

Feasibility Study: Launching a Solar Module Manufacturing Plant in Algeria

A Factual Assessment of Local PV Module Production

Content Partner: J. v. G. technology GmbH

Turnkey solar module production lines — since 1997

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Technical Overview: Launching a Solar Module Plant in Algeria



Created as part of the PVKnowHow Knowledge Network



Prepared by J.v.G. Technology GmbH



European specialists in turnkey solar module production lines

Algeria's Solar Opportunity

Resource Base

- Among the highest solar irradiation levels globally — 2,500–3,000 kWh/m²/year
- Saharan surface area exceeds 2 million km²
- Consistent DNI levels suitable for both PV and CSP deployment
- Geographic proximity to European energy import markets

Strategic Context

- Algeria is a major fossil fuel exporter — energy transition is an economic imperative
- Domestic energy demand growing 5–7% annually
- Solar substitution of gas can free export capacity
- Industrial policy increasingly favors local content requirements

Government Renewable Targets

- 1 National Energy Plan — Target Framework**

Algeria's Ministry of Energy has set a renewable electricity target of 15,000 MW by 2035

Solar PV identified as the primary technology pathway
- 2 Local Content Policy**

Algerian procurement regulations increasingly require locally manufactured components

Import substitution strategy applied across energy sector infrastructure
- 3 Industrial Development Agenda**

Government linking renewable deployment to domestic manufacturing job creation

PV module production identified as anchor sector for green industrial policy
- 4 Export Potential**

Proximity to EU markets — potential for certified module exports under green trade frameworks

Euro-Mediterranean energy partnerships under active development

Local Manufacturing Gap

Current State

- Algeria currently imports the majority of its PV modules
- No large-scale domestic crystalline silicon module production exists at industrial scale
- Dependency on Chinese, European, and Asian supply chains

Structural Risk

- Import dependency exposes projects to currency risk and logistics delays
- No local warranty and after-sales support infrastructure
- Limited technology transfer and workforce skill development

Market Opportunity

- Domestic pipeline of multi-GW scale creates viable demand base for local production
- Regional export to sub-Saharan Africa and MENA adds further volume potential
- First-mover advantage available to early industrial entrants

Key Project Data — 100 MW Factory Concept

100 MW

\$5.5–7M

12 mo

Algeria

Production Scale

Annual nameplate capacity
— crystalline silicon PV
modules

CAPEX Range


Estimated investment for
turnkey automated
production line

Ramp-Up Period

Typical implementation
timeline from contract to full
production

Target Region

Reference scenario —
applicable to other MENA
markets with adaptation

 Line type: Automated solar module production line · Source: PVKnowHow / J.v.G. Technology GmbH

Technical Infrastructure Requirements

Facility Requirements

- Clean production area: 3,000–5,000 m² minimum for 100 MW line
- Stable three-phase power supply: 400–600 kW connected load typical
- Controlled temperature and humidity environment
- ESD-safe flooring and anti-static workstation setup
- Compressed air supply for pneumatic systems

Utility & Logistics Infrastructure

- Road access suitable for oversized equipment delivery
- Reliable grid connection with backup provisions
- Raw material warehousing: glass, cells, EVA, backsheet, frames
- Finished goods storage and shipping area
- Water supply for cooling systems

Production Line Overview

- 1 – Cell Stringing**
Solar cells tabbed and strung into series circuits using automated stringer
EL inspection to detect micro-cracks before further processing
- 2 – Lay-Up & Lamination**
Glass / EVA / cell strings / EVA / backsheet assembled in sequence
Laminator bonds all layers under heat (135–180°C), vacuum, and pressure — ~20 min cycle
- 3 – Framing & Junction Box**
Aluminum frame attached and sealed; junction box installed and potted
Electrical connections made and tested
- 4 – Final Testing & Flash Test**
I-V curve measurement under standard test conditions (STC)
Power binning, labeling, and packaging for shipment

☐ Fully automated systems can achieve up to ~600 modules/hour throughput · Source: PVKnowHow / J.v.G. Technology GmbH

Raw Material Supply Chain

Solar Cells

- Primary input – typically imported (monocrystalline PERC/TOPCon)
- Global cell supply concentrated in China, with emerging Southeast Asian sources
- Price benchmarking via industry indices (OPIS, PV Infolink)

Encapsulants & Backsheet

- EVA film: widely available from global chemical suppliers
- Backsheet: imported; increasingly available from regional distributors
- TPO alternatives gaining adoption for bifacial applications

Glass, Frames & Junction Boxes

- Tempered low-iron solar glass: heavy – freight costs favor regional sourcing
- Aluminum frames: potential for local Algerian production given domestic capacity
- Junction boxes: globally sourced; standard specification components

Workforce & Operations

Staffing Requirements – 100 MW Line

- Estimated 80–120 production staff for two-shift operation
- Technical roles: line engineers, quality technicians, maintenance specialists
- Management: production, quality, supply chain, and sales functions
- On-site training by equipment supplier typically included in turnkey scope

Training & Skill Development

- No prior PV manufacturing experience required for line operators
- Structured training protocols delivered by experienced European turnkey provider
- Process documentation and standard operating procedures (SOPs) provided
- Quality management system (ISO 9001 / IEC standards) implemented from day one

CAPEX and OPEX Overview

Category	Indicative Range	Notes
Turnkey Production Line (CAPEX)	\$5.5–7.0M	Automated 100 MW line; equipment, installation, commissioning
Civil Works & Facility Preparation	Variable	Site-dependent; existing building preferred to reduce cost
Raw Materials (OPEX/year)	Dominant cost	Cells, EVA, glass, backsheets, frames — ~70–80% of unit cost
Labor (OPEX/year)	Relatively low	Algeria wage levels competitive vs. European peers
Energy & Utilities (OPEX/year)	Low to moderate	Algeria subsidized industrial electricity tariffs apply
Depreciation (10-year straight line)	\$0.55–0.70M/yr	Based on CAPEX range above

Revenue and Profitability Example

Production Output


- 100 MW/year at ~400W average module = ~250,000 modules/year
- Domestic market pricing typically at or above import parity
- Local content premium possible under government procurement programs

Indicative Revenue Range

- Wholesale module pricing: reference global benchmark indices
- 100 MW at \$0.15–0.22/W → \$15–22M gross revenue (illustrative, market-dependent)
- Export to MENA/EU markets may command different price points

Profitability Drivers

- Cell cost and module ASP spread is the primary margin determinant
- Yield rate and scrap reduction directly impact unit economics
- Government incentives, tax holidays, and import duty exemptions can materially improve returns

 All revenue figures are illustrative scenario estimates only. Actual results depend on market conditions, procurement contracts, and input costs at time of operation.

Regulatory and Environmental Framework

Regulatory Landscape

- Algeria's energy regulator (CREG) oversees renewable energy licensing
- Ministerial decrees govern industrial zone development and investment incentives
- National Agency for the Promotion and Rationalization of Energy Use (APRUE) — key stakeholder
- Investment law reforms (2022) have improved foreign participation conditions

Environmental & Certification Standards

- IEC 61215 / IEC 61730 module certification required for international market access
- TÜV or equivalent third-party certification recommended for EU export
- Environmental impact assessment (EIA) required for industrial facility licensing
- Waste management plan for encapsulant and backsheet offcuts required

Risk Assessment

Market & Demand Risk

- Government renewable deployment pace may differ from published targets
- Module pricing is globally competitive — margins can compress if cell costs rise
- Mitigation: anchor supply agreements with domestic EPC contractors or utilities

Supply Chain & Technology Risk

- Solar cell supply is dominated by a limited number of global producers
- Technology transitions (TOPCon, HJT) may require equipment adaptation
- Mitigation: modular equipment design allows upgrade without full line replacement

Operational & Regulatory Risk

- Workforce training curve — quality standards require consistent management
- Currency and import duty exposure on cell and material procurement
- Mitigation: phased ramp-up, strong process documentation, and experienced turnkey partner

Strategic Value for Algeria

1

Energy Security

Domestic module production reduces import dependency and strengthens the renewable deployment supply chain

2

Industrial Development

Creates skilled manufacturing employment, technology transfer, and a replicable industrial model for scale-up

3

Export Positioning

IEC-certified local production enables access to MENA and European module export markets under preferential trade frameworks

📄 A proven turnkey manufacturing concept integrates engineering, training, and process methodology – reducing implementation risk for first-time industrial entrants. Source: PVKnowHow / J.v.G. Technology GmbH

Conclusion & Outlook

1 Algeria has a credible resource and policy foundation for domestic PV manufacturing

Solar irradiation, government targets, and local content policy create enabling conditions

2 A 100 MW automated line is a technically and financially viable entry point


CAPEX of \$5.5–7M with 12-month implementation is achievable with an experienced turnkey provider

3 Execution risk is manageable with structured implementation

Phased ramp-up, certified process methodology, and on-site training reduce operational risk

4 Scalability from 100 MW to multi-GW is the long-term strategic objective

First factory establishes the template — supply chain, workforce, and quality systems — for national expansion

 Reference: PVKnowHow Knowledge Network / J.v.G. Technology GmbH · www.jvg-thoma.com



About the Content Partner

J. v. G. technology GmbH – The DESERT Company

Founded in 1997 in Bavaria, Germany. Family-owned engineering company specializing in turnkey solar module production lines.

More than 90 factory projects delivered worldwide.

On-site team training included – no prior manufacturing experience required.

Key areas:

Turnkey PV manufacturing lines | DESERT Technology® |
TÜV-certified module designs | Factory planning to production

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