### ****Division 25 - Integrated Automation: Master Systems Integration (MSI)****

### ****Part 1 - General****

#### ****1.1 Summary****

This specification outlines the requirements for a **Master Systems Integration (MSI)** solution aimed at integrating **smart building IoT platforms**. The scope includes:

* Energy Management and Information Systems (EMIS)
* Fault Detection and Diagnostics (FDD)
* Automated System Optimization (ASO)
* Real-time data analytics solutions

#### ****1.2 Related Sections****

This specification refers to integrated automation solutions and is related to:

* Building Automation Systems (BAS)
* Building control systems
* HVAC
* Other operational technology (OT) equipment

### ****Overview****

This specification provides a comprehensive guide for the procurement, implementation, and support of **Energy Management and Information Systems (EMIS)** and smart building automation technologies. The purpose is to:

* Facilitate optimized building performance
* Ensure integration with existing systems
* Enable fault detection, diagnostics, and automated system optimization

### ****Part 2 - Products****

#### ****2.1 Energy Management and Information Systems (EMIS)****

The system shall integrate with existing building automation systems and support the following features:

* **Energy Information Systems (EIS)** with interval meter data analytics and advanced Measurement & Verification (M&V)
* **Fault Detection and Diagnostics (FDD)** to automatically detect issues in HVAC and other critical systems
* **Automated System Optimization (ASO)** for real-time system performance improvement

### ****2.2 Data Integration****

The EMIS shall integrate data from the following sources and provide near real-time data within 5 minutes of actual readings:

* Utility Bills
* Interval Meters
* Weather Stations
* Building Automation Systems (BAS)
* IoT Devices
* Distributed Energy Resources

### ****Energy Management Goals and Specifications****

* Facilitate continuous energy management and increase operational efficiency.
* Enable the organization to reduce portfolio energy use by **[X]%**.
* Automate energy performance analysis using an Energy Information System (EIS).
* Perform automated fault detection and diagnostics (FDD) for the HVAC system.
* Achieve automated system optimization with EMIS software performing supervisory control to supplement BAS.
* Track the impact of energy efficiency projects and verify savings.
* Track and manage peak demand.
* Produce reports for energy and utility management operations and maintenance.
* Support implementation of **ISO 50001 Ready**.
* Provide ongoing support for the owner’s team for EMIS analysis follow-up.
* Manage utility rebate submissions and subsequent reporting.

### ****Site Description and Data Integration****

### ****List of Tables****

#### ****Table 1. Team Members****

| **Role** | **Responsibility** |
| --- | --- |
| **Energy Manager** | Overseeing EMIS implementation and progress communication |
| **Building Engineer** | Assisting in system configuration and FDD rule selection |
| **IT Representative** | Supporting EMIS network setup and cybersecurity |
| **EH&S Representative** | Providing input for specialty equipment monitoring |
| **EMIS Provider** | Integrating and commissioning the EMIS system |
| **MBCx Services Provider** | Supporting EMIS setup and ongoing performance monitoring |

#### ****3.1 Site Description****

Provide a description of the site(s) or campus included in the scope of work:

* Gross floor area by building function and age.
* Relevant details of lighting and HVAC system design.
* Critical loads and services.

#### ****3.2 Meter and BAS Data****

* Provide a list of existing meters desired for integration, including natural gas, chilled water, heating hot water, steam, and/or water.
* Provide BAS documentation, including the make, model, year of installation, and any bandwidth/speed issues.

### ****Part 3 - Cybersecurity Requirements****

#### ****3.1 Cybersecurity for Smart Building IoT Platforms****

Due to the convergence of IT and OT, the cybersecurity of smart building IoT platforms is critical. The key cybersecurity measures include:

1. **Network Segmentation**: Isolate the building's operational technology network from the corporate IT network.
2. **Access Control**: Enforce strict role-based access control (RBAC).
3. **Secure Data Transmission**: Encrypt data using protocols like **TLS** or **BACnet Secure Connect**.
4. **Authentication**: Implement multifactor authentication (MFA).
5. **Monitoring & Intrusion Detection**: Use intrusion detection/prevention systems (IDS/IPS).
6. **Incident Response**: Develop and maintain a comprehensive incident response plan.
7. **Patch Management**: Ensure timely patching of software and firmware.
8. **Data Privacy Compliance**: Adhere to relevant data privacy laws like **GDPR** or **CCPA**.
9. **Backup and Recovery**: Implement regular backups of critical systems.

### ****Extended Cybersecurity Guidelines****

1. **Network Segmentation and Isolation**: Ensure BMS is segmented from corporate networks using firewalls and VLANs.
2. **Control System Hardening**: Implement system hardening practices.
3. **Encryption Requirements**: Use encryption to protect data in accordance with **NIST FIPS 140-2** standards.
4. **Vulnerability Scanning**: Conduct regular vulnerability scans.
5. **Wireless Security**: Ensure WPA2 encryption for wireless networks.
6. **Audit and Logging**: Maintain comprehensive audit trails for all system activities.
7. **Incident Response Plan**: Develop a robust incident response plan for cybersecurity breaches.

### ****Tables: KPIs & Fault Detection Requirements****

#### ****Table 3. Benchmarking KPIs****

| **KPI** | **Measure** |
| --- | --- |
| Annual energy use | Normalized for floor area, heating, and cooling |
| Monthly energy use | Energy use intensity (kBtu/sqft by fuel) |
| Daily electricity usage | kWh/day |
| Submetering data | Equipment end uses (kWh or kBtu) |

#### ****Table 4. Fault Detection Requirements****

| **System** | **Fault** |
| --- | --- |
| General | Sensor errors, stuck valves, scheduling issues |
| Chilled Water Plant | Temperature reset, low delta T, short cycling |
| Air Handling Unit | Over economizing, excess outdoor air supply |
| Hot Water Plant | Temperature reset, short cycling, pressure reset |

#### ****Table 5. System-Level KPIs****

| **Metric** | **Measure** |
| --- | --- |
| Occupant Comfort Index | % of hours within target temperature |
| Cooling Plant Efficiency | kW/ton |
| Heating Plant Efficiency | % |
| Fan System Efficiency | kW/cfm |