

Power Usage Effectiveness Survey Service Schedule

Support... Planned and contracted maintenance services

To ensure that data centre or building services are always operating to their full potential Workspace Technology recommends the deployment of regular planned preventative maintenance programmes which are backed up with emergency callout for unplanned failures.

To compliment our data centre planned preventative maintenance services we also recommend an annual Power Usage Effectiveness 'PUE' Survey where there is no fixed metering or measurement technology in place.

Power Usage Effectiveness Survey Service Overview

Power Usage Effectiveness (PUE) Assessment

Metering the total energy used at a site is important, but it does not show how energy consumption is being used across an area or for a specific function e.g. a data centre facility. Without measurement it can be hard to understand why and where energy performance is poor and how to improve it.

As detailed within the basic audit if we are able to take relevant readings from existing meters we will be able to provide a "snapshot" PUE rating for the room. If these readings are not available then it will only be possible to undertake a rating of the room through the deployment of the PUE Assessment service.

Depending on the specific site requirements a 'snapshot' survey can be done however for a more accurate assessment we will require recording equipment to be left in place for a week or more.

The PUE Assessment enables I.T and data centre managers to accurately benchmark the Power Usage Effectiveness** (PUE), Data Centre Infrastructure Efficiency** (DCiE) and usage of the server room environment through direct analysis of power and energy consumption.

$$\text{Power Usage Effectiveness (PUE)} = \frac{\text{Total Facility Power}}{\text{I.T Equipment Power}}$$

and it is reciprocal, the DCiE is defined as:

$$\text{Data Centre Infrastructure Efficiency (DCiE)} = \frac{\text{I.T Equipment Power}}{\text{Total Facility Power}}$$

**Data Centre Infrastructure Efficiency / Power Usage Effectiveness are industry recognized standards for data centre room efficiency measurement introduced by the Green Grid.

I.T Equipment Power

This includes the load associated with all of the I.T equipment, such as compute, storage and network equipment, along with supplemental equipment such as KVM switches, monitors, and workstations/laptops used to monitor or control the data centre.

Total Facility Power

This includes everything that supports the I.T equipment load such as:-

- Total I.T equipment power
- Power delivery components such as UPS, switch gear, generators, PDU's batteries, and distribution losses external to I.T equipment
- Cooling systems components such as chillers, computer room air conditioning units, direct expansion air handler (DX) units, pumps, and cooling towers
- Other misc. loads including lighting, BMS panels etc.

PUE Assessment Deployment benefits

- Assists in reducing energy consumption, minimising environmental and economic impacts associated with excessive energy use
- Confirmation of Data Centre DCiE / PUE efficiency ratings
- Accurate proof of the effectiveness of any "claimed" energy efficiency deployments throughout the life of the facility
- Measurement of energy consumption, critical load trends, power quality and response time of emergency power plant
- Opportunities to improve a server room or data centres operational efficiency
- Shows how a server room or data centre compares to other internal or competitive facilities.

Audit Report Schedule of Works

Frequency Yearly (minimum recommended frequency).

Item	Service Detail
1	Assess existing power configuration to determine measurement points and to create the Measurement Plan. Note there will be multiple measurement points required to undertake the PUE Assessment.
2	Agree monitoring period, typically this will be over a 7 day period.
3	Electrician to attend site to connect CT clamps and install recorder equipment as per the agreed measurement plan.
4	Electrician to attend site to disconnect CT clamps and remove recorder information.
5	Engineer to download recorded information, analyze and generate PUE reading report with associated recommendations.

Note

Where clients prefer a permanent Energy / PUE measurement capability Workspace Technology recommends the deployment of our EcoMeasure solution. EcoMeasure will provide on going 24x365 measurement of PUE, DCiE and general room electrical performance information required for reporting energy efficiency statistics or assessing the impact of new technology or infrastructure changes.

Additional Data Centre Services

Workspace Technology offers a range of data centre audit and survey services. These services may be specified as a result of a Data Centre Audit or as part of a comprehensive Data Centre planned preventative maintenance and support package.

Service	Details
Electrical Thermal Imaging Survey	Detailed thermal imaging survey of data centre electrical systems and equipment. This survey will help identify unseen faults on electrical systems which can cause expensive business downtime, damage, loss of data or risk from fire.
Power Quality Survey	A comprehensive Power Quality Survey & Analysis service is designed to help: <ul style="list-style-type: none"> • Identify and quantify harmonic related problems • To investigate 'flicker', 'sag' and other phenomena • Confirm electricity supply voltage levels • To identify Power Factor levels • Check loads before planned changes to distribution • To record the data needed to assess G5/4-1 compliance
Data Centre Audit	The Data Centre Audit service is designed to provide a comprehensive review of the existing data centre or server room facility. This review is designed to help identify both good and bad practice and help clients reduce the risk of downtime.
Airflow & Room Thermal Imaging Survey	The Airflow and Thermal Imaging Survey enables data centre managers to identify problems with cooling capacity and airflow efficiency. The survey includes the following: <ul style="list-style-type: none"> • Room assessment and layout plan • Thermal imaging photos of each aisle and photographic images of each cabinet • Air velocity pressure survey (airflow through each 600x600 vented floor tile) • Temperature and humidity check at low, medium and high levels on each aisle • Flow & return temperature and humidity check on the air conditioning units

Further details on audit services can be found in individual audit and survey schedules.

Notes On Audit Schedule

All work mentioned in the schedule is carried out subject to Workspace Technology's Terms and Conditions of sale.

The audit schedules shown are based on a standard and will not be applicable to every installation for every item listed. Consequently each task has to be qualified by the term; "if it is safe so to do", "if applicable" , "if possible" and "if appropriate".

It is possible that your specific installation may have additional or specialised equipment not mentioned in this schedule. In that case, the specific equipment would be the subject of addenda to the main contract.

Tasks mentioned in the schedule may also be omitted if Workspace Technology's engineers or its appointed agents deem that it is unsafe to carry out that task or that it may jeopardise the security of electrical supply.

