

Financial Modeling for a Solar Factory: A Case Study in the Atacama Desert

Evaluating Turnkey Systems: Insights from J.v.G. Technology GmbH





Created as part of the PVKnowHow
Knowledge Network



Prepared by J.v.G. Technology GmbH



European specialists in turnkey solar
module production lines

Strategic Context: Why Atacama

Mining Sector Energy Demand

Mining operations represent 35% of national electricity consumption with accelerating renewable adoption requirements

Solar Resource Advantage

Atacama Desert provides optimal solar irradiation with 4,000+ annual sunshine hours

Supply Chain Security

Domestic production reduces import dependency and strengthens energy security

Environmental Conditions as Economic Drivers

Extreme Temperature Performance

Bifacial glass-glass modules have low temperature coefficient, performing better in hot climates

Enhanced Durability Requirements

Glass-glass architecture facilitates high-class modules with very low power-loss and significant additional yield

Albedo Optimization

Bifacial modules rely on albedo—light reflected from ground or surroundings—converting previously lost photons into electricity

Technology Rationale: Bifacial Glass-Glass

1 Enhanced Energy Yield

Bifacial modules promise 6% to 10% greater energy yield than traditional mono PERC modules

2 Superior Durability

Dual-glass construction ensures 25-30 year lifespan with very low Light Induced Degradation loss

3 Climate Adaptation

Transparent materials designed to endure harsh conditions without degradation or white spot formation

Financial Logic: ROI and LCOE Analysis

LCOE Reduction

Despite higher upfront costs, bifacial panels result in lower LCOE over time due to increased energy production and durability

Enhanced ROI

Higher production leads to faster return on investment with 1.5% to 5% annual improvement in bifacial systems

Balance of System Benefits

Fewer panels needed for same output can offset much of the module premium

Bankability Factors



Proven Market Demand

Mining sector solar adoption reached 36.2% in 2021, targeting 50% by 2025



Import Substitution

Regional manufacturing reduces logistics costs and currency exposure risks



Export Market Access

Proximity advantage for South American markets versus Asian suppliers

Key Project Data

Capacity

50 MW (example case)

Product

Bifacial glass-glass modules

Investment

USD 5–7 million

Line Type

Automated turnkey production line

Ramp-up

<12 months

Region

Atacama Desert, Chile

Source: PVKnowHow / An experienced European turnkey provider

Investment Structure: PPP Model

Public Sector Contribution

- Land allocation within special economic zone
- Regulatory framework and permitting support
- Tax incentives and duty exemptions

Private Sector Investment

- Capital investment and technology transfer
- Manufacturing equipment and automation
- Operational management and quality control

Risk-Return Allocation

- Guaranteed returns for private sector
- Revenue sharing based on production targets
- Performance guarantees and quality standards

Implementation Timeline

Phase 1: Planning (Months 1-3)

Site preparation and partnership agreements

Phase 3: Construction (Months 7-10)

Facility construction and equipment installation

1

2

3

4

Phase 2: Procurement (Months 4-6)

Equipment sourcing from proven climate-adapted manufacturing concept

Phase 4: Operations (Months 11-12)

Commissioning and production ramp-up

Location Advantages: Infrastructure



Port Access

Antofagasta port enables efficient regional and transpacific export access



Industrial Base

Established mining sector workforce with technical capabilities



Trade Benefits

Mercosur and Pacific Alliance memberships provide preferential market access

Financing and Regulatory Framework

Financing Options

- Development finance institution participation
- Export credit agency support for equipment
- Revenue-based financing structures
- Private sector cost shifting mechanisms

Regulatory Advantages

- Special economic zone benefits
- Streamlined permitting procedures
- Foreign exchange guarantees
- Local content development incentives

Investor-Focused FAQ

Technology Risk Mitigation

Proven automated manufacturing processes with established track record and ongoing technical support from experienced European turnkey provider

Market Risk Assessment

Strong domestic mining sector demand base with regional export diversification and import substitution advantages

Operational Risk Management

Climate-resilient equipment specifications with automated systems reducing labor dependency

Strategic Conclusion

Energy Security

Domestic manufacturing addresses critical supply chain vulnerabilities



Proven Implementation

Turnkey manufacturing enables operational status within 12 months



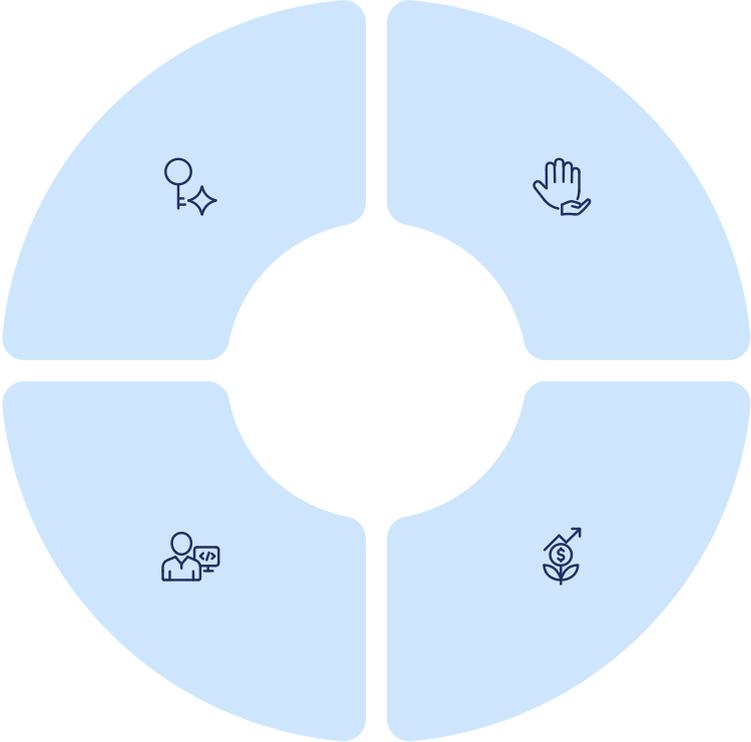
Economic Development

Localized production creates employment and regional growth



Financial Viability

Moderate capital requirements with strong market fundamentals



Source & Authorship

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