20 billion to clients to make up for the shortfall in allocation from SBP, the most interesting feature of these disbursements is the pricing. The banks have offered these loans at normal commercial loan pricing, suggesting the leverage effect of SBP RE financing and signs of RE financing market development.*

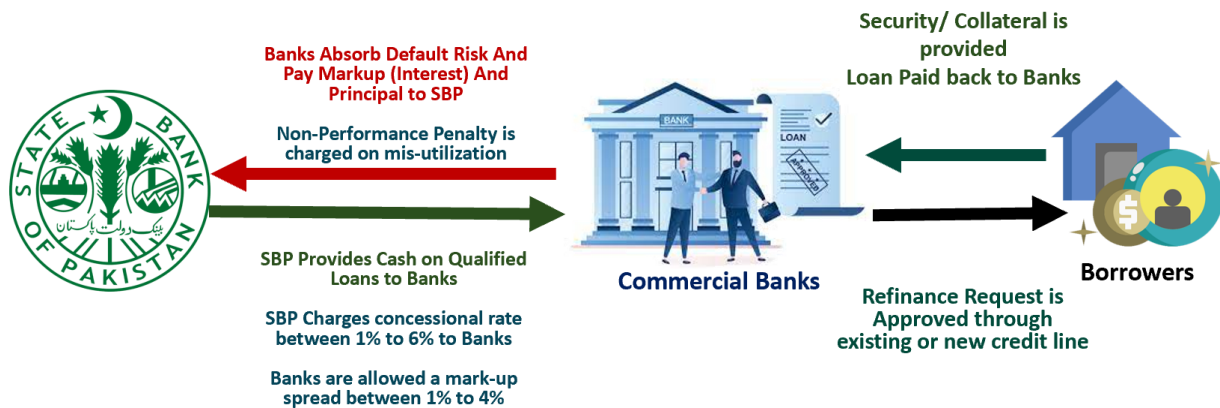
## 6.3 How Does Renewable Energy Concessional Re-Financing Work?

Any consumer can approach any of the AEDB-certified service providers cum installers (ESCO). ESCO installers sometimes also approach prospective clients and offer their services free of cost. These services include an assessment of the load, a survey of the location, and the preparation of the technical proposal with load and equipment details. It sometimes involves working with an electrical and civil engineer to assess the need for any infrastructure improvements especially if the solution requires rooftop installation. The clients or consumers negotiate price and quality with ESCO on a competitive bidding basis; the banks/ DFIs require bidding among at least three qualified installers.

Upon successful conclusion of bidding, the clients/ consumers apply for RE financing through their banks or DFIs. Normally, banks/ DFIs also demand a minimum of 30% equity share. The banks/ DFIs assess the risk of the transaction and assume the default risk and apply to SBP for cash re-finance. The SBP allows a 3% to 4% spread to banks and DFIs and charges 2% to 3% on cash refinance provided to the banks/DFI.

Every year, each bank applies for an allocation of RE financing revolving limit to SBP. Based on banks/DFIs' past year performance, RE financing allocations are revised upwards or downwards hence creating competition among banks for successful disbursement while isolating itself from default risks. The banks work through their risk assessment teams to perfect their procedures and client selection criteria, in the end, everyone is a winner. The structure is also explained in Figure 1 below:

**Figure 1: SBP Concessional Re-Financing Explained**



#### 6.4 National Energy Efficiency and Conservation Authority (NEECA) & Projects

National Energy Efficiency and Conservation Authority (NEECA) continues to serve as the national regulator for the energy efficiency and conservation market, and the suppliers in Pakistan. Their role is critical in bringing the policymakers' focus, creating a knowledge base, evolving regulations, promoting EE & EC practices, and setting minimum performance standards for the products and services. NEECA through Energy Conservation Fund (ECF) also tried to fund and create the commercial market for EE and EC products and services but continued to struggle hence their role is confined to technical advisory to the government cum the custodian of technical standards across the spectrum of Energy Efficiency (EE) and Energy Conservation (EC).

In 2018, NEECA, with support from the United Nations Environment Program (UNEP) and Global Environment Facility (GEF), implemented the "Delivering the Transition to Energy Efficient Lighting in Residential, Commercial, Industrial and Outdoor Sectors in Pakistan" project. A risk guarantee mechanism was designed with a USD250,000 seed grant from UNEP. In November 2021, the seed grant was used to offer financial institutions a 10% default risk guarantee of the total default loan amount. To date, the funds remain unutilized, and only one transaction of PKR 1 million was used for financing LED light replacement at the Image Pakistan Ltd. office building. Our consultations with HBL revealed that for the replacement of lights a consumer financing product is more suitable. HBL also showed interest in financing energy-efficient, light manufacturers, cum distributors who meet the Minimum Energy Performance Standards (MEPS) per the NEECA guidelines while using the project endowment as leverage. The project, NEECA, or ECF were not able to structure a transaction while working with their financial sector counterparts. It appears that NEECA and ECF both need organization capacity to absorb, structure, manage and administer funds to create an impact on the energy efficiency and conservation market. Regardless, ECF or NEECA for actually entering the financing market would need Non-Bank Financial Institutions (NBFI) license from the Security and Exchange Commission of Pakistan (SECP) which takes 18 to 24 months to come through.

#### 6.5 The Parallel between Alternate Energy Development Board (AEDB) and NEECA

It is pertinent to learn from the experiences of two dedicated federal institutions the Alternative Energy Development Board (AEDB) under the Ministry of Energy (Power Division) and the National Energy



Efficiency and Conservation Authority (NEECA) under the Ministry of Science & Technology. The review of the functioning of the two institutions offers significant opportunities for cross-learning and has been summarized to provide a context to the proposed restructuring of financing decarbonization of the textile sector. AEDB looks into the opportunities in Alternate Renewable Energy (ARE) generation and its work in the past has been significant since its inception in 2003. AEDB spearheaded the project facilitation as a one-window operation and claimed to have supported nearly 400 MW distributed on-grid power generation that is funded through SBP's RE refinancing mechanism besides, over 6,000 MW are generation through IPP mechanisms.

One stark difference from NEECA in the approach of AEDB is the execution of their corporate strategy through the private sector. This allowed them to look into things differently, and adopt an ARE sector development approach that is sustainable. The four pillars on which their corporate approach rests include; i) leveraging private sector financial resources realizing the fact that the public sector will never have enough resources to meet the country's needs, ii) being dynamic in developing and calibrating incentives that make ARE attractive for the private sector, iii) encourage the development of ARE products and manufacturing base only through the private sector, and iv) promote the provision of ARE energy services again from the private sector that is based on ARE resources.

AEDB was effective in mobilizing private sector funding, and financial sector participation by partnering with the SBP. This strategic partnership provided them immediate access to banks and DFIs loan retail networks at no cost and roughly PKR 60 billion in advances were provided by the banking industry just in less than three years. The equally important factor that contributed to the success was the listing of certified ARE service providers and installers. Today, 160 ARE service providers are certified by AEDB, and this ensures the minimum standard of quality of services and products, a sustainable source of revenue for AEDB, and a simplified financing process for banks and DFIs. (The World Bank, 2024)

Broadly speaking NEECA can adopt many national best practices that provide insights into developing inter-institutional coordination, risk sharing, capacity development, and the development of Energy Service Companies (ESCOs) as the service industry. AEDB all along presented itself as the lead technical partner in the ARE market. Along similar lines, NEECA along with ECF hold the same position in the EE&C market. That role needs to evolve, embellish, and must be pro-private sector and focus on the ESCO market development in the private sector. This also amplifies the ECF/NEECA's ability to quickly ramp up their capacity in defining and mainstreaming standards for products and services, certify and list qualified ESCOs, guide banks and financial institutions about how to assess risks and saving, and guide and encourage consumers to come around the EE&C value proposition. (WWF - Pakistan, 2023)

## **7 Development Financing in Pakistan insights for Structuring the Concessional Financing for Decarbonizing the Textile Sector in Pakistan:**

The development Financing regime in Pakistan has heavily relied on the SBP's Cash Re-Financing mechanism as the targeted loans from the State Bank of Pakistan (SBP) to the commercial banks at a minuscule cost of 2% to 4% and also allowed a profit spread to partnering banks between 2-4%. It never involved banks' capital or deposits and cash is always provided to banks to support the lending operation. This led to an unprecedented flow of investment and growth over the years in the targeted sectors. The default risk guarantee mechanism has met with a lukewarm response from banks in general and requires regulatory and legal reforms before becoming a mainstream instrument in development financing. The amendment in section 17 – (a) for clause (1A) in the SBP Act XXXIII of 1956 now requires the Government of Pakistan to make a budgetary allocation to the extent of concessional pricing to make up for the loss of profits to SBP. The amendment has prohibited SBP from absorbing the cost of the concessional financing if not directly linked to inflation. Nonetheless, the following concessional financing options are available and have been summarized for reference but since the promulgation of the new SBP law in 2021 some of these options remain underfunded. Regardless of the resources available, these financing



products provide useful insights for this study and for shaping the structure of the GWFB-funded financing products (State Bank of Pakistan, 2019):

1. **Refinance Facility for Modernization of SMEs:** Financing is available to a wide range of SMEs. SBP has also provided an illustrative list of SME Clusters / Sectors. The concessional loans are available to SME borrowers, as defined in Prudential Regulations for SMEs, and are available for the purchase of new imported/ local plants or machinery, BMR of existing units, and setting up of new SME units. Financing is also available for the import/ local purchase of new generators up to a maximum capacity of 500 KVA, and should not exceed the requirements of loan recipient SME. The loans are priced between 8%-10% p.a. and banks are allowed a spread of 2.5%-3% p.a.
2. **SME ASAAN Finance (SAAF) Scheme:** All SMEs that are new borrowers of the participating banks are eligible. An SME can avail of this facility from one bank only and up to PKR 10 million. These Loans can be secured against the personal guarantees of the borrowers. The banks will charge an interest rate of 9% p.a. and SBP provides refinance to banks at 1% p.a. and hence providing a spread of up to 8 percent p.a. to these collateral-free loans. The Government of Pakistan provided risk coverage of 40% to 60% on the first loss portfolio basis according to published categories.
3. **SBP Financing Scheme for Renewable Energy:** Given that Pakistan's economy is facing the dual challenge of energy shortage and climate change. SBP offered RE Financing for the tenor of 12 years at a fixed loan pricing of 6% p.a. to borrowers and a spread of 4% p.a. is allowed to participating banks in exchange for a default risk absorption.
4. **Export Finance Scheme:** The Export Finance Scheme (EFS) is in operation since 1973 intending to boost exports of the country. Under the scheme, short-term financing facilities are provided to exporters through Banks for exports of all manufacturing goods especially value-added products except for basic & primary commodities/raw materials as mentioned in the negative list issued vide BPRD Circular No. 5 dated February 24, 2003. These loans are priced at KIBOR minus 5%, previously they were priced at a fixed 3% p.a. The changes in the SBP law have changed the pricing mechanism for such loans, the banks enjoy a 2% spread and cash refinance from SBP.
5. **Long-Term Financing Facility (LTFF) for Plant and Machinery:** SBP's Long-Term Financing Facility (LTFF), the markup rates for the borrowers of the Textile Sector will be 5% for a maximum period of financing up to 10 years. The banks are allowed a spread of 1.5% - 3% depending on the tenor of the loan.

**Table 2: Financing Mechanism/ Models for GWFB Fund to Consider (UNDP, 2019)**

Financing Mechanism/ Model	Description
<b>Concessional Loans</b>	Concessional loans (or blended loans or subsidized loans) mix grants with additional funds raised from other sources (e.g., capital markets). Concessional loans might reduce borrower costs and increase the capacity of funds to take higher risks. This type of loan has been proven successful in stimulating Green Financing and investment. Under this mechanism, GWFB Fund will collaborate with local banks and FIs to provide concessional loans for building a financing portfolio for the decarbonization of textile manufacturing.
<b>Aggregation</b>	Aggregation refers to aggregating demand, for example, GWFB Fund will act as a sweetener for the pooling of demand by a potential decarbonization solution provider and bulk-offering solution to several textile manufacturers





	aggregating a portfolio of projects (normally SMEs) with similar technologies or business models. Some of the benefits of aggregation include transaction cost reductions and limited risk exposure of participating banks because aggregation distributes costs and diminishes the associated risks of a portfolio.
<b>Grants</b>	Grants and rebates are used to stimulate uptake in a non-existent market or to improve return on investment in decarbonization technologies of specific measures where the market prices are high, and cost share grants make it economically viable for adoption.

Source: Adapted from *Manual of Financing Mechanisms and Business Models for Energy Efficiency UNIDO*

## 8 The Role of Grants and the Rationale

We have argued throughout this report that the primary obstacle is the challenge of accessing the financial resources required to implement Green activities. Most green or energy-efficiency improvements require an up-front additional cost that is expected to generate cash flow of savings at a later stage, but coming up with the needed finance is always tough for firms and manufacturers that are credit constrained. This has been fairly in detail documented by the World Bank<sup>1</sup>. The Wall Street Journal and Deloitte jointly conducted research namely "Top Ways Companies Are Funding Decarbonization". The study reveals that even in the richest economy like the USA, nearly a quarter (23%) of CFOs report seeking assistance and grants from government and regulators, and one-fifth say they explore partnerships and joint ventures to share capital and monetize tax benefits<sup>2</sup>.

In developing countries like Pakistan, access to finance is a problem for non-corporate medium size or smaller firms. The capital markets are emerging and at a nascent stage and hence are not an option for raising funding. Moreover, local markets tend to focus more on government bond markets, leaving corporate bonds and other financial assets aside. Banks prefer to lend against assets (as for mortgages). Access to finance is particularly problematic for small and medium-sized manufacturers, which typically lack transparency, tangible assets, and financial records often because of informality. World Bank Group estimates suggest that the unmet credit needs of formal small and medium-sized enterprises amount to nearly USD1 trillion in developing countries even for normal growth financing let alone considering Green financing.

In situations like these, grants play a vital role in the development of the private sector market especially in the sectors where markets are non-existent or at a nascent stage. It may also mean that there are entry barriers, not enough demand, the cost of operations is high, the risk of operation is high, or does not provide sufficient return on investment to the private sector investors. For the decarbonization of the textile industry in Pakistan, all this is true. It becomes imperative that financial support in terms of cost-share grants is an integral part of the GWFB Fund augmenting the purchase of qualified decarbonization technologies and services including renewable energy (to a lesser extent), investment in energy efficiency and energy conservation and resource recovery equipment and skills, and services market and ESCO market development. The grants should be a cost share ensuring that partnering private sector player also has skin in the game that could be through a fixed amount contribution or computed as a percentage of the equipment cost with a maximum ceiling. Other criteria would include minimum annual operating hours to ensure adequate decarbonization or energy savings and sound return on investment. Figure 2 outlines the broad structure of the grant flow and its purpose. The final shape and structure should be finalized only after the finalization of the GWFB Fund's size, structure, partner, and delivery mechanisms.

<sup>1</sup> Fay, Marianne, Stephane Hallegatte, Adrien Vogt-Schilb, Julie Rozenberg, Ulf Narloch, and Tom Kerr. 2015. Decarbonizing Development: Three Steps to a Zero-Carbon Future. Climate Change and Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-0479-3. License: Creative Commons Attribution CC BY 3.0 IGO

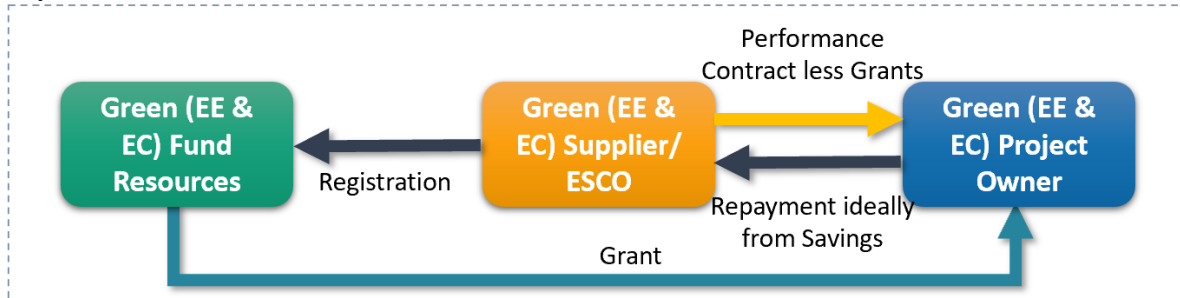
<sup>2</sup> <https://deloitte.wsj.com/articles/top-ways-companies-are-funding-decarbonization-goals-01659981231>

The primary objective nonetheless remains to pursue facilitating capital mobilization to scale up and promote the early adoption of decarbonization across the textile sector (Wall Street Journal, 2021). GWFB Fund must support implementing NAMA plan's targets with the following leveraging of resources in mind:

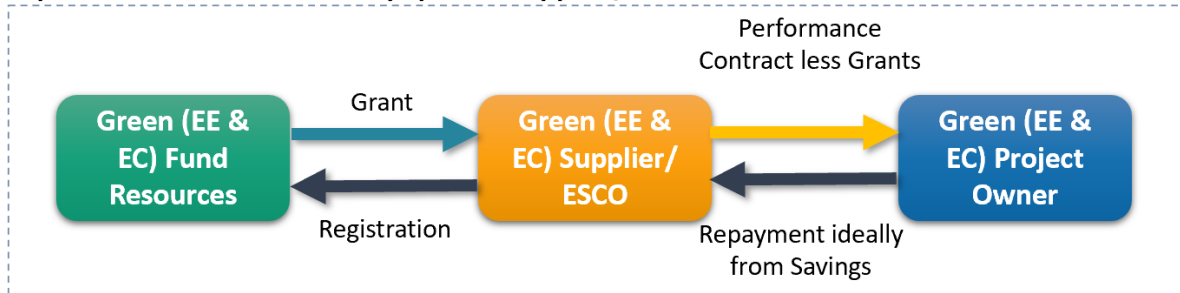
- SBP's experience in concessional and development financing resources in Pakistan, the grant fund could be used to provide any kind of support to SBP or the financial sector partners to leverage resources from SBP/banks/DFIs including the possibility of synergies with SBP's Refinancing schemes especially the Modernization of SMEs, The Export Finance Scheme (EFS), and the Long-Term Financing Facility (LTFF) for Plant and Machinery
- The grants can be used strategically in enticing the interest of any critical Green financing value chain partner to absorb some of the start-up cost or the risk of low return. Another strategic use of the grant will be to hold an annual Green/ Decarbonization Award by category to reward early compliant manufacturers, supporting financial institutions, service providers, public sector regulators, and ESCOs. The awards get media traction, promote healthy competition and accelerate the rate of Green technologies adoption.

Figure 2: Grant Flow Options

**Option 1: Direct Grants to the Textile Owner**



**Option 2: Grants via Green Equipment Supplier/ ESCO**



- GWFB fund must look into leveraging resources under FCDO funded *Karandaz* Project or any other international donor-funded project that commits to climate-related funding.
- Grants will be crucial in securing necessary services and capacity development activities including engaging with the wider financial sector to create products, structure their internal procedures, develop contracts, list and update quality ESCOs and decarbonization services providers, develop procedural manuals, develop training modules, introduce decarbonizing certification programs and training.
- ESCOs in Pakistan are generally undercapitalized and are unable to work as an effective link for demand aggregation and reducing the cost of compliance and grants may be used selectively to shore up their capital base, skills, certification, and overall capacity to deliver.

## 9 Concessional Loans Structure – Decarbonizing the Textile Sector

Pakistan will be able to decarbonizing textile manufacturing though a possible Green-Weave Finance Blueprint (GWFB) fund that will provide access to loans and investment through its GWFB. The financial



services including funds will be offered through a local partner bank or a financial institution. My research suggests that WWF Pakistan through its field teams is working across Pakistan over the past four years and has undertaken extensive technical assessments. WWF's first-hand experience in providing technical advisory rest upon the technology assessments, adoption costs, payback assessments, and successful implementations at several large textile exporting units. A detailed assessment of local quality fabricators was also conducted. WWF-Pakistan's relevant experience over the years provides an excellent repository of skills and technical know-how that needs to be mainstreamed through private sector service providers such as ESCOs and hence WWF Advisory and Technical support should be an integral part of the program that will be scaled up to commercial spin-offs by partnering with local ESCOs and by providing them all the necessary technical pieces of training and skills required to function effectively.

Given the structure of the fund keeping the local realities in mind following broad features have been proposed for incentivizing the private sector investment in green technologies covering the scope of all three areas of interest of the Green-Weave Finance Blueprint (GWFB) including investments in the renewable energy sources, upgradation of the manufacturing processes that ensure Energy Efficiency and Conservation when measured against the baseline, and implementation of other technologies that allow resource recovery further reducing the carbon footprint:

- Government can establish a fund through budgetary allocation or from securing funding from multi-donor funded Green Climate fund to undertake an on-lending operation through a partner financial institution or a bank that will provide *loans at reduced Interest rates* to textile manufacturers for adopting Renewable energy, Energy Efficiency and conservation, and other technologies that reduce the *carbon footprint*.
- The selection of the partner bank will be based on certain key criteria such as willingness to commit resources for the GWFB fund and its objective, availability of a wide enough loan retail network, corporate commitment to advance green financing arrangements, and ability to scale up the program from their fund. On this criterion, the country's largest private bank; Habib Bank Limited has shown willingness for the partnership which is a very encouraging development.
- Pakistan can catalyze the development of financial instruments that textile SMEs can use to reduce carbon footprint through technical support, skills development, and capacity development so that the private sector market for green products service providers i.e., ESCOs can be developed. The concerted effort of multiple stakeholders for the market development will scale up the operations of the existing ESCOs making them large enough to become bankable and act as the aggregators for the textile industries and hence allowing the penetration of green technologies at the small and medium scale manufacturers. The transaction flow has been explained in Figure 2.
- It is understood that the government together with donors will be contributing a fund of Rs. 2 billion to be called *GWFB Fund*. The fund will be a perpetuating resource that will earn interest on its on-lending operation and will continue to grow to continue to provide necessary cash resources on a rolling basis. The initial scope of the fund is envisioned to be Pakistani textile manufacturing but the fund can redefine its scope based on evolving needs across multiple sub-sectors in the Pakistan economy. Nonetheless, the focus of the program will remain to be the decarbonization and Nationally Agreed Mitigation Action (NAMA) plan of Pakistan.
- The possible structure of the *GWFB Fund* is dictated by the review of existing development financing approaches and the objectives of the fund. It is proposed that in the initial phase of the program export-oriented (preferable) Textile SME Manufacturers should get access to affordable loans/leases via Partner Bank/ DFI.
- The project owners i.e., textile manufacturers and service providers should get support from WWF Pakistan via its technical components and all such activities should be funded through a separate grant fund. The same grants should be used for the ESCO market development, capacity development of industry players, and the banks and financial institutions to facilitate the scale-



up. With an ultimate objective that the market approach takes root and Banks/ DFIs and Manufacturers get access to decarbonizing service providers i.e., ESCOs, auditors, etc.

The success of the above shared SBP's refinancing on-lending options provides insights into the possible financing mechanism or the structure and the operationalization of concessional loans. In sum, it is proposed that the GWFB fund will be through an on-lending model while partnering with a bank or a financial institution to provide decarbonization loans to Textile Factories (Project Owners) and ESCOs, Investors. The two possible business transactions are explained below as illustrated in Figure 3:

- Option 1. Project owners secure financing and implement the decarbonization projects themselves
- Option 2. Project owners collaborate with a project aggregator or an ESCO to secure financing and implement the projects and pay the aggregator or the ESCO on a pre-agreed installment plan.

Option 1 is more appropriate for the project owners with adequate human resources and healthy financial performance and the availability of collateral. This group of project owners may choose to implement decarbonization measures without getting loans from commercial banks. Option 2 is suitable for project owners which prefer decarbonization services from a supplier or ESCOs. Both options have been labeled accordingly in Figure 3 for illustration.

**Figure 3: Market Aggregation Model through ESCOs targeting Textile SMEs Going Green**

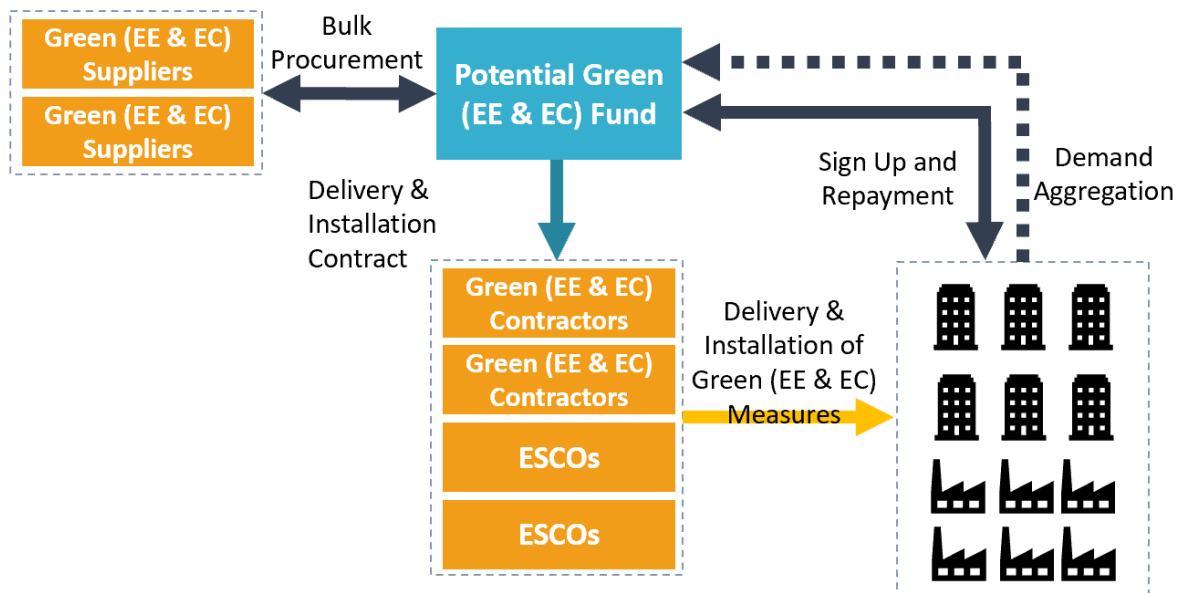
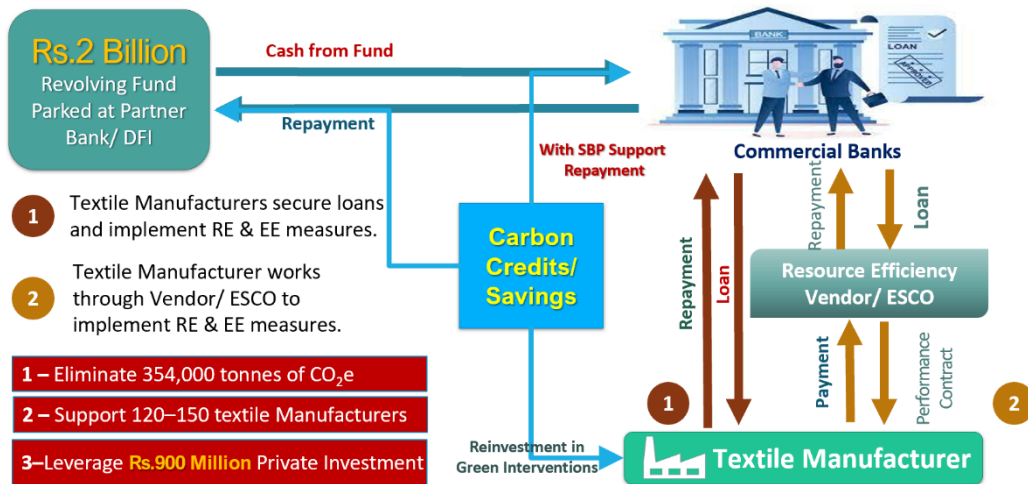


Figure 4 also outlines the funds flow, services flow, and repayment mechanism, and also provides covenants along the value chain. It is further elaborated below:

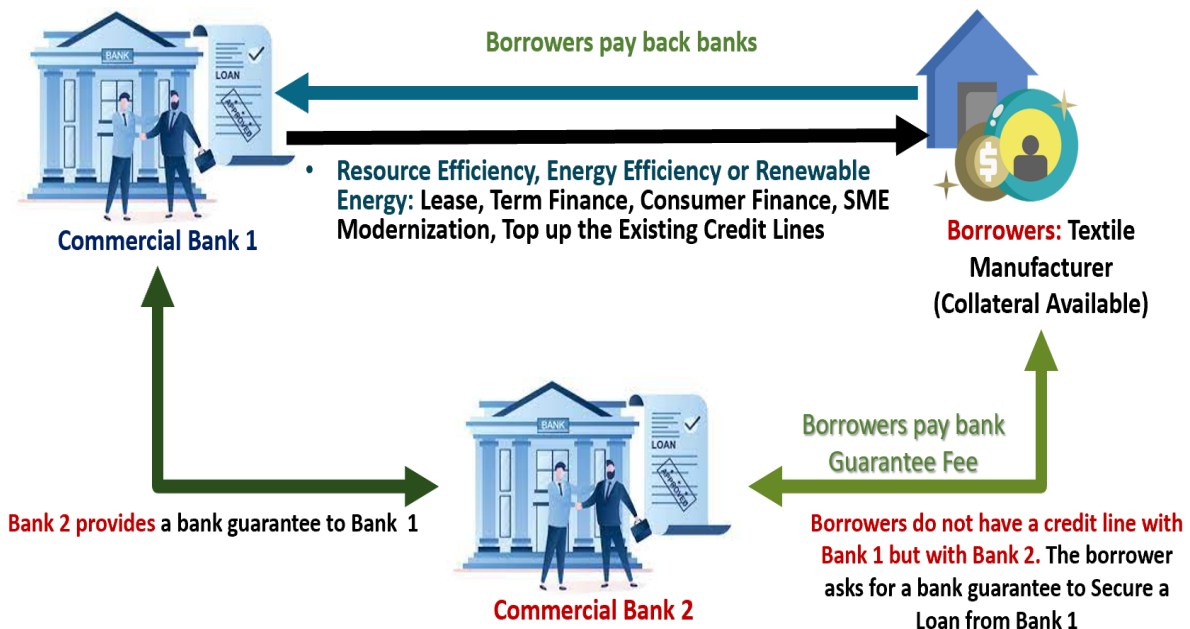
- On receipt from the funds contributors/ organizations, the funds will be placed with a partner bank and it will serve as the cash resource to support an on-lending or loan refinancing. The fund will earn X% interest on all the deployed funds. The rate will be negotiated with the bank at the time of the contractual agreement so that fund continues to grow. Any unutilized funds will attract a higher profit rate.

Figure 4: Operational Structure of the GWFB Fund Pakistan



- On the back of such funds, banks will consider reducing the lending rate to textile manufacturing but will allow a profit spread of up to 4% to banks, for the amounts provided as loans to the Textiles manufacturers for the upgradation of equipment, plants, process, etc., leading to the reduction of the net carbon emissions.
- The default risk of clients will be borne by the partner bank, as has been the case under the SBP re-finance mechanism, and our discussions with multiple banks have confirmed our understanding and also the willingness of the banks to accept the same terms.
- Banks will be allowed to charge market-responsive markup rates that will be concessional and will be less than the commercial lending rate currently priced at KIBOR plus 2% to 3%.
- WWF can contribute to and facilitate the industry visits and share all the technical details for the education and understanding of the ESCOs and banks, helping them develop lending products, transaction structures, and procedures.
- The customers of other banks may also avail of the facility where the Bank (managing fund) will act as the fund manager like SBP for the GWFB fund and the spread may be shared between the managing bank and the other bank as illustrated in Figure 5.

Figure 5: Green Financing for Customers not Dealing with the GWFB Partner Bank





## 10 Recommendations and the Way Forward for the GWFB Fund:

**Fund Structure and Application:** GWFB Fund to be placed with the partner bank – following the SBP cash refinance approach, a spread of up to 4% to the partner bank on the disbursed amount, and loan default risk of clients will be borne by the partner bank. Banks may charge market-responsive mark-up rates on lending. The loan will be used for improvements in reducing carbon footprint targeting textile manufacturing in Pakistan and the loan tenor can vary between 3 – 5 years depending on the preference of the manufacturer see *Figure 6*.

**Figure 6: Priority Areas of Investment and Improvements**

Resource Efficiency	Energy Efficiency	Renewable Energy
Caustic Recovery Plant ●	Energy Efficient Motors ● ● ●	Solar PV ● ● ●
Waste Heat Recovery Boiler ● ●	Energy Efficient Lighting ● ● ●	Biomass Boiler ● ●
Oxygen Trim Control System at Boiler ● ●	Variable Frequency Drive ● ● ●	Solar Water Heater ●
Low Liquor Dying Machines ●	Economizer for Gas Fired Boilers ● ●	
Condensate Recovery System ● ●	Heat Exchanger from Wastewater ●	
	Replacement of Clutch Motors with Servo Motors ●	

**Applications Across Processing:** Spinning Weaving Processing Cut to Pack

## 11 Green Interventions for Financing: The Local Context:

### 11.1 Economizer / Condensing Economizer

An economizer preheats (raises the temperature) the boiler and feeds water by the exhaust flue gases from the gas-fired boiler. This pre-heated water is supplied to the boiler from the economizer. Feed water to the boiler is supplied at a high temperature, hence heat required in the gas boiler is less. Thus, fuel consumption on gas boilers is less & carbon emissions are reduced, the thermal efficiency of the plant is increased, the life of the gas boiler is increased, loss of heat in flue gases is reduced, and steaming capacity is increased. It can improve boiler efficiency by up to 5-10%

A lifetime of Economizer: **15-20 years**

Capex: 5-Million PKR

Payback: Within 01 Year

### 11.2 Condensate Recovery System

Condensate is the liquid formed when steam passes from the vapor to the liquid state. having a temperature of liquid 90-95°C, adding a condensate pump can also increase the flow of condensate up to 30%, minimizing the excessive back pressure condensate can be reused as boiler feedwater, reducing water supply and treatment costs, reducing boiler fuel needs through condensate recovery leads to less air pollution by lowering CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub> emissions.

A lifetime of Condensate Recovery System: **20 years**

Capex: 3-Million PKR



Payback: Within 01 Year

### 11.3 Waste Heat Recovery Boiler

Waste heat recovery" is the process of "heat integration", that is, reusing heat energy that would otherwise be disposed of or simply released into the atmosphere. By recovering waste heat, plants can reduce energy costs and CO<sub>2</sub> emissions, while simultaneously increasing energy efficiency

A lifetime of Waste Heat Recovery: **20 years**

Capex: 8-12-Million PKR

Payback: Within 01 Year

### 11.4 Heat Exchanger

Heat exchangers are used to transfer heat from one medium to another. The use of heat exchangers is to pre-heat a cold fluid entering a heated process system using heat from a hot fluid exiting the system. This reduces the energy input necessary to heat the incoming fluid to a working temperature.

A lifetime of Heat Exchanger: **15 years**

Capex: 4-5-Million PKR

Payback: Within 01 Year

### 11.5 Switching of Coal Fired Boiler to Biomass Boiler

Boilers are the key energy consumers in textile processing to meet the thermal energy demand in processing.

Lifetime: 10-15 years

Capex: 25-Million PKR

Payback: depend upon the price difference between coal and biomass

Renewable energy is energy derived from natural sources that are replenished and do not run out. Industry can reduce greenhouse gas emissions by shifting their source of electricity to renewable energies as it would reduce the combustion of fossil fuels.

### 11.6 Mitigation potential:

It is expected that 354,000 tons of CO<sub>2</sub>e will be mitigated over the five years of the NSP. The capacity of local industrial machinery and equipment manufacturers will be built. This will help to meet the increase in demand for RE and EE technologies and will also reduce costs thereby reducing the need for additional capital investment.

**Augmentation through Grants:** WWF can also provide technical support to the banks, regulators, service providers, and ESCOs. Grants will be crucial in securing necessary services and capacity development activities including engaging with the wider financial sector to create products, structure their internal procedures, develop contracts, list and update quality ESCOs and decarbonization services providers, develop procedural manuals, develop training modules, introduce decarbonizing certification programs and training. ESCOs in Pakistan are generally undercapitalized and are unable to work as an effective link for demand aggregation and reducing the cost of compliance and grants may be used selectively to shore up their capital base, skills, certification, and overall capacity to deliver.

The grants can be used strategically in enticing the interest of any critical green financing value chain partner to absorb some of the start-up cost or the risk of low return. Another strategic use of the grant will be to hold an annual Green/ Decarbonization Award by category to reward early compliant



manufacturers, supporting financial institutions, service providers, public sector regulators, and ESCOs. The awards get media traction, promote healthy competition and accelerate the rate of green technologies adoption.

**Provision for Technical Services:** GWFB Fund still requires several inputs to come on the ground and get full operations some of the key activities that will require a commitment of resources are below:

- Agree on the structure of the fund, pricing, profit sharing, and loan default risk arrangements with the partner banks. Turn the arrangements into an enforceable legal agreement, it will require a few weeks long negotiations and inputs from legal experts from all sides including fund contributors and banks.
- Work with banks to write banking procedures that enable retailing of decarbonization of loans, it will also entail product-specific risk assessments and product structuring.
- Write training manuals and partner with ideally SBP for training bankers and professionals
- Ensure certification and upgradation of ESCO professionals, the qualified professional is enrolled and enlisted with the partner institutions while working with the regulator
- Identify equipment, and local manufacturers, and encourage performance certifications based on minimum performance standards while working on performance standards with the regulator or independent certifying bodies.

## 12 Annex 1: GWFB Financial Modeling

### 12.1 GWFB Financial Modeling: Assumption Sheet

<b>Inflation Factor</b>	<b>Average last 20 Years</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
Inflation Rate Assumed on Costs	9.37%	13%	10%	9%	9%	8%
Indexing Cost Inflation		1.13	1.24	1.35	1.48	1.59
<b>EXCHANGE RATE</b>	<b>Avg. Disc. Rate</b>	<b>Year 1</b>	<b>Year2</b>	<b>Year3</b>	<b>Year4</b>	<b>Year5</b>
Rate (PKR=1USD)	13%	280	316	358	404	457
Rate (PKR=1Euro)	13%	300	339	383	433	489
<b>Financing</b>		<b>Year 1</b>	<b>Year2</b>	<b>Year3</b>	<b>Year4</b>	<b>Year5</b>
1 Year KIBOR or Rate		19.20%	16.14%	15.14%	14.14%	13.14%
Conventional Mark-up rates	3%	22.20%	19.14%	18.14%	17.14%	16.14%
Profit (KIBOR-9%)	-9%	10.20%	7.14%	6.14%	5.14%	4.14%
Loan Price (KIBOR-5%)	-5%	14.20%	11.14%	10.14%	9.14%	8.14%
Non-Performing Loan as % of Principle	0.5%					
Operational Cost to FI % of Profits	10%					
Loan Tenor Years	5					
NAMA Grant Fund Contribution (%)	70%					
Private Sector Mobilization (%)	30%					
Recovery of Principal amount in 1st Year	10%					
Recovery of Principal in rest of Years	20%					
<b>No. of Days:</b>						
No. Months	12					
No. of months required for installation	6					
No. of days in calendar a year:	365					
No. of working days in a year:	300					



**KIBOR**  
2-Jul-2024

<b>Tenor</b>	<b>Bid</b>	<b>Offer</b>
1 - Week	20.37	20.87
2 - Week	20.38	20.88
1 - Month	20.33	20.83
3 - Month	19.97	20.22
6 - Month	19.88	20.13
9 - Month	19.21	19.71
1 - Year	18.70	19.20

Data Source: Refinitiv

## 12.2 GWFB Financial Modeling: Assumption Sheet

<u>Interventions / Targets:</u>	Annual Mitigation MT CO <sub>2</sub> eq/Yr.	Year 1	Year 2	Year 3	Year 4	Year 5	Total	Total Mitigation
		Nos.	Nos.	Nos.	Nos.	Nos.		
Economizer	393	72	8	16	14	12	122	47,946
Condensate Recovery	610	70	8	16	14	12	120	73,200
Waste Heat Recovery Boiler	980	50	4	8	7	6	75	73,500
Heat Exchanger on Hot Wastewater	415	40	4	8	7	6	65	26,975
Switching from Coal to Biomass Boiler	19,613	20	2	4	4	3	33	647,229
Total Intervention in a Year		252	26	52	46	39		
<b>Cumulative Interventions</b>		<b>252</b>	<b>278</b>	<b>330</b>	<b>376</b>	<b>415</b>	<b>415</b>	<b>868,850</b>

<u>Cost of Interventions:</u>	Costs in Euro	PKR	PKR	PKR	PKR	PKR
Economizer	€25,000	7,500,000	9,322,500	10,161,525	11,076,062	11,962,147
Condensate Recovery	€25,000	7,500,000	9,322,500	10,161,525	11,076,062	11,962,147
Waste Heat Recovery Boiler	€45,000	13,500,000	16,780,500	18,290,745	19,936,912	21,531,865
Heat Exchanger on Hot Wastewater	€30,000	9,000,000	11,187,000	12,193,830	13,291,275	14,354,577
Switching from Coal to Biomass Fired Boiler	€150,000	45,000,000	55,935,000	60,969,150	66,456,374	71,772,883
	275,000					

### Energy Savings in Figures:

<b>Economizer</b>		<b>Year1</b>	<b>Year2</b>	<b>Year3</b>	<b>Year4</b>	<b>Year5</b>
Total interventions in a year	No.	72	8	16	14	12
Energy Saving	(MMBtu/Yr.)	6,609.6	6,609.6	6,609.6	6,609.6	6,609.6
Cost	(USD/MMBtu)	6.5	6.5	6.5	6.5	6.5
Cost saving for the year	USD	3,093,293	343,699	687,398	601,474	515,549
Cost saving for the year	PKR	866,121,984	108,746,427	245,766,925	243,002,047	235,364,840



### 12.3 GWFB Financial Modeling: Assumption Sheet

#### Condensate Recovery

Total interventions in a year	No.	70	8	16	14	12
Energy Saving	(MMBtu/Yr.)	10,800.0	10,800.0	10,800.0	10,800.0	10,800.0
Cost	(USD/MMBtu)	6.5	6.5	6.5	6.5	6.5
Cost saving for the year	USD	4,914,000	561,600	1,123,200	982,800	842,400
Cost saving for the year	PKR	1,375,920,000	177,690,240	401,579,942	397,062,168	384,583,071

#### Waste Heat Recovery Boiler

Total interventions in an year	No.	50	4	8	7	6
Energy Saving	(MMBtu/Yr.)	16,560.0	16,560.0	16,560.0	16,560.0	16,560.0
Cost	(USD/MMBtu)	6.5	6.5	6.5	6.5	6.5
Cost saving for the year	USD	5,382,000	430,560	861,120	753,480	645,840
Cost saving for the year	PKR	1,506,960,000	136,229,184	307,877,956	304,414,329	294,847,021

#### Heat Exchanger on Hot Wastewater

Total interventions in an year	No.	40	4	8	7	6
Energy Saving	(MMBtu/Yr.)	10,296.0	10,296.0	10,296.0	10,296.0	10,296.0
Cost	(USD/MMBtu)	6.5	6.5	6.5	6.5	6.5
Cost saving for the year	USD	2,676,960	267,696	535,392	468,468	401,544
Cost saving for the year	PKR	749,548,800	84,699,014	191,419,773	189,266,300	183,317,931

#### Switching from Coal to Biomass Fired

##### Boiler

Total interventions in an year	No.	20	2	4	4	3
Energy Saving	(MMBtu/Yr.)	-	-	-	-	-
Cost	(USD/MMBtu)	6.5	6.5	6.5	6.5	6.5
Cost saving for the year	USD	-	-	-	-	-
Cost saving for the year	PKR	-	-	-	-	-



### 12.4 GWFB Financial Modeling: Calculation Sheet

Use of Technology		Year 1	Year 2	Year 3	Year 4	Year 5	
	Economizer	Rs.540,000,000	Rs.74,580,000	Rs.162,584,400	Rs.155,064,872	Rs.143,545,767	
	Condensate Recovery	Rs.525,000,000	Rs.74,580,000	Rs.162,584,400	Rs.155,064,872	Rs.143,545,767	
	Waste Heat Recovery Boiler	Rs.675,000,000	Rs.67,122,000	Rs.146,325,960	Rs.139,558,384	Rs.129,191,190	
	Heat Exchanger on Hot Wastewater	Rs.360,000,000	Rs.44,748,000	Rs.97,550,640	Rs.93,038,923	Rs.86,127,460	
	Switching from Coal to Biomass Fired Boiler	Rs.900,000,000	Rs.111,870,000	Rs.243,876,600	Rs.265,825,494	Rs.215,318,650	
	<b>Total</b>	<b>Rs.3,000,000,000</b>	<b>Rs.372,900,000</b>	<b>Rs.812,922,000</b>	<b>Rs.808,552,544</b>	<b>Rs.717,728,834</b>	
Sources of Financing							
	GOP & Donors' Grant Fund	70%	Rs.2,100,000,000	Rs.261,030,000	Rs.569,045,400	Rs.565,986,781	Rs.502,410,184
	Private Sector Mobilization	30%	Rs.900,000,000	Rs.111,870,000	Rs.243,876,600	Rs.242,565,763	Rs.215,318,650
	<b>Total</b>		<b>Rs.3,000,000,000</b>	<b>Rs.372,900,000</b>	<b>Rs.812,922,000</b>	<b>Rs.808,552,544</b>	<b>Rs.717,728,834</b>
<b>Cumulative Outstanding Loans</b>			<b>Rs.2,100,000,000</b>	<b>Rs.2,151,030,000</b>	<b>Rs.2,300,075,400</b>	<b>Rs.2,435,856,181</b>	<b>Rs.2,478,251,285</b>
<b>Repayment and Redeployment</b>							
<b>Cash In-flows:</b>							
	Principle Recovered in a Year		Rs.210,000,000	Rs.420,000,000	Rs.430,206,000	Rs.460,015,080	Rs.487,171,236
	Interest Income/Year		Rs.149,100,000	Rs.248,479,371	Rs.246,965,044	Rs.236,092,487	Rs.218,726,788
	<b>Cash in-flows via Financing for the year</b>		<b>Rs.359,100,000</b>	<b>Rs.668,479,371</b>	<b>Rs.677,171,044</b>	<b>Rs.696,107,567</b>	<b>Rs.705,898,024</b>
<b>Cash Out-flows:</b>							
	Financial institute spread (4%)		Rs.(84,000,000)	Rs.(94,441,200)	Rs.(108,803,016)	Rs.(114,642,487)	Rs.(117,530,655)
	<b>Net cash in-flow for the year:</b>		<b>Rs.275,100,000</b>	<b>Rs.574,038,171</b>	<b>Rs.568,368,028</b>	<b>Rs.581,465,080</b>	<b>Rs.588,367,369</b>
	<b>Cash available for financing:</b>		<b>Rs.275,100,000</b>	<b>Rs.588,108,171</b>	<b>Rs.587,430,799</b>	<b>Rs.602,909,098</b>	<b>Rs.688,866,284</b>

## 12.5 GWFB Financial Modeling: Profits / Benefits for Investor, Financial Institute & Grant Fund

### Net Profits for Investors / Textile Manufacturer

<b>Annual Energy Cost Savings through Interventions</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
Economizer	866,121,984	108,746,427	245,766,925	243,002,047	235,364,840
Condensate Recovery	1,375,920,000	177,690,240	401,579,942	397,062,168	384,583,071
Waste Heat Recovery Boiler	1,506,960,000	136,229,184	307,877,956	304,414,329	294,847,021
Heat Exchanger on Hot Wastewater	749,548,800	84,699,014	191,419,773	189,266,300	183,317,931
Switching from Coal to Biomass Fired Boiler	-	-	-	-	-
	<b>4,498,550,784</b>	<b>507,364,865</b>	<b>1,146,644,596</b>	<b>1,133,744,844</b>	<b>1,098,112,863</b>

### Annual cost cut through discounted financing rate

Annual mark-up as per conventional rate KIBOR+3%	201,600,000	426,920,571	368,742,679	365,245,927	353,079,851
Annual Mark-up as per discounted rate KIBOR-5%	149,100,000	248,479,371	246,965,044	236,092,487	218,726,788
Net Interest Rate Benefit to Textile Projects	<b>52,500,000</b>	<b>178,441,200</b>	<b>121,777,635</b>	<b>129,153,440</b>	<b>134,353,064</b>
<b>Total financial benefit for investor:</b>	<b>PKR 4,551,050,784</b>	<b>685,806,065</b>	<b>1,268,422,231</b>	<b>1,262,898,283</b>	<b>1,232,465,927</b>

### Net Profits for Financial Institutions on Financing:

	<b>Year 1</b>	<b>Year2</b>	<b>Year3</b>	<b>Year4</b>	<b>Year5</b>
Benefits through 4% mark-up spread	84,000,000	94,441,200	108,803,016	114,642,487	117,530,655
Non - Performing Loans Booked @0.5% of Loans	(10,500,000)	(10,755,150)	(11,500,377)	(12,179,281)	(12,391,256)
Operational and Administrative Cost 10% of Profits	(8,400,000)	(9,444,120)	(10,880,302)	(11,464,249)	(11,753,065)
<b>Total financial benefit for Financial Institute:</b>	<b>PKR 73,500,000</b>	<b>83,686,050</b>	<b>97,302,639</b>	<b>102,463,206</b>	<b>105,139,398</b>

### Net Profits for GWFB Grant Funds:

	<b>Year1</b>	<b>Year2</b>	<b>Year3</b>	<b>Year4</b>	<b>Year5</b>
Net Interest @KIBOR-5 (Mark Charged to Customers)	149,100,000	248,479,371	246,965,044	236,092,487	218,726,788
Net Spread of 4% allowed to partner FI	(84,000,000)	(94,441,200)	(108,803,016)	(114,642,487)	(117,530,655)
	-	-	-	-	-
<b>Net financial benefit to the GWFB Textile Upgradation Fund</b>	<b>65,100,000</b>	<b>154,038,171</b>	<b>138,162,028</b>	<b>121,450,000</b>	<b>101,196,133</b>

## 13 Bibliography

**State Bank of Pakistan. 2019.** SBP's Incentive Schemes. *State Bank of Pakistan*. [Online] May 16, 2019. [Cited: July 03, 2024.] <https://www.sbp.org.pk/Incen/index.asp>.

— **2011.** Chapter 11: Development Finance Support Services. *State Bank of Pakistan*. [Online] July 01, 2011. [Cited: July 03, 2024.] [https://www.sbp.org.pk/sbp\\_bsc/apr/Perf-10-11/Ch-05.pdf](https://www.sbp.org.pk/sbp_bsc/apr/Perf-10-11/Ch-05.pdf).

— **2017.** *Green Banking Guidelines*. Karachi : State Bank of Pakistan, 2017.

**The Ministry of Energy, Pakistan. 2020.** *Pakistan Energy Year Book*. Islamabad : The Governmnet of Pakistan, 2020.

**The World Bank. 2024.** *Financing Energy Efficiency - the World Bank Knowledge Series*. Islamabad : The World Bank - Pakistan (Unpublished awaiting GOP approval), 2024.

— **2019.** *The World Bank Energy Efficiency Roadmap for Pakistan*. Pakistan : The World Bank, 2019.

**UNDP. 2019.** *Sustainable Energy for All (SEforALL) Investment Prospectus (IP) for Pakistan*. Islamabad : UNDP, 2019.

**USAID. 2016.** Greenhouse Gas -Emissions Factsheet Pakistan. *Climate Links*. [Online] A Global Knowledge Portal for Climate and Development Practitioners, June 30, 2016. [Cited: July 30, 2024.] <https://www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-pakistan>.

**Wall Street Journal. 2021.** Wall Street Journal. *Top Ways Companies are Funding Decarbonization Goals*. [Online] Deloitte Wall Street Journal, 2021. <https://deloitte.wsj.com/articles/top-ways-companies-are-funding-decarbonization-goals-01659981231>.

**WWF - Pakistan. 2023.** *Energy Efficiency and Decarbonization of Textile Sector*. Lahore : WWF (Unpublished), 2023.

**WWF-Pakistan. 2021.** Pakistan's Nationally Determined Contribution (NDC). *WWF - Pakistan*. [Online] July 03, 2021. [Cited: July 13, 2024.] [https://www.wwfpak.org/our\\_work\\_/climate\\_and\\_energy\\_/nationally\\_determined\\_contributions\\_/](https://www.wwfpak.org/our_work_/climate_and_energy_/nationally_determined_contributions_/).