

# DJIN EMS LLC



## ADM-0008-Whitepaper

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# 1. Executive Summary

The rapid expansion of distributed energy resources (DERs) is transforming how commercial and industrial facilities manage energy infrastructure. Solar generation, battery energy storage, EV charging, backup generation, and building systems are increasingly deployed together, often from different manufacturers using incompatible software platforms.

DJIN Energy Management Systems (DJIN EMS) addresses this challenge through GenieOS, a technology-agnostic Energy Management System designed to integrate and optimize complex distributed energy environments.

The DJIN EMS platform combines:

- real-time control of distributed energy assets
- vendor-agnostic integration across multiple equipment manufacturers
- AI-assisted diagnostics and operational intelligence
- local operational resilience independent of internet connectivity

By unifying monitoring, automation, and analytics into a single platform, DJIN EMS enables organizations to improve reliability, reduce energy costs, and simplify operations across modern energy infrastructure.

## 2. The Distributed Energy Management Challenge

Commercial and industrial facilities increasingly operate diverse energy systems including solar PV, battery storage, EV charging infrastructure, and backup generation. These systems are typically deployed using vendor-specific control platforms, resulting in fragmented operational environments.

This fragmentation creates several operational challenges:

- multiple monitoring systems with inconsistent data
- limited coordination between energy assets
- increased operational complexity
- reduced ability to optimize energy consumption

Traditional SCADA platforms provide monitoring and manual control but often lack the advanced automation and integration capabilities required for modern distributed energy environments.

DJIN EMS was designed specifically to address these challenges.

### 3. The DJIN EMS Platform Architecture

The DJIN EMS platform is built as a modular operational ecosystem composed of four integrated components:

- GenieOS — On-Premise Energy Management Platform  
Provides real-time monitoring, automation, and control of distributed energy assets.
- AI Engine — Local Operational Intelligence  
Supports anomaly detection, diagnostics, and optimization using AI-assisted analysis.
- Digital Twin — Validation and Simulation Environment  
Allows energy systems to be tested and validated before deployment using physics-based device models.
- DJIN Cloud Platform — Optional Fleet Analytics  
Provides multi-site monitoring, long-term data analysis, and portfolio-level operational insights.

This architecture allows organizations to maintain local operational control while enabling optional cloud-based analytics.

### 4. GenieOS Plant Controller

At the core of every deployment is the GenieOS Plant Controller, an on-premise platform responsible for coordinating distributed energy assets within the facility.

The GenieOS Plant Controller performs several critical functions:

- device communication and integration
- real-time monitoring of energy systems
- automation and dispatch logic
- safety and fault management

Because GenieOS operates locally within the facility network, the system continues operating even if external connectivity is unavailable.

### 5. AI-Assisted Operations

The DJIN EMS platform incorporates locally hosted AI capabilities designed to support operators with system monitoring and optimization.

These capabilities include:

- real-time anomaly detection
- root-cause analysis of system events

- natural language interaction with operational data
- automated optimization of distributed energy resources

Unlike cloud-dependent AI platforms, the DJIN EMS AI engine operates locally to ensure operational availability and data security.

## 6. Digital Twin Validation Environment

DJIN EMS includes a Digital Twin environment capable of emulating real energy equipment using physics-based device models.

This allows the GenieOS platform to interact with simulated devices exactly as it would with physical equipment.

The Digital Twin enables:

- validation of system configurations prior to deployment
- testing of automation logic
- operator training in a simulated environment
- validation of new device integrations

This capability reduces deployment risk and improves system reliability.

## 7. Real-Time Control Architecture

GenieOS uses a deterministic real-time control architecture designed for industrial energy systems.

Key performance characteristics include:

- 50 Hz deterministic control loop
- sub-microsecond system latency
- <50 ms emergency stop propagation

These capabilities allow DJIN EMS to respond rapidly to changing operational conditions and safety events.

## 8. Cybersecurity & Operational Security

DJIN EMS is designed using cybersecurity principles commonly applied to industrial control systems (ICS) and critical energy infrastructure.

The platform supports deployment within secure operational environments including:

- segmented IT/OT networks
- restricted facility networks
- air-gapped environments

Security controls within the platform include:

- role-based access control (RBAC)
- encrypted communications between system components
- audit logging and event tracking
- secure remote access configuration

The platform architecture follows cybersecurity practices aligned with widely recognized frameworks including:

- NERC Critical Infrastructure Protection (NERC CIP)
- ISO/IEC 27001 information security management principles

## 9. Technology Stack & System Architecture

The genieOS platform is built using a modern, high-performance technology stack designed specifically for industrial control applications.

The platform runs as a native system service with deterministic scheduling to support real-time control operations.

Industrial device communication is primarily implemented using Modbus TCP/RTU and other widely adopted energy system protocols.

## 10. Market Applications

DJIN EMS is designed to support a wide range of distributed energy deployments including:

- commercial and industrial facilities
- microgrids and campus energy systems
- energy storage installations
- EV charging infrastructure
- renewable energy sites

The platform's vendor-agnostic architecture allows organizations to integrate equipment from multiple manufacturers without proprietary platform restrictions.

## 11. Conclusion

The increasing complexity of distributed energy systems requires a new generation of operational platforms capable of integrating diverse technologies while maintaining reliability and security.

DJIN EMS delivers this capability through a technology-agnostic architecture that combines real-time control, AI-assisted diagnostics, and secure operational design.

By enabling organizations to unify monitoring, automation, and analytics across distributed energy resources, DJIN EMS provides a foundation for the next generation of intelligent energy infrastructure.

## Appendix A – Version History Log

Version	Date	Description	Author	Approval
1.0	8/1/2025	Initial release	J. Downey	N. Hughes
2.0	11/4/2025	Update Front Matter	J. Downey	N. Hughes
3.0	3/4/2026	Update to current architecture	J. Downey	N.Hughes