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1.0 Executive Summary

The Schneider Electric Critical Power & Cooling Services (CPCS) EnergySTEP Data Center Assessment is a highly customizable, yet easy to order, onsite assessment of the data center. The focus of this comprehensive service is to uncover the most significant deficiencies in the power, cooling, physical infrastructure and operating efficiency of the IT white space. One of the key values includes benchmarking the efficiency and energy maturity of the data center in accordance with The Green Grid Data Center Maturity Model recommendations.

Schneider Electric certified service professionals will come to your facility and meet with your team, understand your specific concerns/issues, review your energy expenses and conduct a detailed data center evaluation using advanced data collection and analytical tools.

Schneider Electric data center experts will then thoroughly analyze the data collected and produce a highly graphical comprehensive report illustrating the findings and highlighting areas of concern, along with specific recommendations for improvement with potential savings and ROI estimates.

Customers can choose the full EnergySTEP offer suite, or can choose to fully customize their offer by only selecting those deliverables, which meet their specific needs; regardless, the EnergySTEP Data Center Assessment is the perfect solution for customers who want to identify the most significant issues affecting energy use and availability in their data center IT white space.

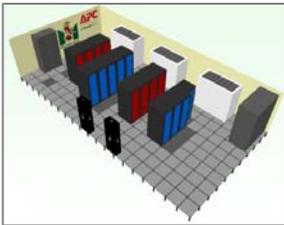
2.0 Available Features & Benefits

Features	Benefits
Data Center Maturity Model Equalizer	Determines Data Center Maturity Level in accordance with The Green Grid. Identifies ongoing steps to achieve greater efficiency and sustainability improvements both today and into the future along with specific recommendations for improvement with potential savings and ROI estimates
Energy Efficiency Analysis	Details energy utilization within the data center. Provides Energy Efficiency summary and KPI calculations (PUE, kWh, carbon, etc.) Highlights areas offering the greatest potential for possible savings and carbon footprint reduction
Energy Mapping	Identifies power consumption from the utility to the main PDU
Cooling Capacity Analysis	Provides a detailed analysis of the cooling capacity and air management of the data center, along with specific recommendations to optimize performance, reduce power consumption and improve efficiency.
Data Center Configuration and Air Management	Details IT Room configuration, Rack characteristics, Identifies hot Spots, Air Management and Air Distribution characteristics mapping and ASHRAE recommendations.
Thermographic Analysis	Provides a visual representation of excessive rack inlet temperatures and hot spots using thermal imaging photography.
CFD Analysis	Provides a color coded three-dimensional modeling of the airflow velocity and air temperatures within the data center.

3.0 Assessment Deliverables Selection

The Schneider Electric EnergySTEP Data Center Assessment Service offers a full analysis and customized report of the data center findings. The deliverables listed in the tables below represent the suite of assessment options customers can consider. Select boxes have been provided next to each deliverable, customers can use this feature to select the deliverables they want included in their assessment. To fully develop an assessment report that best suits their needs, customers should consult with their Schneider Electric (SE) Energy Management Services (EMS) Consultant and/or SE Sales contact.

Note: The minimum recommended deliverables have been highlighted in the list.



Customer Report and Presentation Method Deliverable Selection		
Select	Deliverables	Description
<input checked="" type="checkbox"/> Recommend	Standard Customer Report	<ul style="list-style-type: none"> Presents the data center findings and recommendations Includes floor plans, data charts and graphical representations Provided in a Microsoft PowerPoint presentation format
	Detailed Customer Report	<ul style="list-style-type: none"> Comprehensive in-depth detailed report presented in Microsoft Word format, provides all data measurements, analysis, illustrations, pictures and floor plan updates
<input checked="" type="checkbox"/> Recommend	In Person Review Meeting	<ul style="list-style-type: none"> Meet directly with the Customer team (i.e. Executive Level Managers, Data Center Manager, Facility Manager, etc) Present report overview Present findings and recommendations Discuss next steps
	Customer Teleconference Report Review Meeting	<ul style="list-style-type: none"> Teleconference meeting with the Customer team (i.e. Executive Level Managers, Data Center Manager, Facility Manager, etc) Present report overview via Net Meeting, Webex, etc Present findings and recommendations Discuss next steps
Assessment Deliverable Selection		
Select	Deliverables	Description
<input checked="" type="checkbox"/> Recommend	Energy Efficiency Analysis	<ul style="list-style-type: none"> Energy Efficiency summary and KPIs (carbon, kWh, \$, etc) Energy Efficiency Ranking Level, PUE and DCiE calculations, Carbon Analysis, Energy Reuse Factor (ERF) calculations, Other Usage Effectiveness (carbon/water usage, xUE etc.), Optimization recommendations.
<input checked="" type="checkbox"/> Recommend	Energy Mapping to the Data Center	<ul style="list-style-type: none"> Detailed power consumption mapping from utility to the IT room (main PDU) Cooling power vs. external temperature Air Management and air conditioning systems Electrical distribution, UPS, Cooling system and redundancy Cooling production coefficient of performance (COP)
	Energy Mapping to the Rack	<ul style="list-style-type: none"> Detailed power consumption mapping from the utility to each rack's PDU. (This option identifies the consumption or power density of each rack.) This provides a detailed power consumption mapping from the utility to the rack in addition to the detailed power consumption mapping from utility to the IT room (main PDU).

Recommend	Cooling Capacity Analysis	<ul style="list-style-type: none"> Provides a detailed analysis of the cooling capacity and air management of the data center, along with specific recommendations to optimize performance, reduce power consumption and improve efficiency, includes thermogram illustration.
	Data Center Configuration and Air Management	<ul style="list-style-type: none"> IT Room configuration (description, horizontal density and plan), Rack characteristics (vertical and power density), Identify hot Spots with thermography, Air Management chart (leakage measurements, RTI/RCI calculations), Air Distribution characteristics and mapping (Thermogram and 3D model), ASHRAE recommendations (temperature and humidity compliance map).
	The Green Grid Data Center Maturity Model Equalizer	<ul style="list-style-type: none"> Determines Data Center Maturity Level in accordance with the Green Grid, Identifies ongoing steps to achieve greater efficiency and sustainability improvements both today and into the future along with specific recommendations for improvement with potential savings and ROI estimates.
	Technical Infrastructure Detailed Description	<ul style="list-style-type: none"> Data Center layout floor plan Electrical facility summary Cooling facility summary Equipment description
	Capacity Analysis	<ul style="list-style-type: none"> Defines power and cooling capacity of the current infrastructure regarding redundancy level and Tier design reliability, calculate the available load for: <ul style="list-style-type: none"> Electrical distribution (utility, transformers, UPS's, PDU's, etc.) Mechanical cooling plant (chillers, condensers, etc.) Air Flow Management (CRAC, CRAH, etc.) Vertical (U) and horizontal space Recommendations to improve the appropriate levels of resilience and availability
	Reliability / Availability Analysis	<ul style="list-style-type: none"> Reviews maintenance records and identifies main threats to the uptime of power and cooling components. Defines power and cooling capacity of the current infrastructure redundancy level.
	Thermographic Analysis	<ul style="list-style-type: none"> Provides a visual representation of excessive rack inlet temperatures and hot spots using thermal imaging photography.
	CFD Analysis	<ul style="list-style-type: none"> Computational Fluid Dynamics analysis of the data center, provides a comprehensive 3D model of the air flow with temperature and velocity

4.0 On Site Assessment Activities

The Schneider Electric EnergySTEP Data Center Assessment Service offers a comprehensive list of onsite activities. The specific activities listed in the tables below represent a suite of onsite activities that can be conducted. The actual activities conducted on site will depend on the Customer Assessment Deliverables selections. Customers will want to consult with their SE EMS Consultant and/or SE Sales contact to fully develop an assessment that best suits their needs.



On Site Assessment Activities	
Initial Meeting	
Activities	Description
Review Meeting	<ul style="list-style-type: none"> SE Sales and EMS meet with the Data Center Manager Understand concerns and issues Set expectations Define process Identify input requirements Detail expected outputs
Utility Expense Review	<ul style="list-style-type: none"> Understand availability of current data center utility expenses, if not readily available, plan for utility expense calculations.
Data Center Documentation Review	<ul style="list-style-type: none"> Review the availability of data center documentation such as: <ul style="list-style-type: none"> Data Center Floor Plan with Rack/Row Layout Power Distribution One Line Diagram Cooling Network One Line Diagram Data Center Maintenance/Service Records If required documentation is not readily available, plan for creation of the required documents.
Data Center Measurements Review	<ul style="list-style-type: none"> Understand if multiple days will be required to collect all of the necessary data measurements.
Data Center Measurements	
Activities	Description
Capture Weather Conditions	<ul style="list-style-type: none"> Identify external and internal temperatures
Cooling Electrical Power	<ul style="list-style-type: none"> Determine power usage (kW) of CRACs, Pumps, Chillers, Air Handlers, Air Condensers, etc.
CRAC Characteristics	<ul style="list-style-type: none"> Identify CRAC manufacturer data and age, airflow, temperatures, humidity, set points, etc.
IT Room Layout	<ul style="list-style-type: none"> Identify IT Room size (LxWxH) Map IT Room Floor plan
IT Room Temperature Characteristics	<ul style="list-style-type: none"> Measure IT Room temperature and humidity at optimum location(s)
Main Electrical Panel Board Measurement	<ul style="list-style-type: none"> Determine voltage, current and power factor readings at the MEPB for all data center subsystems, i.e. UPS, CRACs, Pumps, Chillers, Air Handlers, Air Condensers, etc.
Perforated Tile Measurement	<ul style="list-style-type: none"> Map perforated tile locations Measure perforated tile airflow and temperature Identify possible obstructions and restrictions
Power Meter Measurement	<ul style="list-style-type: none"> Capture power usage measurements from Power Meter(s)
Pump and Chiller Characteristics	<ul style="list-style-type: none"> Identify Pump and Chiller manufacturer data and age Identify Pump and Chiller water flow Identify Pump and Chiller inlet and outlet pressure



Rack Power Characteristics	<ul style="list-style-type: none"> Determine power density and rack unit capacity for each rack
Rack Temperature Characteristics	<ul style="list-style-type: none"> Measure Rack inlet and exhaust temperatures and humidity Identify potential issues with the racks
UPS Battery Characteristics	<ul style="list-style-type: none"> Identify Battery manufacturer data, age and potential issues
UPS Characteristics	<ul style="list-style-type: none"> Identify UPS manufacturer data and age, kVA rating, input and output power and potential issues with the UPS
Review Meeting	<ul style="list-style-type: none"> Populate the required inputs for the Green Grid Maturity Model from The Green Grid General review before departing the site

5.0 Exclusions

The following items are outside the scope of this standard service offering. They can be integrated into a customized Statement of Work (SOW) at request of the customer. Contact an SE sales representative for more details.

- Specialized testing or commissioning
- Fire detection and fire suppression
- Physical security
- Structural analysis
- Circuit Tracing

6.0 Scope of Responsibility

The items stated here are responsibilities of both APC and the customer.

6.1 APC RESPONSIBILITIES

- Assign an Energy Management Specialist to the project
- Initiate a preliminary meeting to:
 - Review the assessment process and deliverables
 - Establish project stakeholders and key contacts
 - Request prerequisite items
- Provide a detailed EnergySTEP Data Center Assessment Proposal, which includes the agreed upon deliverables, preliminary schedule and associated pricing. Note: The customer specific proposal will supersede this Statement of Work.
- Schedule assessment and manage the complete assessment process
- Perform the assessment of the customer site
- Provide a written report to the customer based on the completed field survey

6.2 CUSTOMER RESPONSIBILITIES

- Complete and return the Assessment Preparation Questionnaire if applicable
- Provide a single point of contact to assist during assessment
- Notify SE of any security clearance, safety or other certification requirements prior to arrival on-site
- Allow the use of cameras, lap tops, thermal and air flow measurement tools within the data center
- Provide physical access to the data center, all infrastructure support areas and electric panels to be surveyed per the assessment activities list.
- Provide qualified personnel required to access the power systems within the data center and those feeding the data center from outside. Access to data center power systems will include:

- Uninterruptible Power Supplies
- Power Distribution Units
- Switchgear
- Service Entrance
- Breaker Panels
- Generator
- Lighting system
- Provide qualified personnel required to access the cooling systems within the data center and those feeding the data center from outside. Access to data center cooling systems will include:
 - Computer Room Air Conditioners/Handlers
 - Humidifiers
 - Chiller plant
 - Pumps
 - Cooling towers
- Provide an electrician to open electrical panels and connect metering equipment
- Remove floor panels and provide sub-floor access

7.0 Customer Order Information

- SKU: **WQES2-EM-01** EnergySTEP Data Center Assessment

SKU may not be available in all countries/regions. Consult with your local SE Sales agent for availability verification.

Pricing for the EnergySTEP Data Center Assessment varies depending on data center size, equipment, power capacity, cooling capacity, available existing documentation and location of the data center. To receive a price quote for your data center assessment please contact your SE EMS Consultant or your local SE sales representative.

8.0 Project Work Details

The following details of the project specify the schedule, location and successful completion criteria.

8.1 SCHEDULE

All onsite services performed by SE are executed during the normal business hours of SE. Exceptions are national or provincial holidays. Services performed outside of normal working hours may incur additional charges.

The service will be scheduled as quickly as possible, at the convenience of the customer. Delays in fulfilling the service caused by labor disputes of third parties, customer contracted services, or other unforeseen conditions may affect the schedule. SE will not be responsible for delays related to circumstances outside of its control.

8.2 ASSESSMENT PROCESS TIMELINE AND FLOW

- Customer Purchase Order received by SE
- Site assessment scheduled with customer through SE EMS office
- Meet with IT, facility management and SE to coordinate the site visit
- SE Performs the data center assessment at the customer location
- Data is analyzed and Customer Assessment Report completed
- Customer Report presentation scheduled
- Customer Report presented



The actual and specific dates will be determined when the service is scheduled through the SE Advanced Services office.

8.3 LOCATION

The location of this project will be onsite. It will be discussed and approved by SE and the customer.

8.4 COMPLETION CRITERIA

SE will have completed its duties when any of the following occurs:

1. SE completes all the items described in the approved customer proposal.
2. This project and SOW are terminated for other reasons, within the SE Customer Agreement. Termination fees may apply.

9.0 Terms and Conditions

SE standard Terms and Conditions apply.

The information provided in this Statement of Work cannot be used or duplicated, in full or in part. Other uses for this document are prohibited without written consent from SE.

All documentation, photographs, thermal imaging or other information provided by the customer, or gathered at the customer site, will be for internal SE use only and used solely for the purpose of report generation, analysis and recommendations.

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