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Brand–Supplier Shared Responsibility

Advancing Renewable Energy Transition in Pakistan's Textile Sector

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Executive Summary

Pakistan’s textile and sports & apparel industries serve as critical drivers of national economic stability, yet they are increasingly vulnerable to global climate mandates and energy price fluctuations. While the sector must decarbonize to remain competitive, manufacturers often bear the disproportionate burden of high capital expenditures and technical barriers associated with green upgrades. This financial imbalance is often exacerbated by short-term sourcing practices that discourage long-term investment in sustainable infrastructure. Consequently, there is an urgent need to reform traditional procurement models to ensure the industry can meet international environmental standards while maintaining operational viability.

A transition toward a shared responsibility model offers a pathway to mitigate these risks by redistributing the costs and benefits of sustainability across the supply chain. Under this framework, global brands transition from being passive monitors of compliance to active facilitators of the green transition. This involves providing direct co-investment in renewable energy, offering five to ten year purchase agreements to enable suppliers to access green financing, and delivering technical support for managing complex energy technologies. By offering contract volume certainty, brands can significantly reduce the risk profiles of manufacturers, encouraging the adoption of large-scale decarbonization projects such as rooftop solar and electrification.

Collective action initiatives like the Future Supplier Initiative demonstrate the effectiveness of this approach, where multiple global brands collaborate to provide low-cost financing for shared suppliers to reach science-based climate targets. Such efforts are essential for Pakistan to retain its GSP+ status and prepare for the European Union’s Carbon Border Adjustment Mechanism, both of which necessitate strict adherence to environmental conventions. Partnering with international organizations like the Asia Clean Energy Coalition and the Sports and Fitness Industry Association further enables the mobilization of institutional capital and the standardization of green finance taxonomies. Ultimately, adopting a system-level approach that integrates a shared charter for emission reductions will safeguard the industry's future, ensuring it remains a resilient and competitive actor in the global market.

Responsibility for Green Transition in the Textile Sector

1. Introduction

Pakistan's export-oriented textile and sports goods sectors operate at the heart of global value chains, supplying products to major international brands across Europe and North America. Over the past decade, these global buyers have significantly increased their commitments toward climate action, sustainability, and decarbonization. These commitments are no longer voluntary narratives; they are increasingly embedded in procurement requirements, compliance standards, and sourcing decisions. International buyers and brands actively shape production practices through their sustainability commitments, including climate targets, renewable energy adoption, and emissions reductions across Scope II and Scope III. As a result, supplier firms in Pakistan are under growing pressure to align with global decarbonization pathways while remaining cost competitive in a challenging domestic energy and policy environment. Despite this pressure, the transition toward renewable energy at the supplier level remains uneven and constrained. Manufacturers face high upfront capital costs, limited access to affordable finance, evolving regulatory frameworks, and uncertainty in demand patterns. At the same time, global brands continue to benefit from low-cost sourcing while transferring a disproportionate share of transition risks and compliance burdens onto suppliers.

This imbalance has created a structural gap between ambition and implementation. Within this context, the role of international brands extends beyond setting targets; it lies in leveraging their market position, procurement practices, and financial influence to enable a more equitable and accelerated transition. A shift toward a shared responsibility and accountability model is therefore critical, where both brands and suppliers jointly contribute to the costs, risks, and outcomes of renewable energy adoption and broader industrial decarbonization. This concept centers on repositioning global brands as active partners in Pakistan's green industrial transition, rather than passive standard-setters. Major sourcing companies such as H&M, Nike, Adidas, IKEA, and Walmart possess significant leverage over supplier behaviour through sourcing volumes, long-term relationships, and sustainability commitments. When aligned with supplier needs, this leverage can unlock financing, reduce transition risks, and create predictable pathways for renewable energy uptake. On the supplier side, leading Pakistani manufacturers such as Interloop Limited, Artistic Milliners, Soorty Enterprises, and Nishat Mills Limited are already adopting with energy efficiency and renewable energy solutions. However, their ability to scale these efforts is closely tied to the predictability of orders, access to capital, and alignment with buyer requirements.

Feature	Description
Main Export Products	Ready-made garments, knitwear, bed linen, and cotton yarn (Nayak et al., 2017).
Leading Clusters	Faisalabad, Sialkot (Sports/Apparel), Karachi & Multan.
Competitive Challenges	High energy tariffs, lack of automation, and raw material volatility (Memon et al., 2020).

Table 1. Pakistan's Textile Industry Profile: Products, Clusters, and Challenges

1.1 Textile Sector

The textile industry is the bedrock of Pakistan's industrial architecture, serving as the primary driver of foreign exchange earnings and industrial employment. For decades, Pakistan has positioned itself as a key supplier in the global apparel value chain, leveraging its status as one of the world's leading cotton producers. The sector constitutes a multifaceted industrial ecosystem encompassing sequential processes from ginning, spinning, and weaving to the production of high value–added garments and specialized sports apparel (Malik, 2020).

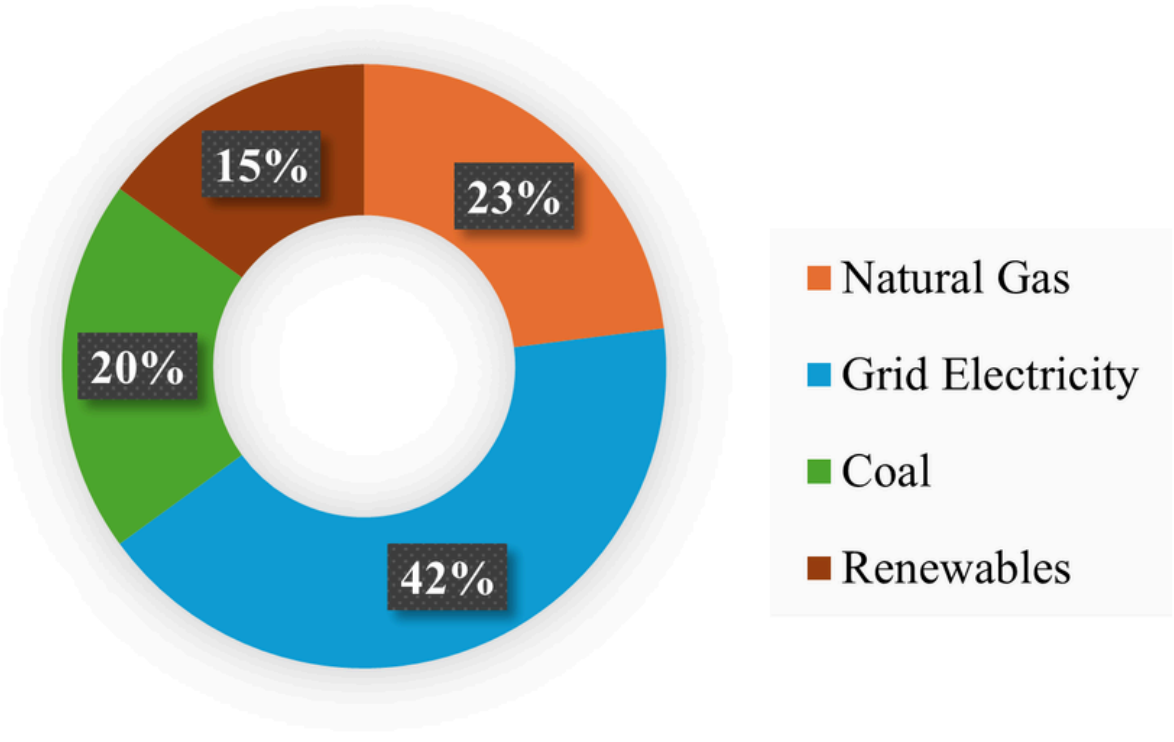

Figure 1. Energy mix of the textile industry of Pakistan (ADS Report, 2025)

The sector's contribution to the national economy is immense, consistently accounting for approximately 60% of Pakistan’s total exports (Khattak, 2020) Within this sector, the apparel and clothing segment is considered the "backbone" of value-added products (Memon et al., 2020 However, the industry has historically struggled to increase its global market share. Exports grew steadily from around 8 billion USD in 2004 to about 13 billion USD by 2011, remained relatively flat until 2020, and then surged sharply to a peak of 29 billion USD in 2024 before dipping slightly in 2025. It highlights both long-term growth and recent volatility in the sector. The dip in textile exports in 2025, as shown in the Figure 1, is a result of rising energy costs and unreliable supply, intensifying global competition from Bangladesh, India, and Turkey, policy uncertainty linked to upcoming EU carbon regulations, and domestic economic challenges such as inflation, currency depreciation, and reduced industrial activity.

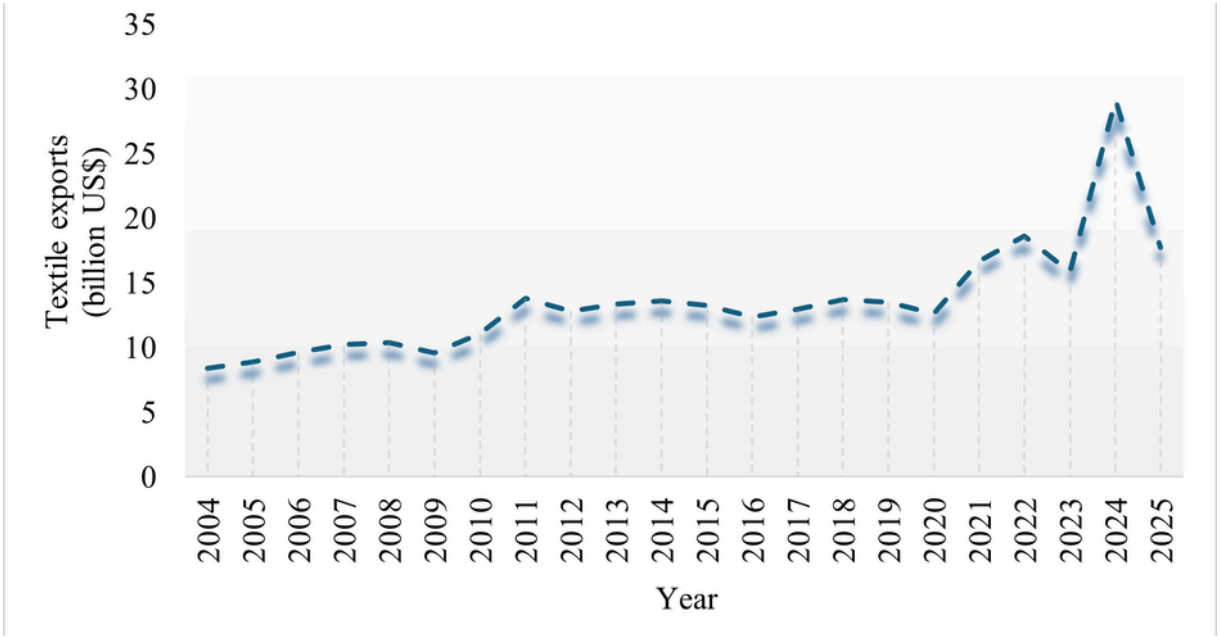

Figure 2. Trends in the textile exports of Pakistan (SBP Database, 2026)

Despite this, the textile sector remains a significant economic pillar, contributing 8.5% to the GDP, employing 40% of the industrial labor force, and accounting for 28% of industrial value addition (Khan et al., 2019).

Major industrial clusters are concentrated in Karachi, Faisalabad, Lahore, and Multan. These clusters host spinning mills, weaving units, dyeing and finishing facilities, and garment manufacturing units. The presence of a complete value chain provides Pakistan with a competitive advantage, allowing it to cater to diverse market demands. Despite this strength, the sector is highly sensitive to external shocks. Energy costs, currency fluctuations, and global demand cycles significantly influence production decisions and export performance.

1.2 The Sports and Apparel Sector

Pakistan's sports apparel sector represents a significant portion of the value-added segment, yet it faces rising competition from Vietnam and Cambodia. The sector's survival is increasingly tied to its ability to meet the stringent technical and environmental specifications demanded by global sports brands.

This sector is concentrated in Sialkot, which hosts over 290 registered sportswear factories and more than 1,200 sports goods exporters, supported by around 20,000 chamber members (ADS Snapshot, 2026). The industry employs an estimated 150,000 workers, with about 48,000 formally registered under Punjab Employees Social Security Institution (PESSI) and generates between $0.9 to 1.3 billion annually in exports, contributing significantly to the broader $1.6 billion sports and surgical goods exports (ADS Snapshot, 2026). This cluster accounts for nearly 1.5% of Pakistan's total export earnings, with firms paying around USD 472 million to the national exchequer as shown in Figure 3(ADS Snapshot, 2026).

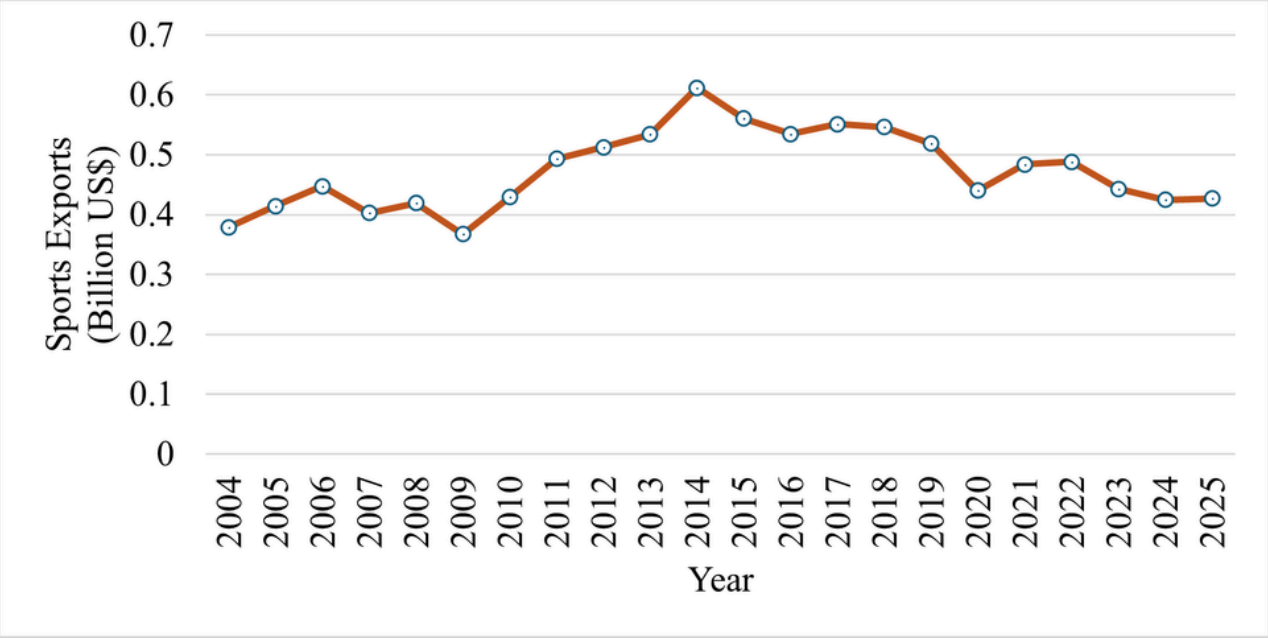

Figure 3. Trends in exports of the sports industry in Pakistan (SBP Database, 2026)

Despite its scale, the sector faces chronic energy challenges: nearly 11,000 SMEs operate at only 60% capacity due to unreliable grid supply, forcing reliance on diesel generators (40% of energy mix), natural gas (5%), and limited solar (2%), as shown in Figure 4. Encouragingly, solar adoption is rising, Pakistan's solar share surged from under 2% in 2020 to 24% in early 2025, with Sialkot firms increasingly installing rooftop PV systems and hybrid solar-storage solutions to cut costs and ensure uninterrupted production.

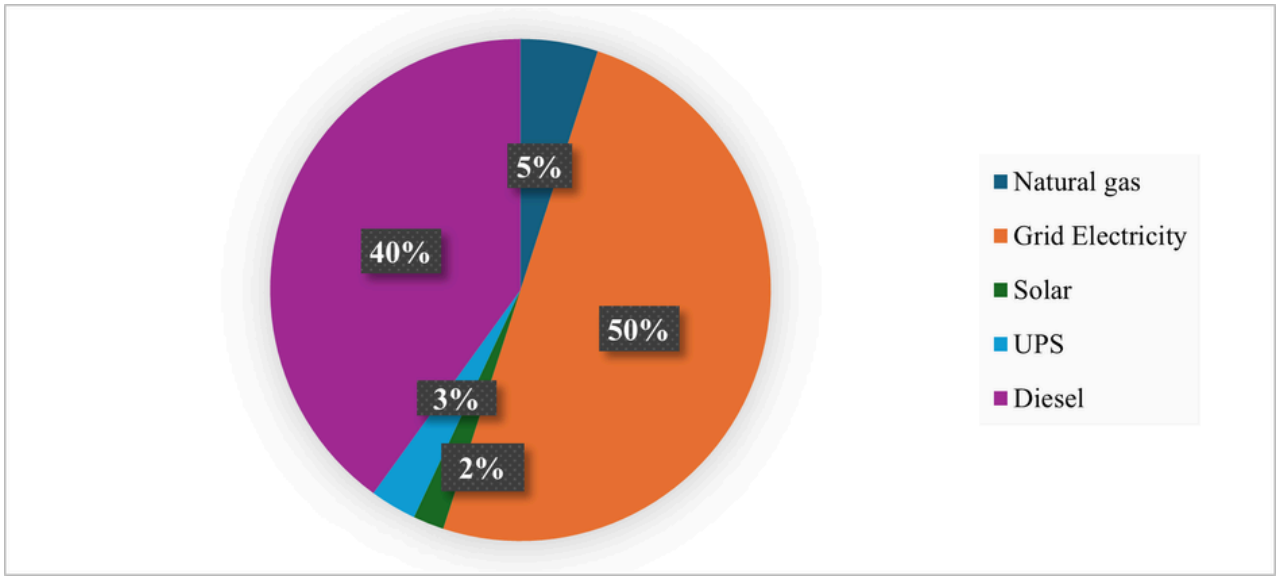

Figure 4. Energy mix of the sports & apparel sector (ADS Snapshot, 2026)

This sector is deeply integrated into global supply chains and works closely with leading brands such as Nike, Adidas, and Puma. Unlike mass textile production, sports goods manufacturing often involves more customized and labor-intensive processes, which creates both opportunities and constraints in adopting new technologies and sustainability practices.

2. The Evolution of Standards, Regulations, and Policy Frameworks

Over the past two decades, sustainability has evolved from a niche concern to a central pillar of global trade. Initially focused on labor standards and quality assurance, compliance frameworks now encompass environmental performance, carbon emissions, chemical usage, and resource efficiency.

In the European context, policy developments such as the European Green Deal have significantly altered the landscape. Measures like carbon border adjustments and eco-design requirements are reshaping how products are evaluated in international markets. Similarly, regulatory frameworks governing chemical use and product traceability have become more stringent.

Standard	Core Focus & Governance Logic	Implications for Pakistan's Textile Industry	Industry Response in Pakistan	Implications for Export Competitiveness
RE100 (2014 onward)	Corporate commitment to 100% renewable electricity; driven by global brands.	Externalizes decarbonization pressure on suppliers; creates demand for renewable energy adoption at manufacturing level.	Leading firms investing in solar; systemic barriers (grid constraints, financing) limit wider adoption.	Emerging determinants of preferred supplier status; early adopters gain strategic advantage.
Science Based Targets initiative (2015 onward)	Alignment of corporate emissions reduction with climate science; includes Scope 3 emissions.	Integrates suppliers into brands' carbon accounting; requires emissions measurement, reporting, and reduction pathways.	Limited participation due to technical and financial constraints; awareness increasing.	Transforms sustainability into a quantifiable performance metric influencing sourcing decisions.
Buyer-led Decarbonization Programs (2016 onward)	Direct engagement by brands to reduce supplier emissions; project-based interventions.	Shifts governance from audit-based compliance to *performance-based engagement*; introduces expectations of energy transition.	Fragmented participation; dependence on buyer-specific initiatives; lack of standardization.	Direct linkage between emissions performance and sourcing continuity.
Higg Index (2010s onward)	Standardized sustainability measurement tools across environmental and social dimensions.	Introduces benchmarking and comparability across suppliers; reduces information asymmetry for buyers.	Widely adopted among exporters; concerns regarding cost, duplication, and methodological consistency.	Increasingly used in sourcing decisions; affects supplier ranking and visibility.
SDGs, ESG Reporting (2010s onward)	Integration of sustainability into corporate disclosure frameworks.	Expands scope of reporting beyond compliance to impact metrics; requires data systems and transparency.	Large firms engaged in ESG reporting; SMEs lack capacity.	Enhances reputation and access to sustainability-linked finance.
UN Fashion Industry Charter for Climate Action (2018 onward)	Sector-wide commitment to net-zero emissions and renewable energy adoption.	Formalizes expectation that entire supply chains (including suppliers) must decarbonize.	Indirect engagement via brand requirements; limited direct participation from Pakistani firms.	Shapes long-term sourcing strategies; aligns industry with global climate governance.
The Fashion Pact (2019 onward)	Collective action on climate, biodiversity, and oceans.	Reinforces sustainability commitments at industry level; increases coherence among brand expectations.	Limited direct engagement; impact transmitted through buyers.	Strengthens sustainability as a non-negotiable sourcing condition.
Supplier Climate Programs & Scope 3 Accountability (2020 onward)	Integration of suppliers into value-chain emissions targets.	Requires suppliers to measure, disclose, and reduce emissions; increases technical and financial burden.	Early-stage adoption; major gaps in MRV (Measurement, Reporting, Verification) systems.	Core determinant of future participation in global supply chains.
Just Transition & Shared Responsibility (2020s onward)	Equity-focused governance emphasizing cost-sharing and responsible purchasing.	Challenges existing cost distribution where suppliers bear decarbonization burden; introduces need for collaborative financing models.	Strong advocacy from suppliers for co-investment and fair pricing mechanisms.	Central to sustaining competitiveness; without it, transition may be economically unviable.
Corporate Sustainability Reporting Directive (2022 onward)	Mandatory ESG disclosure across value chains	Converts voluntary reporting into legal obligation; suppliers become data providers	Low readiness; systems under development	Essential for continued engagement with EU buyers

Table 2. Global Sustainability Standards and Their Impact on Pakistan's Textile Industry

German Supply Chain Due Diligence Act (2023 onward)	Legal accountability for supply chain risks.	Extends liability to suppliers; increases compliance pressure.	Gradual alignment; compliance driven by buyers.	Influences sourcing decisions, particularly in EU markets.
Ecodesign for Sustainable Products Regulation & DPP (2024 onward)	Product-level lifecycle transparency and traceability.	Requires granular data on materials, emissions, and recyclability; digitalization of compliance.	Early-stage awareness; significant capability gaps.	Likely to redefine market entry requirements.
Carbon Border Adjustment Mechanism (2020s onward)	Carbon pricing is linked to embedded emissions in imports.	Introduces implicit carbon cost; penalizes fossil fuel-dependent production systems.	Minimal preparedness; high exposure due to energy mix.	Potentially transformative; could erode cost advantage if decarbonization is delayed.
Net-Zero Supplier Requirements by Brands (2020s–present)	Full decarbonization of supply chains.	Converts sustainability commitments into enforceable supplier requirements.	Early adopter's vs laggards; growing polarization within industry.	Decisive factor for long-term survival in export markets.

Table 2. Global Sustainability Standards and Their Impact on Pakistan's Textile Industry

2.1 Implications of Global Standards for Pakistan's Textile Sector

Since the late 1990s, Pakistan's export-oriented textile industry has been progressively reshaped by a layered architecture of international standards and regulatory frameworks. This evolution reflects a transition from early regimes focused on quality and social compliance such as ISO 9001, SA8000, and WRAP, to more sophisticated environmental and chemical management systems like REACH, OEKO-TEX, and ZDHC (Legardeur & Ospital, 2024). More recently, the sector has entered a new phase of climate-focused, disclosure-driven governance, characterized by voluntary mechanisms like the Science Based Targets initiative, RE100, the UN Fashion Industry Charter for Climate Action, and The Fashion Pact, alongside binding regulations including the Corporate Sustainability Reporting Directive, German Supply Chain Due Diligence Act, and the emerging Ecodesign for Sustainable Products Regulation and Carbon Border Adjustment Mechanism(Sadowski et al., 2021).

Collectively, these frameworks have transformed the fundamental basis of international competitiveness. Market access is no longer determined solely by cost and basic compliance, but by low-carbon production, supply chain traceability, and comprehensive ESG transparency (Khan et al., 2019). Such requirements impose rigorous mandates for renewable energy adoption, the measurement of Scope 3 emissions, and the disclosure of lifecycle data through tools like the Digital Product Passport (Legardeur & Ospital, 2024). The impact of these regulations is already evident in the intensification of buyer audits and the widespread use of sustainability scoring systems such as the Higg Index (Sadowski et al., 2021). However, these requirements are projected to become significantly more binding over the 2025 to 2030 period as EU disclosure laws fully operationalize and carbon-related pricing begins to influence global sourcing decisions, thereby exposing Pakistan's fossil-fuel-dependent manufacturing base to acute competitiveness risks (Malik, 2020; Nájera-Aguirre et al., 2023).

The industry's response to these shifts remains uneven and stratified. While some large-scale apparel exporters demonstrate compliance with both domestic environmental legislation and global buyer requirements, the broader textile sector still faces significant challenges in adopting stringent environmental management systems due to various institutional and economic constraints (Khan et al., 2019). This disparity is particularly pronounced given the absence of a comprehensive national Environmental Performance Index framework in Pakistan, despite various national initiatives that indirectly track environmental metrics (Nadeem et al., 2025). This fragmented approach often leads to an inefficient allocation of resources and hinders the systemic integration of sustainability practices across the value chain, further exacerbating the challenges faced by suppliers who are increasingly burdened by buyer-enforced sustainability mandates (Khan & Halme, 2025).

Empirical findings further suggest that while a majority of export-oriented firms have adopted discrete environmental or efficiency-related interventions, comprehensive and system-wide integration of sustainability practices remains limited, reflecting underlying financial, technological, and organizational constraints. This external pressure from foreign buyers and investors is perceived as a critical driver for enhanced sustainability practices, particularly given the potential for losing global competitiveness if these international standards are not met (Mahmood et al., 2019). Consequently, many suppliers proactively engage in environmental upgrading, recognizing that adherence to such standards is crucial for maintaining access to international markets (Khan et al., 2019; Khattak & Stringer, 2017). This uneven pattern of adoption has become more pronounced in the current phase, wherein emerging climate-related standards, disclosure requirements, and due diligence frameworks, including the Corporate Sustainability Reporting Directive and evolving carbon-related measures such as the Carbon Border Adjustment Mechanism, are expected to generate more binding and systemic effects over the 2025 to 2030 period by embedding suppliers within value chain-level emissions accounting, traceability systems, and sustainability reporting obligations.

Although Pakistan has established a formally developed environmental regulatory architecture, accumulating evidence indicates that its effectiveness remains constrained by persistent institutional deficiencies in monitoring, enforcement capacity, and the credibility of penalty mechanisms, thereby contributing to continued non-compliance, particularly in resource-intensive and pollution-intensive wet processing segments. As a result, the adoption of environmental and sustainability practices by firms is driven less by domestic regulatory enforcement and more by external pressures emanating from international buyers, lead firms, and global value chain governance structures, which effectively serve as the primary enforcement mechanism.

Importantly, in contexts characterized by weak domestic enforcement, global buyers and lead firms effectively operate as functional regulators, while simultaneously highlighting a deepening structural constraint: the transition toward decarbonization and renewable energy is inherently capital-intensive and systemic in nature and cannot be sustained through compliance pressures alone. Consequently, there is increasing recognition that the effectiveness of emerging climate and sustainability standards is contingent upon the development of shared responsibility frameworks, including co-investment arrangements, responsible purchasing practices, and more equitable cost distribution across global value chains, in the absence of which supplier-level green transition in countries such as Pakistan is likely to remain partial, uneven, and economically constrained.

Figure 5. Standards, Regulations, and Policy Frameworks

3. Global Trade Dynamics: Volumes, Challenges, and Barriers

Pakistan's trade relationship with the EU and the US is both a source of strength and a point of vulnerability.

3.1 Export and Import Volumes

The EU is Pakistan's most significant trading partner, absorbing approximately 24% of its total exports, with nearly 80% of those exports being textile and clothing products (2024).Pakistan's textile industry has secured 8th position in textile products exporting countries. Globally, the textile and apparel value chain contribute around 1.7 to 2.1 billion tons of CO_2e annually, accounting for roughly 2% of global GHG emissions (Net Zero by 2050 Analysis, IEA, 2021). In 2024, China accounted for €22.9 billion in EU textile imports (28.1% market share), followed by Bangladesh with €17.4 billion (21.4% share). Pakistan registered €1.42 billion in exports, with a 12.4% year-on- year increase, surpassing all major competitors in growth rate (Eurostat trade statistics, 2024).

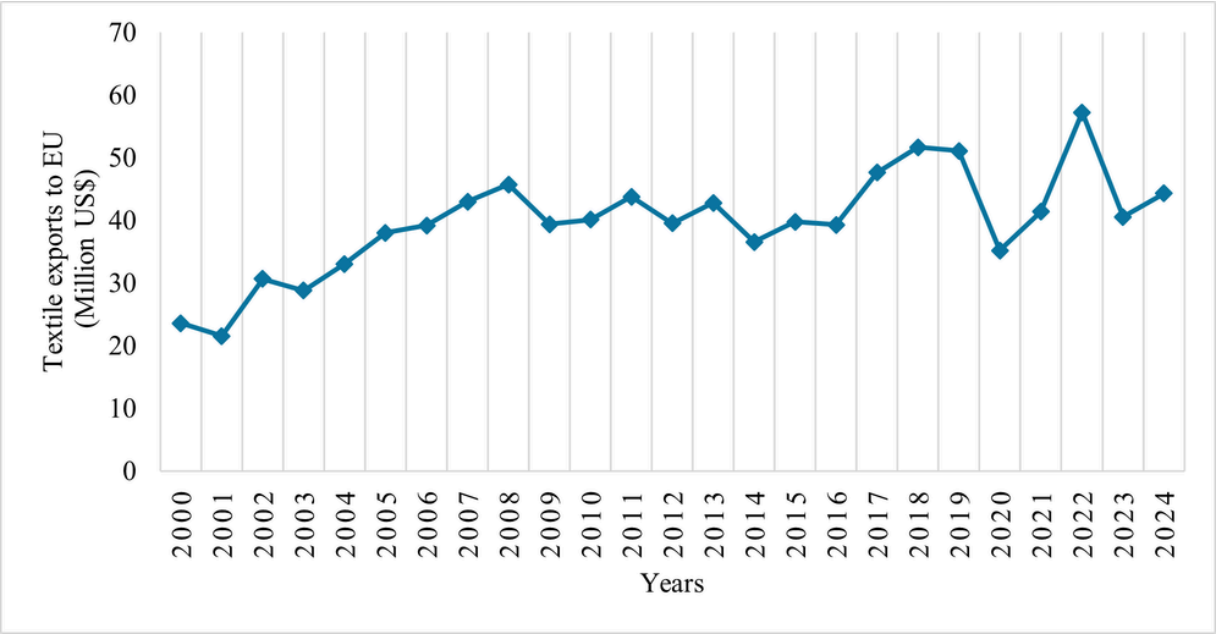

Figure 6. Textile exports of Pakistan to European Union (EU) (UN Comtrade Database, (2025).

Pakistan's textile exports are concentrated in a few key regions, with the European Union and United States accounting for a significant share. These markets not only absorb garments and fabrics but also supply critical imports such as machinery, chemicals, and specialized fibers.

Region	Export Concentration	Key Export Products	Key Import Products
European Union	Around 24% of total exports.	Readymade garments, bed linen, knitwear.	Machinery, chemicals, transport gear.
United States	Around 20% of total exports.	Cotton yarn, woven fabrics, carpets.	Raw cotton, technology, specialized fibers.

Table 3. Regional Trade Patterns: Export and Import Profiles

3.2 Challenges Associated with International Trade

The sector faces several systemic barriers that hinder its ability to capitalize on trade preferences:

- **Energy Insecurity and Cost:** High electricity tariffs and the removal of subsidies have made Pakistani textiles roughly 20% more expensive than those from regional peers (Memon et al., 2020).
- **Technological Obsolescence:** A significant portion of the weaving and processing machinery is outdated. For instance, in some clusters, thousands of machines are non-functional due to a lack of maintenance and high import costs for spare parts (Memon et al., 2020) Market Diversification: 88% of Pakistan's textile shipments are concentrated in the EU and US markets, leaving the sector highly vulnerable to policy shifts in these two regions (Memon et al., 2020).

4. The Client Paradox: Commitments vs. Commercial Realities

A major conflict has emerged between the environmental commitments of global brands and their purchasing practices. This "green paradox" is the primary obstacle to the renewable energy transition at the supplier level.

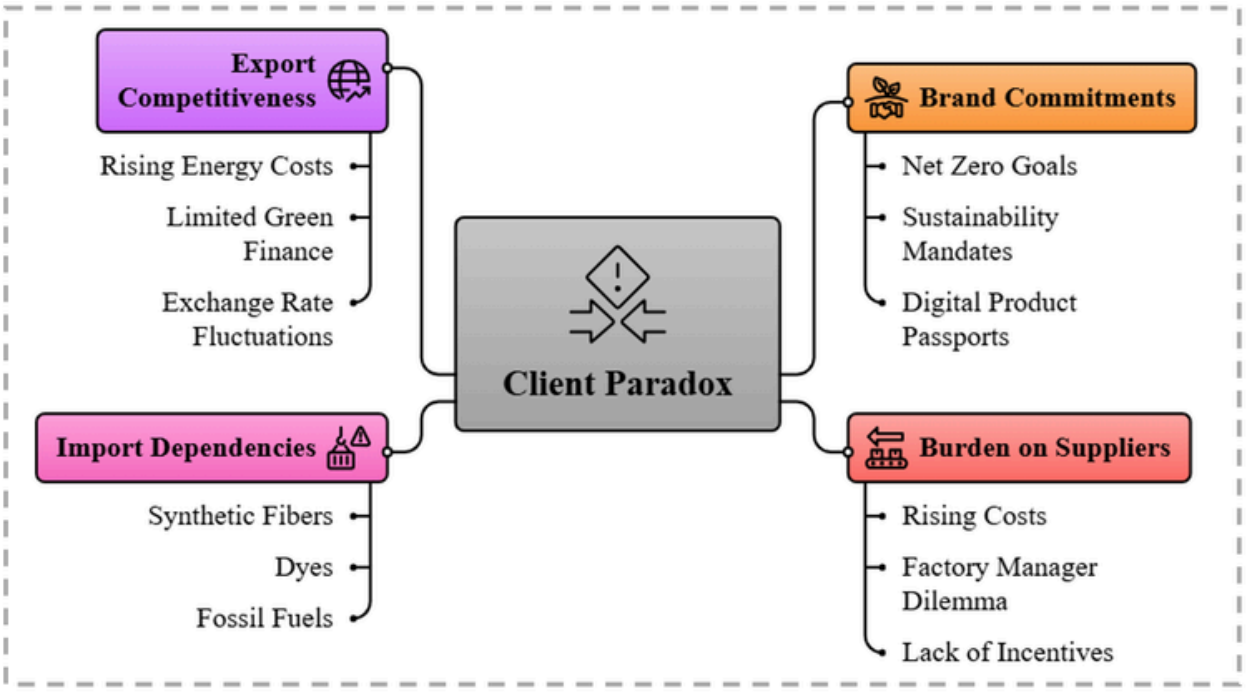

Figure 7. Commitments vs. Commercial realities in renewable energy transition

4.1 Brand Commitments to "Green" Products

European and American clients have made bold public pledges to achieve Net Zero by 2040 or 2050. They demand that suppliers install solar PV systems, reduce water consumption by up to 44%, and implement Life Cycle Assessments (Nadeem et al., 2025;) Consequently, aligning with global sustainability trends necessitates significant capital investment in renewable energy infrastructure and waste management solutions (Awino, 2025; Islam, 2025).

4.2 The Burden on Suppliers

Despite these demands, brands are often unwilling to pay a price premium for green products. The "fast fashion" model requires high volumes and low prices, which leaves suppliers to absorb the capital expenditure of RE transitions (Khan et al., 2019).

- **Rising Costs:** Suppliers face skyrocketing costs for local energy and raw materials, yet they are squeezed by clients who threaten to move orders to cheaper markets if prices rise.
- **The Factory Manager Dilemma:** This creates a scenario where factory managers must choose between expensive environmental compliance and short-term economic survival (Khan et al., 2019).
- **Lack of Incentives:** While some brands issue green bonds, very little of this capital reaches the small and medium enterprises that make up the bulk of Pakistan's textile base (Sadowski et al., 2021).

Moreover, the financial and policy incentives, critical for driving renewable energy adoption, such as tax breaks or subsidies, are often inadequate or inconsistently applied in Pakistan, further discouraging private and foreign investment in sustainable infrastructure (Ali et al., 2022).

4.3 Import Dependencies

1. Key imported inputs include synthetic fibers, dyes, machinery, and increasingly, fossil fuels for captive power generation in manufacturing zones.
2. Volatile import prices, particularly for LNG and furnace oil, drive unpredictable production costs.
3. The country's reliance on imported raw cotton to meet domestic demand for textile production also presents a substantial drain on foreign exchange reserves (Memon et al., 2020).

4.4 Challenges in Export Competitiveness

1. Rising energy costs and power outages reducing factory productivity. Such energy disruptions, including frequent electricity shutdowns and gas shortages, significantly impede manufacturing operations and cause shipment delays, ultimately damaging the reputation of Pakistani suppliers and increasing production expenses due to the necessity of alternative energy sources (Safeer et al., 2019).
2. Limited access to affordable green finance for upgrading equipment or installing solar systems.
3. Exchange rate fluctuations and global inflation impacting margins.
4. Compliance fatigue, the growing number of certifications creates administrative burdens on small and medium suppliers.
5. Limited domestic R&D in clean process technologies.

5. Technical Pathways for Industrial Decarbonization in Pakistan’s Textile Sector

Decarbonizing Pakistan’s textile sector requires prioritizing measures that are technically mature, commercially viable, scalable across both large firms and SMEs, and aligned with emerging buyer expectations on emissions, renewable energy, water stewardship, and supply chain traceability. Based on current studies, industry roadmaps, and policy analysis, the most relevant measures are as follows:

5.1 Rapid Solarization and Renewable Electricity Procurement

- Scale rooftop and captive solar PV deployment across spinning, weaving, processing, and garment units, particularly in major textile clusters such as Faisalabad, Multan, and Karachi, where solar economics are increasingly favorable.
- Enable cluster-scale solarization models, including shared renewable infrastructure and collective procurement, to lower costs and improve access for SMEs.
- Advance wheeling and competitive electricity market access (CTBCM) to allow industrial consumers to procure renewable electricity beyond onsite generation, which is particularly important for larger export-oriented mills.

- Adopt hybrid power configurations combining solar, grid supply, and storage or backup systems to improve reliability while reducing emissions.
- Use renewable electricity procurement to align with buyer expectations, especially where suppliers increasingly face pressure linked to Scope 2 emissions and RE100-aligned sourcing expectations.

5.2 Energy Efficiency First and Deep Efficiency Retrofits

- Prioritize no-regret efficiency measures before or alongside renewable energy investments, as efficiency lowers energy demand and improves renewable integration economics.
- Upgrade motors, drives, compressors, boilers, and steam systems, including widespread deployment of variable frequency drives (VFDs), efficient motors, improved insulation, and optimized process controls.
- Implement waste heat recovery systems, particularly in dyeing, finishing, and thermal processes, where substantial energy savings and emissions reductions are achievable.
- Adopt structured energy management systems, including ISO 50001, regular energy audits, sub-metering, and performance monitoring, to institutionalize continuous improvement.
- Target process optimization in wet processing, which remains one of the highest-impact opportunities for reducing both energy intensity and emissions.

5.3 Decarbonizing Thermal Energy for Process Heat

This is often under-addressed but is one of the most important measures for textile decarbonization.

- Deploy solar thermal for low- and medium-temperature process heat where technically feasible.
- Introduce industrial heat pumps and electrification of low-temperature thermal loads in suitable applications.
- Assess electric boilers and thermal energy storage for selected use cases as grid conditions improve.
- Use sustainable biomass only where feedstock sustainability and air quality safeguards are credible, avoiding unsustainable fuel switching.
- Treat thermal decarbonization as a priority alongside electricity decarbonization, because process heat is often a major emissions source in textile processing.

5.4 Cleaner Production and Low-Carbon Process Technologies

- Deploy low-liquor ratio dyeing and water-efficient processing technologies to reduce both water and embedded energy use.
- Promote waterless or near-waterless dyeing technologies where commercially relevant, particularly for higher-value applications.
- Improve process chemistry and chemical management, including cleaner chemical substitution and resource-efficient processing.
- Use cleaner production audits to identify process-level emissions reduction opportunities, particularly in wet processing units.

5.5 Water-Energy-Carbon Integration

- Integrate water efficiency and energy efficiency interventions, rather than treating them separately, particularly in dyeing and finishing operations.
- Expand wastewater treatment, reuse, and recycling systems, including opportunities to reduce energy and water footprints simultaneously.
- Explore wastewater heat recovery, which is emerging as a promising decarbonization pathway.

5.6 Circularity and Low-Carbon Materials

- Increase use of recycled and lower-impact fibers, where technically and commercially feasible.
- Strengthen pre-consumer and post-consumer textile recycling pathways, including higher-value recycling rather than low-value waste recovery.
- Reduce raw material-related emissions through sustainable cotton and lower-impact input strategies, where applicable.

5.7 Digitalization, Measurement, and Emissions Management

- Deploy digital energy monitoring and production analytics, including real-time monitoring for energy performance.
- Strengthen emissions accounting for Scope 1, Scope 2, and relevant Scope 3 emissions, particularly for export-oriented suppliers facing buyer disclosure requirements.
- Build facility-level MRV systems (Monitoring, Reporting, and Verification) to support credible reporting, buyer engagement, and emerging carbon-related trade requirements.

6. The Need for Shared Responsibility

Transitioning to renewable energy in industrial supply chains cannot be supplier-led alone. The concept of Shared Responsibility, co-developed by sustainability coalitions such as NEXT Group, OXFAM, and Asia Clean Energy Coalition, recognizes that brands, investors, governments, and financial institutions all share accountability in enabling suppliers' transition. This collective accountability model is crucial for fostering a sustainable transition, especially in regions like Pakistan, where energy security issues and reliance on imported fossil fuels present significant hurdles to renewable energy adoption (Asim et al., 2022; Malik et al., 2018; Moomin et al., 2024).

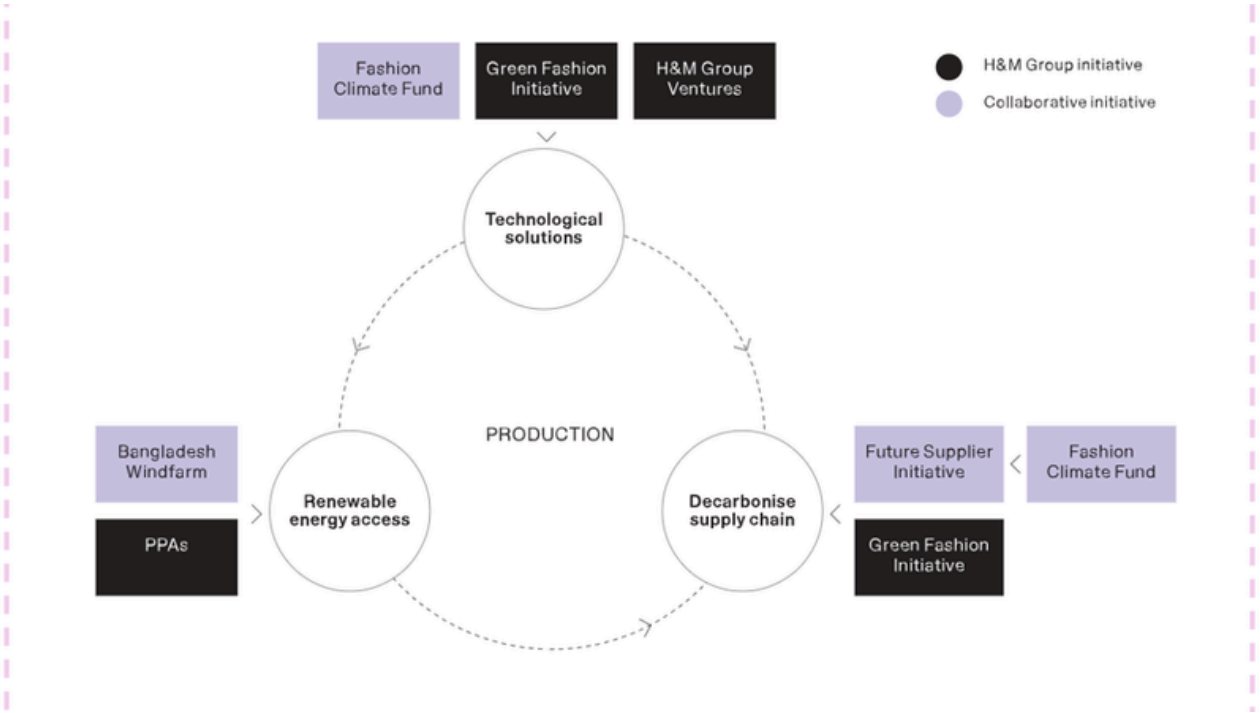

Figure 8. Shared responsibility initiatives by H&M to promote sustainability (H&M Group, 2026)

Eva von Alvensleben, Executive Director and Secretary General of The Fashion Pact, said: *"The Future Supplier Initiative is a unique opportunity for fashion retailers to join forces and drive progress towards science based targets, and offer much needed financial and technical support to apparel suppliers in their journey to decarbonisation."*

She also said: *"No single business alone can solve this challenge, but by sharing the costs, risks and responsibilities of the transition to renewable energy, we can build an ecosystem of solutions and kickstart a new era of change."*

Anders Holch Povlsen, Owner and CEO of BESTSELLER, said: *"We are working intensively to improve our climate footprint. We have largely managed to tackle our direct emissions, but it is clear that emissions in our value chain require ambitious efforts on a scale that calls for innovative, joint solutions."*

Richard Dickson, President and CEO, Gap Inc., said: "*Gap Inc. is committed to bridging the climate gap by collaborating with our supply chain partners to reduce emissions."*

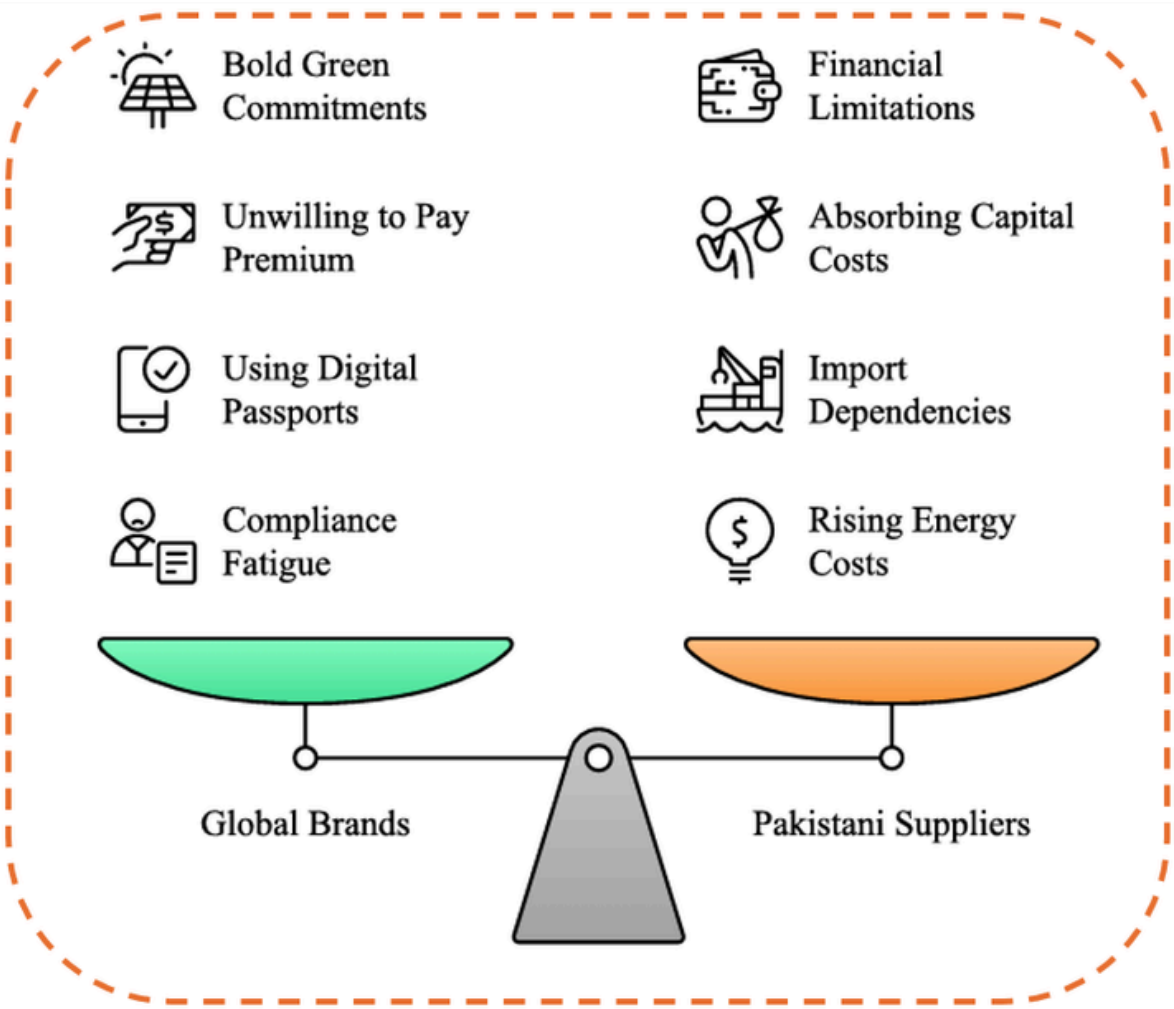

Figure 9. Brands green commitments vs challenges faced by suppliers.

7. Brand-supplier Shared Responsibility Model

Shared Responsibility states that the transition to renewable energy is a collective obligation. Since brands derive value from the greening of their supply chain, through regulatory compliance and consumer trust, they must share the costs and risks. This necessitates the development of innovative financial mechanisms and collaborative frameworks that distribute the economic burden and incentivize sustainable practices across the entire value chain. This approach is crucial, especially given the high initial investment costs associated with renewable energy infrastructure, which can be a significant barrier for industries, particularly those already facing financial challenges (Dissanayake & Lokupitiya, 2024).

The proposed approach envisions a structured mechanism through which brands and suppliers assume joint responsibility for achieving renewable energy and climate targets. This mechanism is grounded in principles of fairness, predictability, and mutual accountability. Within such a framework, procurement practices evolve to support long-term transition pathways rather than short-term cost optimization. Greater contract stability and volume predictability reduce investment risks for suppliers undertaking renewable energy projects emissions tracking, alongside the development of robust monitoring, reporting, and verification systems, create

shared evidence base for climate action. In parallel, suppliers are supported in meeting international standards such as energy management systems and carbon accounting practices, strengthening their global competitiveness. Importantly, the framework acknowledges the role of external uncertainties, including regulatory changes and energy market dynamics.

Shared risk approaches allow both brands and suppliers to navigate policy shifts without disproportionately burdening one side of the value chain. The success of such a shared responsibility model is closely linked to the broader institutional and policy environment in Pakistan. Regulatory bodies such as the National Electric Power Regulatory Authority (NEPRA), along with institutions including the Private Power and Infrastructure Board (PPIB) and the National Energy Efficiency and Conservation Authority (NEECA), play a critical role in shaping the feasibility of renewable energy investments through tariffs, grid access, and energy policies. In parallel, international organizations already engaged on this agenda, including NEXT Group, Oxfam, Asia Clean Energy Coalition (ACEC), Asia Investor Group on Climate Change, Sustainable Finance Institute Asia, Southeast Asia Clean Energy Facility, Institute for Essential Services Reform, Institute for Global Environmental.

Strategies, Climate Policy Initiative, Responsible Energy Initiative Philippines can contribute by providing technical expertise, convening brands and suppliers, mobilizing climate finance, supporting policy reform, generating evidence-based solutions, advancing just transition approaches, and strengthening the institutional architecture needed to operationalize shared responsibility and accelerate supplier-level renewable energy transition in Pakistan.

At the same time, industry associations, compliance managers, and corporate sustainability teams serve as key intermediaries between global requirements and local implementation realities. Their engagement ensures that transition pathways are both technically feasible and commercially viable. The concept therefore situates dialogue and alignment at its core, fostering engagement between international brands, local manufacturers, and public sector stakeholders. This multi-level coordination helps bridge gaps between global climate commitments and domestic policy frameworks, ensuring that transition efforts are coherent and scalable.

By embedding shared responsibility within supply chain relationships, this approach enables a more inclusive and effective transition toward renewable energy in Pakistan’s export sectors. It reduces the financial and operational risks faced by suppliers, enhances access to green finance, and aligns global sustainability ambitions with local industrial realities. Over time, this model contributes to strengthening Pakistan’s position in international markets by ensuring compliance with evolving environmental standards while maintaining competitiveness. It also supports broader climate goals by accelerating emissions reductions across key export-oriented industries.

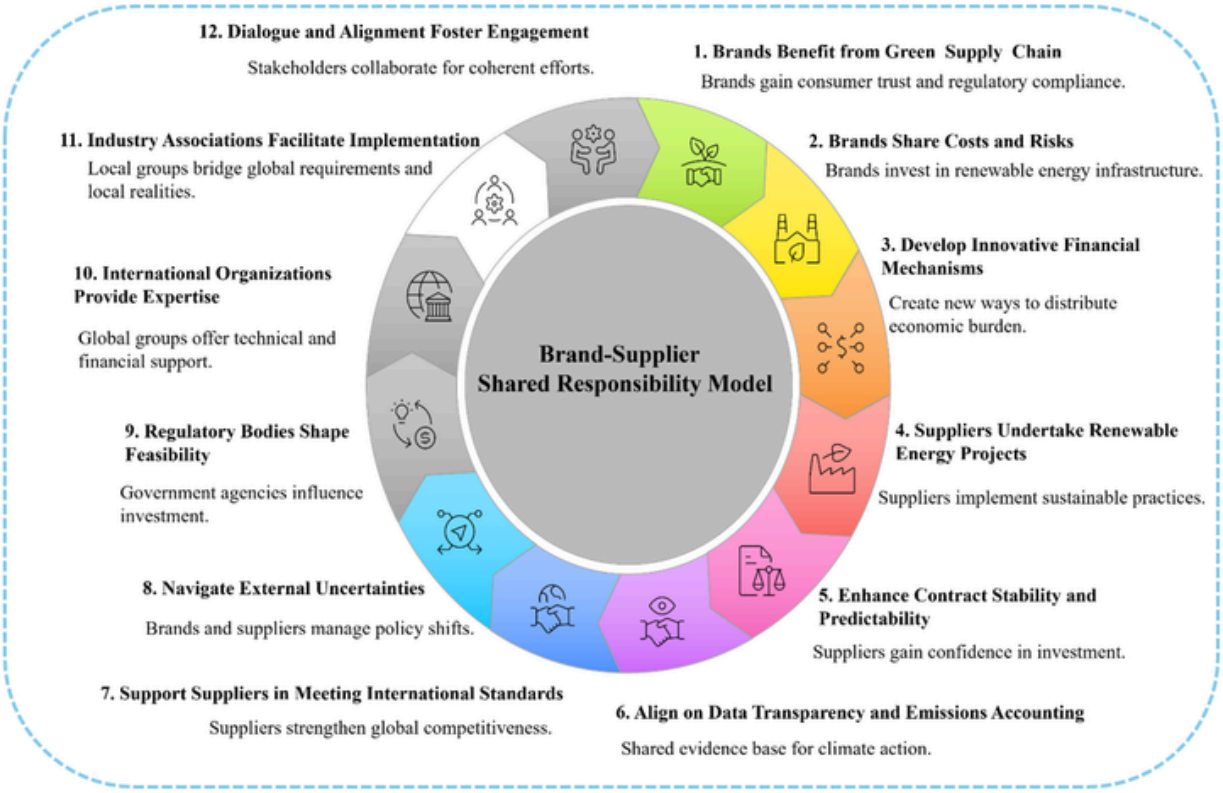

Figure 10. Framework of brand-supplier shared responsibility model.

7.1 The Logic of Brand-Led Facilitation

Brands have access to low-interest international capital and strong balance sheets that Pakistani suppliers lack. We advocate for:

- Direct Financial Support: Co-investing in renewable energy installation and decarbonization projects for key suppliers.
- Long-term Sourcing Commitments: Providing the five to ten year purchase agreements required for suppliers to secure local "green loans."
- Technical Capacity Building: Providing the expertise needed to navigate complex RE technologies.

7.2 Suppliers' Decarbonization Support Measures that International Brands/Clients Can Adopt

- Reduce manufacturers' risks during transition periods, particularly when suppliers are making capital-intensive investments in renewable energy or efficiency upgrades.
- Provide contract and volume certainty to avoid sudden order reductions that undermine supplier investment confidence and create major economic risks for manufacturers.
- Make advance payments for specific transition-related capital expenditure, particularly for renewable energy, efficiency retrofits, and decarbonization technologies.
- Support order smoothing and phased compliance, allowing suppliers realistic transition timelines instead of immediate compliance burdens.
- Remove accept/reject sourcing practices that create volatility and discourage long-term sustainability investments.
- Replace punitive delisting approaches with technical assistance, corrective action support, and supplier improvement pathways. vii.Co-invest in supplier decarbonization, including support for renewable energy projects, efficiency upgrades, and shared transition infrastructure.

- Support supplier capacity building and training, including ISO 50001, carbon accounting, emissions reporting, and compliance with emerging buyer and regulatory requirements.
- Collaborate on Scope 2 and Scope 3 emissions data collection and MRV system development, including credible monitoring, reporting, and verification frameworks.
- Share risks associated with policy and regulatory uncertainty, particularly where suppliers face barriers related to tariffs, wheeling, grid access, or policy instability.
- Recognize and incorporate decarbonization costs in pricing structures, rather than expecting suppliers to absorb all sustainability-related costs.
- Offer green price premiums or transition-linked sourcing incentives for suppliers making verified decarbonization investments.
- Replace punitive delisting approaches with technical assistance, corrective action support, and supplier improvement pathways. vii.Co-invest in supplier decarbonization, including support for renewable energy projects, efficiency upgrades, and shared transition infrastructure.
- Support supplier capacity building and training, including ISO 50001, carbon accounting, emissions reporting, and compliance with emerging buyer and regulatory requirements.
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- Share risks associated with policy and regulatory uncertainty, particularly where suppliers face barriers related to tariffs, wheeling, grid access, or policy instability.
- Recognize and incorporate decarbonization costs in pricing structures, rather than expecting suppliers to absorb all sustainability-related costs.
- Offer green price premiums or transition-linked sourcing incentives for suppliers making verified decarbonization investments.
- Facilitate access to green finance, including credit guarantees, blended finance structures, and introductions to climate finance providers.
- Support aggregated or collective procurement models for renewable energy and decarbonization technologies to reduce supplier costs.
- Provide longer-term sourcing commitments linked to transition performance, allowing suppliers to justify and recover sustainability investments.
- Support supplier access to renewable electricity procurement mechanisms, including virtual power purchase arrangements, shared procurement models, or buyer-enabled renewable sourcing solutions where feasible.
- Align purchasing practices with climate objectives, including realistic lead times, reduced last-minute changes, and procurement decisions that do not undermine resource efficiency.
- Support pilot projects and demonstration investments to de-risk adoption of new decarbonization technologies.
- Enable shared infrastructure models at cluster level, including collective solarization, shared treatment systems, or common decarbonization facilities.
- Integrate supplier decarbonization into strategic supplier partnerships, treating climate transition as part of long-term supplier development rather than only compliance.
- Support just transition measures, ensuring worker impacts, competitiveness concerns, and social dimensions of decarbonization are addressed alongside emissions reduction.

8. Global Case Studies:

In the textile sector, the concept of "Shared Responsibility" has evolved from simple compliance to active co-investment. As of 2026, brands are moving away from just "demanding" green products and are instead providing the capital and technical de-risking necessary for suppliers to transition.

8.1 Bangladesh: The Collaborative Financing Model

Bangladesh has the highest number of LEED-certified green factories globally, but the transition to renewable energy (RE) has been hampered by high capital costs. Brands have responded by creating "blended finance" tools.

Key Activities & Support:

- **The Future Supplier Initiative (FSI):** Launched as a collective effort by brands including H&M Group, Gap Inc., Mango, and Bestseller, facilitated by The Fashion Pact in partnership with Apparel Impact Institute, Guide house, and DBS Bank, this initiative offers a unique financial model. Instead of a single brand helping a single factory, brands collectively provide low-cost financing to shared suppliers. This spreads the risk and ensures the supplier doesn't lose the investment if one brand moves its orders. With 99% of total fashion brand emissions occurring in the supply chain (Scope 3), the initiative aims to provide a combination of technical support and financial incentives will be provided to help overcome the barriers that prevent many factories from adopting electrification and renewable energy solutions.
- **Green Fashion Initiative (GFI):** H&M Group specifically provides direct financial support and interest-rate subsidies for suppliers in Bangladesh to install rooftop solar and electrify boilers (moving away from coal/gas).
- **Infrastructure Co-investment:** Global Fashion Agenda and brands like Bestseller have signed letters of intent to co-invest in large-scale offshore/onshore wind farms in Bangladesh to increase the green energy available on the national grid, which individual factories can then tap into. This is a massive infrastructure play where H&M and Bestseller are co-investing in a 500MW offshore wind farm near Cox’s Bazar to green the national grid.

8.2 Vietnam: The Policy & Infrastructure Model

In Vietnam, the focus has been on Direct Power Purchase Agreements (DPPA) and technical retrofitting. Because Vietnam’s energy grid is heavily industrialized, brands have focused on changing the "rules of the game" to make RE viable.

Key Activities & Support:

- **Direct Power Purchase Agreements (DPPA):** Brands like Nike, Samsung, and Adidas were instrumental in advocating for Vietnam's DPPA framework. This allows suppliers to buy renewable energy directly from private generators rather than relying on the state-owned coal-heavy grid. Nike has actively supported its "Tier 1" suppliers in signing 20-year solar power agreements with providers like TotalEnergies.
- **The Fashion Climate Fund (Apparel Impact Institute):** This fund, backed by brands like Lululemon and H&M, targets Tier 2 suppliers (fabric mills) in Vietnam. It provides technical audits and bridge funding to replace coal-fired boilers with biomass or electric heat pumps, which are often the most expensive part of a textile factory's transition.

- **IFC Vietnam Improvement Program:** Supported by multiple brands, the IFC (International Finance Corporation) provides sustainability-linked loans to Vietnamese factories. If the factory meets energy-reduction targets set by the brands, the interest rate on their loan decreases.

Pakitan can look at the Bangladesh model for financing (where brands pool resources for shared suppliers) to overcome high local interest rates. Simultaneously, the Vietnam model shows how brands can help the government create "Green Energy Corridors" or DPPAs, which would allow Pakistani textile hubs to bypass grid instability by purchasing RE directly from private wind or solar parks.

9. International Organizations and Their Contributions to the Transition

This campaign is supported by an international coalition of organizations, each playing a critical role in activating brand leverage and facilitating clean energy solutions.

9.1 NEXT Group and OXFAM

These organizations focus on ensuring that industrialization in the Global South is both clean and socially just. They advocate for policies that prevent the RE transition from leading to labor exploitation or job losses in the traditional energy sector.

9.2 Asia Clean Energy Coalition and AIGCC

- **ACEC:** Works to remove policy barriers for corporate RE procurement in Asia, focusing on direct power purchase agreements.
- **AIGCC:** Engages institutional investors to ensure that climate risks in textile supply chains are reflected in brand valuations, creating financial pressure for brands to support their suppliers.

9.3 Sustainable Finance Institute Asia and SEACEF

- **SFIA:** Focuses on standardizing green finance taxonomies so that Pakistani banks can more easily lend to RE projects.
- **SEACEF:** Aims to trigger billions in investment into Asian clean energy by providing early-stage capital for high-impact projects (Bank, 2021)

10. Strategic Importance: Why This Matters Now

The transition is no longer a matter of corporate preference; it is a matter of national economic survival for Pakistan.

- **Retention of GSP+ Status:** Compliance with environmental conventions is non-negotiable for maintaining duty-free access to Europe (2024
- **Energy Security:** Transitioning to local RE reduces the industry’s vulnerability to the volatile global oil and gas markets, which frequently cause production halts in Pakistan (Ayaz, 2025; Nájera-Aguirre et al., 2023)
- **Future-Proofing against CBAM:** The EU's Carbon Border Adjustment Mechanism will soon impose taxes on carbon-intensive imports. Only decarbonized industries will be able to compete.

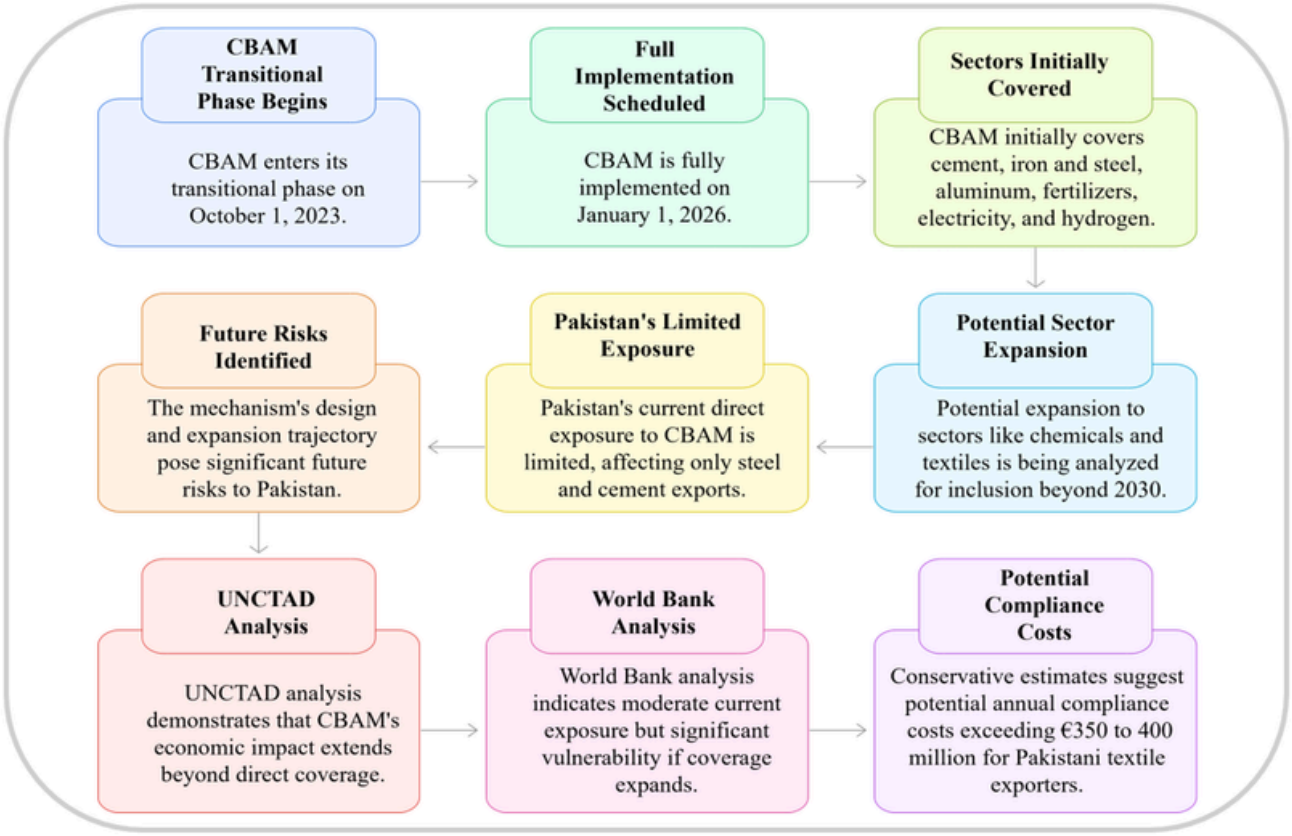

Figure 11. Impacts of CBAM on Pakistan.

11. Intervention Strategies

The operationalization of this concept is structured through the following interconnected intervention strategies:

11.1 Leveraging Global Brand Influence

1. Target engagement with major international buyers, including H&M, Marks & Spencer, Nike, GAP, Walmart, Target, Levi Strauss & Co., Reebok, IKEA, Adidas, PUMA.
2. Align brand sustainability commitments with supplier capabilities to enable realistic transition pathways.
3. Use procurement power of brands to influence supplier investment decisions in renewable energy.

11.2 Engagement with Global Sustainability Platforms

1. Collaborate with international initiatives shaping sustainable sourcing norms, including Fashion Revolution, Partnership for Sustainable Textiles, Fair Wear Foundation, Textile Exchange, Cascale.
2. Leverage these platforms to strengthen accountability in supply chains, promote transparency & traceability and amplify advocacy for shared responsibility.
3. Align local supplier practices with globally recognized standards and benchmarks.

11.3 Mobilizing Climate and Green Finance

1. Engage international financial institutions, including International Finance Corporation, Asian Development Bank, Green Climate Fund, Global Environment Facility, World Bank, Asian Infrastructure Investment Bank.
2. Utilize domestic financing channels through State Bank of Pakistan and local financial institutions.
3. Promote innovative financing mechanisms such as blended finance structures, concessional green loans and risk-sharing and co-investment models.
4. Address supplier constraints by reducing upfront capital barriers and improving access to affordable finance.

11.4 Advancing Responsible Procurement Practices

1. Reform traditional procurement approaches by introducing greater predictability in orders and long-term contracts.
2. Financial participation by brands in sustainability investments.
3. Flexibility in compliance timelines and expectations.
4. Shift from compliance-driven to collaboration-driven models
5. Provide technical assistance and capacity building.
6. Enable phased transition pathways and introduce shared risk management frameworks.
7. Improve Scope II and Scope III emissions accounting and develop standardized monitoring, reporting, and verification systems.

11.5 Market Shaping and Demand-Side Interventions

1. Engage in global campaigns and public discourse to promote sustainable production.
2. Influence consumer awareness and demand for green products.
3. Collaborate with industry influencers and advocacy networks.
4. Create demand-side pressure that incentivizes brands to prioritize low-carbon sourcing.

11.6 Policy and Regulatory Alignment

1. Engage with key public sector institutions in Pakistan, including National Electric Power Regulatory Authority (NEPRA), Central Power Purchasing Agency (CPPA), Private Power and Infrastructure Board (PPIB), National Energy Efficiency and Conservation Authority (NEECA).
2. Address systemic barriers such as tariff structures, grid access limitations, wheeling regulations, energy market inefficiencies.
3. Promote policy reforms that enable renewable energy adoption and industrial decarbonization.

11.7 Development of Brand-Supplier Mechanisms

1. Establish structured frameworks that integrate procurement practices, sustainability commitments, financial incentives.
2. Develop a shared charter that includes measurable emission reduction targets, transparency and disclosure requirements, accountability and compliance mechanisms.
3. Ensure alignment with global standards while remaining adaptable to local supplier realities.

11.8 Integrated and System-Level Approach

1. Ensure coordination across all intervention areas.
2. Align stakeholders including brands, suppliers, financiers, and policymakers.
3. Enable scalable and replicable models for renewable energy transition.
4. Support long-term industrial competitiveness alongside climate objectives.

The path forward for Pakistan's textile sector requires a radical shift in the buyer-supplier relationship. Brands can no longer expect suppliers to bear the full cost of a green transition that benefits the brand's own reputation and legal compliance. By activating brand leverage and mobilizing the finance and technical support of partners like ACEC and SFIA, we can ensure that Pakistan's textile industry remains a competitive, sustainable, and vital part of the global economy. Shared responsibility is not a request for charity; it is a strategic necessity for a resilient global value chain.

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