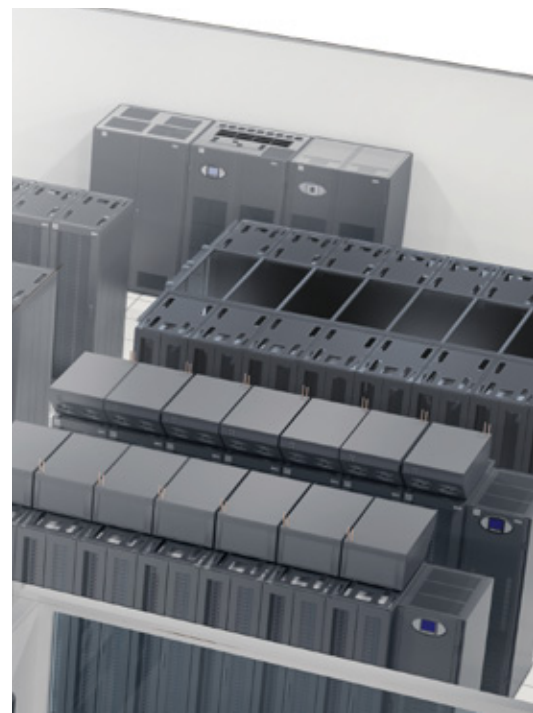
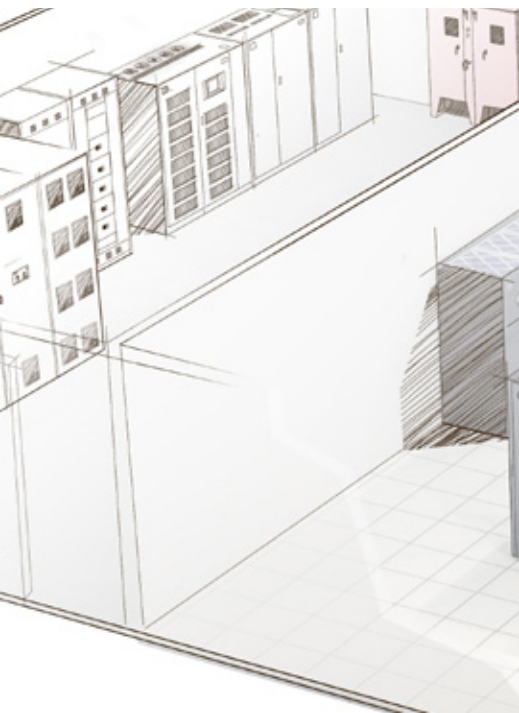


*SmartDesign*<sup>™</sup>  
Intelligent, Integrated Infrastructure For The Data Center





## Prepare Your Data Center For What's Next

### Efficiency. Availability. Capacity. Control.

#### One Approach

Studies from the Data Center Users' Group reveal that efficiency, availability, capacity and control continue to be leading concerns within data centers. As a result, it is more important than ever for economic and business considerations to drive data center decision-making.

#### Efficiency Saves

The proper data center design can provide an organization with significant operating savings. Data center professionals are routinely reducing their energy costs by 30-50% or more, while simplifying the process of deploying and operating a facility.

#### Availability Matters

The 2011 National Study on Data Center Downtime reveals:

- The mean costs for any type of data center outage is \$505,502
- The average cost of a partial data center shutdown was \$258,149
- A full shutdown costs more than \$680,000
- Employing a data center design approach that delivers availability and capacity is one of the most effective ways of preventing outages and disruption, saving a company from a loss of goodwill, revenue and productivity.

#### Pulling It All Together

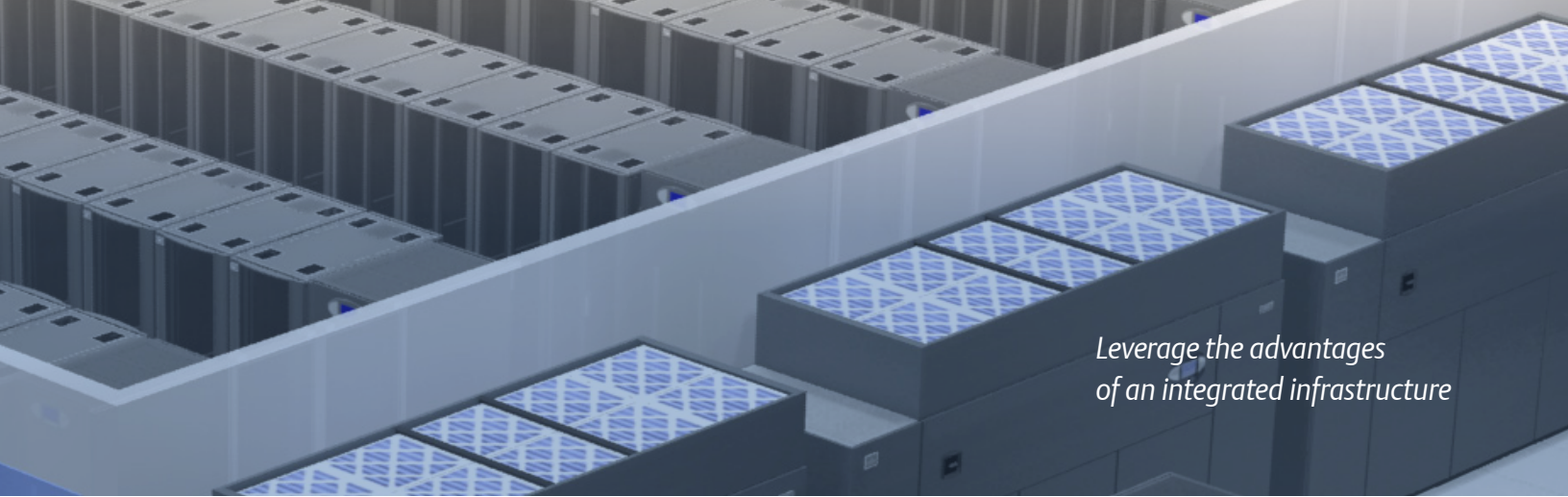
The combination of expertise, technologies and systems need to come together to achieve your goals. Ensuring availability and capacity does not mean sacrificing efficiency or control. Data center designers are discovering and applying proven models to cutting energy costs.

The SmartDesign approach from Emerson Network Power helps you deploy and utilize effective configurations that eliminate these challenges, while saving money and maintaining performance.

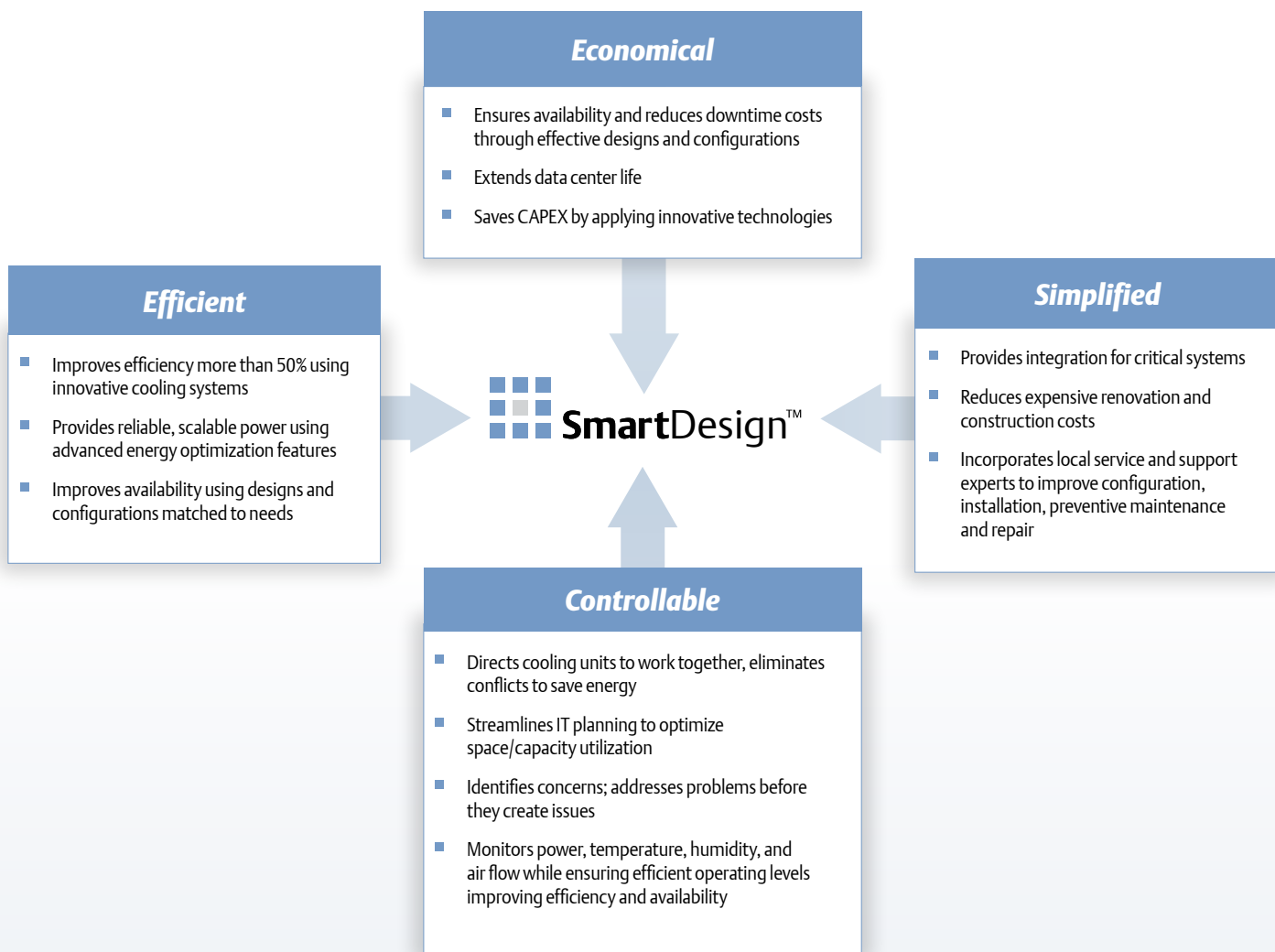
#### With the SmartDesign approach, you can be prepared for what's next:

- Deploy innovative systems that utilize highly efficient cooling, UPS, power distribution, rack/enclosures and infrastructure management
- Leverage industry best practices to ensure that your data center is operating optimally and cost effectively
- Take advantage of Emerson Network Power local data center design expertise, service and support to help plan, deploy, maintain and expand your data center

*Reduce energy costs by up to 50% with a SmartDesign approach.*



Leverage the advantages of an integrated infrastructure



**SmartSolutions**

Intelligent, integrated infrastructure for the data center

Smart Solutions help you cost-effectively achieve and manage levels of density, availability and efficiency.



**SmartRow™**



**SmartAisle™**



**SmartDesign™**



**SmartMod™**

## Industry-Best Practices Put into Action

Emerson Network Power and the SmartDesign approach simplify the complex environment of data centers by bringing together the most comprehensive power, precision cooling, monitoring and management technologies, as well as providing industry-best practices to deliver infrastructures that overcome challenges in efficiency, availability and capacity.

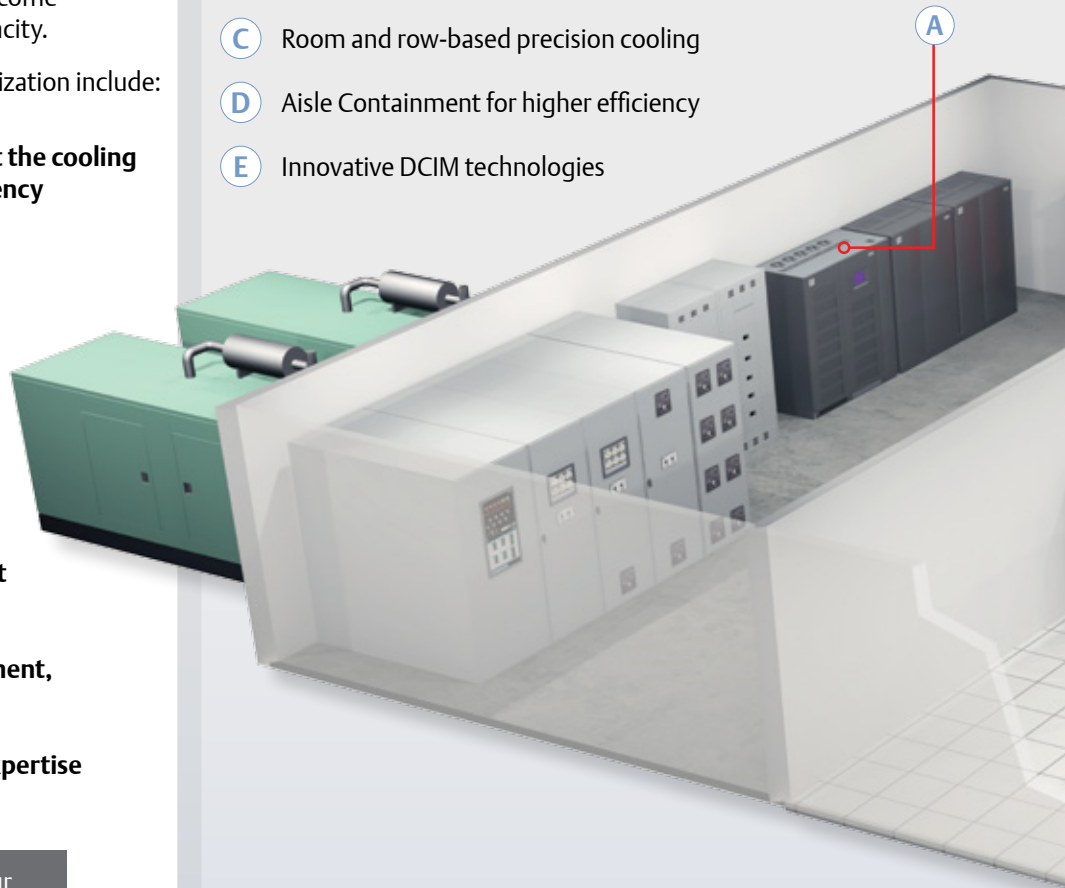
The seven best practices to improved optimization include:

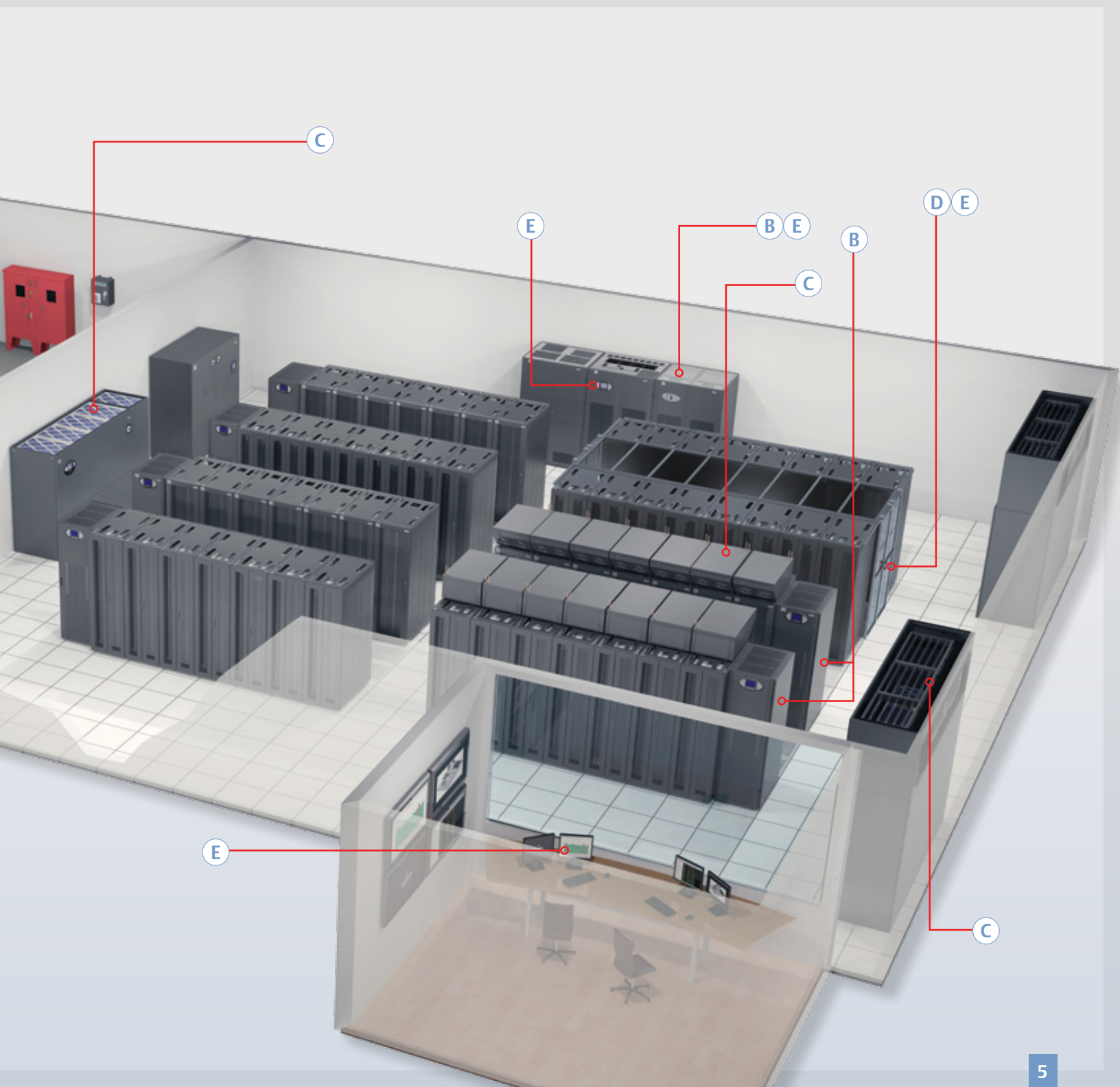
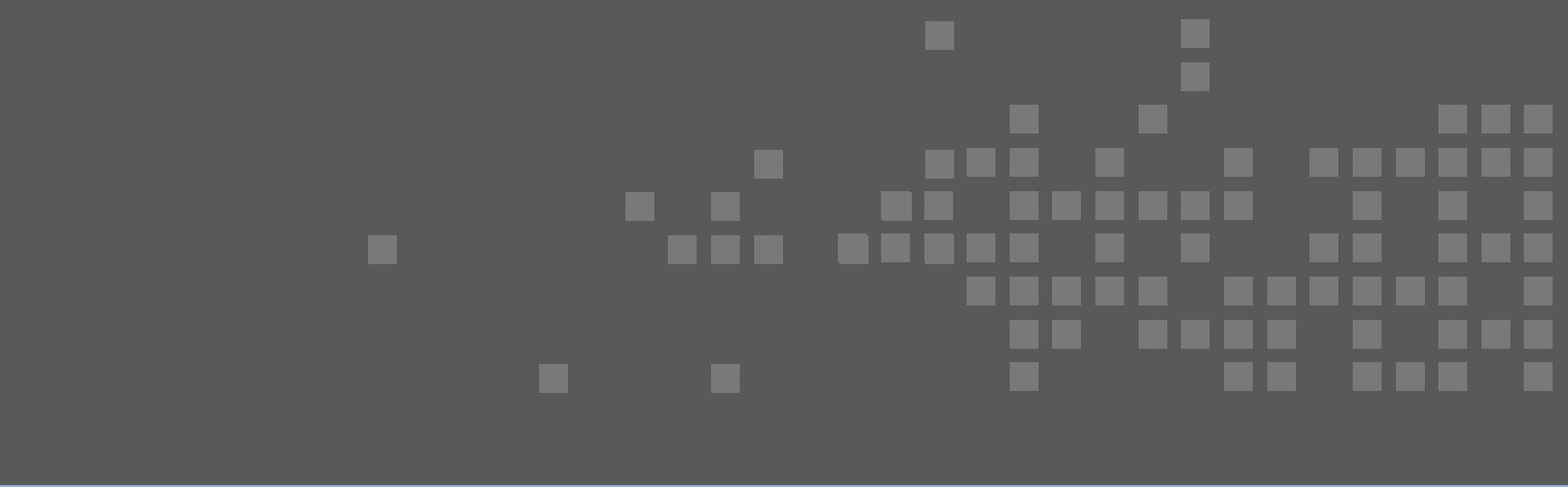
- 1 **Maximize the return temperature at the cooling units to improve capacity and efficiency**
- 2 **Match cooling capacity with IT loads**
- 3 **Utilize cooling designs that reduce energy consumption**
- 4 **Select the power system that optimizes your availability and efficiency**
- 5 **Design for flexibility using scalable architectures that minimize footprint**
- 6 **Enable performance-enhancing data center infrastructure management, monitoring and control**
- 7 **Leverage local data center design expertise and technical assistance**

Read more about these best practices in our white paper, *Seven Best Practices for Increasing Efficiency, Availability and Capacity: The Data Center Design Guide*

### Technology Solutions

- A High availability, high efficiency UPS Systems
- B Flexible and scalable power distribution and switching
- C Room and row-based precision cooling
- D Aisle Containment for higher efficiency
- E Innovative DCIM technologies





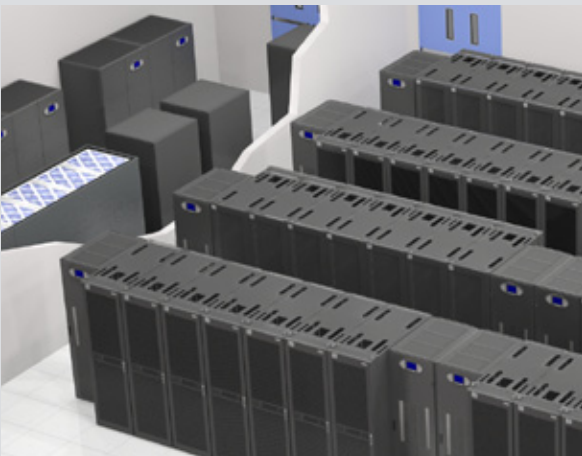
## SmartDesign Approach Ensures A Better Infrastructure

### Support and Design Expertise from Emerson Network Power

SmartDesign configurations start by leveraging our four decades of data center expertise. Local data center infrastructure specialists, supported by the industry's largest service organization, work in tandem with industry planners, engineers and contractors to meet customer requirements.



*These experts collaboratively assess each situation, recommend the best option and deliver it effectively and efficiently.*



*SmartDesign approach is ideal for any room-based data center project.*

### Innovative Technologies and Systems from Emerson Network Power

The SmartDesign approach uses the industry's most reliable and comprehensive product offering to deliver critical availability, scalability, intelligence and capacity, while ensuring the highest efficiency.

#### Cooling

- Energy-efficient, scalable precision cooling and control systems
- Widest array of high-density cooling systems enable energy efficient operation, improved capacity and reduced footprint
- Intelligent cold aisle containment systems improve energy efficiency and capacity
- Fluid, air and refrigerant economizers maximize free cooling

#### Power

- Wide range of large power UPS systems offer scalability, efficiency and reliability
- Power configurations which can be designed for every availability and redundancy situation
- Robust power distribution systems provide flexible, intelligent and reliable power from the utility to inside the rack

#### DCIM and Support

- Comprehensive line of infrastructure management solutions provide visibility and control, to improve uptime and efficiency
- Largest and most highly trained local service and support team ensures systems uptime and improved performance

A local data center infrastructure specialist will assist you in the proper selection and configuration of these innovative technologies, to ensure you obtain the optimum design for your needs.

## Demonstrated Success

### The SmartDesign Approach Ensures Optimal Performance



#### **DataCenter.BZ**

**Critical need:** Support DataCenter.BZ's data center

expansion with an ultra-high-density power and cooling infrastructure optimized for efficiency and flexibility without compromising its 2(N+1) high-availability operational commitment.

#### **Results:**

- Substantial gains in power and cooling capacity enabled DataCenter.BZ to continue providing data center customers with 500 watts per square foot of power across a 32,000-square-foot raised floor along with ultra-high-density cabinet power deployments—some up to 90 kW (50 kW in standard racks)
- Cooling infrastructure achieved a facility-wide PUE of 1.25 or less
- Projected to achieve LEED Certification from the United States Green Building Council (USGBC)
- 100 percent site availability since completion of initial carrier-neutral data center provisioning in 2007
- 2(N+1) redundancy maintained on all critical power and cooling infrastructure



#### **Sarasota County**

**Critical need:** A data

center design that would effectively and efficiently use the technologies and best practices available today to provide high availability, scalable capacity and an efficient operation.

#### **Results:**

- Reduced data center equipment needs by 20% through an intelligent, integrated design approach.
- Minimized IT footprint by incorporating server virtualization along with innovative power and cooling technologies.
- Eliminated additional single points of failure using a comprehensive N+1 power design
- Reduced cooling costs and improved reliability with management and control systems that direct units to work together, eliminating conflicts



#### **Cyber Development**

**Critical need:** Support Cyber Development

Group International's data center expansion efforts with an enterprise infrastructure optimized for efficiency and flexibility, while ensuring availability demands dictated by cash-backed, zero-downtime SLAs.

#### **Results:**

- Increased efficiency by 12 and 30%, respectively, through enhanced perimeter and row-based cooling technologies
- Achieved availability levels in excess of “six-nines” (99.9999 % uptime), resulting in zero unplanned downtime over a 12-month period
- Reduced total energy bill by an average of 14% by implementing a new design using supplemental cooling, cold aisle containment and innovative cooling strategies (on the perimeter and in the row)
- Achieved on-target PUE, earning the facility the title of “Most Energy Efficient Data Center in the Chicago Metropolitan Area”



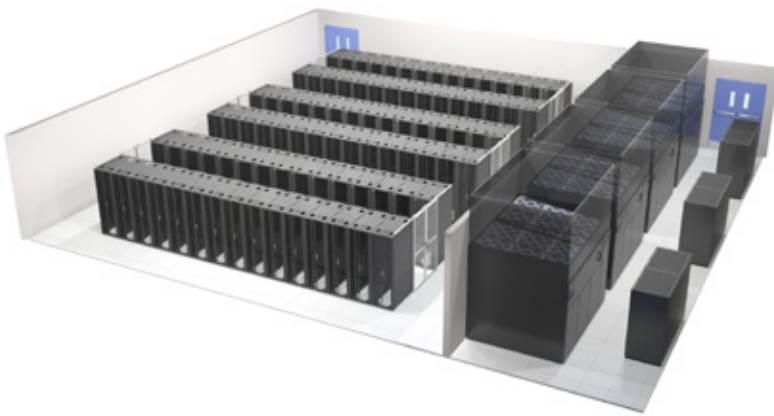
*“I don't see this data center working without our SmartDesign infrastructure.”*

*– Rene LeBlanc, Manager, Data Center Operations, Go Daddy*

## SmartDesign Reference Scenarios: Applied to Meet Your Goals

Our Reference Scenario Guides are designed to give you a glimpse of the virtually limitless possibilities of the SmartDesign Approach.

### 1100kW Tier 2 With Air Economization



In this scenario, cooling is configured around four large capacity 400kW Liebert CW units with air economization, partial cold aisle containment and Liebert iCOM controls. Electrical design is a Tier 2 using the 500kVA Liebert NXL UPS in 3+1 redundant plan; with six Liebert PPC PDUs, Liebert MB modular busway and Liebert MPX rack PDUs.

#### Benefits:

- Reduces floor space usage 34%
- Saves \$5 MM in CapEx
- Lowers energy bill by \$60,000 per year
- Ensures maximum uptime for Tier 2
- UPS operates at 97% efficiency, 80% of the time, generating energy savings of over \$37k per year
- Lowers installation and maintenance costs, while providing for fast and easy reconfigurations

- Design Capacity:** 1100kW
- Tier:** 2 Mechanical, 2 Electrical single bus
- Facility Size (s/f):** 4,307 RF / 3,223 DC / 1,752 ER
- Number of Racks:** 90
- Containment:** Partial, doors only
- Average Rack Density:** 12kW/rack
- Economization:** Air-side
- Raised Floor:** 36"
- PUE (total / cooling):** 1.28 / 1.18
- UPS Efficiency:** 97.4% via efficiency mode
- Redundancy:** N+1

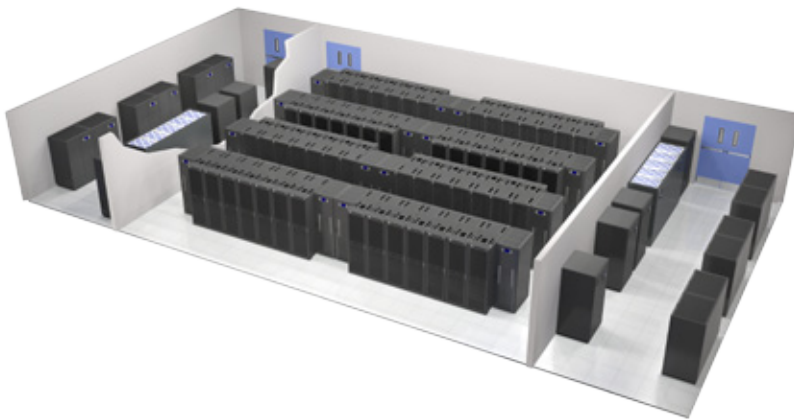
#### Emerson Network Power Equipment:

- (4) Liebert CW 400kW
- (4) Liebert NXL 500kVA UPS
- (6) Liebert PPC PDU
- Liebert MB Busway
- (90) DCF Optimized Racks
- (90) Liebert MPX rack PDU
- ASCO ATS
- Liebert Nform
- Albér® Battery Monitoring
- Avocent Data Center Planner™

	Premium Base Mechanical Tier 2, Electrical Tier 4	This SmartDesign	Cost Savings (vs. Base)	Cost Advantage
<b>Total Annual Energy Cost</b>	\$377,676	\$317,564	<b>\$60,112</b>	<b>16%</b>
<b>5 Year OpEx</b>	\$1,888,380	\$1,587,820	<b>\$300,560</b>	<b>16%</b>
<b>5 Year TCO</b>	\$20,770,517	\$15,445,480	<b>\$5,325,037</b>	<b>26%</b>

\* TCO is fully burdened with building and related costs

# 1100kW Tier 3 With High Density



In this scenario, the innovative, high efficiency Liebert XDR™ rear door heat exchangers are partnered with base-cooling using Liebert CW units to save both operating expenses and space. We pair this with an equally efficient power design using Liebert NXL 1100kVA UPS in a Tier 3, 2N configuration.

### Benefits:

- Reduces raised floor space by 60%
- Lowers racks needed by 62%
- Reduces energy costs 44% with heat neutralizing rack coolers
- Provides highly-scalable cooling options
- Utilizes efficient double conversion UPS with near unity PF
- The tier 3 design protects against most all downtime while being concurrently maintainable

**Design Capacity:** 1100kW  
**Tier:** 2 Mechanical, 4 Electrical Dual bus  
**Facility Size (s/f):** 2,609 RF / 1,701 DC / (2) 1,446 ER  
**Number of Racks:** 56  
**Average Rack Density:** 20kW/rack  
**Raised Floor:** 36”  
**Economization:** Fluid-side  
**PUE (energy / cooling):** 1.26 / 1.16  
**UPS Efficiency:** 97.4% via efficiency mode  
**Redundancy:** 2N

### Emerson Network Power Equipment:

- (2) Liebert CW 114kW
- (56) Liebert XDR
- (8) Liebert XDP
- (12) Liebert PPC PDU
- (12) Liebert FDC PDU
- (2) Liebert NXL 1100kW UPS
- (112) Liebert MPX Rack PDU
- (56) DCF Optimized Racks
- ASCO ATS
- Liebert Nform
- Albér Battery Monitoring
- Avocent Data Center Planner

	Premium Base Mechanical Tier 2, Electrical Tier 4	This SmartDesign	Cost Savings (vs. Base)	Cost Advantage
<b>Total Annual Energy Cost</b>	\$377,676	\$232,681	<b>\$144,995</b>	<b>38%</b>
<b>5 Year OpEx</b>	\$1,888,380	\$1,163,405	<b>\$724,975</b>	<b>38%</b>
<b>5 Year TCO</b>	\$20,770,517	\$16,408,453	<b>\$4,362,064</b>	<b>21%</b>

\* TCO is fully burdened with building and related costs

## SmartDesign Approach: For Medium or Large Data Centers

A SmartDesign approach is available to fit the needs of your data center. Look for a reference design that fits your IT load, availability requirements and efficiency target. Visit [www.SmartSolutionsDesigns.com](http://www.SmartSolutionsDesigns.com) and view more examples.



**180kW Tier 2**  
**With Row-Based Cooling,**  
**Room-Based Power**

**IT Load:** 180kW Tier 2  
**Opex Savings:** \$67,000/yr  
**TCO Savings:** \$196,000 over 5 years  
**PUE:** 1.27



**500kW Tier 2**  
**With High Efficiency**  
**Refrigerant Economization**

**IT Load:** 500kW Tier 2/ 4 power  
**Opex Savings:** \$170,000/yr  
**TCO Savings:** \$379,000 over 5 years  
**PUE:** 1.29



**1300kW Tier 4**  
**With High Efficiency**  
**Refrigerant Economization**

**IT Load:** 1300kW Tier 4  
**Opex Savings:** \$420,000/yr  
**TCO Savings:** \$953,000 over 5 years  
**PUE:** 1.28

\* TCO based on infrastructure technologies CAPex and Opex

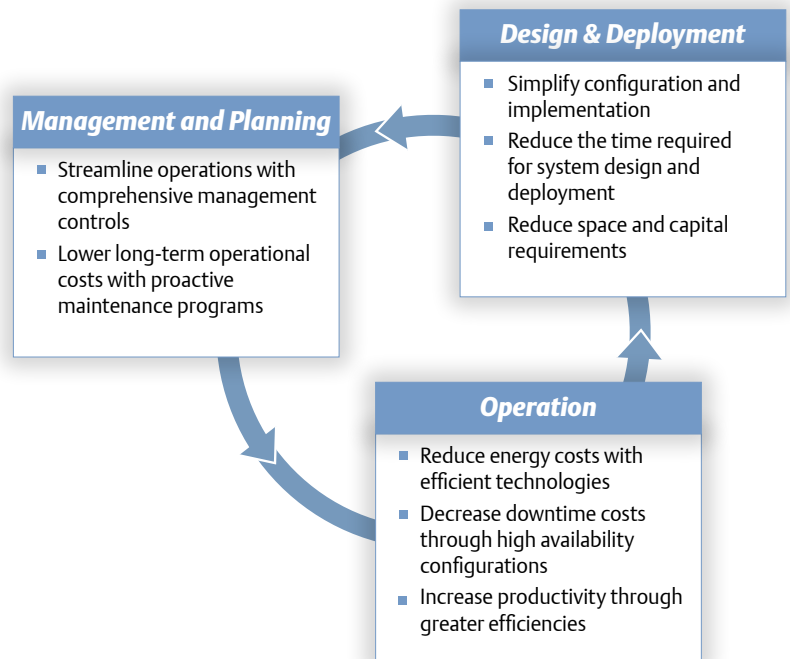
## Get Started with the SmartDesign Approach Today

### Efficiency Throughout the Planning and Operation Phases

With the SmartDesign approach, you ensure efficiency across the lifecycle of the data center.

As your infrastructure partner, we provide the on-going support that keeps your data center operating at peak levels of performance.

Field engineering is available 24x7. Professional assessment services are offered to ensure continual performance adjustments and improvements.



Visit [www.liebert.com](http://www.liebert.com), under Smart Solutions, to explore new scenario references that depict additional ways to apply SmartDesign configurations.

### Contact Your Local Data Center Infrastructure Specialist to Get Started Today

Whether you are building a new data center, expanding your current environment or renovating an older installation, we can help you create, implement and operate an infrastructure solution that meets your needs. Schedule a discussion with your Emerson Network Power representative to begin developing a SmartDesign infrastructure for you.



Emerson Network Power, a business of Emerson (NYSE:EMR), delivers software, hardware and services that maximize availability, capacity and efficiency for data centers, healthcare and industrial facilities. A trusted industry leader in smart infrastructure technologies, Emerson Network Power provides innovative data center infrastructure management solutions that bridge the gap between IT and facility management and deliver efficiency and uncompromised availability regardless of capacity demands. Our solutions are supported globally by local Emerson Network Power service technicians. Learn more about Emerson Network Power products and services at [www.EmersonNetworkPower.com](http://www.EmersonNetworkPower.com)

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- |                |  |                              |                              |
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| ■ DC Power     | ■ Infrastructure Management & Monitoring | ■ Precision Cooling          | ■ Precision Cooling          |

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