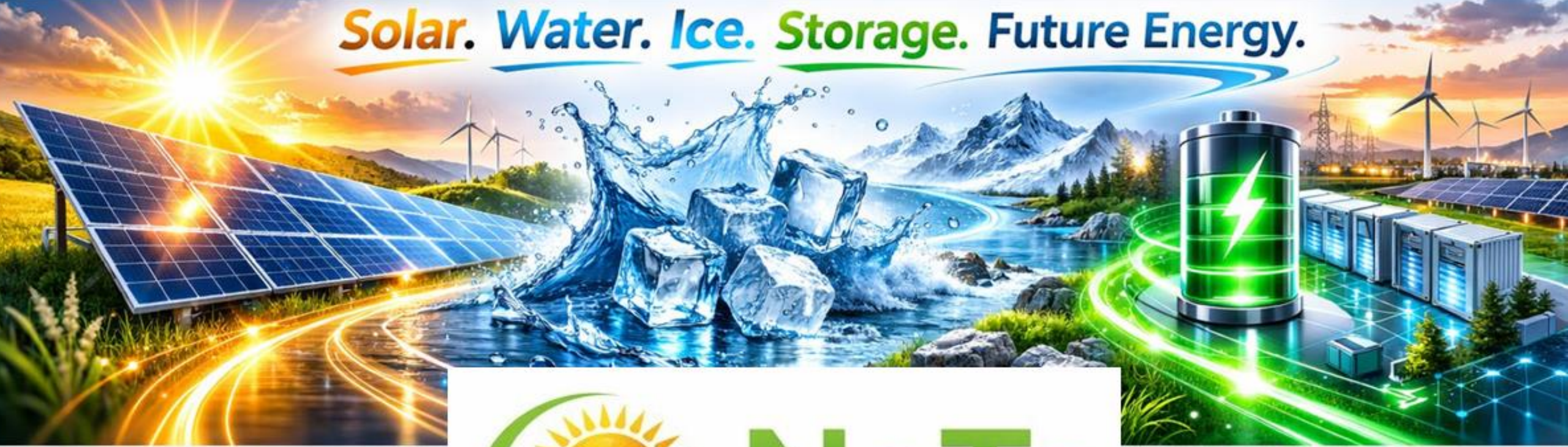


Solar. Water. Ice. Storage. Future Energy.



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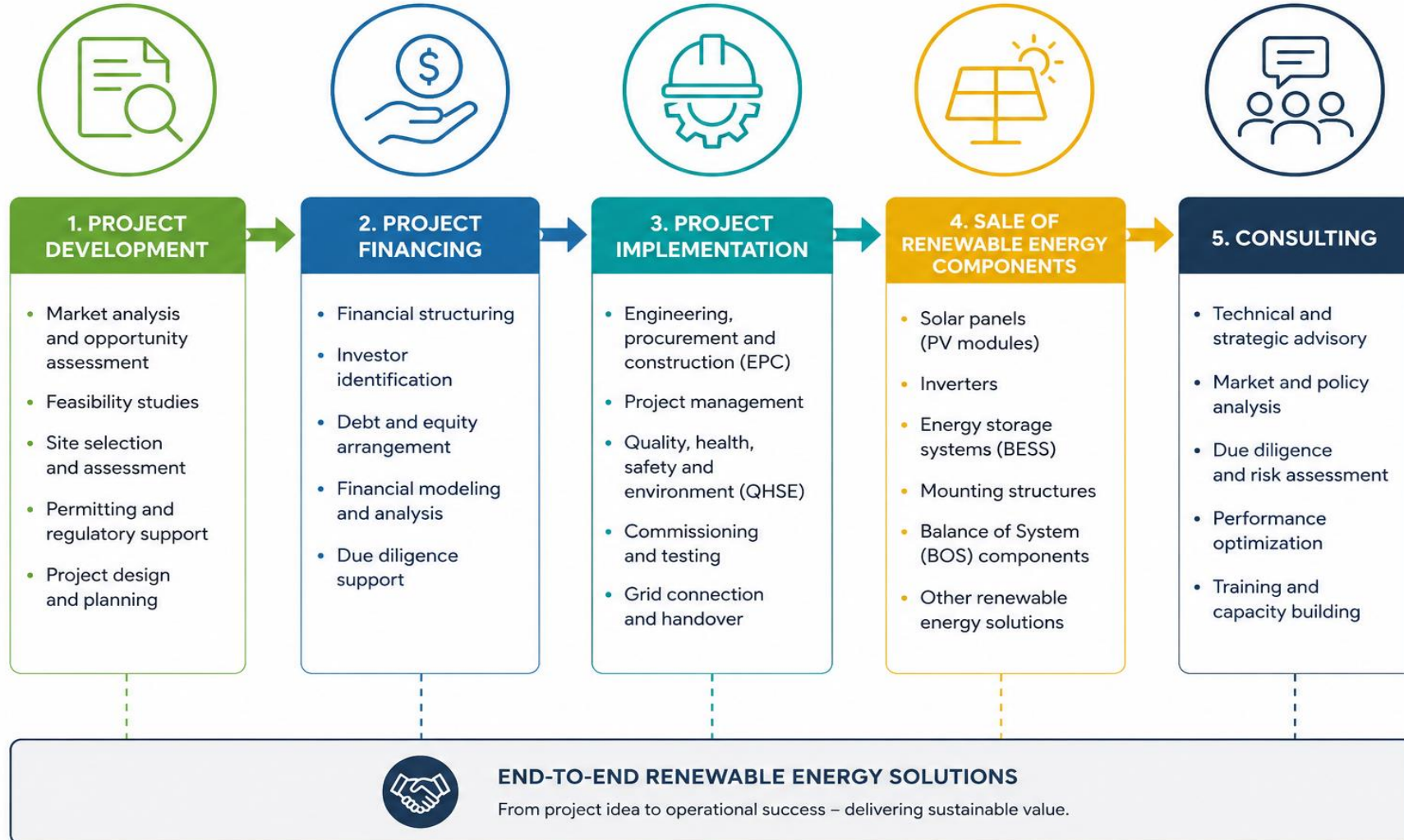
**Your Partner in Renewable Transformation and
Future Energy Innovation**

Who We Are

NoTa Renewable Energy Norbert Taphorn



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**30 years' experience
in renewable energy,
starting in 1996 at
SMA (German solar
inverter brand)**



ASIA CLEAN ENERGY FORUM 2026

Beyond Transition: Building Secure, Resilient, Inclusive, and Intelligent Energy Systems

8-11 June | ADB Headquarters, Metro Manila, Philippines



Ai-powered solar diagnostics - maximising
asset performance, protecting inverters and
strengthening cyber resilience
At scale

AI-Powered Solar Diagnostics

SOLAR FARMS



- Drone Thermography
- Advanced Imaging (AI-powered software that captures EL images on daylight hours)
- SCADA and AI-aided Data Analytics
- Smart Trackers with Environment Diagnostics

Global ROI Impact

- **70%** reduction in total equipment breakdowns
- **25% lower O&M**
- **up to 25%** increase in energy productivity

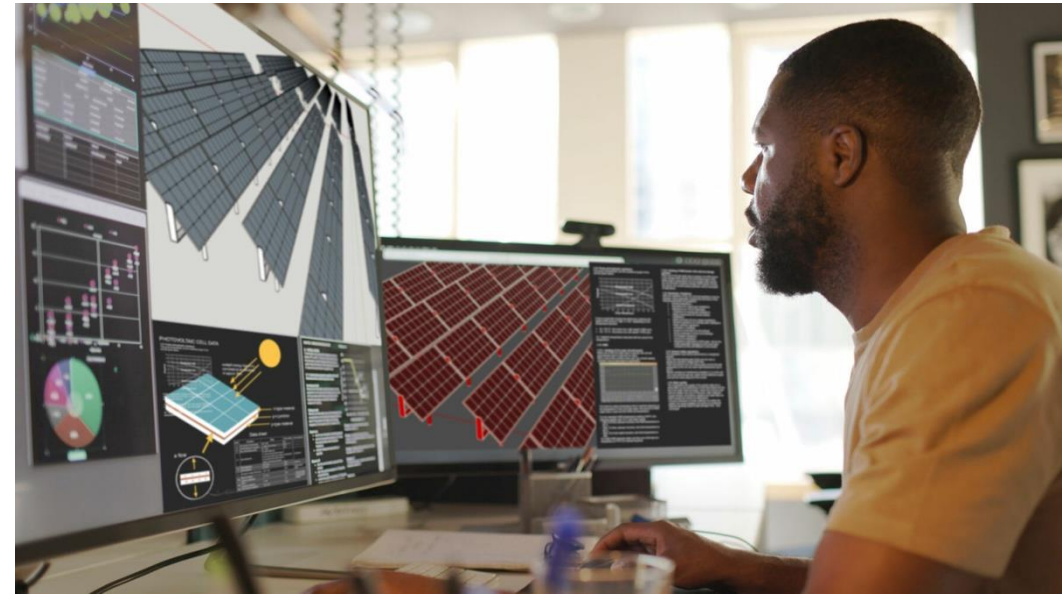
AI-Powered Solar Diagnostics

ROOFTOP SOLAR

- ❑ AI-Driven rooftop design and shading/obstruction diagnostics
- ❑ Module-level diagnostics and Optimization (soling alert, single panel failure, inverter faults)
- ❑ Handheld/mini- drone thermal scanning for larger areas

Impact

- Optimized design and rooftop layout- better ROI
- Real-time plant performance monitoring against standard parameters
- Module level problem detection and intervention
- Reduced risk of on-roof accidents



Protecting Inverters Through AI



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Common failure risks

- Thermal stress
- Component degradation
- Grid disturbances
- Firmware issues
- Communication failures

AI diagnostic capabilities

- Predict failures before they occur
- Detect abnormal operating patterns
- Monitor fleet-wide inverter performance
- Prioritise maintenance by risk

Example

Without AI Failure → Downtime → Revenue Loss

With AI Early Warning → Planned Intervention → Continuous Operation

How AI Improves Solar Performance



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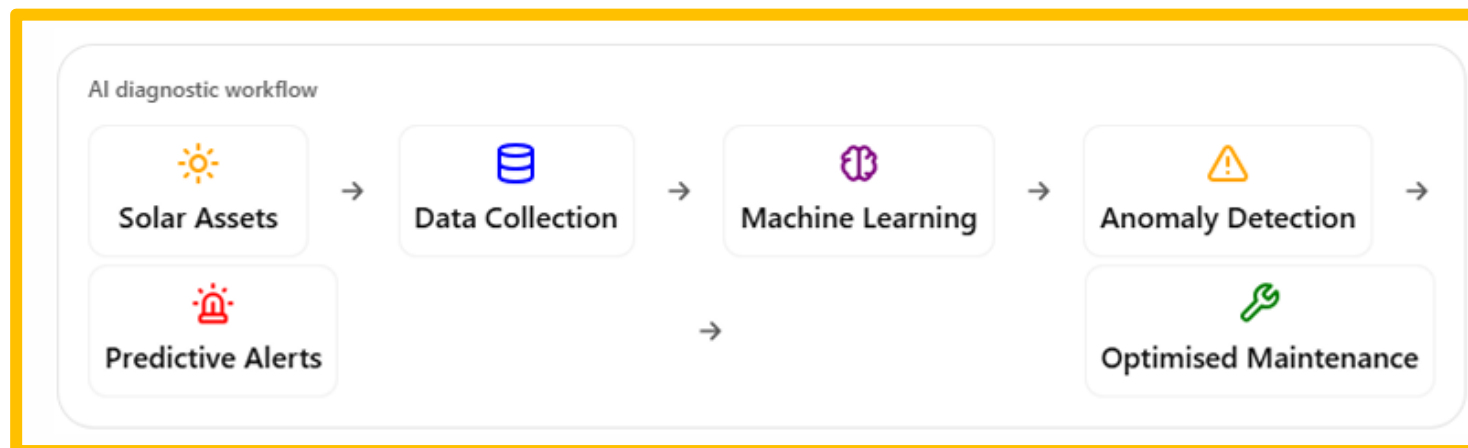
From Reactive Maintenance to Predictive Operations

Traditional approach

- Faults detected after losses occur
- Manual inspections
- Reactive maintenance
- Higher operational costs

AI-powered approach

- Continuous monitoring and anomaly detection
- Automated analytics
- Predictive maintenance
- Optimized maintenance scheduling
- Continuous Cyber security monitoring



AI-Powered Solar Diagnostics

As an Asset Management Platform



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ASSET PROTECTION

Real-time performance monitoring
Predictive fault detection
Automated maintenance prioritization
Inverter health/degradation detection
Continuous cybersecurity monitoring

ASSET OPTIMIZATION

Higher energy yield thru design
Improved production through
continuous optimization
Faster issue detection and **RAPID
RESPONSE** (reduced downtime)

AI combines operational analytics and
cybersecurity monitoring into a
**UNIFIED ASSET MANAGEMENT
PLATFORM**

The Next Step...

**SOLAR and BATTERY
ENERGY STORAGE
SYSTEMS (BESS)**



AI in Solar Farms With BESS

- Thermal Runaway Mitigation & Safety Diagnostics (monitor temp, voltage, current & gas emissions)
- Predictive Anomaly Detection
- Battery State of Health Predictive Modeling
- AI Arbitrage (energy market trading)**

AI focuses on **GRID BALANCING, ASSET LONGEVITY, SAFETY & PROFIT OPTIMIZATION**



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AI in Rooftop Solar With BESS



- ❑ Predictive Facility Energy Management (Behavioral diagnostics & weather machine Learning)
- ❑ System Health Monitoring thru Apps (degradation & warranty alerts)
- ❑ **Virtual Power Plants & Aggregation**

AI focuses on **ENERGY MANAGEMENT, SAFETY**

WITH POTENTIAL TO SUPPORT LOCAL GRID STABILIZATION



AI Integration on Systems with BESS



AI Diagnostic Target	Utility-Scale BESS	Rooftop-Scale BESS
Primary Safety Focus	Preventing thermal runaway across thousands of cells, identify “bad” cells	Ensuring safe indoor/small outdoor operations Emergency back-up function
Financial Driver	Wholesale grid arbitrage	Cutting utility use/ energy cost management
Grid Interaction	Acts as major power plant capable of stabilizing the regional grid	Linking residential & C&I facilities to form a virtual power plant to support the local grid

Cyber Resilience & Compliance

Securing Solar Infrastructure at Scale



As solar fleets become **increasingly connected**, **CYBERSECURITY** becomes an integrated part of **ASSET MANAGEMENT** rather than a separate function.

Policy & Security Trend The EU is moving towards stricter cybersecurity requirements and funding restrictions for Chinese-made solar inverters, reflecting growing concerns over supply chain security, remote access risks, and critical infrastructure protection.

AI-based cyber monitoring

- Firmware integrity verification
- Anomalous communication detection
- Unauthorized configuration change alerts

Key standards

- [IEC 62443](#)
- [IEEE 1547](#)
- [National Institute of Standards and Technology](#)

Outlook

Delivering Operational and Cyber Value



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Operational performance

Reduced downtime

Higher energy production

Longer equipment life

Lower O&M costs

Cyber resilience

Faster threat detection

Improved firmware control

Continuous compliance monitoring

Reduced cyber risk exposure

✦ The future

Self-diagnosing solar plants

Predictive maintenance at fleet scale

Cyber-resilient inverter ecosystem

"The next generation of solar asset management will not simply monitor assets — it will PREDICT, PROTECT and continuously OPTIMIZE them."

NoTa Renewable Energy – Consulting the Future of Energy



- From solar to storage, from water to future energy systems—NoTa Renewable Energy connects today's needs with tomorrow's solutions
- Our mission is simple: to make future energy solutions practical, scalable, and profitable for our clients



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