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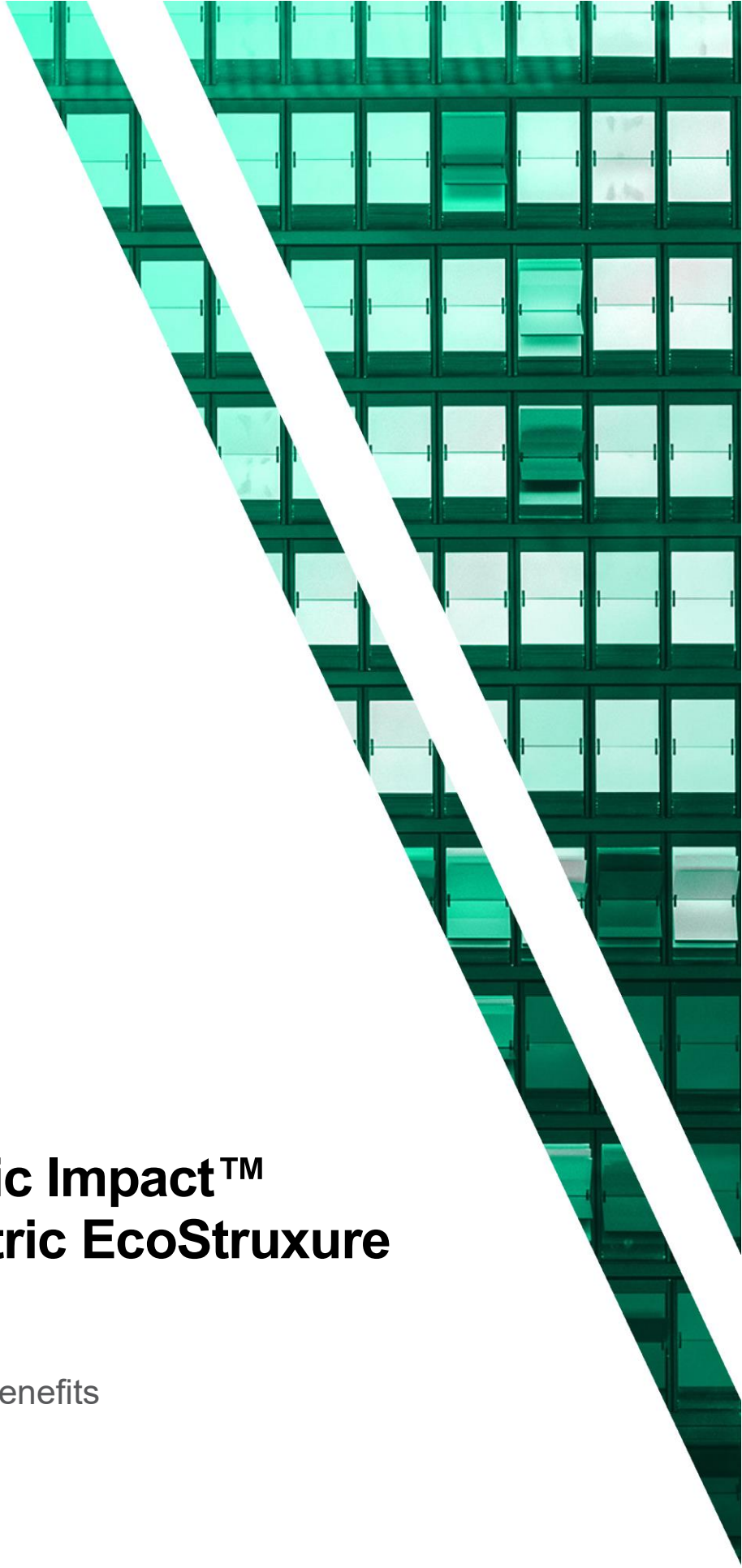

The Total Economic Impact™ Of Schneider Electric EcoStruxure For Data Centers

Cost Savings And Business Benefits Enabled By EcoStruxure

MARCH 2024

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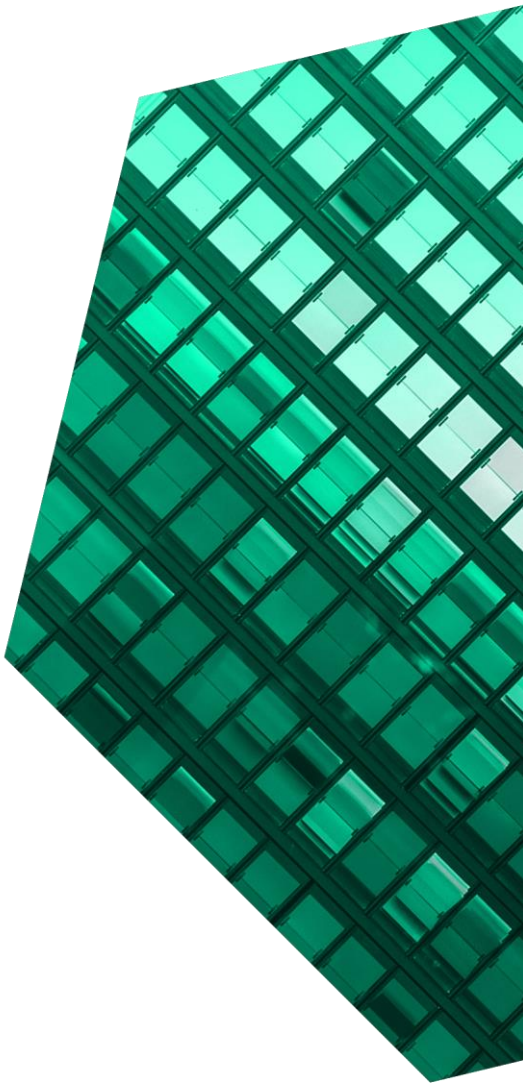

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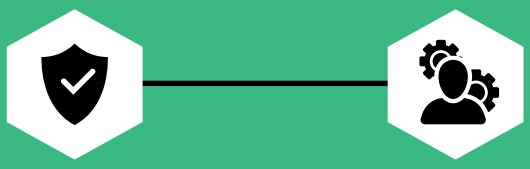
Executive Summary

Demand for data centers is experiencing significant growth, but it is somewhat checked by available energy and operational inefficiencies. Schneider Electric's EcoStruxure solution delivers integrated and optimized EPMS and BMS software combined with smart meters and IoT devices to enable organizations to deploy new, high-capacity data centers faster, ensuring reliable and resilient operations, optimizing energy usage, and reducing data center operations expenses with intelligent infrastructure management.

The data center (DC) market is experiencing significant growth driven by trends such as the rise of cloud computing, increasing data volumes, and more recently the advancements in artificial intelligence (AI) — with large language models (LLMs) requiring ever-increasing computational power. These trends necessitate the development of more data centers to support high-performance processing and huge volumes of data storage.

Two broad factors are inhibiting data center expansions: available energy (especially with regulatory challenges) and bringing operationally efficient data centers online quickly. Data centers are energy-hungry, and there is a worldwide shortage of cheap, green energy. Bringing data centers online and quickly and efficiently tracking operations poses challenges, including complex design and construction processes, compliance requirements, and efficiency and uptime issues.

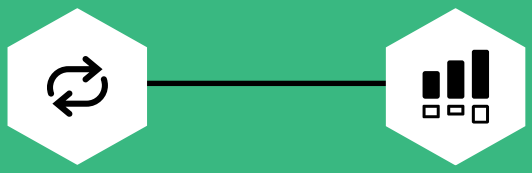
KEY OUTCOMES



Design cycle time reduction enabled by EcoStruxure
25% to 33%

Gross cost savings on utilities
Up to 22.5%

KEY STATISTICS



Return on investment (ROI)
30%

Net present value (NPV)
$6.02M

Energy power management systems (EPMS) and building management systems (BMS) software that integrates with smart meters and internet of things (IoT) devices have become a necessity for data center organizations due to their ability to optimize energy usage and enhance operational efficiency. With the increasing energy demands of data centers, these software solutions enable real-time monitoring and control of critical infrastructure, allowing organizations to identify and address energy inefficiencies, prevent downtime, and reduce operational costs.

Schneider Electric EcoStruxure data center solutions is a comprehensive suite of integrated hardware and software solutions designed to optimize the performance, efficiency, and reliability of data centers. It combines power management, cooling, and monitoring technologies with digital tools to enable data center operators to efficiently build and manage resilient data centers. Equally important,

integrating EPMS and BMS solutions from the same vendor enables a seamless exchange of data between systems and allows users to uncover energy efficiencies and performance improvements that would otherwise be difficult to achieve.

Schneider Electric commissioned Forrester Consulting to conduct a Total Economic Impact™ (TEI) study and examine the potential benefits and financial impacts colocation service providers may realize by deploying EcoStruxure.[1] This TEI analysis specifically focuses on EcoStruxure for data centers as the use case.

To better understand the benefits and risks associated with this investment, Forrester interviewed five representatives with experience using EcoStruxure. For the purposes of this study, Forrester aggregated the interviewees' experiences and combined the results into a single composite organization that is a regional provider of data center facilities. The composite is looking to aggressively expand to become a multiregion provider of higher-capacity data centers, with 200 megawatts (MW) of initial capacity and annual revenues of $150 million.

Prior to using EcoStruxure, these interviewees described their organizations' struggles with long design and commissioning cycles, which led to delays and increased costs. Additionally, the organizations' data center operations teams were burdened with time-consuming manual tasks, further increasing operational costs. Moreover, the organizations' limited ability to monitor power and electric systems hindered their ability to proactively identify and address issues, reducing data center reliability and impacting uptime.

After the investment in EcoStruxure, the interviewees were able to streamline the data center design and commissioning process, optimize their energy usage, improve their operational efficiency, and gain enhanced insights into data center performance.

> **"There is going to be one BMS that can navigate to all regions, all buildings, and all infrastructure, [providing] high-level oversight for everything. … It's a quality-of-life upgrade."**
>
> *Engineering management director, DC facilities provider*

KEY FINDINGS

Quantified benefits. Six-year, risk-adjusted present value (PV) quantified benefits for the composite organization include:

- **Improved time to revenue by reducing design cycle time by 25% to 33%.** By utilizing EcoStruxure's advanced tools, automation capabilities, and design templates, the composite organization can reduce the time required for data center design and construction, enabling faster time to market. By more efficiently bringing data centers online, the composite sees faster revenue generation. The composite organization generates 29.3% of incremental revenues in Year 4, 17.0% in Year 5, and 36.2% in Year 6. Over the course of the six-year analysis, the improved time to revenue nets to a risk-adjusted benefit of $8.6 million for the composite organization.
- **Reduced annual downtime by 0.5% to 0.6%, thus minimizing SLA penalties.** With EcoStruxure, the composite organization gains proactive monitoring and predictive maintenance capabilities, enabling it to identify and address potential issues before they escalate into downtime. By improving data center resiliency, the composite avoids SLA penalties related to unplanned downtime. Over six years, this benefit is valued at approximately $3.6 million.

- **Improved efficiency of data center operations team.** EcoStruxure's EPMS and BMS capabilities streamline operations, automate routine tasks, and enhance productivity, reducing the workload of the data center management team. The composite organization derives 26.3% of cost savings for data center operations professionals in Year 4, 33.3% in Year 5, and 39.1% by Year 6. Overall, the improved data center efficiency saves the composite organization $2.4 million over the six-year analysis.
- **Experienced gross savings on utility expenses of up to 22.5%.** Through advanced energy management capabilities, EcoStruxure optimizes the composite's power usage and cooling efficiency, reducing energy consumption and lowering utility bills. The intelligent monitoring and analytics provided by EcoStruxure enables the composite to identify and address energy inefficiencies, implement energy-saving measures, and proactively manage power distribution, leading to just under $2.3 million in cost savings for the composite over six years.
- **Optimized EPMS and BMS costs.** The gist of this benefit is the incremental investment in an alternative legacy solution to meet the baseline data center buildout plans for the composite organization. Previously, the composite used traditional EPMS and BMS systems, which are deficient for data centers. For the type of growth and data center footprint expansion plans desired by the composite, it either had to make an incremental investment in EcoStruxure or expand its legacy EPMS and BMS capabilities. This benefit yields the composite organization $9.3 million over the six-year analysis.

Unquantified benefits. Benefits that provide value for the composite organization but are not quantified in this study include:

- **Streamlined processes from working with a single vendor.** Interviewees reported that having data center components and software managed by a single vendor simplified installation and maintenance, streamlining data center management and supplier relations.
- **Fostered a beneficial relationship with Schneider Electric.** Interviewees noted that Schneider Electric's dedicated customer support teams helped them efficiently resolve issues and provided them with personalized guidance on how to best leverage EcoStruxure.
- **Improved security.** Some interviewees shared that their organizations used EcoStruxure's digital security features to eliminate any unwanted activity, improving the overall security posture.
- **Standardized system design.** Interviewees reported that using EcoStruxure ensured a consistent design approach across different regions. This standardization mitigates operational risks for the facilities, establishing a reliable and uniform infrastructure deployment.

Costs. Three-year, risk-adjusted present value (PV) costs for the composite organization include:

- **EcoStruxure solution costs.** The composite organization deploys the EcoStruxure solution as a bundle that includes software, hardware, and professional services tied to its aggressive data center buildout plans. The composite incurs a six-year present value cost of $19.5 million.
- **Deployment and ongoing support expenses.** The composite incurs three types of internal costs: deployment, training of software users, and expenses tied to maintenance and support of the EcoStruxure platform. The combined six-year cost is just under $596,000.

The financial analysis based on the interviews found that a composite organization experiences benefits of $26.15 million over six years versus costs of $20.14 million, adding up to a net present value (NPV) of $6.02 million and a payback of 48 months on a 30% return on investment (ROI).

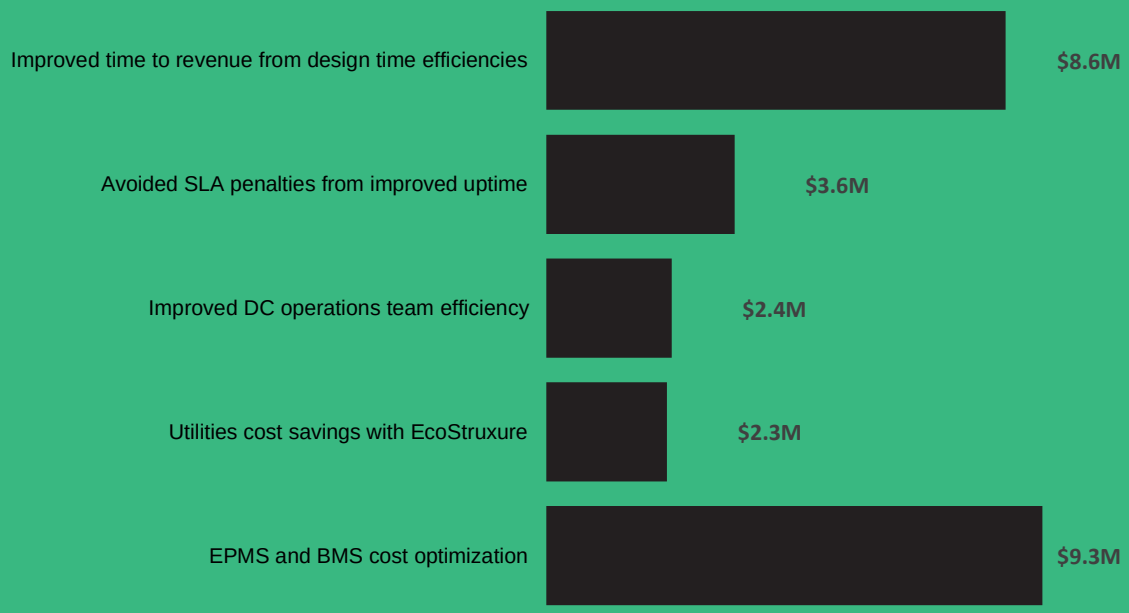
ROI
30%

BENEFITS PV
$26.16M

NPV
$6.02M

PAYBACK
48 months

Benefits (Six-Year)



“[With EcoStruxure], you do not have to engineer from the start. I would say using templates, we are saving 80% of engineering time.”

— Building management applications director, retail DC colocation services

TEI FRAMEWORK AND METHODOLOGY

From the information provided in the interviews, Forrester constructed a Total Economic Impact™ framework for those organizations considering an investment in EcoStruxure.

The objective of the framework is to identify the cost, benefit, flexibility, and risk factors that affect the investment decision. Forrester took a multistep approach to evaluate the impact that EcoStruxure can have on an organization.

DISCLOSURES

Readers should be aware of the following:

This study is commissioned by Schneider Electric and delivered by Forrester Consulting. It is not meant to be used as a competitive analysis.

Forrester makes no assumptions as to the potential ROI that other organizations will receive. Forrester strongly advises that readers use their own estimates within the framework provided in the study to determine the appropriateness of an investment in EcoStruxure.

Schneider Electric reviewed and provided feedback to Forrester, but Forrester maintains editorial control over the study and its findings and does not accept changes to the study that contradict Forrester's findings or obscure the meaning of the study.

Schneider Electric provided the customer names for the interviews but did not participate in the interviews.

The Schneider Electric EcoStruxure Customer Journey

Drivers leading to the EcoStruxure investment

Interviews

Role	Industry	Region	Revenue And Employees	EcoStruxure Configuration For Data Centers
Critical infrastructure program manager	Hyperscale cloud service provider	Global	• >$50 billion • >60,000 employees	• >200 global data centers • EPMS, BMS, SCADA
Building management applications director	Retail DC colocation services	Global	• >$5 billion • >3,500 employees	• >200 global data centers • EPMS, BMS
Technical design manager	DC development	EMEA	• >$40 million • <100 employees	• <10 data center campuses • EPMS, BMS
Head of solution architecture	Engineering consulting services	Middle East	• Revenue not known • <100 employees	• Partner for retail DC colocation services provider • EPMS, BMS, DCIM
Engineering management director	DC facilities provider	North America	• >$700 million • >800 employees	• >15 data centers • EPMS, BMS, DCIM

KEY CHALLENGES

Forrester interviewed five decision-makers who use Schneider Electric EcoStruxure to manage data center operations. Prior to the deployment of Schneider Electric's EcoStruxure EPMS and BMS software, the interviewees noted how their organizations struggled with common challenges, including:

- **Long iterative cycles during the design and commissioning phase.** Interviewees reported that their traditional approach to data center design and commissioning involved multiple rounds of revisions and coordination among various stakeholders, leading to delays and increased costs. The lack of streamlined processes and collaboration tools hindered efficient decision-making and prolonged the time required to bring their data centers online.

  The head of solution architecture at an engineering consulting services organization described the slow process: "You needed to have a meeting with several vendors. … Let's say the generator is from a brand, the fuel tank is from another contractor, and the controller is from someone else. You need to have everyone on the same page to approve the solution."

- **Inefficient use of data center operations resources.** Before adopting Schneider Electric EcoStruxure, the interviewees lacked automation and intelligent monitoring tools, which sometimes led to employees devoting time to labor-intensive tasks such as manually reading and reporting on meters. Additionally, the absence of streamlined workflows and collaboration tools led to

> **"We got to the point five years ago where we found every project was 10% more expensive than the next. A lot of that increase was in the engineering area because we needed to code things from scratch."**
>
> *Building management applications director, retail DC colocation services*

inefficiencies, duplicated efforts, and delays in commissioning.

- **Lack of visibility into monitoring power and electrical systems.** Interviewees noted that previously, it had been difficult to gain insights into the performance, efficiency, and health of key equipment. As a result, they struggled to identify energy-saving opportunities and address potential issues with their data center before they escalated into equipment failures. The engineering management director at a DC facilities organization stated: "Previously, we had someone manually checking a system and manually completing facility walks. … [Critical alerts] could take half an hour to an hour to become visible."

SOLUTION REQUIREMENTS

The interviewees' organizations searched for a solution that could:

- Provide comprehensive monitoring of critical data center infrastructure, including power usage and cooling efficiency.
- Optimize energy usage, identify energy inefficiencies, and provide actionable insights to drive energy-saving initiatives.
- Streamline the design and commissioning of new data centers.
- Scale to accommodate the evolving needs of the organization, supporting additional buildings or facilities as needed.
- Enable automation and centralized control of building systems, allowing for efficient management of data centers.

COMPOSITE ORGANIZATION

Based on the interviews, Forrester constructed a TEI framework, a composite company, and a benefits analysis that illustrates the areas financially affected. The composite organization is representative of the five interviewees, and it is used to present the aggregate financial analysis in the next section. The composite organization has the following characteristics:

"All of our data centers now are using the same structure, the same EPMS and BMS, the same hardware, and the same software. We want consistency and standardization."

Technical design manager, DC development

Description of composite. Data center capacity is measured in terms of MW of energy. The composite is a regional provider of smaller (20-MW) data center facilities, looking to aggressively expand to become a multiregion provider of larger (40-MW) data centers. In Year 1, it generates $150 million in annual revenue, serving five regional markets and employing 200 full-time workers. Each of the five existing markets has two 20 MW-data centers. Given the capacity of the existing data centers, the composite generally serves smaller organizations with varied colocation service offerings.

Prior state. Before implementing the EcoStruxure solution, the composite organization depended on a mix of nonenterprise-level point solutions and partially manual methods (such as physically monitoring meters and devices and recording data on a clipboard, then entering it into Excel) for managing their operations. For the design phase, the composite relied on legacy EPMS and BMS software with a highly iterative process of submitting incremental design updates to the contracting firms.

Figure 1: Baseline Expansion Scenario (24 Months)

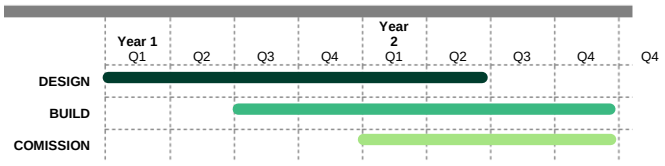
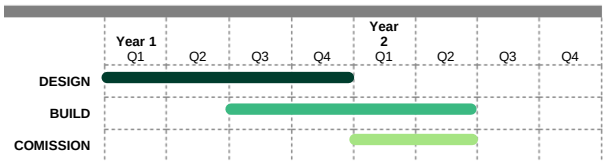


Figure 2: Accelerated Expansion Scenario (18 Months)



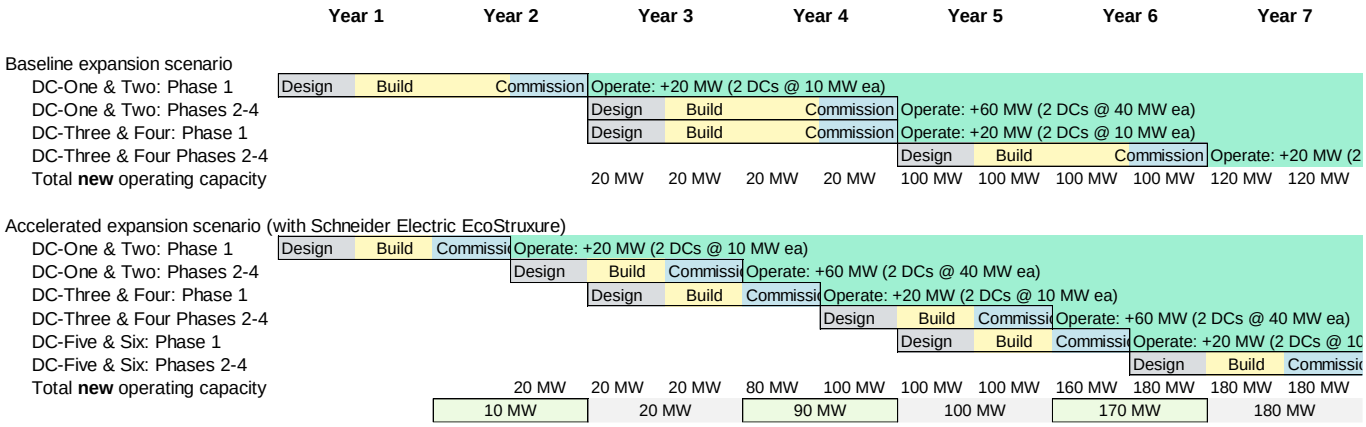
Data center buildout assumptions. Modern data centers are typically constructed in phases. A 40-MW data center is divided into four phases of a 10-MW unit. In the baseline buildout, the design, buildout, and commissioning of the first phase takes two years (with traditional EPMS and BMS systems) (see Figure 1). The next three phases of the data center buildout occur concurrently over the next two years. In summary, 10 MW of data center capacity comes online at the end of two years, and the incremental 30-MW capacity is available at the end of four years. In the baseline expansion scenario, a 40-MW data center will be fully operational at the end of four years.

Due to the varied benefits of the EcoStruxure solution (EPMS and BMS, with smart devices) that is detailed in Benefit A, interviewees described how the design, buildout, and commissioning of each phase is reduced to 18 months in the accelerated expansion scenario (a 25% reduction), which is assumed for the composite organization (see Figure 2). Alternatively, the 18-month design and commissioning cycle is reduced to 12 months in the accelerated expansion scenario (implying a 33% reduction). As explained in Benefit A, not all of this improvement is solely attributable to the EcoStruxure solution. However, the deployment of the EcoStruxure solution enables the accelerated expansion scenario.

Incremental data center capacity assumptions. The composite organization aspires to build two new 40-MW data centers, for each new market, every two years with the multiphase approach. In the baseline scenario, 80 MW of new capacity would be online after four years and 160 MW after eight years. In the accelerated scenario (enabled with the EcoStruxure solution), 80 MW of new capacity would come online after three years. Due to the new design and build cadence every two years, a total of 180 MW would be online after six years (see Figure 3).

Deployment characteristics. Prior to deploying the EcoStruxure solution, the composite organization relied on a combination of nonenterprise-level point solutions and semimanual approaches (physical monitoring of meters and devices with a clipboard entered into Excel) for operations management. For

Figure 3: Additional Data Center Capacity Buildout Scenarios (Six Years)



the design phase, the composite relied on an iterative process of submitting incremental design updated to the contracting firms.

In the baseline expansion scenario, the composite continues to rely on its prior methodology for data center design and operations. In the accelerated expansion scenario, the firm implements EcoStruxure EPMS and BMS software, and related hardware, based on the buildout of its expansion plans and the recommended configuration proposed by Schneider Electric.

In terms of the effective value gained from the EcoStruxure solution, the composite is assumed to derive 70% of the effective value in Year 1, 80% in Year 2, 90% in Year 3, and 100% in Year 4 onward. Forrester assumes that this is due to ongoing learnings from using a newer technological solution.

Key modeling assumptions. To quantify the economic and productivity benefits that the composite organization derives from the deployment of the EcoStruxure solution, Forrester uses the following set of assumptions in the financial model (calculated and summarized in the reference table on the next page):

- Pricing for data center services is generally on a per megawatt of annual capacity basis. Computing power, storage capacity, value-added cloud services, and geographic region are also determinants of price per megawatt (and by extension, revenue per megawatt).
- In the prior state, the composite generates an average of $750,000 per megawatt, based on the relative complexity of 20-MW data centers. At 200 MW of existing capacity, the composite has revenues of $150 million in Year 1.
- For the newer 40-MW data centers, the composite can price capacity at $1.6 million per megawatt based on industry averages across various geographies.[2] At the lower end of the scale, these range from $1,200 per megawatt in Chicago to $3,600 per megawatt in Singapore.
- In the baseline expansion scenario, total data center capacity goes from 200 MW in Year 1 to 300 MW in Year 6, with the incremental 100 MW generating $1.6 million per megawatt. Thus, revenues go from $150 million in Year 1 to $310 million in Year 6, reflecting a compounded annual growth rate (CAGR) of 15.6%.
- In the accelerated expansion scenario, total data center capacity expands by 170 MW (from 200 MW to 370 MW) by Year 6. In this scenario, revenues total $422.2 million in Year 6, reflecting a CAGR of 23.0%.
- In both scenarios, the composite's data centers are 90% utilized. At these revenue levels, a ten percent vacancy for data centers is about average on a global basis.

Key Assumptions

- **DC facilities provider**
- **Initially, 200 MW of capacity — revenues of $150 million**
- **Baseline expansion: total DC capacity of 300 MW, revenues of $310 million by Year 6**
- **Accelerated expansion: total DC capacity of 370 MW, revenues of $422 million by Year 6**

Detailed Composite Characteristics And Metrics								
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
R1	Data centers in operation: baseline expansion	Composite	10	10	12	12	14	14
R2	Overall data center capacity: baseline expansion (MW)	Composite	200	200	220	220	300	300
R3	Revenue: baseline expansion	Composite	$150 million	$155 million	$170 million	$205 million	$282 million	$310 million
R4	Revenue per megawatt: baseline expansion	R3/R2	$750,000	$775,000	$773,000	$932,000	$940,000	$1,033,000
R5	Employees (FTEs): baseline expansion	Composite	200	207	227	273	376	413
R6	DC operations team (FTEs): baseline expansion	Composite	13	15	17	19	21	23
R7	Data centers in operation: accelerated expansion	Composite	10	12	12	14	14	16
R8	Overall data center capacity: accelerated expansion (MW)	Composite	200	210	220	290	300	370
R9	Revenue: accelerated expansion	Composite	$150 million	$165 million	$190 million	$265 million	$330 million	$422 million
R10	Revenue per megawatt: accelerated expansion	R9 / R8	$750,000	$786,000	$864,000	$914,000	$1,100,000	$1,141,000
R11	Employees (FTEs): accelerated expansion	Composite	200	217	238	312	367	444
R12	DC operations team (FTEs): accelerated expansion	Composite	12	13	12	14	14	14
R13	Revenue per hour: accelerated expansion	Composite	$17,123	$18,836	$21,689	$30,251	$37,671	$48,196
R14	Effective value derived from EcoStruxure solution	Composite	70%	80%	90%	100%	100%	100%

Analysis Of Benefits

Quantified benefit data as applied to the composite

Total Benefits

Ref.	Benefit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Present Value
Atr	Improved time to revenue from design time efficiencies	$0	$448,000	$1,008,000	$3,360,000	$2,688,000	$6,283,200	$8,638,238
Btr	Avoided SLA penalties from improved uptime	$440,673	$473,476	$537,791	$915,593	$1,159,499	$1,796,643	$3,555,442
Ctr	Improved DC operations team efficiency	$123,138	$257,040	$609,138	$621,540	$852,138	$1,107,540	$2,360,836
Dtr	Utilities cost savings with EcoStruxure	$463,098	$502,791	$497,078	$451,570	$562,333	$719,445	$2,273,690
Etr	EPMS and BMS cost optimization	$945,000	$2,835,000	$1,890,000	$2,835,000	$1,890,000	$2,835,000	$9,332,219
	Total benefits (risk-adjusted)	$1,971,909	$4,516,307	$4,542,007	$8,183,702	$7,151,969	$12,741,828	$26,160,425

IMPROVED TIME TO REVENUE FROM DESIGN TIME EFFICIENCIES

Evidence and data. Traditional EPMS and BMS systems used by interviewees were not optimized for the design, build, and commissioning (collectively, the design stage) of data centers. Prior to the deployment of the EcoStruxure solution, interviewees' organizations did not have the capability to easily reuse templates for subsequent phases of the data center buildout (i.e., going from the initial 10-MW phase to the incremental phase 2 to phase 4 for the full 40-MW capacity, as outlined in the description of the composite organization). More critical to the design cycle was the stage at which the design would be handed off to the contractors building the innards of the data center facilities. The contractors often came back with changes for the layout of the facilities and equipment because of physical constraints or estimates about equipment form factors. Interviewees described this as a multimonth, iterative process.

With the installation of the EcoStruxure system, interviewee's engineering teams were able to save time during the design stage by dramatically reducing iterations between the design and contractor teams. With templates and EcoStruxure's global support teams, interviewees were able to optimize the subsequent phases of the data center buildout. Additionally, they described how having confidence in the design phase enabled them to preorder various components for equipping the data centers, which typically have long lead times. It is important to note that not all the time improvement was attributed solely to the usage of the EcoStruxure solution. There were processes and people's productivity that also contributed to the overall improvement.

- The building management applications director at a retail DC colocation services provider provided a comprehensive explanation of the improved design and deployment process: "What EcoStruxure allows us to do is build our own

Design cycle time reduction enabled by EcoStruxure solution

25% to 33%

templates and build our own configuration to go on to the BMS systems. … We will also say, 'As you deploy that site, here is the template for the generators and all of the different equipment.' You don't have to engineer from the start, so I would say by this use of templates, we are saving 80% of engineering time."

- The technical design manager at a DC development firm described the faster data center design process: "There is reduced design time as there is less engineering required to do the same thing again and again. By consolidating a standard, we improve the speed of design. Design time is money: The faster you do things, the cheaper it is."
- The technical design manager continued, "Our first two data halls took time, and then the second two data halls were a copy and paste of the first two, so we experienced a faster deployment and a smoother deployment, which is great."

Modeling and assumptions. This benefit focuses on how the composite improves time to revenue due to design efficiencies enabled by the EcoStruxure solution. For the composite organization, Forrester assumes the following (also shown in Table A below):

- Row A1 is determined by the baseline expansion outlined in the composite section, assuming $150 million in revenues in Year 1 from 200 MW of existing data centers (smaller-capacity data centers generating $750,000 of annual revenue per megawatt). As the incremental capacity of 40-MW data centers comes online, the revenue generated for new capacity only is computed at $1.6 million per megawatt annually.
- Similarly, row A2 reflects the revenue profile for the composite in the accelerated expansion scenario, similarly calculated and adjusted as row A1. The six-year CAGR for the accelerated expansion scenario is 23.0%, compared with 15.6% for the baseline expansion scenario, both of which are realistic for a rapidly expanding data center enterprise.
- As noted, the EcoStruxure solution contributes to the accelerated expansion scenario, but it is not the sole driver. Based on the interviews, Forrester assumes a 35% attribution for EcoStruxure. The net attribution, in row A3, is based on the effective value derived from deploying the EcoStruxure solution — different from attribution. The full 35% attribution level begins in Year 4 onward.
- The difference in revenues between the two scenarios is the quantified benefit attributable to the EcoStruxure solution. The decline in Year 4 from Year 3 is driven purely by the buildout assumptions (24 months vs. 18 months), with

"When we're deploying equipment, we can just go to our library and say, 'We've got a generator' and take out that configuration. Previously, we had no economy of scale as vendors needed to program that generator every single time."

Building management applications director, retail DC colocation

"Instead of six months, it will take one to two months for the contractor to develop or redevelop our drawings."

Head of solution architecture, engineering consulting services

each new market (comprising two 40-MW data centers) being started every two years.

- To determine the net business impact for the composite, the revenue benefit is converted into operating profit. Forrester assumes that the operating margin for the data center industry is 20%.
- For this benefit, the composite organization generates 29.3% of incremental revenues in Year 4, 17.0% in Year 5, and 36.2% in Year 6.

Risks. Forrester recognizes that these results may not be representative of all experiences and that the benefit will vary among organizations depending on the following:

- Revenue per megawatt is a key determinant of the revenues modeled under both scenarios. There is a wide range based on geography and the complexity of services offered.
- Operating margins will depend on the company and the data center services offered.

Results. To account for these risks, Forrester adjusted this benefit downward by 20%, yielding a six-year, risk-adjusted total PV (discounted at 10%) of more than $8.6 million.

Improved Time To Revenue From Design Time Efficiencies

Ref.	Metric	Source	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
A1	Revenue - baseline expansion	R3	$150 million	$155 million	$170 million	$205 million	$282 million	$310 million
A2	Revenue - accelerated expansion	R9	$150 million	$165 million	$190 million	$265 million	$330 million	$422 million
A3	Net attribution of EcoStruxure	Assumption	25%	28%	32%	35%	35%	35%
A4	Operating margin	Composite	20%	20%	20%	20%	20%	20%
At	Improved time to revenue from design time efficiencies	(A2-A1)* A3*A4	$0	$560,000	$1,260,000	$4,200,000	$3,360,000	$7,854,000
	Risk adjustment	↓20%						
Atr	Improved time to revenue from design time efficiencies (risk-adjusted)		$0	$448,000	$1,008,000	$3,360,000	$2,688,000	$6,283,200
	Six-year total: $13,787,200					**Six-year present value: $8,638,238**		

AVOIDED SLA PENALTIES FROM IMPROVED UPTIME

Evidence and data. Before adopting the EcoStruxure solution, interviewees reported that they lacked visibility into certain components of their data center power, cooling and IT infrastructure, power consumption, cooling efficiency, and/or equipment health. Without real-time monitoring and analytics capabilities, the interviewees struggled to identify potential issues and proactively address those that could lead to unplanned downtime. This lack of visibility increased the likelihood of unexpected failures or service disruptions, potentially resulting in SLA violations and penalties.

Interviewees shared that after the investment in the EcoStruxure solution, their organizations gained advanced monitoring and analytics tools that collect and analyze real-time data from various infrastructure components (IoT sensors, monitors, etc.). With this visibility, the organizations were able to identify potential risks — such as overload of redundant systems in failure mode, capacity constraints and/or management, performance issues, overheating components, and critical equipment requiring maintenance— and take proactive measures to prevent downtime and meet SLA commitments.

Interviewees also reported that EcoStruxure provides them with centralized management capabilities, empowering them to monitor and control their data center infrastructure from a single interface. This centralized view ensures that organizations can recognize and address anomalies with the ability to allocate maintenance resources with greatest flexibility.

- The engineering management director at a DC facilities provider described how the improved visibility delivered by EcoStruxure helped their organization address issues more quickly: “[EcoStruxure] allows us to see the event faster than having someone manually checking a system by completing facility walks. … All of our monitoring systems are configured in a state where you get an email and a system alert within minutes or seconds depending on the critical level that it hit. Their facility people are being dispatched and are at the equipment within 5 to 10 minutes versus half an hour.”
- The engineering management director went on to explain the business value of the improved monitoring capabilities: “The monitoring systems that we had on the building management side were in dire need of upgrades. The money that we spent with Schneider helped us complete all these upgrades and maintain a live production [without] any customer impact. It is worth the money — the money that you spend upfront to make sure that issues do not have an impact is a lot less money than you would spend if you did have impact.”
- The technical design manager at a DC development firm also stated: “The early warning alarms that are in place have allowed us to identify problems before they escalated. … The alarm priorities and the alarm levels that we defined with Schneider’s input have definitely helped us operationally.”

Modeling and assumptions. The focus of this benefit is the cost savings of reduced downtime, *partly* attributable to the EcoStruxure solution. For the composite organization, Forrester assumes the following (also shown in Table B below):

Reduction in annual downtime with EcoStruxure solution

0.5% to 0.6%

- The composite organization incurs SLA penalties of 95% of hourly revenue for unplanned downtime. Data centers operate 24/7. In Year 1, a per-hour SLA penalty would amount to $16,267; as the composite organization builds more higher-capacity data centers, per-hour penalties reach $45,786 by Year 6.
- In the prior state, the composite organization struggled to deliver uptime at 99.99% (four nines) due to lack of visibility into their existing data centers, thus incurring SLA penalty charges. For all incremental capacity added, the composite organization was able to deliver uptime at 99.999% (five nines) with the deployment of the EcoStruxure solution. Simultaneously, the existing 200MW of installed capacity was retrofitted, over the six years, to deliver 99.999% of uptime – consistent with higher capacity data centers.
- In Year 1, the composite organization incurs 43 hours of unplanned downtime: which is tracked across the entire 200MW of existing data center capacity; and is inclusive of a single rack or server outage, and not necessarily the entire data center availability at one time. This was computed by the difference of delivering 99.95% of uptime (vs. the 99.99% target) and adjusted for the number of locations and data centers (row B2). With retrofitting, this downtime for the legacy capacity scales down.
- By deploying incremental capacity with EcoStruxure for proactive visibility, the composite organization can avoid potential downtime in the accelerated expansion scenario. Based on similar assumptions, the composite organization avoids annual downtime of just under 25 hours by Year 6 (row B3) as new capacity comes online.
- For the combination of this avoided downtime (for legacy and incremental capacity) the EcoStruxure solution is attributed with 70% downtime reduction in Year 1 and scales to 80% by Year 6 (row B4). Given this attribution rate, no effective value of deployment of the EcoStruxture solution (R14) is applied for this benefit.
- Improved resiliency with the EcoStruxure solution enables the composite organization to eliminate between 0.5% and 0.6% of downtime hours annually, improving uptime by 30.1 hours in Year 1 and 43.6 hours in Year 6.

Risks. Forrester recognizes that these results may not be representative of all experiences, and the benefit will vary among organizations depending on the following:

- The frequency of unplanned downtime will depend on the scale and the maturity of the organization’s overall infrastructure.
- The hourly cost of downtime for any given organization will vary based on the industry, customer base, and regulatory requirements.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a six-year, risk-adjusted total PV of approximately $3.6 million.

Avoided SLA Penalties From Improved Uptime								
Ref.	**Metric**	**Source**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
B1	SLA penalty per hour for unplanned downtime	R13 * 95%	$16,267	$17,894	$20,605	$28,738	$35,787	$45,786
B2	Unplanned annual downtime for legacy DC capacity (hours)	Composite	43.0	39.4	36.3	33.5	31.6	29.9
B3	Avoided annual downtime for incremental new DC capacity (hours)	Composite	0.0	1.5	2.9	13.0	14.5	24.6
B4	EcoStruxure attribution	Assumption	70%	72%	74%	76%	78%	80%
B5	Net improved annual uptime with EcoStruxure (hours)	(B2+B3)*B4	30.1	29.4	29.0	35.4	36.0	43.6
Bt	Avoided SLA penalties from improved uptime	B1*B5	$489,637	$526,084	$597,545	$1,017,325	$1,288,332	$1,996,270
	Risk adjustment	↓10%						
Btr	Avoided SLA penalties from improved uptime (risk-adjusted)		$440,673	$473,476	$537,791	$915,593	$1,159,499	$1,796,643
	Six-year total: $5,323,674				**Six-year present value: $3,555,442**			

IMPROVED DC OPERATIONS TEAM EFFICIENCY

Evidence and data. Traditional EPMS and BMS systems require dedicated resources, both for monitoring status and physically reading and monitoring devices. Depending on the relative sophistication of the legacy solution, interviewees described how their organizations lacked intelligent monitoring and automation capabilities, which resulted in employees manually reading and reporting on meters — a relatively labor-intensive process. With the EcoStruxure solution, interviewees described how data center operations could be regionally centralized with a single pane of glass. Even as they expanded data center locations and facilities, interviewees were able to better leverage existing data center operations professionals.

In addition, interviewees reported that prior to adopting EcoStruxure, commissioning data centers was a slow, labor-intensive process. The commissioning phase involved multiple revisions and coordination efforts among stakeholders, leading to duplicate work, delays, and higher expenses.

Interviewees shared that EcoStruxure enabled their organizations to commission and operate data centers more efficiently and eliminate a great deal of manual tasks.

- The building management applications director at a retail colocation DC services provider described how EcoStruxure simplified the configuration process, allowing for more streamlined data center commissioning: “The BMS and EPMS system should be very much a click-and-configure and not an engineered solution every time. EcoStruxure is helping us achieve that goal.”

Productivity gain for DC operations staff

Year 4 → Year 6

26.3% → 39.1%

- The building management applications director also described additional savings from the deployment process: “In terms of the deployment, we don’t need to send people to the site. We’re saving money on flights and sending our engineers around. They can just sit at home, click a button, and get a complete overview of where the commissioning is.”
- The critical infrastructure program manager at a hyperscale cloud service provider broke down the time savings on managing infrastructure issues: “[EcoStruxure] does save a lot of time for the operations team to not run around and find the root cause of the problem. It provides visibility into the overall infrastructure and electrical infrastructure, so the operations team can focus on the right area if there is an issue.”
- The building management applications director at a retail colocation DC services provider detailed how EcoStruxure centralized the monitoring of data centers: “EcoStruxure allows us to pull data up to a campus level. We’ve got one country where 17 data centers can be monitored from a central point, so we effectively brought 17 teams down to one team.”
- The technical design manager at a DC development firm observed time savings from using EcoStruxure’s metering platform: “The metering platform definitely allows for improved reporting and improved speed of reporting. … The Power Monitoring Expert metering side of things does make that a lot easier than if it was a manual process.”

“We can now make minor tweaks depending on different buildings, and we can now templatize some of our tools. We’re not having to recreate the wheel every time we build a building.”

Engineering management director, DC facilities provider

“A consolidated EPMS and BMS affords the operatives faster response to problems and a more consistent approach to alarming which we’ve seen across all our sites. There’s almost certainly an operational benefit…”

Technical design manager, DC development

Modeling and assumptions. This benefit captures the labor savings from streamlined data center commissioning and management. For the composite organization, Forrester assumes the following (also shown in Table C below):

- By streamlining data center monitoring and management with EcoStruxure, the composite organization is able to devote fewer FTEs to managing data centers. By Year 6, the composite organization dedicates 14 FTEs to data center operations, whereas it would have needed 23 data center FTEs without EcoStruxure. This equates to 26.3% cost savings for data center operations professionals in Year 4 and a 39.1% reduction by Year 6.
- The composite organization also avoids sending data center FTEs to sites during the commissioning phase. In Year 2, Year 4, and Year 6 (years in which the composite organization commissions new data centers), the

organization avoids 240 FTE travel hours. The composite also reduces the number of data center FTE travel hours required in the design and build phase (Year 1, Year 3, and Year 5).

- The data center operations FTEs have an average fully burdened salary of $135,000 per year, or roughly $65 per hour.

Risks. Forrester recognizes that these results may not be representative of all experiences and that the benefit will vary among organizations depending on the following:

- The FTE savings, reflected between rows C1 and C2, will vary depending on the relative sophistication of the organization's data center operations team and the prior state.
- Average fully burdened salaries of data center operations employees and knowledge workers will mostly vary by geography.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a six-year, risk-adjusted total PV of just over $2.3 million.

Improved DC Operations Team Efficiency

Ref.	Metric	Source	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
C1	DC operations FTEs: baseline expansion	R6	13	15	17	19	21	23
C2	DC operations FTEs: accelerated expansion	R12	12	13	12	14	14	14
C3	Fully burdened annual salary of DC operations professional	TEI standard	$135,000	$135,000	$135,000	$135,000	$135,000	$135,000
C4	Subtotal: Labor cost savings during operations phase	(C1-C2)*C3	$135,000	$270,000	$675,000	$675,000	$945,000	$1,215,000
C5	Avoided operations team travel effort during commissioning (FTE hours)	Composite	28	240	28	240	28	240
C6	Fully burdened hourly salary of DC operations professional	TEI standard	$65	$65	$65	$65	$65	$65
C7	Subtotal: Labor cost savings during commissioning phase of build	C5*C6	$1,820	$15,600	$1,820	$15,600	$1,820	$15,600
Ct	Improved DC operations team efficiency	C4+C7	$136,820	$285,600	$676,820	$690,600	$946,820	$1,230,600
	Risk adjustment	↓10%						
Ctr	Improved DC operations team efficiency (risk-adjusted)		$123,138	$257,040	$609,138	$621,540	$852,138	$1,107,540
	Six-year total: $3,570,534				**Six-year present value: $2,360,836**			

UTILITIES COST SAVINGS WITH ECOSTRUXURE

Evidence and data. Interviewees reported that prior to the adoption of Schneider Electric's EcoStruxure solution, it was difficult to gain insights into the performance and efficiency of their data centers and to identify opportunities to reduce their utility costs. Interviewees noted that metering was a manual process, which often resulted in employees failing to recognize inefficient or wasteful equipment.

With EcoStruxure's EPMS and BMS solutions, the interviewees' organizations gained real-time monitoring and analysis of energy consumption across various systems and equipment in their facilities — for both noncomputational and computing equipment. The organizations used this data to identify trends, set energy-saving targets, and measure the effectiveness of implemented measures. By identifying energy-intensive areas and equipment, the organizations pinpointed opportunities for improvement and implemented energy-saving measures.

- The technical design manager at a DC development firm shared: "The software and metering approach and everything we feed back to the EPMS and BMS allows us to have an understanding of our energy usage. I like the fact that the EPMS and BMS are effectively one platform, and that definitely allows us to identify where we can make energy savings and how we can operate the facility better."
- The senior global program manager at a hyperscale cloud service provider noted:

"The information from the BMS and EPMS systems gives us enough clarity as to where we can make [utility cost] savings."

Technical design manager, DC development

"[EcoStruxure] provides us with visibility to see where we need to add more capacity and where we can move around the capacity. It's critical, and we use that data to meet our net-neutral target."

Modeling and assumptions. This benefit focuses on the cost savings the composite realizes by optimizing its utility costs. For the composite organization, Forrester assumes the following (also shown in Table D below):

- The composite organization has an annual revenue of $150 million in Year 1. As the organization expands its data center footprint, annual revenue reaches $422.2 million in Year 6 under the accelerated expansion scenario.
- The organization's utility costs for operating its data centers constitute 15% of annual revenue based on industry averages reported by public data center companies.
- Power usage effectiveness (PUE) is a ratio that measures the energy usage effectiveness of compute-intensive data centers. For a less energy-efficient data center, 50% of the overall energy consumption is used for computing, or a PUE of 1.8. Highly efficient data centers operate at a PUE of 1.2 or lower, with upward of 83% of energy being dedicated to computing.[3] It is assumed that by incorporating the EcoStruxure solution, the composite organization indeed

Gross cost savings on noncomputing utility expenses with EcoStruxure

22.5%

achieves a PUE of 1.2 in Year 6, while starting at a PUE of 1.8 in Year 1.

- The EcoStruxure solution enables the composite organization to reduce noncomputational utilities costs by 22.5% at a gross level. The net savings, in row D4, is based on the effective value derived from deploying the EcoStruxure solution. The full 22.5% reduction begins in Year 4 onward.
- It should be noted that even though the EcoStruxure solution partially enables the composite to improve its PUE from 1.8 to 1.2, this benefit does not quantify that impact.
- The composite retains 33% of the utility cost savings and passes the other 67% on to customers.

Risks. Forrester recognizes that these results may not be representative of all experiences and that the benefit will vary among organizations depending on the following:

- The utility cost savings will vary depending on an organization's energy consumption patterns, such as peak demand and usage during off-peak hours, as well as the condition of its existing infrastructure.
- Most data center services contracts provide for line-item billing of data center services and utilities expenses. Depending on the nature of these contracts, an organization might be limited in its ability to retain some of the utility cost savings. Forrester estimates that being a highly energy-efficient data center services provider would enable an organization to attract more business, even if 100% of the savings were to be passed on to customers. I.e., this benefit conservatively quantifies the overall benefit of being a highly energy-efficient data center services provider.
- Savings will also vary based on the ambition of an organization's energy optimization targets.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a six-year, risk-adjusted total present value of nearly $2.3 million.

Utilities Cost Savings With EcoStruxure

Ref.	Metric	Source	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
D1	Revenue: accelerated expansion	R9	$150 million	$165 million	$190 million	$265 million	$330 million	$422 million
D2	Annual utilities costs for operating data centers	D1*15%	$22 million	$24 million	$28 million	$39 million	$49 million	$63 million
D3	The ratio of noncomputing DC infrastructure costs to total utilities cost	Assumption	44%	38%	29%	17%	17%	17%
D4	Effective utilities cost savings with EcoStruxure	Interviews	15.75%	18.00%	20.25%	22.50%	22.50%	22.50%
D5	Percentage of savings retained by organization	Composite	33%	33%	33%	33%	33%	33%
Dt	Utilities cost savings with EcoStruxure	D2*D3* D4*D5	$514,553	$558,657	$552,309	$501,744	$624,814	$799,383
	Risk adjustment	↓10%						
Dtr	Utilities cost savings with EcoStruxure (risk-adjusted)		$463,098	$502,791	$497,078	$451,570	$562,333	$719,445
	Six-year total: $3,196,314				**Six-year present value: $2,273,690**			

EPMS AND BMS COST OPTIMIZATION

Evidence and data. Many interviewees had been using the Schneider Electric EcoStruxure solution for several years. Some of them still had institutional knowledge about how data center buildout was done in the past. The interviewees who had more recently switched to the EcoStruxure solution were previously using traditional EPMS and BMS systems — which were not well-suited for data centers — or making do with technicians walking around with clipboards and analyzing the data in Excel.

In general, interviewees stated that the investment in EcoStruxure — the software, the hardware, and the professional services to deploy the solution — was a hefty, multiyear capital investment. However, for the type of growth and data center footprint expansion that they had undertaken and were undertaking, it was either EcoStruxure or staying with a traditional EPMS or BMS system with less-sophisticated devices and a lack of centralized command and control.

Modeling and assumptions. The gist of this benefit is the incremental investment in an alternative legacy solution to meet the data center buildout under the baseline expansion scenario. For the composite organization, Forrester assumes the following (also shown in Table E below):

- The software and hardware cost of an alternative BMS system is assumed to be $3.50 per square foot. Industry sources provide a range of $2.50 to $7.00 per square foot.[4]
- The average area for the composite's new data centers is 300,000 square feet (compared to a range of 200,000 to 500,000 square feet).

EPMS And BMS Cost Optimization

Ref.	Metric	Source	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
E1	Data centers 1 and 2: legacy EPMS and BMS software and hardware	Market sources	$420,000	$1,260,000	$420,000	$0	$0	$0
E2	Data centers 1 and 2: legacy EPMS and BMS installation/ commissioning services	Market sources	$630,000	$1,890,000	$630,000	$0	$0	$0
E3	Data centers 3 and 4: legacy EPMS and BMS software and hardware	Market sources	$0	$0	$420,000	$1,260,000	$420,000	$0
E4	Data centers 3 and 4: legacy EPMS and BMS installation/ commissioning services	Market sources	$0	$0	$630,000	$1,890,000	$630,000	$0
E5	Data centers 5 and 6: legacy EPMS and BMS software and hardware	Market sources	$0	$0	$0	$0	$420,000	$1,260,000
E6	Data centers 5 and 6: legacy EPMS and BMS installation/ commissioning services	Market sources	$0	$0	$0	$0	$630,000	$1,890,000
Et	EPMS and BMS cost optimization	E1+E2+E3+ E4+E5+E6	$1,050,000	$3,150,000	$2,100,000	$3,150,000	$2,100,000	$3,150,000
	Risk adjustment	↓10%						
Etr	EPMS and BMS cost optimization (risk-adjusted)		$945,000	$2,835,000	$1,890,000	$2,835,000	$1,890,000	$2,835,000
	Six-year total: $13,230,000				**Six-year present value: $9,332,219**			

- Forrester estimates that the EPMS and BMS hardware and software costs comprise 40% of the overall expenses for the solution. The remaining 60% is for the professional services required for installation and configuration.
- Thus, a 40-MW data center, fully built out over four years under the baseline expansion scenario, would cost $2.625 million: $1.05 million for the EPMS and BMS hardware and software, and $1.575 million for the installation services expenses. Two 40-MW data centers, outfitted simultaneously, would be twice those amounts.
- Leveraging the outlay of the EcoStruxure solution on a per-40-MW data center buildout in Cost F, Forrester assumes 20% of the overall spending occurs in the first year, 60% in the second year, and 20% in the third year. The distribution of the hardware plus software and professional services expenses is maintained with the 40% to 60% mix, respectively.

Risks. Forrester recognizes that these results may not be representative of all experiences and that the benefit will vary among organizations depending on the following:

- The cost per square foot will vary by the type of legacy EPMS and BMS solution, as well as the geographical location of the data centers being built (especially the professional services component).
- The square footage of each new data center will depend on the type of data center facility and the services being offered.

Results. To account for these risks, Forrester adjusted this benefit downward by 10%, yielding a six-year, risk-adjusted total present value of over $9.3 million.

UNQUANTIFIED BENEFITS

Interviewees mentioned the following additional benefits that their organizations experienced but were not able to quantify:

- **Streamlined processes from working with a single vendor.** Interviewees reported that the unified EcoStruxure solution simplified data center operations and reduced the complexity of having to deal with multiple vendors. While stated in different ways, the synergy between the EcoStruxure software and the hardware resulted in a more robust and resilient solution that could not be easily quantified.
    - The head of solution architecture at an engineering consulting services firm described the benefits of a single supplier managing each of their data center components: "When you have repairs from Schneider, you have cooling units, power supplies, panel boards, BMS controllers, and EPMS software all from one company. It's simpler. You're talking to one company that will provide a full solution."
    - The critical infrastructure program manager at a hyperscale cloud service provider reiterated that having an all-in-one solution made managing data center operations easier: "It's the overall consistency. It's not like we get the software from one company and then the hardware from some other. … It's one package, so that helps a lot."
- **Fostered a beneficial relationship with Schneider Electric.** Interviewees reported that Schneider Electric's customer support team helped them fully leverage the EcoStruxure solution, simplifying troubleshooting and configuration. A unique aspect of Schneider's support team is its consistency of coverage across global geographies, which is critical for a global data center services provider looking to build new data centers on the same template.
    - The engineering management director at a DC facilities provider described the ongoing support they receive from Schneider Electric: "We have a dedicated support person who knows our system inside and out. They know all the ways that we customize things to our standards. When we call them with an application bug, they know how [we] configure our calculations, alarms, and graphics. They have a good idea how to troubleshoot, and if they don't, they can expedite the process to a higher-level engineer."
    - The technical design manager at a DC development firm discussed how Schneider Electric shared examples of other customer stories to help them configure their metering devices and alarms. They said, "What has really helped us was being able to leverage Schneider's experience with other customers to set up alarms and help us create our own platform to facilitate that."

"They listen to what we are trying to do for our customers. They allow me to sit down with their technicians, describe the use cases, and they come back with solutions to our problems. No other vendor is currently willing to do that."

Building management applications director, retail DC colocation services

- **Improved security.** Some interviewees noted that they leveraged EcoStruxure's digital security tools to improve their overall security posture. Stated another way, the data security protocols for a data center facility are critical, and having software and IoT devices with built-in security capabilities can be invaluable. The building management applications director at a retail colocation DC services provider shared: "We work very closely with Schneider on making sure that the internal software we use is secure from any unwanted activity. A flexible system that can cover both monitoring and data-logging needs and security [was] the primary driver for selecting [EcoStruxure]."
- **Standardized system design.** Some interviewees also reported that Schneider Electric's subject matter experts and centralized engineering capabilities ensured that their facilities were designed in a consistent manner, even when deployed in different regions, reducing operational risk. The building management applications director at a retail colocation DC services provider said, "We are now developing to a standard where a site in Croatia looks exactly the same as a site in London and a site in Madrid."

Analysis Of Costs

Quantified cost data as applied to the composite

Total Costs									
Ref.	**Cost**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Present Value**
Ftr	External: EcoStruxure software and hardware configuration and services	$1,585,500	$1,585,500	$5,232,150	$5,232,150	$4,851,630	$4,851,630	$3,424,680	$19,541,298
Gtr	Internal: deployment, training and ongoing support expenses	$62,920	$100,540	$133,091	$105,240	$142,946	$111,521	$151,841	$595,971
	Total costs (risk-adjusted)	$1,648,420	$1,686,040	$5,365,241	$5,337,390	$4,994,576	$4,963,151	$3,576,521	$20,137,269

EXTERNAL: ECOSTRUXURE SOFTWARE AND HARDWARE CONFIGURATION AND SERVICES

Evidence and data. Interviewees stated that their organizations purchased their EcoStruxure solution on a bundled basis that included software, hardware, and professional services. Given the complexity of configuring EPMS and BMS software with related hardware and wrapped with services, Forrester relied on Schneider Electric to provide detailed pricing information.

- Pricing for EPMS and BMS software is based on perpetual licensing, modulated by number of users and complexity of the configuration.
- Pricing for EcoStruxure hardware is based on the types and number of devices recommended for the configuration for optimal operations and energy and temperature monitoring.
- Professional services for supporting the deployment of the EcoStruxure solution, including during the design, commissioning, and operating phases, is generally based on a data center megawatt-capacity basis.

Modeling and assumptions. For the composite organization, Forrester assumes the following (also shown in Table F below):

- The overall pricing for the configuration and data center buildout (for the accelerated expansion scenario) is based on a per-megawatt basis.
- EcoStruxure hardware and software accounts for 60% of the per-megawatt pricing, while professional services account for 40%.
- Schneider Electric provided pricing for the configuration and expansion of the composite organization. Phase 1 (of four) for a new data center is typically more expensive as more support areas — such as offices, cafeterias, and conference rooms — are typically included in the initial build. Phases 2 through 4 are typically less expensive as they generally focus solely on the expansion of core infrastructure. For subsequent data centers, the cost decreases due to reduced engineering requirements based on reuse of designs.

- Based on these assumptions, Forrester models $10.3 million for the EcoStruxure solution for the two new data centers initiated in Year 1 and $9.2 million for the two new data centers initiated in Year 3 and Year 5.
- Pricing may vary. Contact Schneider Electric for additional details.

Risks. Forrester recognizes that these results may not be representative of all experiences and that the costs will vary among organizations depending on the following factors:

- The nature of the data center configuration and the buildout timeline will vary by customer.
- Whether or not an organization chooses to purchase hardware directly from Schneider Electric, an authorized distributor, or DIY.

Results. To account for these risks, Forrester adjusted this cost upward by 5%, yielding a six-year, risk-adjusted total PV (discounted at 10%) of just over $19.5 million.

External: EcoStruxure Software And Hardware Configuration And Services

Ref.	Metric	Source	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
F1	Data centers 1 and 2: software and hardware	Schneider Electric pricing	$906,000	$906,000	$2,174,400	$2,174,400	$0	$0	$0
F2	Data centers 1 and 2: installation/commissioning services	Schneider Electric pricing	$604,000	$604,000	$1,449,600	$1,449,600	$0	$0	$0
F3	Data centers 3 and 4: software and hardware	Schneider Electric pricing	$0	$0	$0	$815,400	$1,956,960	$1,956,960	$0
F4	Data centers 3 and 4: installation/commissioning services	Schneider Electric pricing	$0	$0	$0	$543,600	$1,304,640	$1,304,640	$0
F5	Data centers 5 and 6: software and hardware	Schneider Electric pricing	$0	$0	$0	$0	$815,400	$815,400	$1,956,960
F6	Data centers 5 and 6: installation/commissioning services	Schneider Electric pricing	$0	$0	$0	$0	$543,600	$543,600	$1,304,640
Ft	External: software and hardware configuration and services	F1+F2+ F3+F4+ F5+F6	$1,510,000	$1,510,000	$4,983,000	$4,983,000	$4,620,600	$4,620,600	$3,261,600
	Risk adjustment	↑5%							
Ftr	External: software and hardware configuration and services (risk-adjusted)		$1,585,500	$1,585,500	$5,232,150	$5,232,150	$4,851,630	$4,851,630	$3,424,680
	Six-year total: $26,763,240					**Six-year present value: $19,541,298**			

INTERNAL: DEPLOYMENT, TRAINING, AND ONGOING SUPPORT EXPENSES

Evidence and data. Interviewees stated that using the EcoStruxure system (especially the software) in operational mode was relatively straightforward. They stated that there would be some upfront training for new users.

Despite the fact that the installation and commissioning of the EcoStruxure solution involves an investment in professional services with Schneider Electric, as outlined in Cost F above, there was also effort required by the data center operations staff for their organizations.

Modeling and assumptions. For the composite organization, Forrester assumes the following (also shown in Table G below):

- For the initial deployment, the composite organization utilizes five full-time data center operations professionals working 8 hours per day for four weeks in the initial period (for the two new 40-MW capacity DCs). With the two-year cadence to break ground on new data centers, the FTE count is three professionals working 8 hours per day over four weeks.
- Training time for new users of EcoStruxure software is 8 hours per year. Users of the software include data center operations staff and other users comprising 15% to 20% of the composite's workforce over six years.
- For its ongoing operations usage, the composite utilizes three FTEs who dedicate 20% of their time to monitoring and using the EcoStruxure software from regionally centralized locations.
- The data center operations FTEs have an average fully burdened salary of $135,000 per year, or roughly $65 per hour. Other software users requiring training may be compensated slightly less, but the internal cost of the solution (Cost G) is only about 3% of the overall cost.

Risks. Forrester recognizes that these results may not be representative of all experiences and that the benefit will vary among organizations depending on:

- The size of the organization, the specific configuration of the EcoStruxure solution, and the data center buildout timeline.
- The relative expertise of the organization's data center professionals.

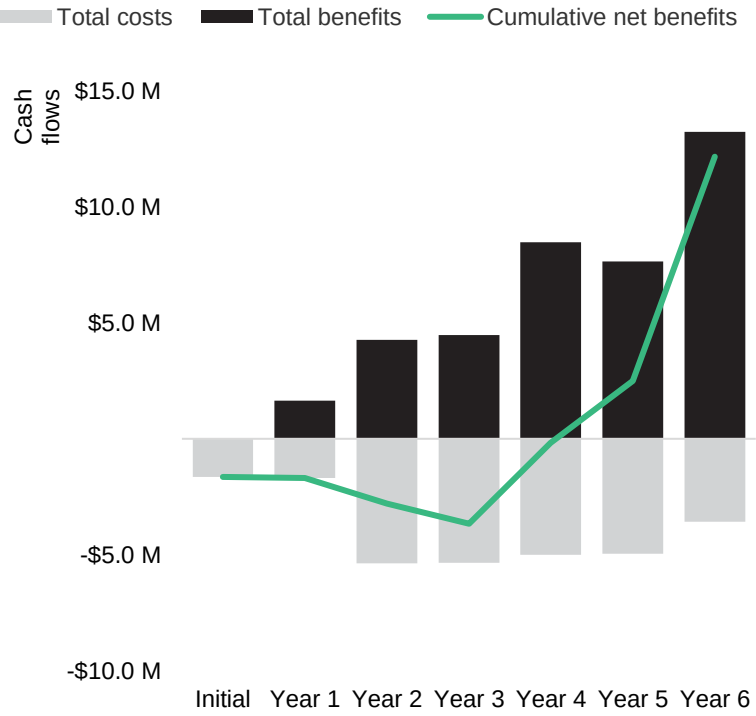
Results. To account for these risks, Forrester adjusted this cost upward by 10%, yielding a six-year, risk-adjusted total PV of just under $596,000.

Internal: Deployment, Training, And Ongoing Support Expenses									
Ref.	**Metric**	**Source**	**Initial**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
G1	EcoStruxure software and hardware: initial deployment time (hours)	Composite	160	0	160	0	160	0	160
G2	FTEs for deployment	Interviews	5	0	3	0	3	0	3
G3	Fully burdened hourly salary of DC operations professional	TEI standard	$65	$65	$65	$65	$65	$65	$65
G4	Training time for new users (hours/year)	Composite	8	8	8	8	8	8	8
G5	New users of EcoStruxure software	Composite	10	20	17	28	34	39	50
G6	Effective number of FTEs for ongoing support	Composite	0	0.6	0.6	0.6	0.6	0.6	0.6
G7	Fully burdened annual salary of DC operations professional	TEI standard	$135,000	$135,000	$135,000	$135,000	$135,000	$135,000	$135,000
Gt	Internal: deployment, training, and ongoing support expenses	(G1*G2+ G4*G5*G3)*G6*G7	$57,200	$91,400	$120,992	$95,673	$129,951	$101,383	$138,037
	Risk adjustment	↑10%							
Gtr	Internal: deployment, training, and ongoing support expenses (risk-adjusted)		$62,920	$100,540	$133,091	$105,240	$142,946	$111,521	$151,841
	Six-year total: $808,099					**Six-year present value: $595,971**			

Financial Summary

CONSOLIDATED SIX-YEAR RISK-ADJUSTED METRICS

Cash Flow Chart (Risk-Adjusted)



The financial results calculated in the Benefits and Costs sections can be used to determine the ROI, NPV, and payback period for the composite organization's investment. Forrester assumes a yearly discount rate of 10% for this analysis.

These risk-adjusted ROI, NPV, and payback period values are determined by applying risk-adjustment factors to the unadjusted results in each Benefit and Cost section.

Cash Flow Analysis (Risk-Adjusted Estimates)

	Initial	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total	Present Value
Total costs	($1,648,420)	($1,686,040)	($5,365,241)	($5,337,390)	($4,994,576)	($4,963,151)	($3,576,521)	($27,571,339)	($20,137,269)
Total benefits	$0	$1,971,909	$4,516,307	$4,542,007	$8,183,702	$7,151,969	$12,741,828	$39,107,722	$26,160,425
Net benefits	($1,648,420)	$285,869	($848,934)	($795,384)	$3,189,126	$2,188,818	$9,165,307	$11,536,383	$6,023,156
ROI									30%
Payback									48 months

Appendix A: Total Economic Impact

Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

TOTAL ECONOMIC IMPACT APPROACH

Benefits represent the value delivered to the business by the product. The TEI methodology places equal weight on the measure of benefits and the measure of costs, allowing for a full examination of the effect of the technology on the entire organization.

Costs consider all expenses necessary to deliver the proposed value, or benefits, of the product. The cost category within TEI captures incremental costs over the existing environment for ongoing costs associated with the solution.

Flexibility represents the strategic value that can be obtained for some future additional investment building on top of the initial investment already made. Having the ability to capture that benefit has a PV that can be estimated.

Risks measure the uncertainty of benefit and cost estimates given: 1) the likelihood that estimates will meet original projections and 2) the likelihood that estimates will be tracked over time. TEI risk factors are based on "triangular distribution."

The initial investment column contains costs incurred at "time 0" or at the beginning of Year 1 that are not discounted. All other cash flows are discounted using the discount rate at the end of the year. PV calculations are calculated for each total cost and benefit estimate. NPV calculations in the summary tables are the sum of the initial investment and the discounted cash flows in each year. Sums and present value calculations of the Total Benefits, Total Costs, and Cash Flow tables may not exactly add up, as some rounding may occur.

PRESENT VALUE (PV)

The present or current value of (discounted) cost and benefit estimates given at an interest rate (the discount rate). The PV of costs and benefits feed into the total NPV of cash flows.

NET PRESENT VALUE (NPV)

The present or current value of (discounted) future net cash flows given an interest rate (the discount rate). A positive project NPV normally indicates that the investment should be made unless other projects have higher NPVs.

RETURN ON INVESTMENT (ROI)

A project's expected return in percentage terms. ROI is calculated by dividing net benefits (benefits less costs) by costs.

DISCOUNT RATE

The interest rate used in cash flow analysis to take into account the time value of money. Organizations typically use discount rates between 8% and 16%.

PAYBACK PERIOD

The breakeven point for an investment. This is the point in time at which net benefits (benefits minus costs) equal initial investment or cost.

Appendix B: Supplemental Material

Online Resources

Tier Classification System, Uptime Institute, LLC

Thane Moore, Data Center Energy Consumption & Power Sources, Enconnex, August 31, 2023

6 Benefits of Building Management Systems Automation You're Overlooking, BuildingsIOT, January 31, 2024

Oliver Farrell, Why EPMS Is Key To The Future of Data Centre Management, Hanley Energy, March 19, 2020

John Atherton, BMS versus EPMS — How to Get the Best of Both Systems, July 27, 2022

Appendix C: Endnotes

[1] Total Economic Impact is a methodology developed by Forrester Research that enhances a company's technology decision-making processes and assists vendors in communicating the value proposition of their products and services to clients. The TEI methodology helps companies demonstrate, justify, and realize the tangible value of IT initiatives to both senior management and other key business stakeholders.

[2] Source: Global Data Center Trends 2023, CBRE, July 14, 2023.

[3] Source: High-Performance Computing Data Center Power Usage Effectiveness, National Renewable Energy Laboratory (NREL).

[4] Source: Laura Miller, Balancing Average Building Management System Costs and ROI Estimates, BuildingsIOT; How Much Does a Building Management System Cost?, Mid-Atlantic Controls Corp., December 6, 2022.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