

# A Guide to Investing in a Turnkey Bifacial Solar Module Factory in Oman

Expert analysis of turnkey manufacturing deployment addressing agricultural irrigation and desalination energy demand.

A Detailed Guide to Manufacturing Frameworks and Long-Term Performance Stability by J.v.G. Technology GmbH.





## Analysis Framework

Created as part of industry  
knowledge network

Prepared by experienced  
Prepared by J.v.G.  
Technology GmbH

Specialists in turnkey solar  
module production lines

# Key Project Data

**100-200**

**Capacity**

MW per year production capacity

**12-18**

**Ramp-up Period**

Months to operational capacity

**8-15**

**Investment**

USD million CAPEX requirement

- **Technology:** Bifacial modules (DESERT+ specification)
- **Line type:** Semi-automated turnkey production line
- **Region:** Oman
- **Focus:** Agricultural irrigation & desalination energy supply
- **Source:** PVKnowHow / Experienced European turnkey provider

# Agricultural Energy Demand

## Irrigation Requirements

Agriculture consumes over 70% of regional freshwater resources, creating substantial energy demand for water pumping systems.

## Solar Solutions

Solar-powered desalination, filtration, and UV disinfection address seasonal water scarcity while reducing grid dependency.

## Efficiency Requirements

Without efficiency gains, water demand may exceed critical thresholds, requiring renewable energy coordination.

# Desalination Energy Requirements

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## National Programs

Regional projects aim to increase drinking water production capacity with substantial energy requirements.

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## Energy-Intensive Operations

High installation costs and substantial energy demands make renewable integration essential for cost-effectiveness.

03

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## Renewable Integration

Authorities emphasize renewable energy sources to reduce carbon footprint and operating costs.

# Grid and Diesel Limitations

## Grid Infrastructure

- Remote agricultural areas lack reliable connection
- Peak demand conflicts between urban and agricultural users
- Infrastructure limitations pose significant obstacles
- Unconventional resource development increases consumption

## Diesel Generator Issues

- High operational costs for remote irrigation systems
- Supply chain vulnerabilities for fuel delivery
- Environmental impact and emissions concerns
- Maintenance requirements in harsh desert conditions

# Local Manufacturing Advantages

## Energy Security

Regional solar potential among highest globally, with areas receiving more than 3,000 hours of sunshine annually.

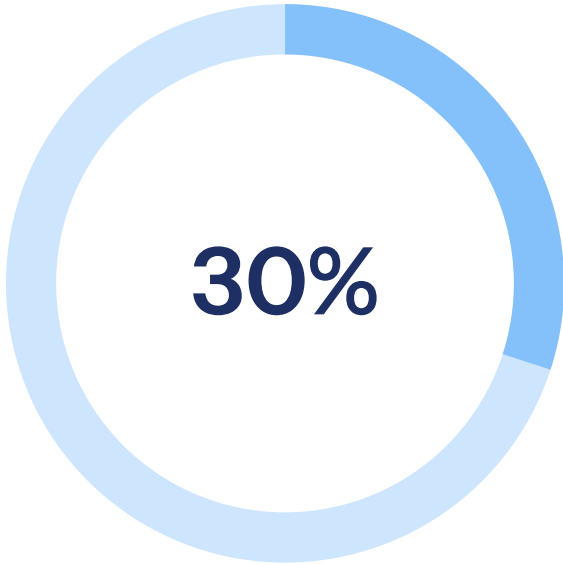
## Cost Reduction

Local production eliminates import costs and transportation delays for water-intensive agricultural operations.

## Supply Chain Resilience

Domestic manufacturing reduces international dependency and provides immediate access to solar components.

# Oman Vision 2040 Alignment



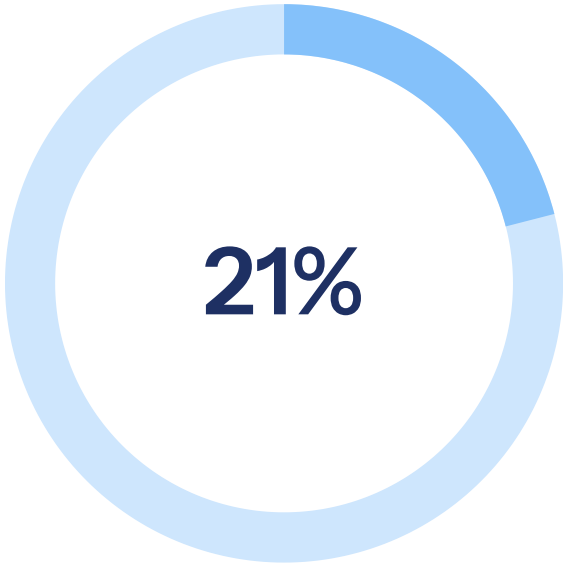
## Renewable Target 2030

Electricity from renewables by 2030 as part of national energy transition strategy



## Renewable Goal 2050

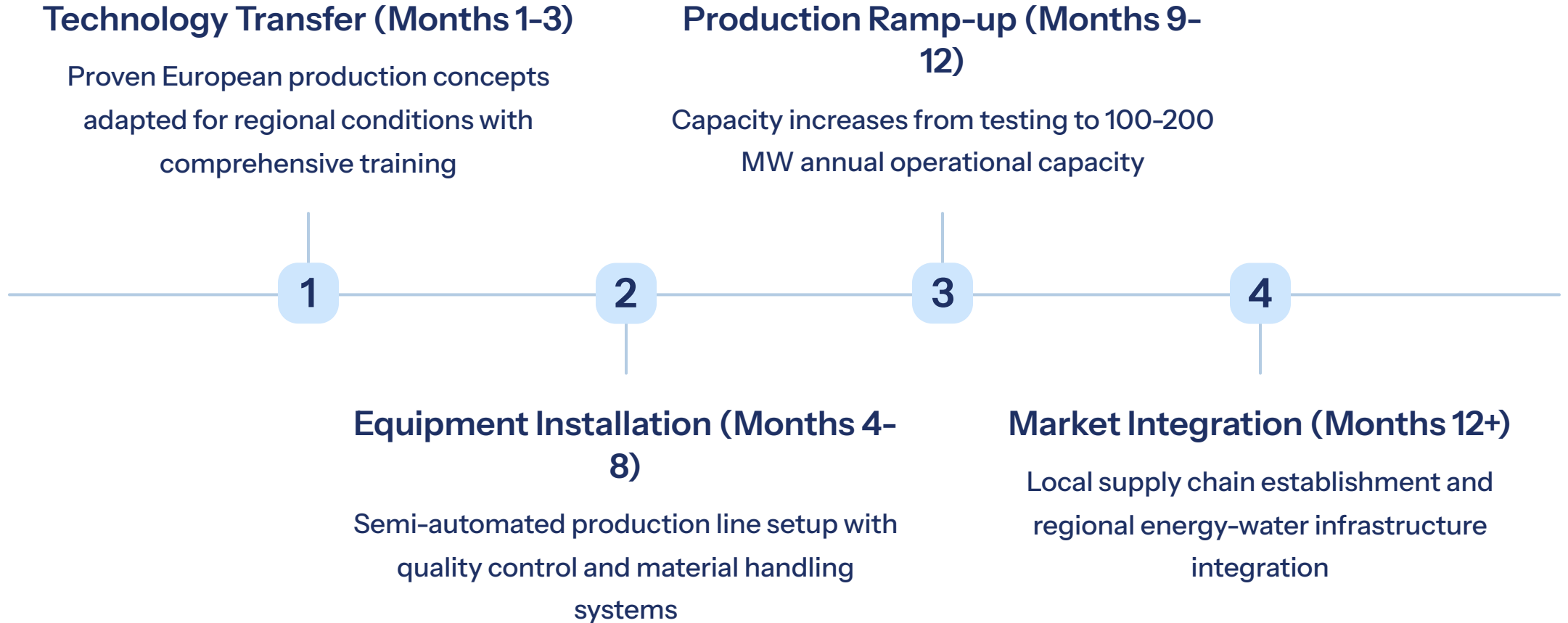
Renewable energy target supporting Net Zero emissions commitment



## Emission Reduction

GHG emissions reduction by 2030 from BAU scenario with industrial opportunities

# Turnkey Implementation Model



# Investment Considerations

## Policy Environment

Regulatory frameworks increasingly favor foreign investment in renewable energy projects under Vision 2040.

## Local Content Requirements

Regions implement local content requirements supporting domestic manufacturing development and job creation.

## Market Demand

Growing demand from desalination projects, agricultural modernization, and renewable targets provides stable market foundation.

# Implementation Phases

## Foundation

- Site preparation and infrastructure development
- Equipment procurement and shipping
- Workforce recruitment and training
- Local supplier network establishment

## Implementation

- Production line installation and testing
- Quality management system deployment
- Advanced workforce training programs
- Initial production runs and optimization

## Operations

- Full production capacity achievement
- Regional market integration
- Continuous improvement processes
- Technology transfer completion

# Strategic Assessment

- **Why Oman?** Exceptional solar irradiation, proximity to agricultural zones requiring irrigation, and government focus on diversification under Vision 2040
- **Workforce development:** Comprehensive training programs based on European standards, leveraging local technical education infrastructure
- **Energy-water nexus:** Direct supply of solar modules for irrigation and desalination systems reduces costs and improves agricultural productivity
- **Grid integration:** Production designed for both grid-connected and off-grid applications, suited for distributed energy systems

# Strategic Conclusions

Assessment framework for local solar manufacturing addressing energy-water-food nexus challenges:

- Exceptional solar resources and water-energy demands create optimal conditions for turnkey manufacturing deployment
- Oman's commitment to net zero by 2050 requires substantial acceleration of renewable capacity development
- Local manufacturing addresses national energy transition goals through job creation and technology transfer
- Integration with agricultural irrigation and desalination provides sustainable energy-water-food nexus solutions

☐ Analysis demonstrates strategic viability of turnkey solar manufacturing for addressing critical energy-water infrastructure needs in arid regions aligned with Oman Vision 2040

# Source & Authorship

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Turnkey Solar Module Production Lines

PVKnowHow Knowledge Network

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