



AMI & Energy IoT Solutions for Municipalities & Utilities

Presented by Joule Energy — Exclusive South African Partner of
NuriFlex

"Powering Revenue. Protecting Infrastructure. Enabling the Future."

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Joule Energy — End-to-End Utility Management, Locally Delivered

- Joule Energy is a South African Energy Services Company (ESCO) specialising in smart metering, infrastructure services, and utility revenue management for municipalities and utilities across Southern Africa.
- **Proprietary Partnership:** Joule Energy holds a proprietary relationship with NuriFlex Co., Ltd. (South Korea) as the authorised delivery partner for NuriFlex's full suite of AMI and Energy IoT solutions in South Africa and the broader African region.
- This exclusive arrangement enables Joule Energy to deliver **end-to-end utility management** — from smart meter supply, installation and commissioning, through to revenue management systems, energy loss detection, and infrastructure maintenance.
- **What this means for municipalities:** A single, accountable local partner backed by world-class Korean technology, with full after-sales support, local assembly capability, and deep understanding of the South African regulatory and municipal environment.



***"Joule Energy + NuriFlex =
World-class smart metering
technology, delivered and
supported locally."***

NuriFlex — World-Class Leader in AMI & Energy IoT

1992

FOUNDED

KOSDAQ

LISTED 2000

\$98.6M

REVENUE (2023)

22

COUNTRIES

6.2M+

UNITS DEPLOYED

65+

PATENTS

 **Global Presence:** Headquartered in Seoul, South Korea, with overseas offices in USA, Canada, Norway, Vietnam, Ethiopia, Ghana, Papua New Guinea, and more.

 **Market Dominance:** The dominant domestic AMI provider in South Korea, holding over 90% market share in both MV and LV segments — a position earned through KEPCO (Korea Electric Power Corporation), the national utility.

 **End-to-End Solutions:** Supplies hardware and software including smart meters, data concentrators, head-end systems (HES), meter data management systems (MDMS), energy loss management (ELMS), transformer monitoring (TMS), energy management (xEMS), and virtual power plant (VPP) platforms.

 **Group Subsidiaries:** Includes Nuri Voice (VoIP), Nuri Vista (Nano Technology), Nuri Bill (EBDD), Nuri Next Energy (Energy Platform)



Recognition & Awards

-  \$30M Export Award (2018)
-  World Class 300 Company (2018)
-  \$20M Export Award (2016)
-  \$10M Export Award (2008)

Three Decades of Innovation — A Proven Global Track Record

1992

NuriFlex (then Nuri Telecom) founded in Seoul, South Korea

2015

SORIA Norway AMI project: orders from 29 power companies; \$20M Export Award

2019

Inducted into the **Venture \$100 Million Club**

2023

Microgrid contracts awarded for

2000

Listed on **KOSDAQ** (South Korean Stock Exchange)

2017

Naju Manufacturing Center completed for high-volume production

2021

Company renamed NuriFlex; **1.5M+ unit residential smart electricity platform** (South Korea)

2024

New CEO Mr. Jeonghoon Han

2008

\$10 Million Export Award; **first nationwide AMI project** in the world (KEPCO)

2018

\$30M Export Award; **World Class 300 Company** designation; KEPCO Energy Valley Star Company

2022

Medi Hub established; Green New Deal **House Power Platform** participation

A Complete Suite of Smart Energy Solutions — From Meter to Management

AMI AND ENERGY IOT SOLUTIONS

AMI | TMS | ELMS | xEMS | VPP | MICROGRID | SMART CITY



AMI

Advanced Metering Infrastructure: Smart electricity & water metering, remote reading, prepayment, cloud data management.



TMS

Transformer Monitoring System: Real-time voltage, current, load & temperature monitoring to prevent failures.



ELMS

Energy Loss Management System: AI-powered detection of technical and non-technical losses (power theft, tampering).



xEMS

Energy Management System: Centralised monitoring and control of energy consumption across all facility types.



VPP

Virtual Power Plant & Microgrid: Integration of distributed energy resources — solar, ESS, wind, hydro.



Smart City / Industry IoT

Connected infrastructure solutions for urban and industrial environments, enabling intelligent operations.

AMI — The Foundation of Revenue Protection & Utility Modernisation

NuriFlex's AMI solution is the most widely deployed in South Korea, with over 90% domestic market share and more than 6.2 million units produced across 22 countries.

Core Capabilities

- ✓ Remote meter reading for electricity, water, and gas
- ✓ Real-time consumption monitoring and cloud-based data management
- ✓ Advanced prepayment functionality
- ✓ Seamless integration with existing billing, CIS, and SCADA systems

Security & Communication

- ✓ **Comms:** Supports RF Mesh, PLC, ZigBee, 6LoWPAN, M-Bus, 2G/3G/4G LTE, Wi-SUN
- ✓ **Security:** AES-128/256 encryption, TLS/DTLS protocols

Revenue Protection

- ✓ Automatic detection of illegal connections and tampering
- ✓ Elimination of manual reading errors
- ✓ Significant reduction of non-payment and late payment
- ✓ Automated billing via Head End System (HES) and Meter Data Management System (MDMS)

Proven Deployments

- ✓ **KEPCO (South Korea):** 4.1M+ units
- ✓ **SORIA (Norway):** 911,029 units
- ✓ **ECG (Ghana):** 715,774 units

6.2 Million Units Deployed Across 22 Countries — Proven at Scale

Country	Client	Units	Year
South Korea	KEPCO	4,106,883+	2000–ongoing
Norway	SORIA (29 DSOs)	911,029+	2015–ongoing
Ghana	ECG	715,774	2013–ongoing
Sweden	Göteborg Energi	306,450	2007
Vietnam	EVNHCMC	95,300	2017
Ethiopia	EEU	50,000	2020–ongoing
Papua New Guinea	PPL	10,109	2024–ongoing



NuriFlex is the only AMI provider to have completed a nationwide AMI rollout — a distinction that sets it apart from all competitors globally

TMS — Prevent Failures Before They Happen, Reduce O&M Costs

The NuriFlex TMS is designed to reduce the operational and maintenance costs of transformers by preventing incorrect or unjustified replacements through continuous detection, measurement, analysis, and management of transformer load and temperature.

Real-Time Monitoring

Voltage, current, load, and transformer oil/winding temperature — all tracked continuously to prevent overloading and overheating.

Core Components

IR temperature sensor, Rogowski Coil, balancing meter, Transformer Monitoring Unit (TMU) with communication device.

Scalability

Supports monitoring of large numbers of transformers across wide geographic areas, with customisable dashboards and KPI visualisation.

Data Management

Integration with MDMS enables historical data storage, threshold alarms, event logging, predictive maintenance scheduling, and lifecycle management.

Benefits for Municipalities

- ✓ Reduced unplanned outages
- ✓ Extended transformer lifespan
- ✓ Lower O&M costs
- ✓ Improved grid reliability

ELMS — AI-Powered Revenue Recovery from Power Theft & Technical Losses



Electricity theft costs utilities globally an estimated **\$89.3 billion annually**. South Africa's municipalities face significant non-technical losses (NTL) that directly erode revenue and infrastructure capacity.

Comprehensive Loss Detection

NuriFlex's ELMS combines AMI hardware with deep-learning AI software to detect both:

- ✓ **Technical Losses (TL):** Line faults and equipment inefficiencies.
- ✓ **Non-Technical Losses (NTL):** Power theft, meter tampering, and illegal connections.

Proven Accuracy

- ✓ **99.98% detection accuracy** achieved in extensive field tests.
- ✓ Reference deployment in Ghana successfully detected

How It Works

- ✓ Pattern analysis and AI model training on metering data from smart meters and TMDs.
- ✓ Anomaly detection identifies distribution grid network irregularities using an IP-patented deep-learning methodology.

Advantages & Municipal Benefits

- ✓ **Beyond Conventional Methods:** Unlike CCTV or manual checks, ELMS is data-driven, reflects new theft patterns dynamically, and is highly cost-effective (cloud-based).
- ✓ **Direct Municipal Benefits:** Immediate revenue recovery, reduced system losses, automated alerts, and

xEMS — Centralised Intelligence for Energy Efficiency Across Every Facility

NuriFlex xEMS is a centralised, scalable energy management solution that integrates AMI hardware with advanced software to autonomously monitor, control, and optimise energy usage across the entire generation-supply-consumption chain.



**Energy Consumption
Monitoring**



**Energy Management
& Control**



**Energy Consumption
Analysis**



**Greenhouse Gas (GHG)
Emissions Management**

- **Applications:** Commercial buildings, industrial complexes, smart cities, government facilities — xEMS is deployed across Gyeongnam Daegu Metropolitan City (430 commercial facilities), Changwon Factory Smart Industrial Complex, and Banwol/Sihwa Smart Industrial Complex.
- **Scalable design:** xEMS can be scaled from a single building to an entire city grid, with a Total Operations Centre (TOC) providing centralised oversight.
- **DEMS extension:** The Distributed Energy Management System (DEMS) extends xEMS to manage all distributed energy resources — grid, solar, ESS, generators — under one unified platform, suitable for large-scale power users and

VPP & Microgrid — Enabling Energy Independence & Net-Zero Goals

NuriFlex's VPP platform integrates and manages distributed energy resources (DERs) — solar PV, battery energy storage (ESS), wind, hydropower, and EV charging — through a centralised software platform, enabling municipalities and utilities to optimise generation, trade surplus power, and pursue net-zero targets.

Total Solution: Generation to Consumption

- ✓ **Solar Operation:** Comprehensive management of solar PV assets
- ✓ **Separate AMI:** Dedicated metering for distributed generation
- ✓ **Energy Trade Policy:** Establishment of surplus power trading frameworks
- ✓ **Sustainability Guarantees:** Tracking and verification of green energy
- ✓ **Carbon Control:** Monitoring and reduction of GHG emissions

Proven References & Deployments

- 📍 **Busan Metropolitan City (South Korea):** Joint development agreement for metropolitan-level VPP
- 📍 **TOC Construction:** References with CJ, SK E&S, and Suncheon City
- 📍 **Microgrid Deployments (2023):** Mozambique and Morocco — renewable energy convergence systems combining solar PV, ESS, and grid management

46.3%

Global VPP Market CAGR — A high-growth opportunity for municipalities investing in energy independence.

Local Assembly, Local Jobs — The SKD Smart Meter Factory Opportunity

NuriFlex offers a **Semi-Knocked-Down (SKD) smart meter factory** investment opportunity, enabling local assembly of smart meters in South Africa — directly supporting industrial policy, job creation, and technology transfer objectives.

Economic Contribution

- ✓ Approximately **100 direct jobs** created
- ✓ Comprehensive skills transfer and training programme
- ✓ Foreign Direct Investment (FDI) facilitation
- ✓ Broader economic and community development

Joule Energy's Role

As NuriFlex's proprietary South African partner, **Joule Energy** is positioned to facilitate and manage this investment opportunity on behalf of municipalities and government stakeholders, ensuring seamless local execution.

Factory Capacity & Products

- ✓ **Capacity:** Up to 1,500 smart meters per day (30,000 per month)
- ✓ **Products:** Single-phase and three-phase smart meters

Production Processes

- ✓ Assembly and Testing
- ✓ Quality Control (QC) and Inspection
- ✓ Final Packaging

Investment & Reference

- ✓ **Investment:** Approximately R10 million (infrastructure)
- ✓ **Timeline:** 8–12 months establishment

• **Reference:** SKD Factory already operational in

Consistent Growth Backed by Global Demand for Smart Infrastructure

\$98.6M

2023 GLOBAL REVENUE

KOSDAQ

PUBLICLY LISTED SINCE 2000

65+

REGISTERED PATENTS

Growth Drivers & Market Expansion

- **Global Footprint:** Expanding presence across 22 countries, driven by increasing worldwide demand for AMI and revenue protection solutions.
- **Emerging Markets:** Strong focus on Africa and Southeast Asia, addressing critical needs for grid modernisation and non-technical loss reduction.
- **Solution Diversification:** Revenue growth supported by expansion into Microgrids, Virtual Power Plants (VPP), and Smart City IoT platforms.
- **Strategic Partnerships:** Leveraging proprietary relationships, such as with Joule Energy in South Africa

Intellectual Property & Innovation

- **Robust IP Portfolio:** Over 65 registered patents covering smart grid technologies, IoT communications, and energy management systems.
- **Proprietary AI:** In-house development of deep-learning algorithms for the Energy Loss Management System (ELMS) to detect complex power theft patterns.
- **Continuous R&D:** Sustained investment in research and development at the Seoul headquarters and Naju Manufacturing Center.
- **Next-Gen Tech:** Pioneering advancements in Distributed Energy Management Systems (DEMS) and

Trusted by Major Utilities Across 22 Countries — Over 50 International Clients

NuriFlex solutions are actively managing millions of endpoints globally, trusted by national utilities and private energy companies across diverse regulatory and environmental landscapes.

Asia & Pacific

- ✓ **South Korea:** KEPCO
- ✓ **Papua New Guinea:** PPL
- ✓ **Malaysia:** TNB
- ✓ **Fiji:** Viti Levu
- ✓ **Vietnam:** EVNHCMC
- ✓ **Thailand:** PEA
- ✓ **Philippines:** MERALCO
- ✓ **Cambodia:** EVN

Africa

- ✓ **Ghana:** ECG
- ✓ **Mozambique:** EDM
- ✓ **South Africa:** Joule Energy (Pretoria)
- ✓ **Ethiopia:** EEU
- ✓ **Morocco:** ONEE
- ✓ **Egypt:** ONEE Pilot

Europe

- ✓ **Norway:** SORIA (29 DSOs)
- ✓ **United Kingdom:** Various DSOs
- ✓ **Italy:** Pilot Projects
- ✓ **Sweden:** Göteborg Energi
- ✓ **Spain:** Regional Utilities
- ✓ **Germany:** Smart Grid Pilots

Americas & Middle East

- ✓ **Mexico:** CFE
- ✓ **Ecuador:** CNEL
- ✓ **Saudi Arabia:** SEC
- ✓ **Uruguay:** UTE
- ✓ **Iraq:** EEHC
- ✓ **UAE:** SEC Pilot

The Complete Solution — World-Class Technology, Local Accountability



End-to-End Capability

From smart meters and communication networks to MDMS, billing integration, and AI-driven loss management, we provide a **complete, unified ecosystem** rather than fragmented components.



Revenue Protection Focus

Our solutions are explicitly designed to solve municipal challenges: **eliminating non-technical losses**, preventing power theft, and ensuring accurate, automated billing and collection.



Proven Global Scale

Backed by NuriFlex's track record of **6.2 million units deployed across 22 countries**, including the world's first nationwide AMI rollout for KEPCO in South Korea.



Economic Investment

Commitment to local economic development through the proposed **SKD Smart Meter Factory**, driving job creation, skills transfer, and industrial capacity in South Africa.



Local Accountability

Through **Joule Energy**, municipalities gain a dedicated South African partner for project management, installation, maintenance, and ongoing support, ensuring long-term success.



Future-Proof Technology

Beyond basic metering, our platforms are ready for the energy transition, seamlessly integrating **VPP, Microgrids, and renewable energy resources** to support net-zero objectives.

Let's Build the Future of Utility Management Together

Partner with Joule Energy and NuriFlex to secure revenue, protect infrastructure, and empower your municipality.

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