



# Statement Of Work

# Data Center Electrical Efficiency Assessment

Professional Services

Service



## 1.0 Executive Summary

The Data Center Electrical Efficiency Assessment provides analysis of the data center power and cooling infrastructure to determine the operating efficiency of the data center.

APC Professional Service consultant will document the existing infrastructure, determine the efficiency and provide an accurate assessment of the factors limiting the achievable efficiency of the data center.

The service consultant will provide a comprehensive report that will make recommendations for changes to maximize efficiency including:

- The assessment and analysis of the existing electrical efficiency in the data center.
- The breakdown of losses into power, cooling, and lighting losses.
- The breakdown of the cooling system losses into Computer Room Air Conditioners / Computer Room Air Handlers (CRAC/CRAH), humidification and outdoor heat rejection losses.
- The breakdown of the power system losses into Uninterruptible Power Supply (UPS) and power distribution.
- Detailed recommendations to improve the efficiency of the data center.
- Projected efficiency gains for each recommended improvement.

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## 2.0 Features & Benefits

Features	Benefits
Comprehensive data center efficiency assessment report	Reports efficiency values for the data center. Identifies inefficient systems and provides detailed recommendations for efficiency improvement.
Measurement of actual data center power flows	Documents the existing power flows in the data center infrastructure and identifies inefficient systems.
Recommendations to improve efficiency	Lower energy costs while maintaining or improving availability.
Break out of IT power consumption from total data center power consumption	Determines the amount of electricity consumed by the data center for every watt of power drawn by the IT equipment. This facilitates apportionment of the total electrical costs, including cooling, to the IT systems, and back-billing to users.
Estimated efficiency gains	Enables return on investment (ROI) calculations for capital expenditures and optimizes operating expenditure for power usage in the data center.



## 3.0 Details of Service

The specific activities of this service are listed below. For each item, APC will perform the work described.

Data Collection	
Activities	Description
Data Center Infrastructure Characterization	Inventory and record the operational characteristics of the electrical infrastructure including: <ul style="list-style-type: none"> <li>• Utility input</li> <li>• UPS</li> <li>• Power Distribution Units (PDU)</li> <li>• Static Switches</li> <li>• Automatic Transfer Switches</li> <li>• Others as required</li> </ul>
	Inventory and record the operational characteristics of the cooling infrastructure including: <ul style="list-style-type: none"> <li>• CRAC/CRAH</li> <li>• Air distribution systems</li> <li>• Heat rejection systems</li> <li>• Pumps</li> <li>• Humidifiers</li> <li>• Others as required</li> </ul>
	Identify data center power, cooling or facilities infrastructure that limit efficiency or reduces operational effectiveness of the data center.
	Inventory and record data on specific concerns, unusual conditions, or other issues identified by data center operations.
Data Center Power	Using the data center one-line diagram, create a list of all measurements required to accurately characterize the power use of the data center infrastructure elements. APC will review the measurement plan with the data center operator prior to the site visit.
	Instrument and measure power flows on all required equipment and systems without interruption of the circuits, according to the measurement plan.
	Identify and collect data from the existing measurement systems, if available.

Data Center Efficiency Analysis	
Activities	Description
Identify Inefficient Systems	Analyze power infrastructure and identify conditions that adversely affect system efficiency, including: <ul style="list-style-type: none"> <li>• Utility input</li> <li>• UPS</li> <li>• Power Distribution Units (PDU)</li> <li>• Static Switches</li> <li>• Automatic Transfer Switches</li> <li>• Transformers</li> </ul>
	Analyze the cooling infrastructure and identify the conditions that adversely affect the system efficiency, including: <ul style="list-style-type: none"> <li>• Heat rejection systems</li> <li>• Pumps</li> <li>• Humidifiers</li> </ul>
	Characterize and analyze the air distribution system within the data center white space, including: <ul style="list-style-type: none"> <li>• Identify the air distribution methodology.</li> <li>• Identify inefficient design or operation of the air distribution system.</li> <li>• Assess the condition of the CRAC/CRAH units.</li> <li>• Measure the CRAC/CRAH utilization.</li> <li>• Identify counter productive modes of the CRAH/CRAC units.</li> </ul>
Compute Efficiency	At the time of the assessment, compute the efficiency of the data center using the PUE measurement metric.
Analysis and Recommendations	Provide a summary of the total data center power and the IT load.
	Identify all design, installation, or operating practices of the data center that compromise efficiency, including power infrastructure, cooling infrastructure and facilities.
	Break down the power and cooling systems into their subsystems components and provide power usage data for each.
	Provide recommendations to improve data center efficiency within the constraints supplied by the customer.
	Provide projected efficiency improvements for each recommendation to facilitate ROI calculations and capital expenditure justification.
	Identify general data center conditions and make recommendations for improvement where applicable.

## 4.0 Deliverables

APC will deliver a comprehensive data center assessment report to the customer which includes:

- Determination of the data center electrical efficiency.
- Identification of inefficient systems, equipment and processes within the data center.
- Detailed recommendations to increase efficiency.
- An optional follow-up conference call to review the report and answer questions.

## 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 the request of the customer. The customer should contact a certified APC sales representative for more details.

- Direct measurement of voltages above 600 VAC.
- Opening of panels with an arc-flash rating of 600 VAC or higher.
- Installation of temporary or permanent power monitoring equipment.
- Design of a more efficient data center.
- Analysis of IT, power or cooling equipment efficiency.

## 6.0 Scope of Responsibility

### 6.1 APC RESPONSIBILITIES

- Assign a Professional Services Fulfillment Manager to the case.
- Initiate a meeting to:
  - Review the assessment process and deliverables.
  - Establish project stakeholders and key contacts.
  - Review the Assessment Preparation Questionnaire to identify customer specific existing conditions and issues within the data center.
- Schedule an assessment and manage the complete assessment process through the APC Professional Services office.
- Perform an assessment of the customer site.
- Provide a written report of the completed field survey to the customer.

### 6.2 CUSTOMER RESPONSIBILITIES

- Complete and return the Assessment Preparation Questionnaire. This will identify issues or problems within the data center needing specific, detailed analysis and recommendations.
- Provide physical access to the data center, all infrastructure support areas and electric panels to be surveyed per the measurement requirements 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.
- Notify APC of any security clearance, safety or other certification requirements prior to arrival on-site.
- Provide a single point of contact to assist during assessment.

## 7.0 Project Work Details

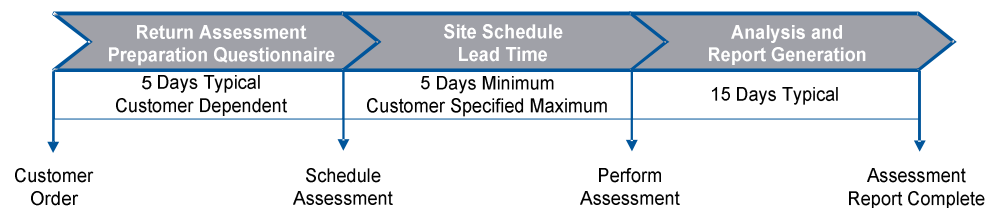
The following details of the project specify the schedule, location and successful completion criteria.

### 7.1 SCHEDULE

1. All onsite services performed by APC are executed during the normal business hours of APC. Exceptions are national or provincial holidays. Services performed outside of normal working hours may incur additional charges.
2. 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. APC will not be responsible for delays related to circumstances outside of its control.

### 7.2 ASSESSMENT PROCESS TIMELINE AND FLOW

- Customer Purchase Order received by APC.
- Assessment Preparation Questionnaire completed and returned to APC.
- Site assessment scheduled with customer through APC Professional Services office.
- Meet with IT, facility management and an APC representative to coordinate the site visit.
- APC performs the site assessment at the customer location.
- Customer Site Assessment Report completed.



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

### 7.3 LOCATION

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

### 7.4 COMPLETION CRITERIA

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

1. APC completes all the items described in the Deliverables section of this SOW.
2. This project and SOW are terminated for other reasons, within the APC Customer Agreement. Termination fees may apply.

## 8.0 Pricing

Part Number: QWPAEFFICIENCY-MISC

Pricing for the Data Center Electrical Efficiency 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 application please visit [www.apc.com](http://www.apc.com) or contact your local APC sales representative.

## 9.0 Terms and Conditions

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