

From Stack to Strategy: Unlocking ROI Through Integrated Solar Systems

Date: 14 October 2025

Facilitator: Agreepa Neduvhuledza

Time: 10:00-12:30

The Session will begin soon

In Partnership With

LONGI



Agenda

1. Welcome Tea and Registration	09:00-09:45	All
2. Opening and welcoming notes	10:00-10:05	SAPVIA
3. Presentation 1: Grid Compliance & Technical Best Practices	10:05 – 10:30	City of Tshwane City Power JHB
<ul style="list-style-type: none">• Clarifying requirements for CAT B/C compliance across municipalities• Smart inverters: compliance, diagnostics, and remote optimisation• AC-coupled systems and rating plate requirements• Role of professional engineers in compliance sign-off		
4. Huawei Utility Grid Forming BESS	10:30-11:00	Huawei
5. Presentation 2: Procurement & Commissioning Best Practices	11:00-11:30	SAPVIA
<ul style="list-style-type: none">• Procurement pathways and supplier collaboration• Commissioning to operation – ensuring reliability• EPC and finance perspectives		
6. Presentation 3: PV Module Innovation & Implementation Challenges	11:30 – 12:00	LONGi
7. Closure	12:00 – 12:05	SAPVIA
8. Site Visit	12:05 – 12:30	Huawei
9. Networking	12:30 - End	All



Grid Compliance & Technical Best Practices

Date: 14 October 2025

Presenter: Busisiwe Nxasana, Pr Tech Eng (City Power)

Time: 10:00-12:30

PRESENTATION OUTLINE

- **Introduction**
- **The Role of Professional Engineers**
- **Why Compliance Sign-Off Protects the Grid**
- **Key Responsibilities of Pr Eng / Pr Tech Eng**
- **Types of SSEG Systems**
- **SSEG Approval Process**
- **Technical & Safety Requirements**
- **Required Documentation**
- **SSEG Sign-Off Categories (ECSA)**
- **Internal Streamlining at City Power**
- **Engineering Assurance**

INTRODUCTION

My name is **Busisiwe Nxasana**, and I am a **Professional Engineering Technologist** working in the **Small-Scale Embedded Generation (SSEG) Office at City Power Johannesburg**.

In my role, I focus on ensuring that all embedded generation systems particularly solar PV installations comply with our municipal grid standards, technical regulations, and safety requirements before they are connected to the network.

The purpose and objective of my presentation today is to highlight the critical **“Role of Professional Engineers in ensuring compliance sign-off”** within the renewable energy sector.

I will be sharing both the expectations our SSEG office has from Professional Engineers (Pr Engs) when it comes to grid compliance and documentation, as well as some of the internal processes I have implemented to streamline SSEG compliance and improve coordination between municipalities, EPCs, and system designers.

Ultimately, the goal is to strengthen collaboration between professionals and utilities ensuring that as we expand renewable integration, we do so safely, sustainably, and in line with engineering best practices.”



Role Of Professional Engineers In Compliance

Sign-off.

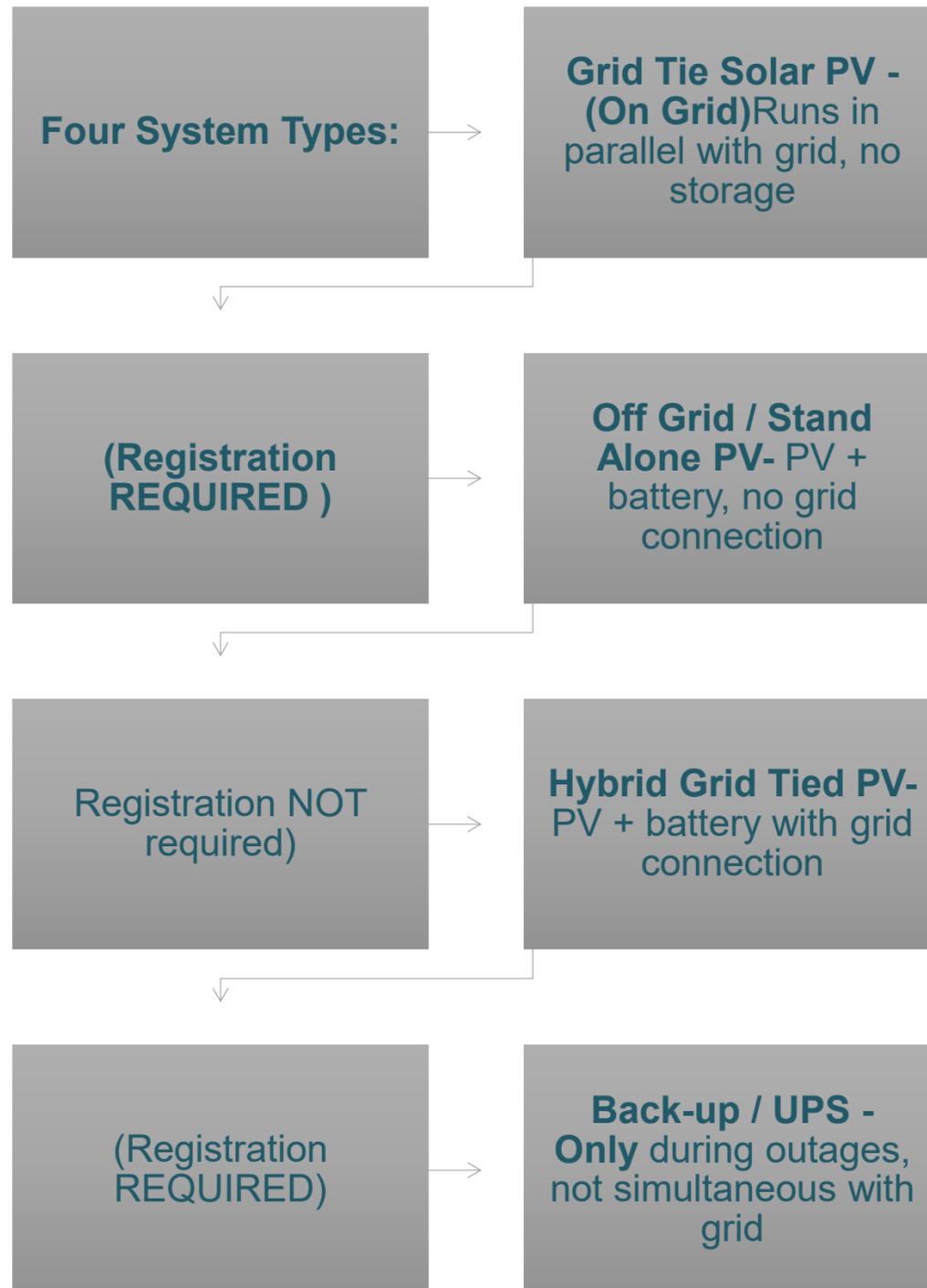
The involvement of Professional Engineers (Pr Eng) and Professional Engineering Technologists (Pr Tech Eng) is fundamental to ensuring that Small-Scale Embedded Generation (SSEG) and utility-scale solar projects meet the stringent grid-compliance, safety, and quality of supply standards defined by NERSA, SANS 10142-1, and the NRS 097-2 series.

Their legal accountability and technical expertise bridge the gap between engineering design, municipal approval, and operational safety.

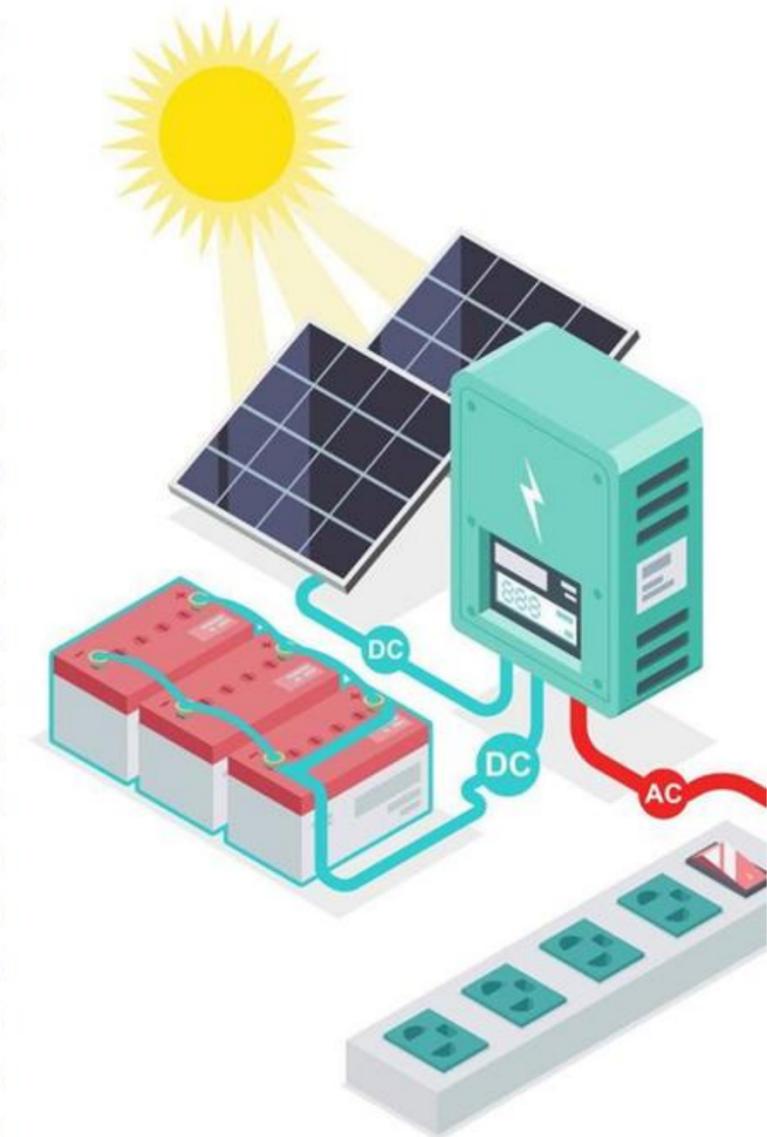
Key Responsibilities of Professional Engineers in the Solar Industry:

1. Assurance of Technical Integrity
2. Legal Accountability and Public Safety
3. Bridging Compliance Between EPCs and Municipalities
4. Enabling Quality Assurance in a Decentralized Energy Landscape
5. Upholding Professional Ethics and Continuous Competence

TYPES OF SSEG SYSTEMS



On Grid



Off Grid

SSEG APPROVAL PROCESS

8 STEP PROCESS:

- Applications & Notification
- Pre-Approval (Document Review)
- Grid Impact Study (≥ 350 kVA)
- Installation by Registered Installer
- Testing & Commissioning
- Final Approval
- Grid Connection
- **Feed-in: Own Use & Sell Excess Power**

Technical Requirements & Safety

Regulatory Framework:

NRS 097 (Grid Code)

NRS 049 (Installation Standards)

NRS 048 (Quality of Supply)

SANS 10142 (Wiring Code)

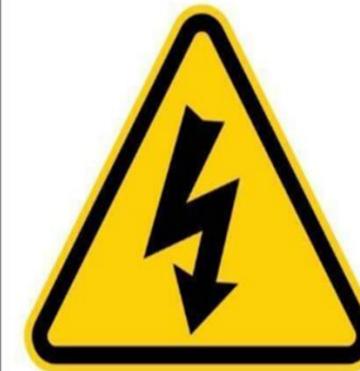
Safety Requirements:

Anti-islanding protection (60s disconnect)

Disconnection points / Main PV Breaker

Danger stickers & proper labeling

SAFETY FIRST



Risk of Electric Shock.
Disconnect all power sources before servicing.

REQUIRED DOCUMENTATION

Essential Documents:

- Completed Electricity Supply Form with Notification Number
- Single Line Diagram
- Inverter Datasheet
- Inverter NRS Certificate
- Design/Drawings
- Site Plan/Layout
- PV Plant Operating Procedure
- PV Commissioning Form
- Certificate of Compliance (COC)
- Utility Bill

SSEG SIGN-OFF CATEGORIES

The following categories of ECSA-registered professionals are authorized to sign off Small-Scale Embedded Generation (SSEG) installations, subject to their respective scopes of competence and registration category:

PROFESSIONAL ENGINEER

(Pr Eng)

May design, verify, and sign off all categories of SSEG systems without limitation

PROFESSIONAL ENGINEERING TECHNOLOGIST

(Pr Tech Eng)

May design and sign off SSEG systems up to approximately 1 MVA

PROFESSIONAL ENGINEERING TECHNICIAN

(Pr Techni Eng)

May design and sign off smaller SSEG systems,

ENGINEERING ASSURANCE = GRID PROTECTION

Why Compliance Sign-Off Protects the Grid?

Unverified or incorrectly commissioned SSEG systems can lead to **voltage rise, islanding, and harmonic distortion**, threatening grid stability and power quality.

The **compliance sign-off process** ensures:

Through professional verification, **municipal infrastructure, customer assets, and public safety** are all protected.

Inverters are **type-tested** in accordance with *NRS 097-2-1*.

Protection settings are coordinated correctly to prevent unsafe operation.

Earthing, metering, and interconnection comply with *SANS 10142-1* and municipal requirements.

**“Engineering is not about building systems,
but about earning society’s trust”**

Paraphrased from the Engineering Council of South Africa (ECSA)
Preamble to the Code of Conduct for Registered Persons, 2021

Procurement & Commissioning Best Practices

Presenter: Agreepa Neduvhuledza

Deputy Chair – PV Residential Working Group (SAPVIA)

Date: 14 October 2025

Procurement & Commissioning Best Practices



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Procurement pathways and supplier collaboration

02

Commissioning to operation – ensuring reliability

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EPC and finance perspectives

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Closing Remarks





Procurement and commissioning best practices include developing a strategic plan with **clear objectives, fostering collaborative supplier relationships through open communication and shared goals, implementing robust risk management, and leveraging technology to streamline processes.** From a financing and EPC perspective, ensure that a **clear procurement plan is tied to project milestones, that reliable and ethical suppliers are selected, and that risk is managed proactively to maintain project budget and schedule.**

Procurement Pathways and Supplier Collaboration

- **Strategic Planning:**

Develop a **comprehensive procurement plan** that aligns with business objectives, identifies key suppliers, and establishes **clear policies and procedures**.

- **Supplier Relationship Management:**

Build trust and mutual understanding with suppliers by setting clear expectations, sharing forecasts, and establishing open communication channels.

- **Collaborative Sourcing:**

Engage in strategic sourcing by **collaborating with suppliers on joint planning, identifying their capabilities, and selecting reliable partners** to ensure project success.

- **Technology & Automation:**

Utilize procurement technology to improve efficiency, streamline processes, and gain better visibility into supplier performance.





Commissioning to Operation – ensuring reliability

Phased Commissioning:

- Ensure a smooth transition from commissioning to operation by having a **detailed plan for each phase.**

Performance Monitoring:

- **Continuously monitor and evaluate the performance of the commissioned equipment and systems to ensure they meet reliability standards.**

Proactive Maintenance:

- **Integrate preventative maintenance and robust risk management practices from the outset to ensure long-term operational reliability.**



EPC and Finance Perspectives

➤ **Integrated Planning:**

Work closely with EPC (Engineering, Procurement, and Construction) teams to integrate procurement and commissioning into the broader project lifecycle.

➤ **Financial Due Diligence:**

Thoroughly evaluate the financial stability and credibility of potential suppliers to mitigate financial risks.

➤ **Contractual Safeguards:**

Establish clear contractual terms with suppliers that include performance guarantees and accountability for delays or failures, which is critical for project financing and overall budget control.

➤ **Cost Optimization:**

Implement strategies for cost reduction and optimization throughout the procurement process without compromising quality or reliability.



Closing Remarks

1. **Integration is Everything.** Break down the silos between procurement, operations, and finance. The most successful projects are where these teams are collaborating from day one.
2. **Data is Your Compass.** Move from reactive cost-cutting to proactive value management. Use data to inform your decisions, forecast risks, and measure total cost of ownership, not just the initial price tag.
3. **Relationships are Your Foundation.** This applies internally with your stakeholders, and externally with your suppliers. Treat your key suppliers as strategic partners, and you'll unlock value you didn't know was possible.

The landscape of procurement and commissioning is evolving faster than ever, driven by digitalization, sustainability imperatives, and global volatility. The best practices we discussed today are your toolkit not just to survive in this environment, but to thrive.

PV Module Innovation & Implementation Challenges

Driving Energy Transition Across Southern Africa

LONGi, Huawei, and SAPVIA partnering to transform Africa's renewable energy landscape

Global Energy Transition & Carbon Neutral Goals

170+

37.8B

61%

Countries

Tons CO₂

Non-Power

Signed Paris Agreement committing to climate action

Global emissions in 2024 (+0.8% increase)

Emissions from sectors beyond electricity generation

Green Power and Green Hydrogen are essential pathways to achieving global carbon neutrality by 2050



Africa's Energy Landscape & Opportunities

Current Challenges

- South Africa: 80% coal-based energy mix
- Power shortage exceeding 6GW capacity
- Aging grid infrastructure limiting growth

Solar Potential

- 66GW photovoltaic potential identified
- 80% projected market share by 2030
- Industrial & mining PPAs rapidly expanding



Global PV Market Overview

2025

China Growth

+223GWac installed capacity
(Jan–Jul 2025)

Leading global manufacturing
and deployment

EU Manufacturing

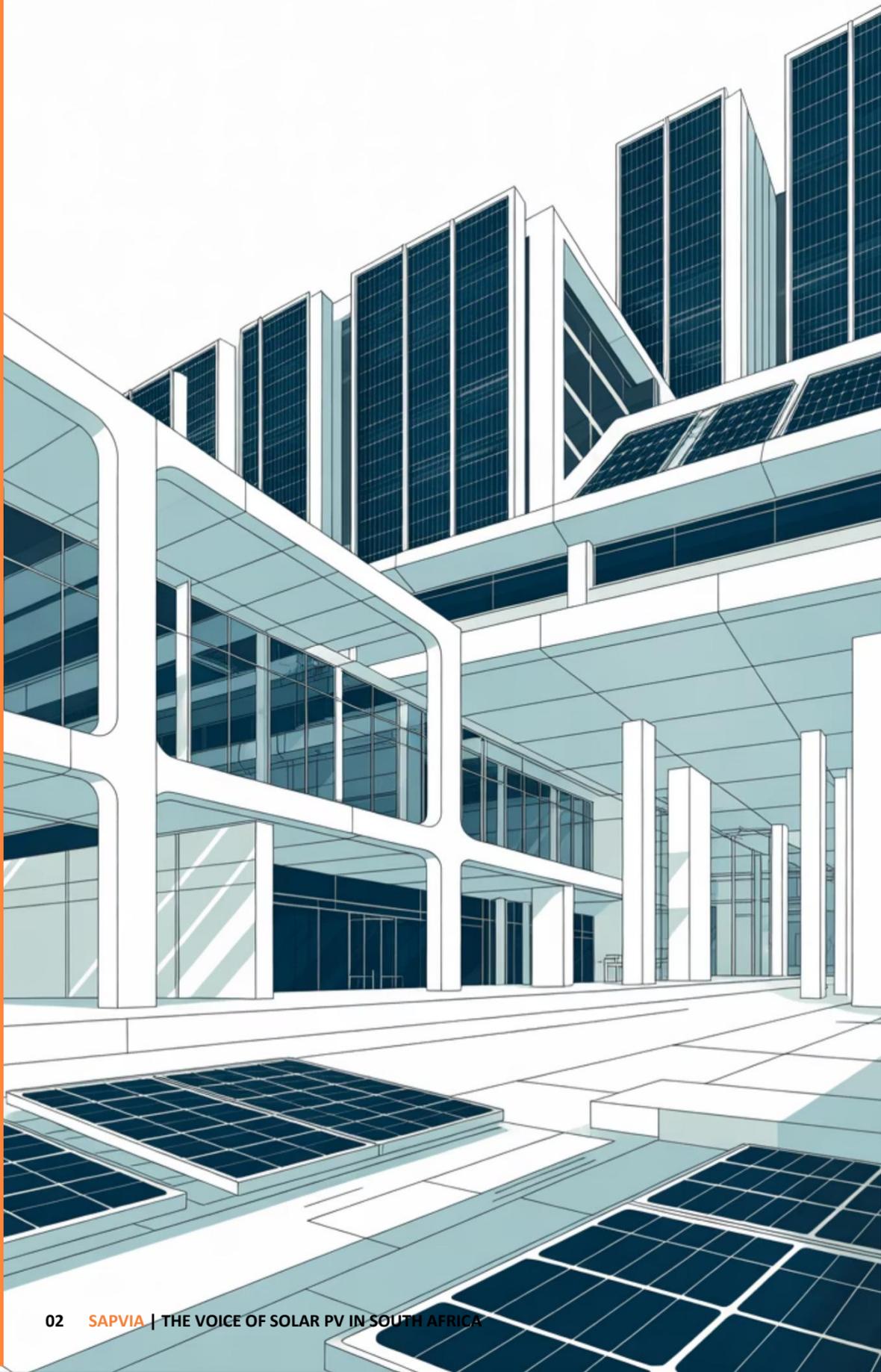
NZIA policy driving local
production

Strengthening European supply
chain resilience

Market Stabilization

Supply chain equilibrium post-consolidation

Improved pricing predictability for developers



LONGi's Global Leadership & Bankability

1

BNEF Tier 1 Ranking

#1 position maintained for 7 consecutive years

Recognized as most bankable module manufacturer globally

2

AAA Bankability

PV Tech AAA rating for financial strength

Strong cash flow, minimal debt exposure, investor confidence

3

R&D Investment

¥25 billion invested (2021–2025H1)

Continuous innovation driving efficiency breakthroughs

Technology Evolution in PV Modules



P-Type Era

Traditional technology, 20 - 22% efficiency baseline



TOPCon Advancement

Tunnel oxide passivated contact, 23 - 24% efficiency



BC Innovation

Back contact design, front-grid-free architecture



Hi-MO9 Excellence

Industry-leading >25.0% efficiency achieved



Innovation Driven by R&D Excellence

R&D Infrastructure

- 13 research centers worldwide
- 2,000+ patents filed and granted
- Focus areas: Efficiency, Reliability, LCOE optimization

Continuous lab-to-mass-production acceleration ensures competitive advantage

The Only Lighthouse Factory in PV Industry

World's Most advanced Factory | Highest Level in Manufacturing
LONGi lighthouse factory

43%
Reduced yield loss

12s
Average time for one product
offline

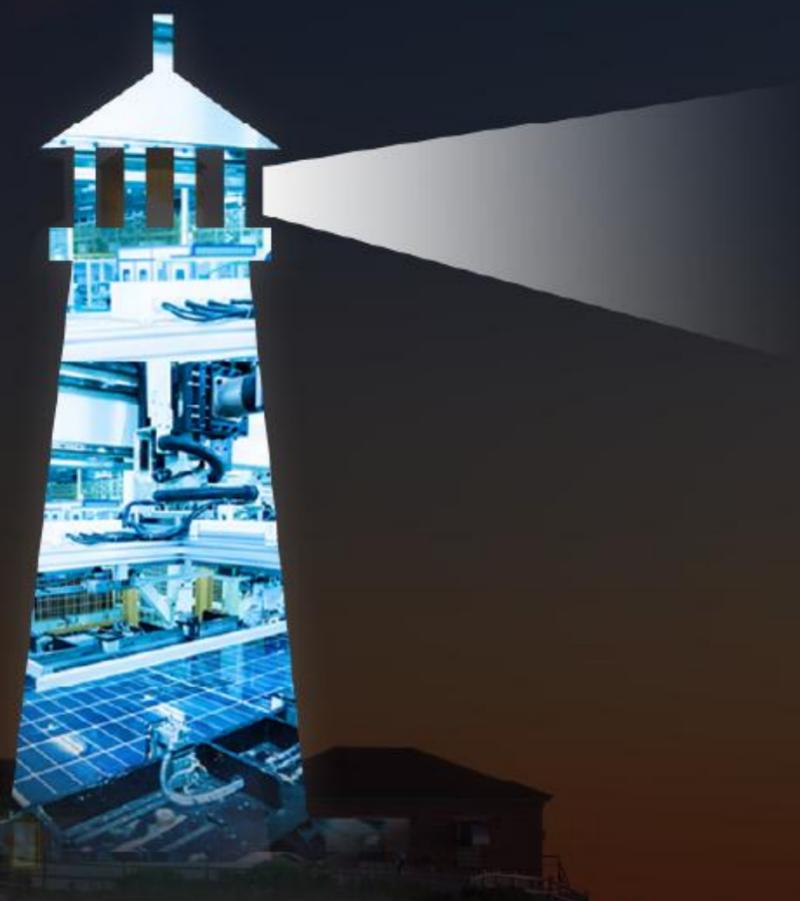
20%
Reduced energy consumption
per unit

Flexible Automation Production
Automation rate for the whole line

Full-process AI Quality Inspection
Industry's first full-process AI quality
inspection

Cell Intelligent Allocation
AI Intelligent Production System
Program

Overall Delivery
84% reduction in production
delivery period



Global

World Economic Forum launches, Global selection Digital
Manufacturing Industry 4.0



China

World's most advanced factory
Highest level in manufacturing and digitalization

Implementation Challenge #1

Harsh Environmental Conditions

Desert & Dust

Extreme temperatures, sandstorms, and dust accumulation

Specialized coatings and anti-soiling treatments required

Structural Resilience

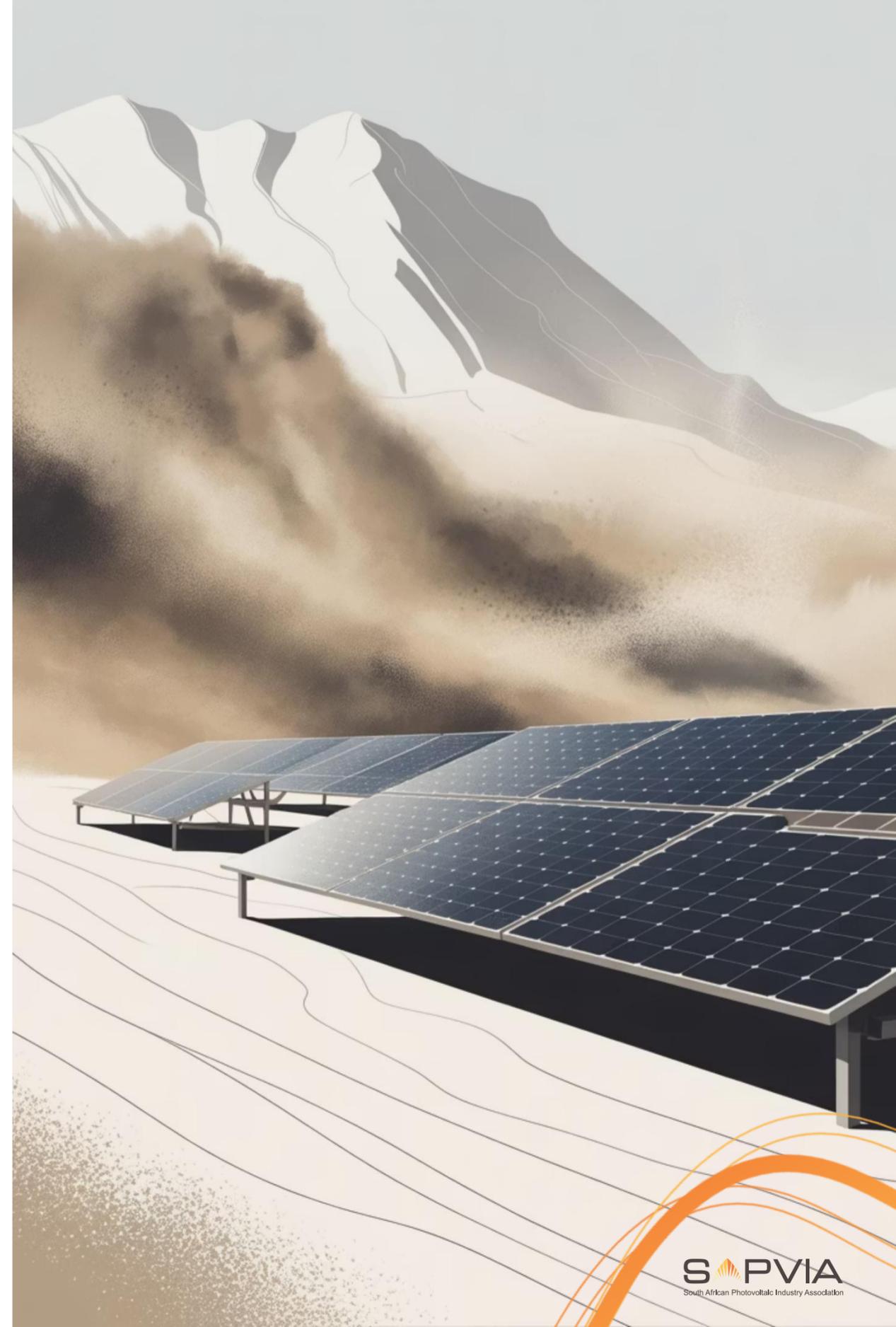
G550 steel structures engineered for high wind loads

Enhanced durability for coastal salt-mist environments

Smart Cleaning Systems

Automated cleaning robots deployed on-site

Performance ratio improved by 35% through optimization



Implementation Challenge #2

Grid & Balance of System Constraints

Grid Limitations

Eskom grid capacity constraints require strategic interconnection planning

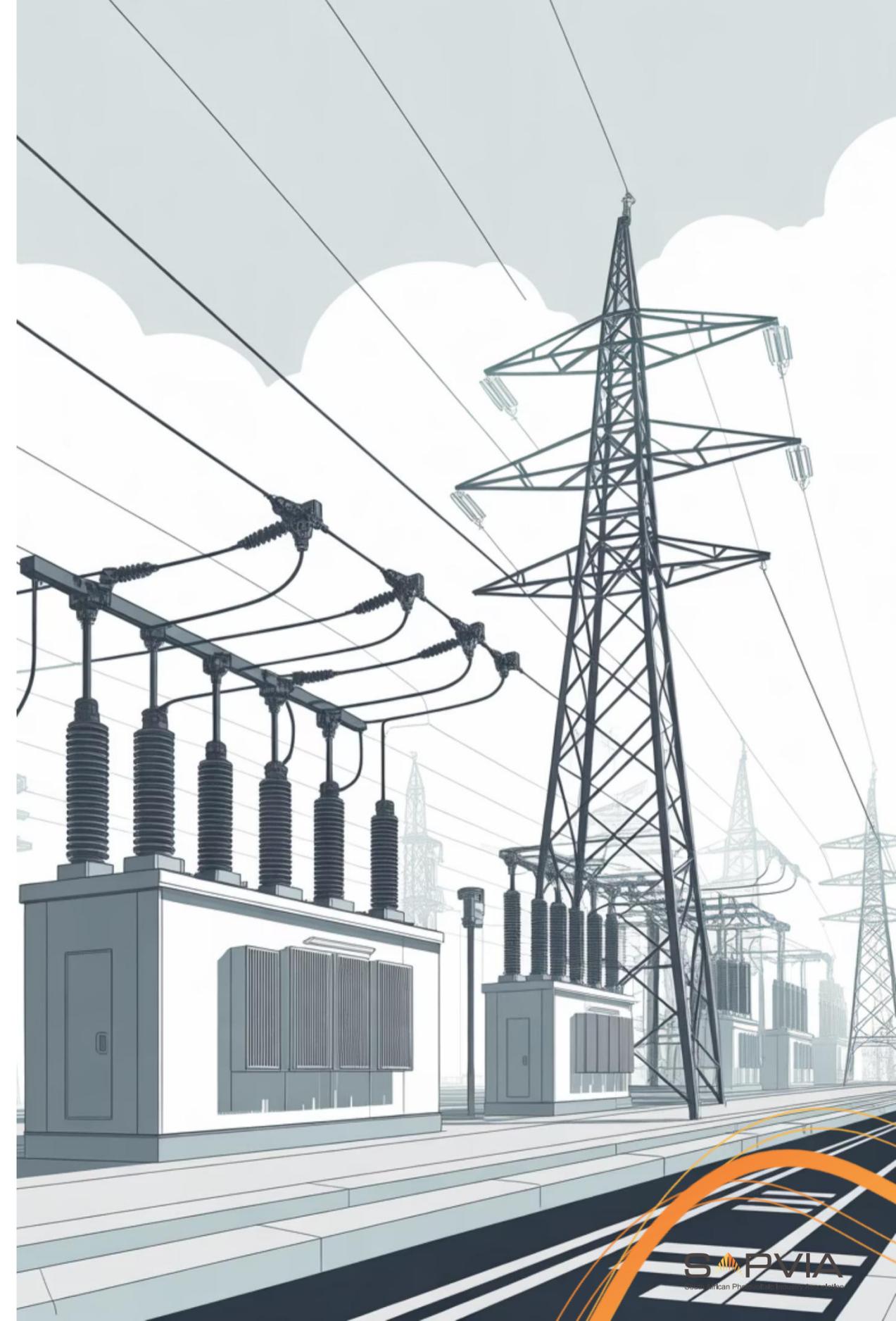
Queue management and upgrade coordination essential

BOS Cost Savings

Higher efficiency modules reduce BOS costs by 0.8 - 1.5¢/W

LONGi Premium Calculator quantifies project-specific savings

Fewer modules = reduced racking, wiring, and land requirements



Challenge #3 — Oversized Modules vs System Optimization

Industry trend pushes module size beyond practical limits—compromising system performance for headline wattage



The Size Race

TOPCon modules exceed 700 W at 2382 × 1303 mm

No efficiency gain - just larger surface area



Real-World Impacts

- Heavier handling, higher breakage
- Tracker stress beyond IEC limits
- Increased BOS costs



LONGi's Approach

2382 × 1134 mm standard format

Optimized for output, mechanical reliability, logistics efficiency

- ☐ **System LCOE - not module power - defines true value.** LONGi chooses scientific standardization over blind size expansion, ensuring system safety and cost optimization.

Implementation Challenge #4

Financing & Warranty Requirements

1 — Bank Due Diligence

Focus on degradation rates and warranty reliability for project financing

2 — 30-Year Warranty

≤1% degradation year 1, ≤0.35% annually thereafter

3 — Extended Coverage

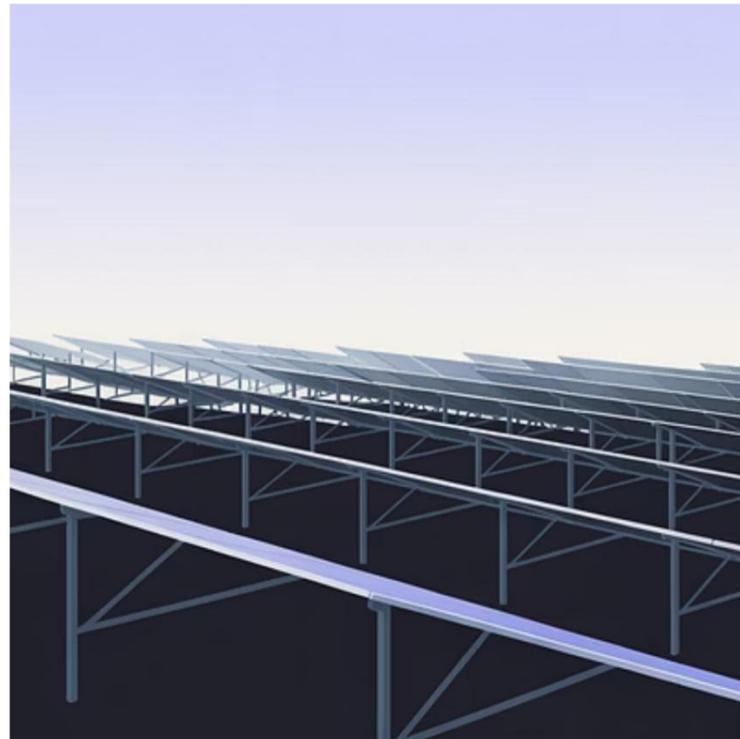
IPH case: Delivery +6 months warranty commencement option

4 — Bankability Confidence

Reduced financing costs through proven performance track record

Scenario-Based System Design Excellence

One Module, Multiple Scenarios



Flat Terrain

Dense array configurations with single-axis trackers
Optimized for maximum land utilization

Mountain Topography

Adaptive tilt angles following terrain contours
Reduced earthwork and environmental impact

Floating Systems

Anti-corrosion materials and coatings
Simplified O&M access design



Digital & Smart O&M Solutions



GSE Platform

Real-time monitoring and advanced data visualization

Centralized control across multiple project sites



Predictive Maintenance

AI-driven anomaly detection and failure prediction

Reduced downtime through proactive interventions

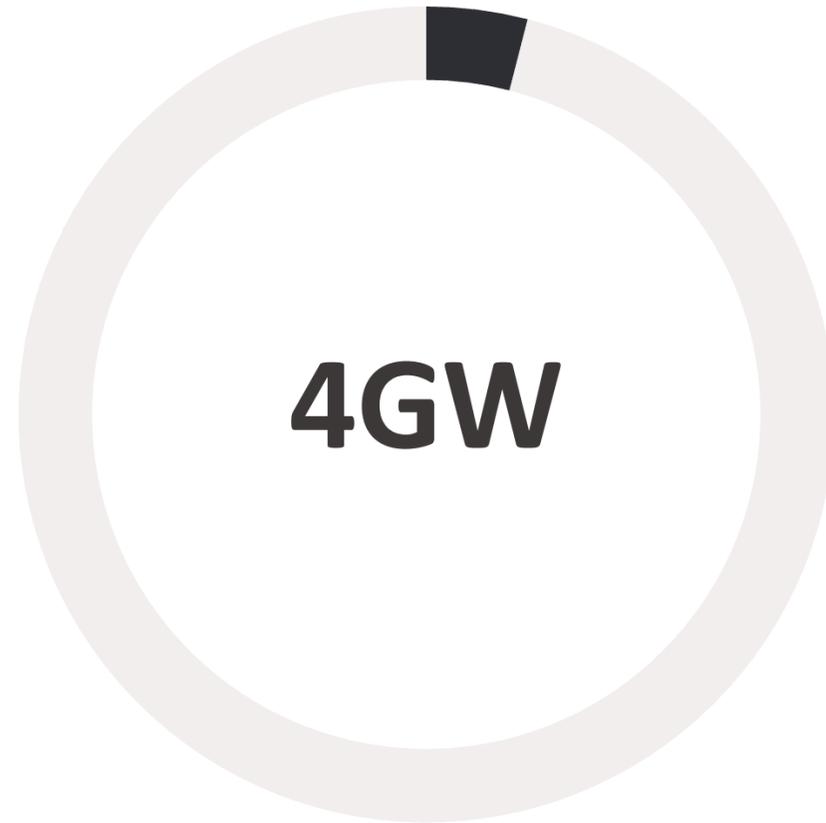


Huawei Integration

Seamless connection with FusionSolar ecosystem

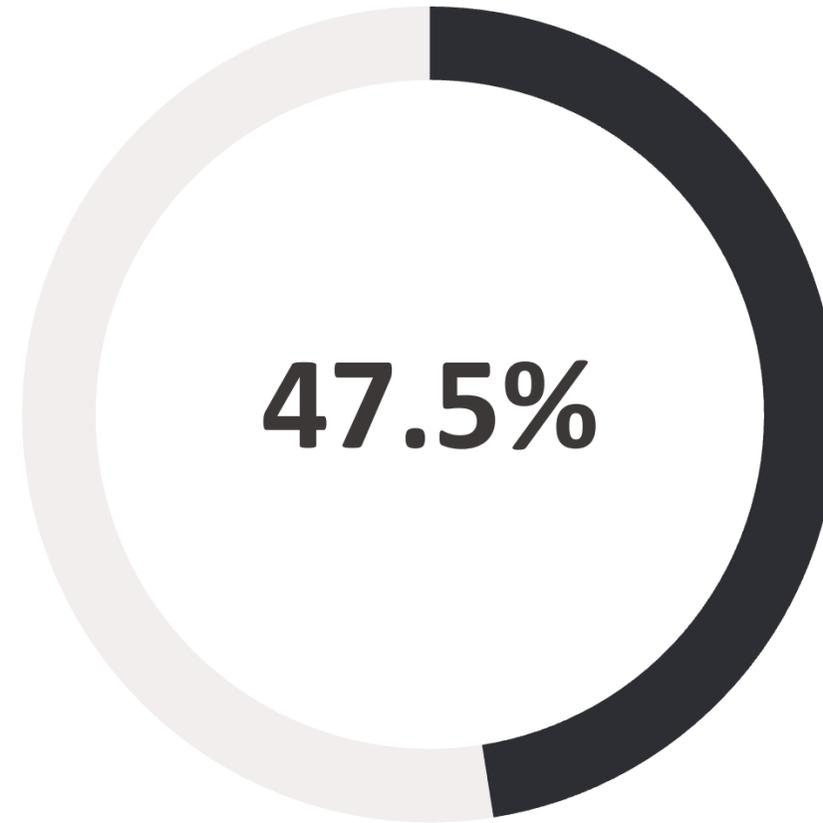
Optimized dispatch and grid interaction management

South Africa Market Landscape



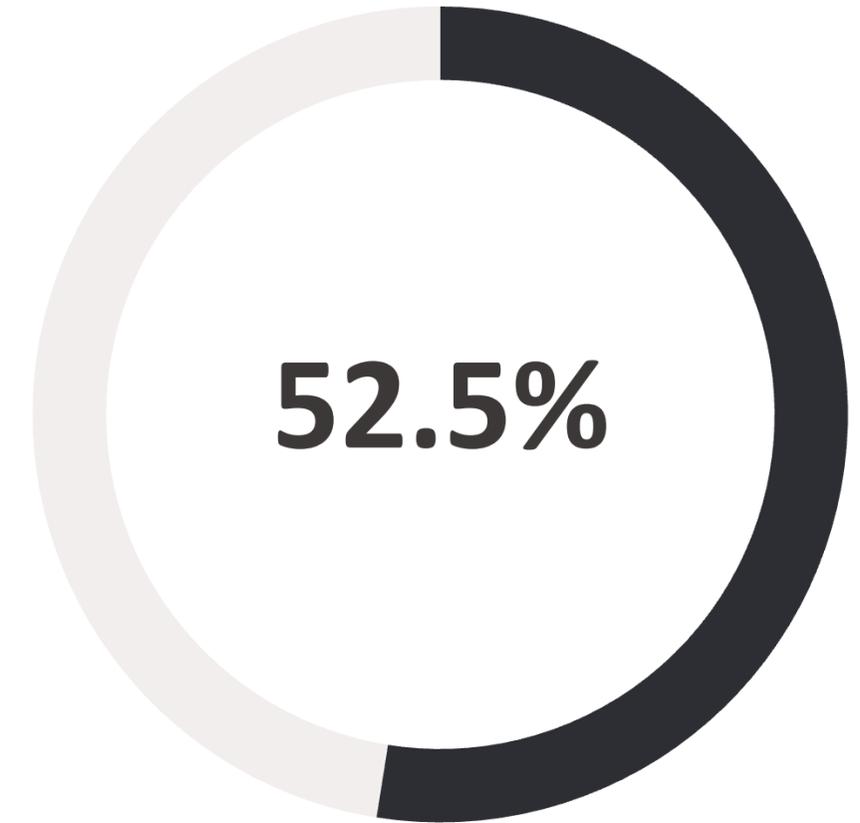
Pipeline 2024 - 26

Strong project development momentum across all segments



Private PPA

Commercial and industrial direct procurement growing rapidly



REIPPPP

Government-led procurement program continuing expansion

Mining and industrial sectors leading demand for renewable energy solutions



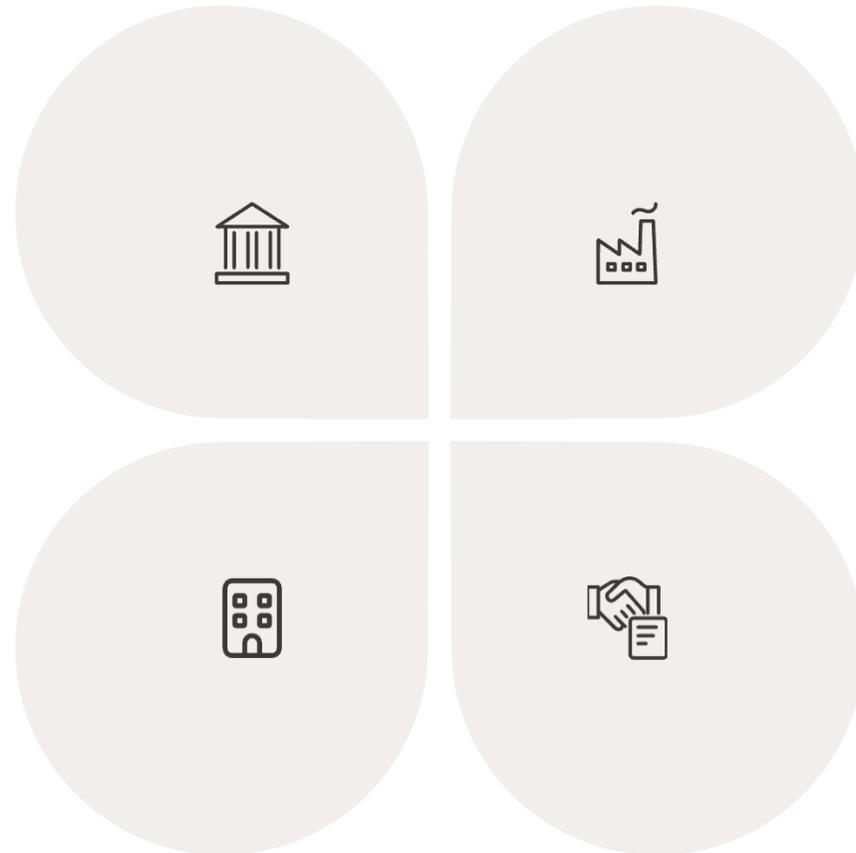
Eskom & IPP Project Ecosystem

REIPPPP

Renewable Energy Independent Power Producer Procurement - the national long-term renewable program supporting energy transition.

Key Developers

Privately financed projects with bilateral agreements between generators, renewable energy traders and corporate off-takers.



RMIPPPP

Risk Mitigation IPP Program - emergency procurement initiative to stabilize the grid and ensure dispatchable capacity.

Private IPP

A broad ecosystem including developers, EPCs, financiers, and utilities collaborating across different program types.

LONGi Hi-MO9 modules featured in BW7 competitive bids

Localization & BEE Strategy



Local Impact Initiatives

- Support for Atlantis local manufacturing zone development
- MOU with CSIR for standards alignment and technical collaboration
- BEE training programs and local employment opportunities

Building sustainable capacity and skills transfer in South Africa

PV + Green Hydrogen Outlook

01

COP29 Commitment

Hydrogen Declaration accelerating global transition

02

2050 Vision

Green H₂ = 14% of final energy demand (IRENA projection)

03

LONGi ALK Technology

Alkaline electrolysis: stable, scalable, low-cost hydrogen production

04

Integrated Strategy

"PV leads, H₂ follows" approach for comprehensive decarbonization

Case Study: Desert PV & Ecological Restoration

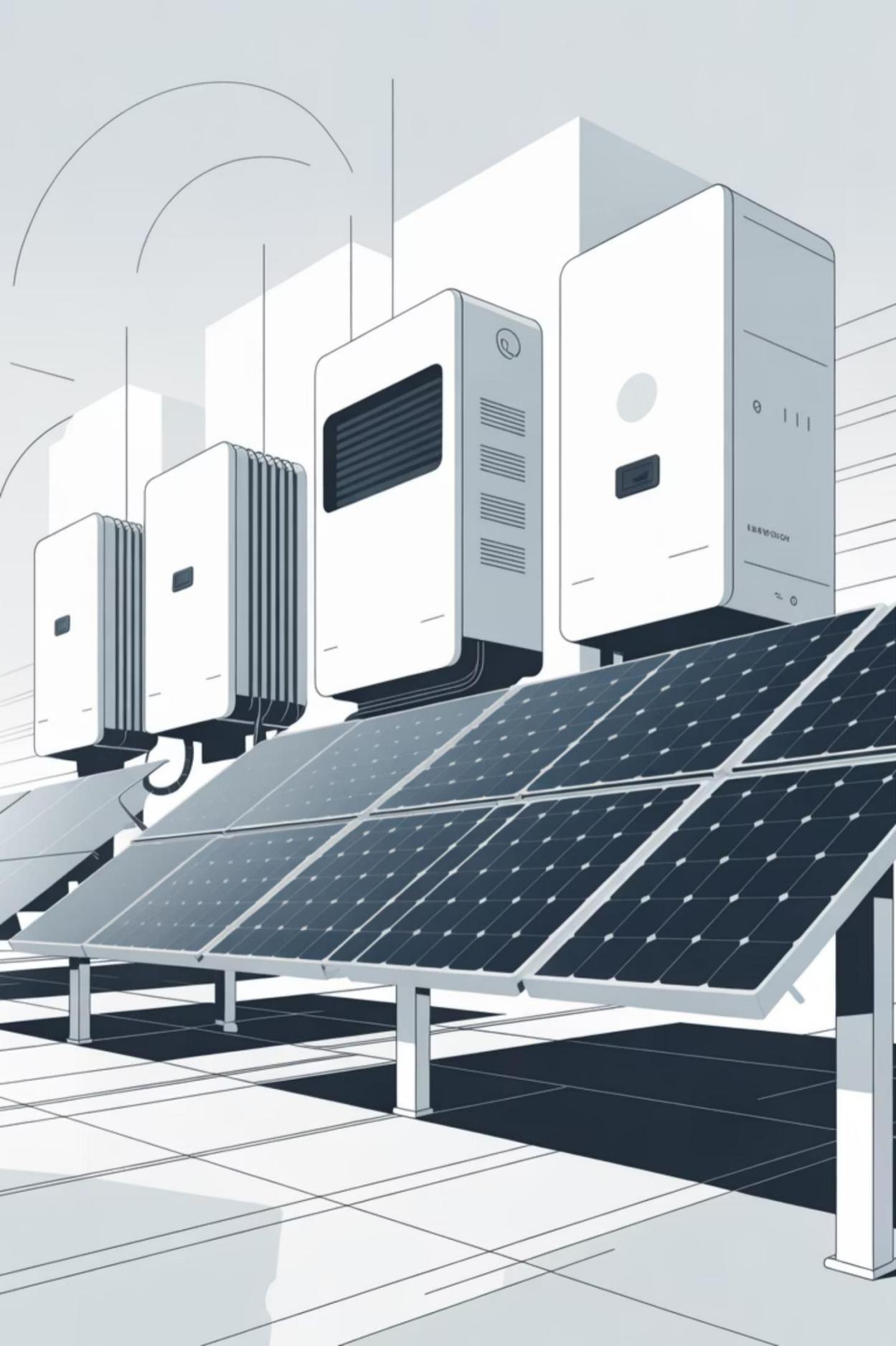
Ningxia Project – Solar for Sustainability



Environmental Benefits

- Photovoltaic installation combined with sand control measures
- Vegetation recovery and ecosystem regeneration
- Biodiversity gain through microclimate improvement
- Carbon sequestration beyond renewable energy generation

Demonstrating that solar development can enhance rather than harm natural environments



LONGi × Huawei Synergy

Integrated Smart Solar Solutions

High-Efficiency Modules

LONGi Hi-MO9 BC technology delivering maximum power output

Smart Inverters

Huawei advanced grid-forming capabilities and monitoring

Energy Storage

Battery integration for grid stability and peak shaving

5-8%

LCOE Reduction

System-level optimization delivering lower cost of energy

>99%

System Uptime

Exceptional reliability through intelligent monitoring and control

Co-building Africa's smart solar ecosystem for sustainable energy future

Key Takeaways

1

Innovation Leadership

Back contact technology achieving industry-leading >25.0% efficiency

Continuous R&D investment driving next-generation solutions

2

Implementation Excellence

Scenario-based adaptation for diverse environmental conditions

Proven solutions for harsh climates, grid constraints, and financing requirements

3

Strategic Partnership

Localization commitment supporting South African manufacturing ecosystem

Green hydrogen synergy creating comprehensive decarbonization pathway

Innovation & Implementation – Empowering Africa's Solar Future



Q & A



Thank You



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