

# A Framework for Public-Private Partnership in Ethiopian Solar Module Manufacturing

A Detailed Evaluation of Turnkey Systems and Long-Term Operational Success by 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



**Independent manufacturing analysis  
framework**



**Experienced European turnkey  
provider assessment**



**Proven turnkey solar manufacturing  
concept**

# Strategic Context for Ethiopia



## Market Fundamentals

Heavy hydropower dependence  
vulnerable to climate-induced  
droughts



## Development Goals

Plans to increase power generation  
capacity to 17,000 MW in 10 years



## Solar Potential

Average total daily solar radiation of 5-7  
kWh/m<sup>2</sup>

# Rationale for Local Solar Manufacturing

## Energy Security

- Reduce dependence on drought-vulnerable hydropower
- Domestic production capacity for strategic autonomy
- Reliable supply chains for renewable expansion

## Economic Development

- Job creation and technical expertise advancement
- Industrial capacity building
- Foreign exchange savings on imports

# Public-Private Partnership Structure



## Public Sector Role

Policy framework and competitive procurement process



## Private Sector Role

Joint ventures with foreign partners for technology transfer



## Investment Incentives

Tax exemptions on imported solar materials and grace periods



# Phased Implementation Approach

Ethiopia investing \$300 million for 300 MW solar capacity development, providing foundation for manufacturing expansion.

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## Phase 1: Pilot Manufacturing

- Partnership with experienced European turnkey provider
- Brownfield conversion approach
- Local workforce development

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## Phase 2: Scale-up Production

- Capacity expansion to meet domestic demand
- Technology transfer completion
- Regional export preparation

# Technology and Operational Requirements

## Production Technology

TOPCon tunnel oxide passivated contact with 25% efficiency potential

## Infrastructure Requirements

Dust-free manufacturing environment and electrical system upgrades

## Quality Standards

Dual UL and IEC certification for international market access

## Line Compatibility

Modular, scalable production systems utilizing proven turnkey concepts

# Key Project Data

## Capacity

500 MW

## Line Type

Utility-scale, automated

## Investment

Typical utility-scale range

## Ramp-up Period

18–24 months

## Region

Ethiopia

## Source

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# Skills Development and Workforce Impact

## Technical Training

- Solar manufacturing processes
- Quality control systems
- Equipment maintenance protocols

## Economic Benefits

- Direct manufacturing employment
- Indirect supply chain jobs
- Knowledge transfer to local industry

# Risk Assessment Framework

## Technical Risk

- Technology transfer complexity
- Quality certification timeline
- Infrastructure adaptation requirements

## Financial Risk

- Initial capital requirements
- Market demand fluctuations
- Currency and investment recovery

## Operational Risk

- Skilled workforce development
- Supply chain establishment
- Regulatory framework stability

# Frequently Asked Questions

## Why manufacturing vs. imports?

Reduces foreign exchange pressure, creates jobs, enables technology transfer, and provides strategic energy security

## What about international competition?

PPP structure with experienced European turnkey provider ensures competitive technology and quality standards

## How does this align with policy?

Supports Ethiopia's 2030 green economy vision and renewable energy diversification goals

# Strategic Conclusion

## Economic Opportunity

Local manufacturing provides sustainable foundation for renewable energy expansion and industrial development

## Strategic Position

Leverages Ethiopia's abundant renewable energy potential of over 60,000 MW

## Implementation Pathway

PPP framework with proven turnkey manufacturing concept offers pragmatic approach for emerging market entry

# Source & Authorship

J.v.G. Technology GmbH

Turnkey Solar Module Production Lines

PVKnowHow Knowledge Network

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