SURVEYOR™

Measurement and Verification Protocol

The measurement and verification (M&V) protocol incorporated in SURVEYOR adheres to the International Performance Measurement & Verification Protocol (IPMVP). This standard is used globally to provide best practice techniques for verifying results of energy efficiency.

Following IPMVP ensures that an accurate baseline is computed and that the actual energy savings are derived by regularly referencing to the baseline.

SURVEYOR enforces your power management settings then measures and quantifies the amount of energy consumed by the PC network via a client-server application. The collated data is regularly saved to a server database to generate analysis for reports that can show energy consumption over any given period of time.

Verifying those savings will prove that the installed measures are really working and provide information to measure your business progress against environmental and financial KPIs.

The SURVEYOR software from IPEM is engineered with a robust set of data collection and reporting features to provide measurable and verifiable information that details energy consumption, energy savings and cost savings.

SURVEYOR Measurement and Verification:

Step 1: Current Process Review & Measurement
Step 2: Establish Baseline Annual Energy Use
Step 3: Establish Post-Installation Annual Energy Use
Step 4: Calculate Energy Savings
Step 5: Calculate Corresponding kW Reductions

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SURVEYOR Measurement and Verification:-

Step 1: Current Process Review & Measurement

Determine the different types of PCs used throughout your organisation and whether or not there are any current means of centrally controlling and measuring the power states of those computers.

Step 2: Establish Baseline Annual Energy Use

Working with you, IPEM will establish an inventory of your PC equipment, including both CPUs and monitors. Either national average consumption values for the specific hardware or actual energy consumption measurements from each of the PCs and monitors on the network are then tabled for each of their power states. A simplified example for a theoretical environment of 6,000 PCs with three primary CPU and monitor configurations is shown below:

Type of Equipment	Number of Units	Watts consumed			
		On	Standy	Hibernate	Off
CPUs					
CPU Type 1	2000	55	25	4	2
CPU Type 2	2000	45	20	2	2
CPU Type 3	2000	60	35	8	2
Average PC Energy Consumption		**53.3**	**26.6**	**4.6**	**2**
Monitors					
Monitor type 1	2000	60	0	n/a	0
Monitor type 2	2000	48	0	n/a	0
Monitor type 3	2000	55	1	n/a	0
Average Monitor Energy Consumption		**54.3**	**0.3**	**-**	**0**

To establish the baseline energy usage, you use SURVEYOR to collate usage data without changing your current energy management policies. Data is collected for two consecutive weeks. A simplified example for an average set of power states for the CPU and monitors are shown in the tables below:

Type of Equipment	Hours per CPU	Watts consumed	kWh per unit in 24 hours	Annual kWh per unit
CPU's				
On	10	53.3	0.533	194.54
Standby	2	26.6	0.053	19.42
Hibernate	2	4.6	0	0
Off	12	2	0.024	8.76
Total Monitor Consumption	**24**		**0.610**	**222.72**

Type of Equipment	Hours per CPU	Watts consumed	kWh per unit in 24 hours	Annual kWh per unit
Monitors				
On	10	54.3	0.543	198.16
Standby	2	26.6	0.0006	0.22
Off	12	2	0	0
Total Monitor Consumption	**24**		**0.544**	**198.38**

By determining the amount of time each PC spends in each of its energy states, SURVEYOR can precisely calculate the actual network energy consumption and enable businesses to establish optimum power management settings that minimize user impact yet maximize energy savings.

The data collection process will also provide you with invaluable information about how various groups of users interact with their PCs. You will be collating data at a granular level not just across three theoretical groups. The usage information will be important for identifying the appropriate energy policies that should be implemented for any given group of users.

The analysis provides a summary of the Daily energy consumed for the theoretical network :

Type of Equipment	Daily kWh per unit	Annualised kWh per unit	Annualised Network (kWh) consumption
CPU's	0.610	222.72	1,336,630
Monitors	0.544	198.38	1,190,280
Total Network Consumption	**24**	**421.10**	**2,526,600**

SURVEYOR has a robust internal data collection and reporting system that makes all of these calculations automatically and provides diverse reporting capabilities for administrators of the product. The tables above depict annualized consumption data derived from baseline data typically collected over a period of 2-4 consecutive weeks. This is a period of sufficient length to capture user trends and anomalies that might impact data collection efforts of shorter duration.

Step 3: Establish Post-Installation Annual Energy Use

Using the data from the baseline consumption analysis the I-PEM consulting team will work with your team to fully understand how various groups of PC users within the network utilize their machines.

I-PEM will provide a detailed review of software and BIOS settings to help in the configuration of systems and the network, to facilitate low power states in the computers.

Together, we will create your energy management user groups and profiles within SURVEYOR to gain energy savings without impacting user productivity. These configurations will ensure that PCs properly use low power states when users are away and appropriately powered down in the evenings, on weekends, and on holidays.

For a period of 2 consecutive weeks SURVEYOR will both enforce energy policies and continue to collect data that will enable an accurate 'post-installation' energy consumption level to be established. The collection, circulation, and reporting of data occurs in an identical fashion to that of the baseline period.

For example, the energy consumption for the theoretical 6,000 PC network after SURVEYOR energy policies are enabled would be:

Type of Equipment	Hours per CPU	Watts consumed	kWh per unit in 24 hours	Annual kWh per unit
CPU's				
On	5	53.3	0.267	97.46
Standby	5	26.6	0.133	48.55
Hibernate	3	4.6	0.014	5.11
Off	11	2	0.022	8.03
Total CPU Consumption	**24**		**0.436**	**159.14**

Type of Equipment	Hours per CPU	Watts consumed	kWh per unit in 24 hours	Annual kWh per unit
Monitors				
On	5	54.3	0.272	99.28
Standby	8	0.3	0.0001	0.088
Off	11	0	0	0
Total Monitor Consumption	**24**		**0.272**	**99.32**

Type of Equipment	Daily kWh per unit	Annualised kWh per unit	Annualised Network (kWh) consumption
CPU's	0.436	159.14	954,840
Monitors	0.272	99.32	595,920
Total Network Consumption	**24**	**258.46**	**1,550,760**

Step 4: Calculate Energy Savings

Savings levels are simply the difference between the baseline and the post-installation consumption levels Savings.
Applying this formula to the data sets used in the theoretical example yields a saving of **975,840** kWh per annum.
Or 162kWh per PC per annum.
Using your energy supplier billing tables we can demonstrate the financial savings that SURVEYOR will make on your overheads.

Step 5: Calculate Corresponding kW Reductions

The data collected during the baseline and post-implementation data collection can be further analyzed to determine SURVEYOR's impact on demand and kW reductions.
SURVEYOR collects data in a way that enables "time of day' analysis, providing an opportunity to define the amount of kW reductions that can be attributed to SURVEYOR activities.
The detailed data that SURVEYOR collects ensures that your IT and Energy teams will have the information necessary to report on energy savings and to ensure that their energy policies are as effective as possible.

What do other companies have to say about SURVEYOR?

"*Its unique combination of functionality and flexibility gives SURVEYOR the broadest applicability of any power-management software we are aware of and the potential to extract the maximum energy savings…with minimal disruption to worker productivity.*"

Platts, a division of The McGraw-Hill Companies

"*Based on the results of a metering study, SURVEYOR generally appeared to properly shut down the computers and monitors, leading to energy savings.*"

Quantec (commissioned by the Northwest Energy Efficiency Alliance)
visit http://www.quantecllc.com/?page=tools&action=about_quantec
Quantec, Market Progress Awareness Report 2: SURVEYOR, Software, May 2004

"*All configurations saved between 15% and 60% of total energy consumed during the period. The software operated seamlessly, and was easy to install*"

Advanced Energy
visit http://www.quantecllc.com/?page=tools&action=about_quantec
Quantec, Market Progress Awareness Report 2: SURVEYOR, Software, May 2004

Currently, SURVEYOR monitors and controls the energy use of more than 400,000 PCs worldwide saving their owners more than $32 million, and saving the environment from 276,000 tons of carbon dioxide emissions—the equivalent of taking 34,000 cars off the road.

Try it out

We have an evaluation solution called a Computer Energy Consumption Analysis (CECA) so that we can test on an agreed sample of PCs to assess the current energy consumption and demonstrate the level of savings that can be made.

This works by measuring the current power consumption, which we call the Baseline Power Calculation. By introducing SURVEYOR onto the sample of PCs, IPEM can demonstrate the savings possible across your entire organisation both in terms of financial cost savings with a ROI analysis and the reduction in carbon emissions.