# A Primer on Building Controls

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- Employee of Building Automation Unit of Siemens Building Technologies
- Employee at various locations for the past 18 years
- Project Manager by trade

# What are we going to talk about?

- Defining some of the industry standard terms
- Typical system architecture
- Systems Integration and its benefits

# Defining Some Industry Standard Terms

- DDC control system (DDC)
- Building Automation System (BAS)
- Building Control System (BCS)
- Energy Management System (EMS)

# Direct Digital Control System (DDC)

- What is it?
- Direct digital control (DDC) refers to the application of microprocessor technology to building environmental controls. With DDC it is possible to control heating and cooling functions with software that takes into account a wide range of variables, thereby achieving greater efficiency.

# Building Automation System (BAS) Building Control System (BCS)

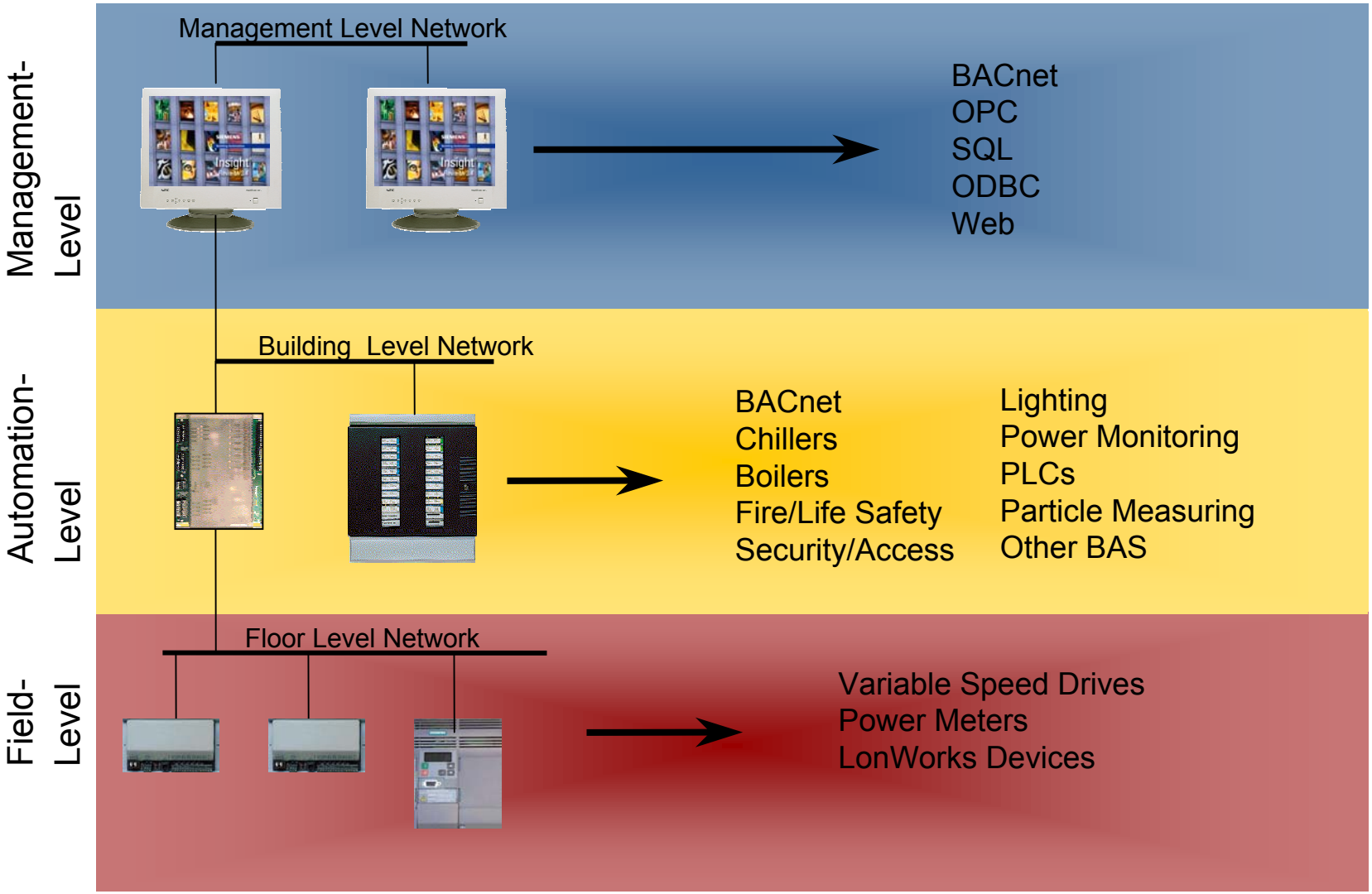
- What are they?
- A building automation system is comprised of electronic equipment that automatically performs specific facility functions. The commonly accepted definition of a BAS includes the comprehensive automatic control of one or more major building system functions required in a facility, such as heating, ventilating, and air conditioning (HVAC) systems. In many cases a BAS includes lighting, security, fire safety, industrial processes, and more.

# Energy Management System (EMS)

- What is it?
- A control system capable of monitoring environmental and system loads and adjusting HVAC operations accordingly in order to conserve energy while maintaining comfort.

DDC control system (DDC)
Building Automation System (BAS)
Building Control System (BCS)
Energy Management System (EMS)

***REALLY ONE AND THE SAME!!***

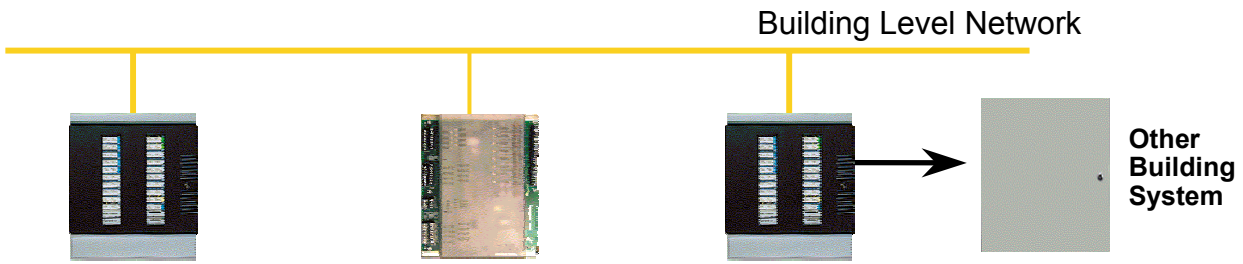

Management-Level
Management Level Network
BACnet
OPC
SQL
ODBC
Web
Automation-Level
Building Level Network
BACnet
Chillers
Boilers
Fire/Life Safety
Security/Access
Lighting
Power Monitoring
PLCs
Particle Measuring
Other BAS
Field-Level
Floor Level Network
Variable Speed Drives
Power Meters
LonWorks Devices

# Management Level Network

- Graphic Interface
- Where the connectivity occurs
- Web-access
- Higher level of sharing of information between systems
- Can be on a company's corporate Intranet via Ethernet

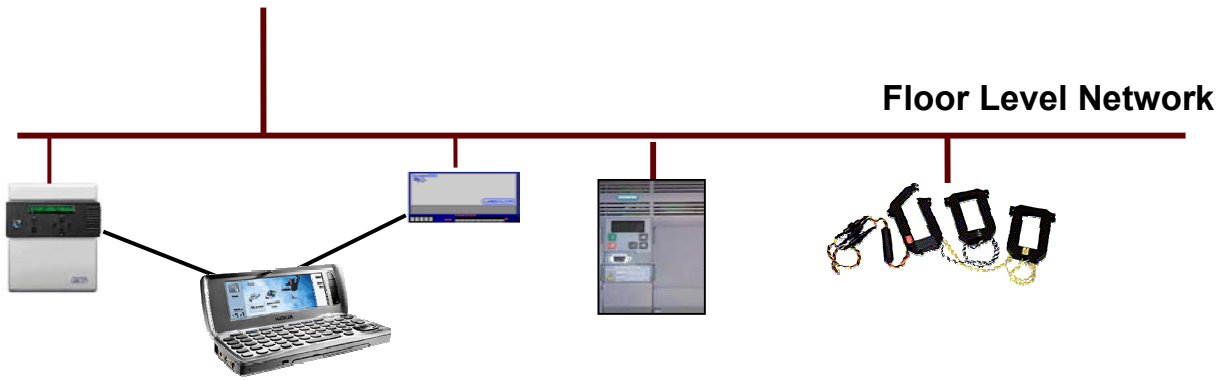
# Building Level Network

- Also referred to the panel level
- Interface and control of larger equipment
- Integration between larger mechanical equipment
- Can be on a company's corporate Intranet via Ethernet



# Floor Level Network

- Provides individual zone control
- Integration between electrical equipment
- Controllers are “stand-alone”
- Can be used to monitor power



# What issues are facility managers facing today?

- Staff shortage
- Reduced operating and capital budgets
- Information overload
- Increased regulations
- Desire to reduce lost productivity or product due to equipment downtime
- Desire to reduce # of suppliers – one stop shopping

# Integration

# Integration has many definitions

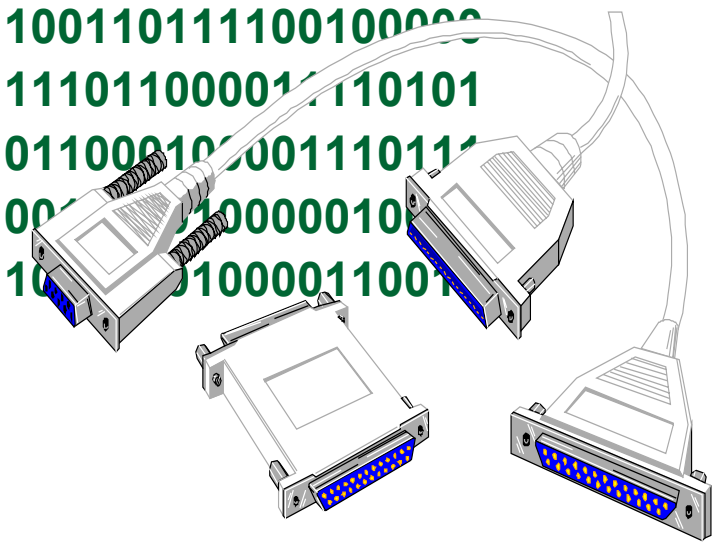
- Contractual / Commercial – “One Source”
- Technical

# “One source” integration

- Single supplier for multiple systems
- Leverage economies of scale
  - product, pricing, labor
  - contract efficiencies

# Technical integration

Connecting systems together for intercommunication



# Technical integration

Connecting systems together for intercommunication

- In the past it typically involved hardwiring between devices and systems for monitoring and control

# Technical integration

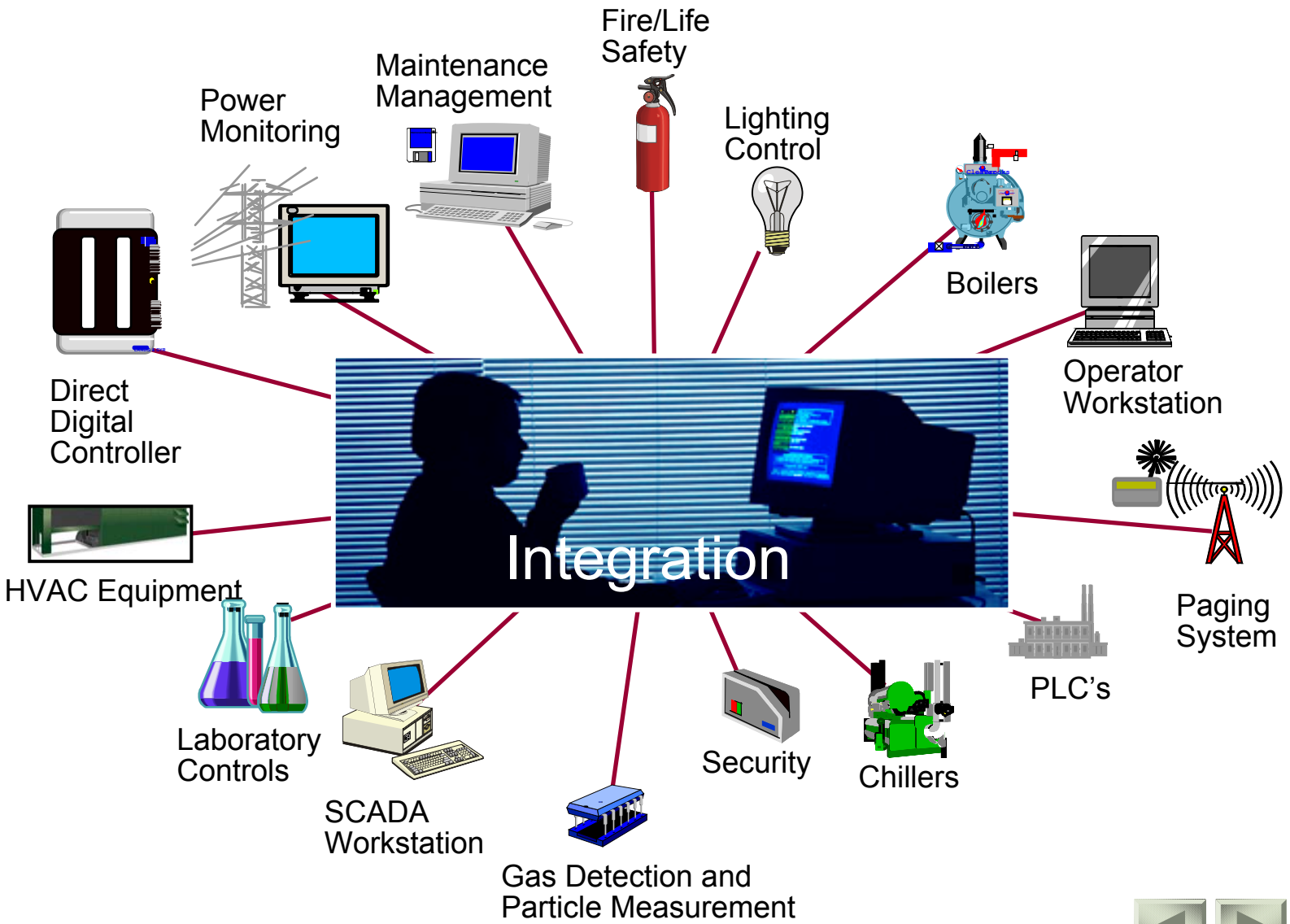
## Connecting systems together for intercommunication

- It involves:
  - communications using
    - open, standard and proprietary protocols
    - gateways
    - software drivers
  - applications work
    - valuable integration is about providing solutions, not just a connection

**ALLOCATION OF ENERGY COSTS FOR 1000 DEERFIELD PARKWAY**

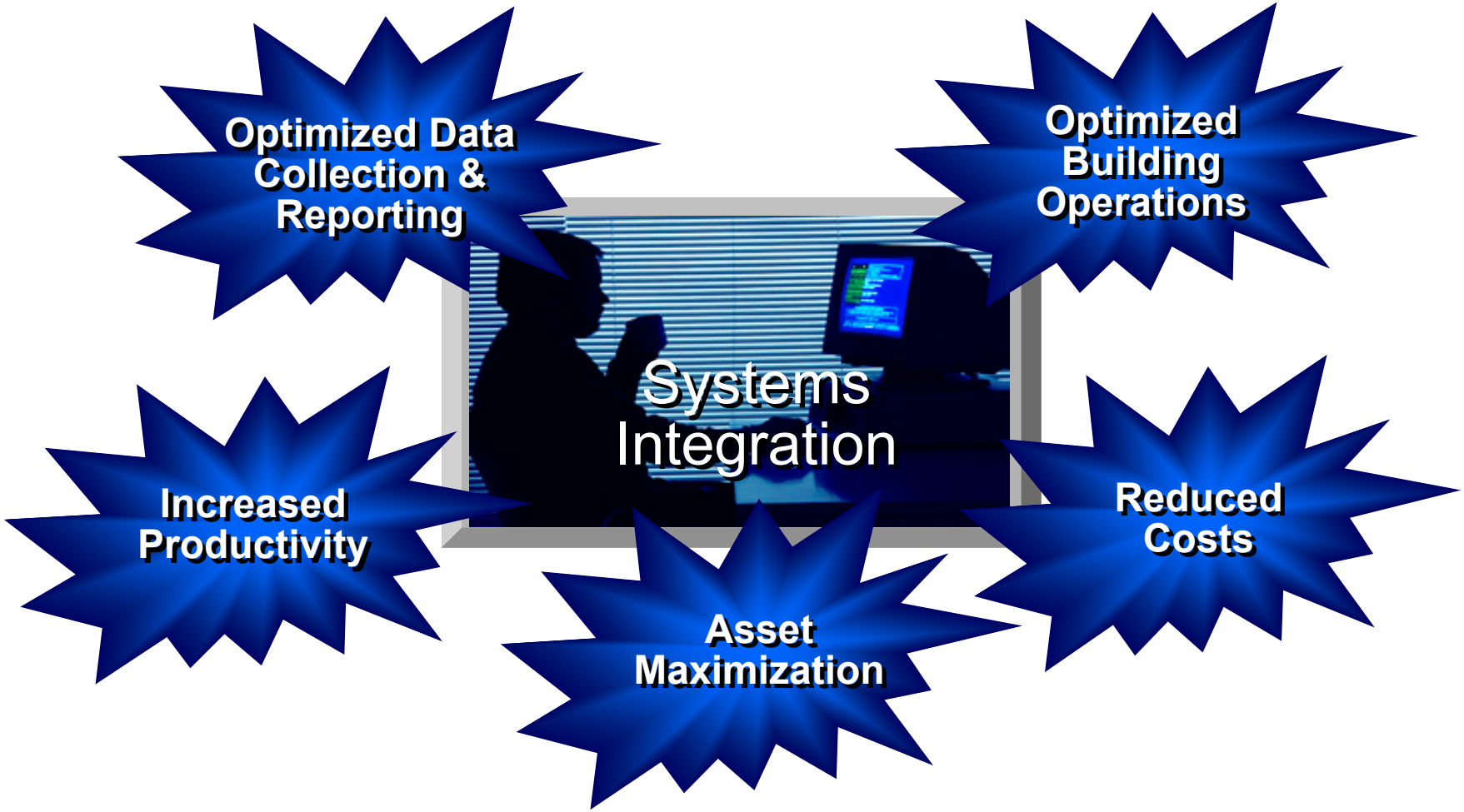
For Service
From To
5/13/97 6/12/97

| | | | | |
|---|---|---|---|---|
| **Billed General Service - Time Of Day** | | | | |
| G980416 1000 DEERFIELD | | | | |
| Peak Demand | 745.0 | KW | $9,573.25 | |
| Peak Energy | 167,672 | KWH | $8,777.88 | |
| Off-Peak Energy | 203,928 | KWH | $5,308.25 | |
| | | | | $23,659.37 |
| Office Peak Demand | 216.0 | KW | $2,775.60 | |
| Office Peak Energy | 0 | KWH | $0.00 | |
| Office Off-Peak Energy | 39,709 | KWH | $1,033.63 | |
| | | | | $3,809.23 |
| Factory Peak Demand | 0 | KW | $0.00 | |
| Factory Peak Energy | 0 | KWH | $0.00 | |
| Factory Off-Peak Energy | 0 | KWH | $0.00 | |
| | | | | $0.00 |
| Computer Room Peak Demand | 0 | KW | $0.00 | |
| Computer Room Peak Energy | | KWH | $0.00 | |
| Computer Room Off-Peak Energy | 0 | KWH | $0.00 | |
| | | | | $0.00 |
| **Billed Space Heating** | | | | |
| G980542 1000 DEERFIELD | 221,320 | KWH | | |
| Office | 0 | KWH | $0.00 | |
| Computer Room | 0 | KWH | $0.00 | |
| | | | | $0.00 |
| TOTAL - OFFICE | | | $3,809.23 | |
| TOTAL - FACTORY | | | $0.00 | |


Fire/Life Safety
Maintenance Management
Power Monitoring
Lighting Control
Boilers
Operator Workstation
Direct Digital Controller
Integration
HVAC Equipment
Paging System
PLC's
Laboratory Controls
SCADA Workstation
Security
Chillers
Gas Detection and Particle Measurement

# Benefits of Integration

# Integration provides the following benefits



# Site-wide user interface - benefits

**Optimized Building Operations**

- Centrally monitor all facilities
  - more efficiently direct personnel
  - more efficiently handle and escalate alarms
  - reduces after-hours night shift requirements

# Site-wide user interface - benefits

**Reduced Costs**

- Centrally monitor all facilities
- Increases productivity for day to day operators
- Eliminates cost of duplicate front-end equipment
  - reduces repair parts & service contract needs

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# Information collection & management - benefits

- Store and archive important information for regulations and accreditation
- Track and allocate energy use per department
- Use past reports to predict future costs for budgeting
- Gain insight in how to optimize building performance
  - example: report key equipment indicators
    - to determine maintenance schedules
    - increase efficiency

**Reduced Costs**

**Increased Productivity**

**Optimized Data Collection & Reporting**

# Intersystem control - benefits

- Systems interact with each other to
  - reduce energy costs
  - increase safety
  - shorten response time
  - meet customer specific operational strategies (efficiencies)
  - maximize use of assets
  - optimize building operation

Optimized Building Operations

Reduced Costs

Increased Productivity

Asset Maximization

# Questions?