

China–Pakistan Investment Pitch Book

Solar PV & Allied Equipment Manufacturing Sector

1. Strategic Overview: Pakistan as China’s Regional Solar Manufacturing Base

Pakistan’s Solar PV sector is undergoing a strategic transition from an import-driven consumption market to an export-oriented, China-linked manufacturing hub serving South Asia, the Middle East, Africa, Central Asia, and select G-20 markets. While Pakistan possesses an estimated solar potential of 2,200-2,900 GW, the sector has historically remained import-dependent. In recent years, however, solar adoption has accelerated significantly, with approximately 45-50 GW of PV modules imported and an estimated 18-21 GW installed capacity, reflecting both strong demand and substantial untapped industrial opportunity .

The Government’s energy transition framework targets a rising share of renewables in the national energy mix, with solar expected to contribute around 20% by 2026-27, supported by rapid growth in distributed and utility-scale deployment . However, domestic demand alone remains fragmented and insufficient to sustain capital-intensive manufacturing, necessitating a clear shift toward export-led industrialization.

Pakistan has incurred over USD 4.1 billion in solar equipment imports in recent years, with the majority sourced from China, while local manufacturing remains limited to low-value assembly activities . This import dependence, combined with evolving global trade dynamics particularly tariff and compliance restrictions in major markets creates a compelling opportunity to localize production and integrate into global solar value chains.

The proposed Solar Panels & Allied Equipment Manufacturing Policy (2026-2031) introduces a hybrid, export-oriented industrial framework based on phased localization, cascading tariff structures, duty-free inputs, and strong compliance mechanisms. The policy targets 30-40% domestic value addition by 2031, while facilitating foreign direct investment, technology transfer, and scale-driven manufacturing aligned with international standards .

Leveraging CPEC-enabled SEZ infrastructure, competitive labor costs, preferential market access (GSP+), and a favorable trade position (including absence of Anti-Dumping (AD) Duties/ Countervailing Duties (CVD) exposure in key markets such as the United States), Pakistan offers Chinese firms a policy-backed, cost-efficient, and strategically located manufacturing platform. The current heavy reliance on imports predominantly from China, further strengthens the case for China-Pakistan joint ventures, enabling relocation of production, supply chain diversification, and development of an integrated, export-ready solar manufacturing ecosystem.

2. Why China Should Invest in Pakistan

Strategic Location Advantage

- Gateway to Middle East, Africa, Central Asia
- CPEC-enabled logistics connectivity

Market & Scale

Indicator	Status (Updated & Refined)
Annual Import Market	~USD 2.8 Billion (2025); cumulative imports USD 4.1+ Billion in recent years
Growth Trend	Structural high growth, driven by rising tariffs, grid constraints, and distributed solar adoption (imports surged from 7.7 GW (2023) → 16.6 GW (2024))
Demand Segments	Distributed solar (residential/commercial/industrial) dominant; utility-scale secondary; off-grid and agricultural applications expanding
Key Driver	High electricity tariffs, grid reliability issues, and net-metering adoption (market-driven demand rather than purely government-led programs)

2.3 Cost Competitiveness

Cost Component	Pakistan	China
Labor Cost	Low-cost, abundant workforce (USD 150–500/month; scalable for assembly & manufacturing)	High and rising labor costs (mature industrial base)
Land Cost	Low-cost industrial land, especially in SEZs (USD 30–100/m ² lease range)	High land acquisition and leasing costs in industrial zones
Utility Cost	Competitive in SEZs (Electricity ~\$0.09–0.11/kWh; subsidized/negotiable tariffs)	Moderate but stable industrial tariffs
Import Duty on Machinery & Inputs	0% duty (Fifth Schedule incentives; full exemption for solar manufacturing inputs & machinery)	Applicable duties/taxes on imported machinery and inputs
Tariff Protection (Finished Goods)	Cascading tariff regime (FED + CD) to discourage CBU imports and support local manufacturing	Limited tariff protection (export-oriented system)
Export Market Advantage	No AD/CVD exposure (notably for US market) + GSP+/FTA access → strong export arbitrage	Subject to AD/CVD, trade restrictions in US/EU markets
Logistics & Connectivity	CPEC-enabled corridors + proximity to GCC, Africa, Central Asia (shorter export routes)	Highly mature global logistics ecosystem
Working Capital & Lead Time	Lower working capital requirements + shorter domestic supply cycles	Higher working capital + longer export lead times (4–8 weeks)
Overall Cost Positioning	20–40% potential cost advantage (export-linked manufacturing scenario)	Scale-driven efficiency but rising cost pressures

Pakistan offers approx. 30–50% lower operational costs, making it ideal for relocation of Chinese manufacturing facilities.

3. China–Pakistan Solar Cooperation Opportunity

Import Dependence Structure

Segment	Local Production	Import Dependence
Solar Modules	Limited (assembly stage; emerging capacity)	High
Solar Cells	None (planned assembly within 24 months)	100%
Wafers	None (long-term upstream target)	100%
Inverters (Hybrid)	Nascent / targeted for 100% localization (12 months)	High (declining)
Batteries (Li-ion)	Limited (assembly stage; parallel policy support)	High
EVA / Backsheet / Glass / BOS Components	Partial (frames, cables, junction boxes localized; others in 12–24 month pipeline)	High (declining)

China can establish end-to-end value chain integration in Pakistan, leveraging phased localization (12–24 months) from module assembly and BOS components toward cells and upstream manufacturing, enabling export-oriented production for US, GCC, and global markets.

4. Priority Investment Segments for Chinese Firms

Segment	Opportunity	Scale Potential
Solar Modules	Immediate entry via export-oriented assembly; anchor for DVA and JV-led manufacturing	1–10 GW/year (scalable, export-driven)
Solar Cells	Phased localization with technology transfer; critical for RoO compliance and US/EU exports	High (medium-term, capital-intensive)
Wafers	Strategic upstream integration to achieve full value chain and cost competitiveness	High (long-term, strategic)
Inverters (Hybrid)	Rapid localization (target: 100% within 12 months); strong domestic + export demand	High (fast-track segment)

Batteries (Li-ion)	Integration with BESS and solar storage ecosystem; linked with EV & grid storage demand	High growth (cross-sector demand)
Allied Components (BOS)	Immediate localization (frames, cables, junction boxes); low-tech, quick wins for DVA	Immediate (12–24 months localization)

5. Flagship Projects for China–Pakistan JVs

Project	Location	Scale
Solar Module Assembly Plants	Rashakai SEZ, Allama Iqbal Industrial City (Faisalabad), Port Qasim SEZ	\$50–100 million per plant (1–3 GW each)
Cell & Wafer Manufacturing Facility	Punjab, KPK (SEZ-based clusters)	\$500 million+ (strategic, large-scale upstream integration)
Battery (Li-ion) Assembly & Storage Systems	Port Qasim SEZ, Dhabeji SEZ, other SEZs	\$50–150 million (linked with BESS & EV ecosystem)
Integrated Solar Manufacturing Clusters	CPEC SEZs & Industrial Zones (multi-location)	\$1 billion+ (phased, export-oriented value chain)
Inverter (Hybrid) Manufacturing	Nationwide (SEZs + industrial zones)	Medium–Large scale (target: 100% localization within 12 months)

6. Policy & Incentives for Chinese Investors

Incentive Framework

Incentive Type	Details
Customs Duty	0% on machinery, raw materials & parts; cascading tariff with higher duties/FED on finished imports (CBU)
ACD / RD	Exempted on inputs for registered manufacturers under Fifth Schedule
Sales Tax	Exemptions/rationalization under 5th & 6th Schedule; removal of anomaly between inputs (18%) and finished goods
Machinery Import	100% duty-free import for solar PV, inverter & battery manufacturing equipment (EDB-certified)
Raw Materials	0% duty on key inputs (EVA, glass, frames, junction box, etc.) subject to IOCO quota & manufacturer registration
Export Incentives	SEZ tax holidays (0% CIT for 5–10 years), LTFF/export financing, duty-free access (GSP+, US no AD/CVD advantage)

Localization Framework

Phase	Focus Area	Timeline
Phase I	Module Assembly + BOS Components (frames, cables, junction boxes)	0–12 Months (Immediate Localization)
Phase II	Solar Cells, Hybrid Inverters, EVA / Backsheet, Key Components	12–24 Months (Intermediate Integration)
Phase III	Wafers, Upstream Materials, Full Value Chain Integration	Beyond 24 Months (Strategic Long-term)

7. Export Market Access for Pakistan-Based Production

Region	Refined Opportunity
Middle East (GCC)	Utility-scale solar expansion (15–20 GW annually), strong procurement pipelines and proximity advantage
Africa	Very high off-grid and distributed solar demand driven by electrification gaps and donor-funded programs
Central Asia	Growing distributed and grid-scale solar under energy diversification and transition policies

South Asia	Regional trade integration potential with cost-competitive supply and logistics advantage
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Pakistan offers a cost-efficient, export-oriented manufacturing platform with proximity to high-growth markets, CPEC-enabled logistics, and a compliance-friendly origin making it an attractive base for Chinese firms targeting diversified global solar supply chains.

8. What Pakistan Offers to Chinese Partners

Model	Description
Joint Ventures	Local partnerships
Wholly Owned Subsidiaries	SEZ-based investment
Technology Transfer	Licensing & collaboration
EPC + Manufacturing	Integrated solutions

9. Facilitation & Government Interface

Lead Agencies

- Ministry of Industries & Production
- Engineering Development Board (EDB)

Proposition for Chinese Investors

Pakistan offers Chinese solar companies a high-growth, export-oriented, and policy-backed manufacturing platform, with:

- USD 2.8B annual import substitution opportunity and USD 4.1B+ cumulative import base, ensuring immediate scale.
- 45-50 GW imported vs ~18-21 GW installed capacity, creating surplus-driven export-oriented manufacturing potential.
- Access to 2,200+ GW solar resource base with solar expected to reach ~20% energy mix by 2026–27.
- CPEC-enabled SEZ ecosystem offering 0% duty on inputs, tax holidays, and low-cost operations
- Cascading tariff regime (0% inputs + FED on CBU) ensuring clear duty protection for local manufacturing.
- 30-40% Domestic Value Addition (DVA) target by 2031 with phased localization (12-24 months roadmap)
- Strategic export access to USA (no AD/CVD), GCC, Africa, and Central Asia, enabling global supply chain diversification.
- \$500M+ Chinese FDI pipeline (MoUs/JVs) with strong government facilitation and policy stability.

Pakistan is positioned to become China's preferred overseas, export-oriented Solar PV manufacturing base, offering cost competitiveness, trade advantage, and policy certainty aligned with global supply chain realignment.

Pakistan-China B2B Investment Conference

Sector Snapshot *(To be attached with the investment pitch book)*

SOLAR PV & ALLIED EQUIPMENT

I. Market Overview & Opportunity

a. Pakistan Solar PV Market Size & Growth

Indicator	Value
Total Market Size (Imports 2025)	~USD 2.8 Billion (Modules + Inverters; part of USD 4.1B+ cumulative imports)
Installed vs Imported Capacity	~18–21 GW installed vs ~45–50 GW imported (indicates surplus inventory & rapid adoption)
5-Year CAGR (Import Volume)	~60–65% (2020–2025, GW basis; policy-driven expansion)
Household Penetration Rate	~9–10% (residential solar; rapidly increasing due to high tariffs)
Total Solar Penetration (Energy Mix)	~20% by 2026–27 (projected contribution to electricity mix)
Demand Nature	Price-sensitive, distributed, and import-driven (non-industrialized)

b. Category-Wise Market Breakdown (Import Dependence)

Category	Market Size (Import Value, 2025)	Local Production
Solar Modules	~USD 2.23 Billion	Limited (assembly stage; no cell integration; export-oriented scale absent)
Solar Cells	Embedded in modules (100% imported)	None (targeted for localization within 24 months under policy)
Wafers	Embedded in cells (100% imported)	None (long-term upstream localization planned)
Inverters (incl. Hybrid)	~USD 0.59 Billion	None (policy target: near/full localization within 12–24 months)
Batteries (Li-ion)	~USD 0.2–0.3 Billion (growing rapidly)	Limited (early-stage assembly; linked with emerging BESS ecosystem)
Allied Components (BOS)	Significant (unquantified but sizable)	Partial (frames, cables, junction boxes localized; EVA, glass under localization roadmap)

c. Demographic Tailwinds

Indicator	Metric
Population	240+ million
Median Age	21–23 years
Urbanization Rate	38–39%
Middle-Class Size	40–50 million households
Avg. Disposable Income	PKR 1.2–1.5 million/year

d. Demand Drivers

Driver	Updated Status
Government Target	~20% solar share in energy mix by 2026–27; export-oriented solar manufacturing under Policy 2026–31
Electricity Tariffs	High and rising → primary driver of rooftop and distributed solar adoption
Grid Reliability	Persistent supply constraints → shift toward behind-the-meter solar
Net Metering / Distributed Generation	Rapid expansion with regulatory rationalization underway
Consumer Financing Penetration	Limited but emerging; expected to improve with policy support

Solar Import Surge	~45–50 GW imported vs ~18–21 GW installed → strong latent demand
Industrial & Commercial Demand	Increasing adoption for cost reduction and energy security

II. Local Production vs Imports

e. Import Bill of Solar Equipment

Year	Import Value (USD)	Import Volume (GW)	Key Insight
FY 2023	~\$0.85 Billion	7.7 GW	Early surge phase; demand driven by rising tariffs
FY 2024	~\$1.8 Billion	16.6 GW	Peak import expansion; large-scale inflow from China
FY 2025	~\$2.8 Billion	16.5 GW	Market saturation; imports exceed installation capacity

f. Cost Comparison (Localization in Pakistan vs. CBU Imports from China)

Cost Component	Local Manufacturing (Pakistan)	CBU Imports (from China)
Freight	Low (raw materials inbound; proximity to export markets)	High (finished goods shipping + handling)
Customs Duties / Taxes	0% on machinery & inputs (5th Schedule)	5% CD + ~10% FED (policy-driven cascading tariff)
Lead Time	Short (domestic supply + faster export turnaround)	4–8 weeks (international shipping cycle)
Working Capital Lock	Lower (localized production cycle)	Higher (inventory + shipping delays)
Export Competitiveness (US Market)	Strong (no AD/CVD exposure; RoO compliant)	Weak (subject to AD/CVD duties)
Total Cost Index (Landed to US)	~\$0.28–0.32/Wp	~\$0.50–0.55/Wp (post AD/CVD)

g. Government Policy Direction (Solar Manufacturing Policy 2026-31)

Policy Instrument	Updated Description
Customs Duty	0% customs duty on machinery, raw materials, and components for registered manufacturers under the Fifth Schedule (EDB-certified imports)
Federal Excise Duty (FED)	Gradual imposition of FED on finished solar imports (CBU modules/inverters) to establish effective tariff differential amid CPFTA duty constraints
Sales Tax	Rationalization with exemptions/reduced rates for manufacturing inputs; alignment to remove anomaly of higher taxation on inputs vs finished imports
Import Substitution / Tariff Structure	Cascading tariff regime (0% on inputs, increasing duties/FED on finished goods) to promote Domestic Value Addition (30–40% by 2031)
Quality & Compliance Enforcement	Mandatory IEC standards, strengthened market surveillance, and establishment of national testing & certification facility (PCRET transition to MoIP/EDB)

III. Export Potential & Market Access

h. Preferential Trade Access (for Pakistan-Based Production)

Market	Trade Framework	Concessional Duty
China	Pak-China FTA	Preferential access
EU	GSP+	Duty-free for most products
USA	No AD/CVD duties currently	Competitive advantage
GCC	Ongoing negotiations	Growing access
Africa/Central Asia	Bilateral/Transit trade	Low duties

i. Regional Demand Snapshot

Region	Application Segment	Demand Growth	Strategic Insight
Middle East (GCC)	Utility-scale & grid-connected solar	Very High (policy-driven energy transition; >15–20 GW annual additions)	Large-scale procurement programs; strong opportunity for export-oriented manufacturing

Central Asia	Distributed & hybrid solar systems	High (energy diversification & grid reliability needs)	Growing demand for decentralized systems; proximity advantage for Pakistan exports
Africa	Off-grid & mini-grid solar solutions	Very High (electrification gap & donor-funded programs)	Strong demand for low-cost solutions; ideal for Pakistan's cost-competitive exports

IV. Cost & Resource Analysis

j. **Raw Material Availability (for Solar Manufacturing)**

Input	Local Capacity	Compliance / Policy Position
Silica Sand	High (significant reserves)	High purity achievable; potential for upstream integration (cells/wafers)
Aluminum (Frames)	High (established extrusion industry)	Meets international quality; already localized component
Tempered Glass	Limited (planned localization within 24 months)	Requires investment to meet IEC/export-grade standards
EVA / Backsheet	None (import-dependent; targeted localization in 12 months)	Critical input; localization required for Rules of Origin (RoO) compliance
Junction Box / Cables	Localized	IEC-compliant; supports immediate domestic value addition

k. **Utility Cost (Industrial & SEZ Tariffs)**

Utility	Industrial Tariff	SEZ Tariff
Electricity	~USD 0.12–0.15/kWh (reflecting higher industrial tariffs impacting competitiveness)	Facilitated / concessional tariffs under SEZ framework (lower than national average)
Gas	~USD 6.5–9.0/MMBTU	Competitive / priority allocation for industry
Water	Moderate (location dependent)	Subsidized / infrastructure-supported in SEZs

l. **Labor Cost Structure**

Category	Average Monthly Cost (USD)
Unskilled	\$150–\$200
Semi-Skilled	\$200–\$300
Skilled (SMT Operators)	\$300–\$500
Engineers / Technicians	\$500–\$1,000+

V. Fiscal & Tariff Incentives

m. **Tax Regime Overview (for Manufacturing)**

Tax Type	Rate (Standard)	Incentivized Rate (SEZ / Export-Oriented)
Corporate Income Tax	~29%	0% for 5–10 years (SEZ regime)
Withholding Taxes	Variable	Reduced / concessional for exporters
Sales Tax (Goods & Services)	18% (general regime)	Exemptions under 5th & 6th Schedule for solar manufacturing
Customs Duties (Imports)	0–20% (general tariff)	0% on machinery, raw materials & components (IOCO-linked)
Federal Excise Duty (FED)	Not applicable on inputs	Gradually increasing on CBU imports (to create tariff differential)

n. **Tariff Differential (Incentive Signal)**

Category	Duty Structure (Indicative)	Policy Rationale
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Raw Materials / Inputs	0% CD + ST Exemptions (5th Schedule)	Ensures zero-cost inputs for local manufacturing; removes tax distortions on upstream materials
Cells / SKD Kits	0% CD + 0% FED	Supports module assembly and early-stage localization; enables gradual value addition
Finished Modules (CBU)	5% CD + 10% FED (increasing trajectory)	Creates effective tariff spread despite CPFTA; discourages imports and incentivizes local production

VI. SEZs & Facilitation

o. Priority SEZs for Solar Manufacturing

SEZ	Province	Readiness Status	Suitability
Rashakai SEZ	KPK	Operational	High (CPEC, proximity to Afghanistan/CARs)
Allama Iqbal Industrial City	Punjab	Operational	High (industrial heartland)
Port Qasim (KE Land)	Sindh	Under development	High (port access)
Dhabeji SEZ	Sindh	Under development	High (CPEC, near Karachi)

p. Approval Timelines (Illustrative)

Authority	Estimated Timeline
SECP (Company Incorporation)	1–3 Days
BOI (SEZ Approval)	1–3 Months
EDB (Manufacturing License)	1–2 Months
Environmental Approval	1–2 Months

VII. Investment Projects

q. Available / Proposed Projects

Project	Location	Investment Size	Structure
Solar Module Assembly	Rashakai / Faisalabad	\$50–100 million (1–3 GW)	JV / Wholly Owned
Cell & Wafer Facility	KPK / Punjab	\$500 million+	Strategic JV
Battery (Li-ion) Assembly	Port Qasim SEZ	\$50–150 million	JV / Technology Transfer
Integrated Solar Cluster	Various SEZs	\$1 billion+ (phased)	Consortium

r. Land Availability (Indicative Rates)

Location	Plot Size (Acres)	Lease/Purchase Rates (USD/sq. m.)
SEZ (Developed)	1–50+	~\$50–\$100 (lease)
Non-SEZ (Industrial Area)	1–100+	~\$30–\$80 (lease/purchase)

VIII. Financing Ecosystem

s. Financing Sources

Source	Instrument	Terms
Local Banks/DFIs	Project Finance / Working Capital	KIBOR + spread
Chinese Banks (Exim, CDB)	Long-Term Debt (CPEC)	Concessional / Commercial
State Programs	Credit Guarantee / LTFF	Subsidized for exporters
International DFIs	Equity / Debt	Market-based + TA