How to Structure a Solar Manufacturing Project in Andhra Pradesh for PLI Scheme Success

Educational framework analysis of India's Production Linked Incentive scheme objectives for high-efficiency solar PV module manufacturing.

The Evolution of the Turnkey Model: A Strategic Analysis of Manufacturing Frameworks and Systemic Stability by J.v.G. Technology GmbH.

Analysis Framework

Created as part of the PVKnowHow Knowledge Network

Prepared by J.v.G. Technology GmbH

European specialists in turnkey solar module production lines

Key Project Data

⩾1GW	$150-250M	5 years
Capacity	**Investment**	**Incentive Period**
Minimum requirement	USD (1 GW reference)	Post-commissioning

- **Integration level:** Wafer-to-module minimum (polysilicon → module receives highest scoring)
- **Technology:** TOPCon / HJT capable with minimum 19.5% efficiency
- **Region:** Andhra Pradesh, India
- **Source:** PVKnowHow / J.v.G. Technology GmbH

PLI Scheme Objectives

Manufacturing Capacity

Build up solar PV manufacturing capacity of high efficiency modules at Gigawatt scale to reduce import dependence.

Local Ecosystem

Develop an ecosystem for sourcing of local material in solar manufacturing and strengthen supply chain resilience.

Employment Generation

Employment generation and technological self-sufficiency through advanced manufacturing capabilities.

Core Eligibility Requirements

01

Minimum Capacity

Minimum 1,000 MW capacity for each manufacturing stage

Scalable platform for future expansion

02

Vertical Integration

Integration from polysilicon to modules receives 50 marks; wafer-to-module 35 marks; cell-to-module 20 marks

03

Performance Standards

Minimum module efficiency 19.50% with temperature coefficient better than -0.30% per degree Celsius

Vertical Integration Value Chain

Integration Levels

- Polysilicon → Module: 50 scoring points (3 years)
- Wafer → Module: 35 scoring points (2 years)
- Cell → Module: 20 scoring points (1.5 years)
- Higher integration = better incentive positioning

Strategic Benefits

- Better quality control and competitiveness through integrated plants
- Reduced supply chain dependencies
- Enhanced process optimization capabilities
- Lower production costs through vertical integration

Strategic Advantages of Andhra Pradesh

Infrastructure Excellence

Well-developed industrial zones with reliable access to power, water, and road connectivity

Six operational ports with four under development

Policy Support

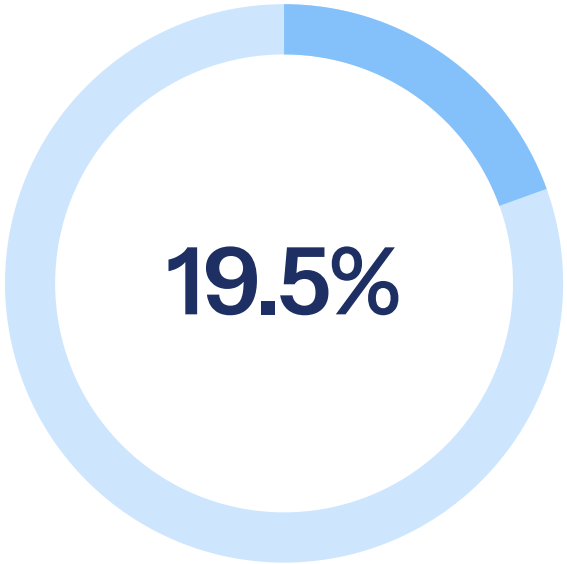
Andhra Pradesh Integrated Clean Energy (ICE) Policy 2024 framework

Aims for 750,000 job creation through clean energy investments

Logistical Advantages

Deep-water ports like Krishnapatnam and Visakhapatnam for importing raw materials and exporting modules

Technology Requirements



Minimum Efficiency

Module efficiency requirement for PLI eligibility

Temperature Coefficient

Per degree Celsius maximum for performance qualification

Technology Readiness

Advanced cell technology compatibility for next-generation efficiency

Step-by-Step Project Structuring Framework

Phase 1: Compliance Setup

Business plan development

PLI application and approval

0-6 months

1

Phase 2: Facility Development

Land acquisition and infrastructure

Equipment procurement and installation

6-18 months

2

Phase 3: Commissioning

Testing and certification

Performance validation

18-24 months

3

Phase 4: Operations

5-year incentive period post commissioning

Scale-up and optimization

24+ months

4

Supply Chain and Integration Focus

1

Upstream Integration

6 GW solar ingot and wafer manufacturing capabilities being developed

Polysilicon sourcing and processing capabilities

2

Manufacturing Components

Cell production with TOPCon/HJT technology

Module assembly and quality control systems

Testing and certification infrastructure

3

Export Infrastructure

Strong grid infrastructure and vast coastline for large-scale projects

International market access through port facilities

Technology Platform Readiness

TOPCon Capability

- 4 GW TOPCon solar cell manufacturing facilities being established
- Equipment platform supporting advanced cell architectures
- Quality control systems for high-efficiency production
- Continuous technology upgrade pathways

HJT Readiness

- Flexible manufacturing platforms for next-generation technologies
- Advanced processing capabilities for heterojunction cells
- Research and development infrastructure support
- Integration with wafer and module production lines

Risks and Compliance Considerations

Performance Guarantees

Performance Bank Guarantees required; default results in PBG forfeiture

Strict timeline adherence for incentive eligibility

Market Execution

If manufacturer bids 25% lower than quoted PLI, disbursement limited to 95%

Sales volume requirements for incentive realization

Integration Complexity

High eligibility requirements may discourage smaller participants

Multi-stage vertical integration coordination challenges

Market Context and Scale

48GW

Total PLI Capacity

Combined Tranche-I and Tranche-II allocations

₹24,000

Total Scheme Outlay

Crore rupees across both tranches

90.9GW

Current Capacity

Total module manufacturing capacity by December 2024

Solar cell and module imports fell significantly—by 20% and 57% respectively—during fiscal 2024-25, demonstrating scheme effectiveness.

Execution Discipline and Success Factors

Critical success factors for PLI-compliant manufacturing projects:

- Meticulous, multi-stage process execution to avoid irreversible problems
- Comprehensive business plan development before equipment procurement
- Strategic location selection with pre-existing industrial infrastructure
- Technology platform flexibility for future advancement requirements

PLI scheme rewards incremental sales of high-efficiency modules, aiming to reduce import reliance and establish India as a global manufacturing hub

Source & Authorship

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Turnkey Solar Module Production Lines

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