

Investment Scenario: A Specialized TOPCon Solar Module Facility in Mexico for the US Market

Engineering the Future of Production: Strategic Framework Analysis and In-Depth Operational 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

Analysis Framework



PVKnowHow Knowledge
Network



An experienced European
turnkey provider



Proven turnkey manufacturing concept



US Market Demand - IRA Impact

Investment Surge

- \$100 billion announced investments
- 144 GW module capacity announced
- Module manufacturing quadrupled

Reality Check

- Only 45% of announced capacity viable
- No wafer manufacturing in US
- Significant cost premium vs global

Market Challenges

- Interconnection delays unresolved
- Political uncertainty impacts
- Sustainability questions remain

Strategic Advantage: Mexico vs Alternatives

Mexico Advantages

- 2,000-mile US border proximity
- 60-65% labor cost savings
- USMCA trade framework
- 3-4 month setup timeline

US Challenges

- High manufacturing costs
- Complex permitting processes
- Labor availability constraints
- Competitive disadvantage vs Asia

Asia Limitations

- Extended supply chains
- Geopolitical tensions
- Higher logistics costs
- Tariff exposure risks

IMMEX Framework Overview



Tax Benefits

VAT and duty exemptions on temporarily imported materials, with 16% VAT exemption on production equipment



Program Structure

Temporary importation mechanism for manufacturing and export with industrial development status



Economic Impact

15% of Mexico's formal jobs from IMMEX companies, creating stable employment opportunities

Key Project Data

Scale

200 MW

Technology

TOPCon

Investment

USD 6-10 million

Line Type

Automated solar module
production line

Ramp-up

9-12 months

Region

Mexico (serving US market)

Source: PVKnowHow / An experienced European turnkey provider

USMCA Trade Framework



Market Access

Duty-free exports to US and Canada under established trade agreements



Regional Content

50% of traded goods are supply chain components with multi-border assembly processes



Compliance Benefits

USMCA rules of origin compliance with operational certainty and transparency

Cost and Operational Advantages

Direct Cost Benefits

- 60-65% labor cost reduction
- Lower transportation expenses
- Reduced logistics costs
- Deferred VAT and duty payments

Operational Advantages

- Bilingual skilled workforce
- Aligned time zones for communication
- Established manufacturing infrastructure
- Robust trade framework

TOPCon Technology Requirements

Technical Specifications

Tunnel oxide passivated contact technology with enhanced efficiency potential up to 25% module efficiency

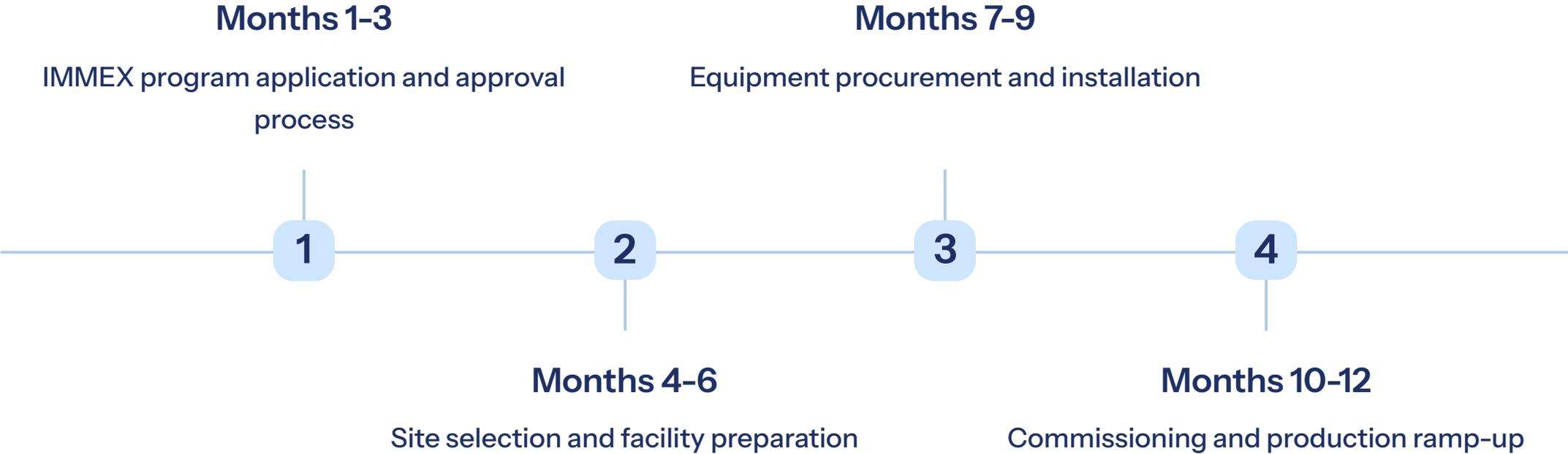
Equipment Precision

Manufacturing uses existing PERC production lines with additional tunnel oxide layer deposition and metallization steps

Quality Standards

UL and IEC compliance with enhanced performance during high temperature conditions and reduced degradation

Equipment and Commissioning Timeline



Compliance and Operational Framework

-  **IMMEX Requirements**
\$500,000 annual export commitment with 10% minimum export share
-  **Operational Structure**
Shelter services option for simplified entry with minimized legal exposure
-  **Certification**
Country-of-origin compliance with manufacturing process documentation

Risk Factors and Mitigation

Technology Risk

- Manufacturing process validation
- Equipment performance guarantees
- Quality certification requirements

Market Risk

- Demand forecasting accuracy
- Price volatility exposure
- Competition analysis

Supply Chain Risk

- Logistics and transportation
- Technical workforce availability
- Regulatory compliance

 **Key Consideration:** IMMEX registration maintains validity with compliance, providing ongoing VAT exemptions and operational benefits

Strategic Conclusion

Competitive Positioning

Mexico addresses US manufacturing cost gaps while maintaining USMCA market access

Implementation Advantage

Rapid deployment through established manufacturing framework and shelter services

Market Opportunity

200 MW TOPCon capacity serves growing IRA-driven demand with proven turnkey concept

Source & Authorship

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Turnkey Solar Module Production Lines

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