

*Tivoli Endpoint Manager for Power
Management Calculations Guide*



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Introduction

Tivoli Endpoint Manager Power Management provides users with policy-driven solutions to manage power consumption of endpoints to reduce energy costs. Behind the features of Power Management are various calculations that are subject to several assumptions and scenarios, depending on how the features are utilized.

The Power Management Calculation Document provides you with references to the assumptions and formulas that are used by its key features that include the following:

- Model Power Savings
- Power Consumption Over Time
- Daily Activity State Breakdown
- Power Management Settings
- Weekly Power Consumption Over Time
- Weekly Idle Time Breakdown

Calculations Used in Power Management

Power Management uses calculations in its dashboards, wizards, and reports.

Model Power Savings

The *Model Power Savings* report shows the estimated power consumption savings of your deployment if every endpoint has the following power profile values set.

Power Profile	Potential Standby Settings	
	System	Monitor
Minimal	Never	60 Min
Moderate	60 Min	30 Min
Aggressive	30 Min	10 Min

You can choose to view daily, weekly, monthly, or yearly potential power consumption savings.

The bar chart in the report shows the Potential Total Savings or the Potential Average Savings Per Computer on each of the endpoints in terms of the cost (in dollars) for the following application scenarios:

- Minimal
- Moderate
- Aggressive Power Profile

Current Yearly Power Consumption

Power Consumption statistics for your deployment:

	All Computers	Average
Power	2,485 kWh	1,242 kWh
Cost	\$199	\$99
Carbon	3,479 lb	1,739 lb

The report also displays the current power consumption.

Current Yearly Power Consumption

Power Consumption statistics for your deployment:

	All Computers	Average
Power	2,485 kWh	1,242 kWh
Cost	\$199	\$99
Carbon	3,479 lb	1,739 lb

Current Yearly Power Consumption

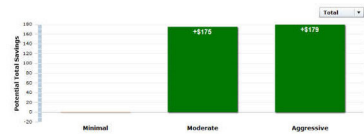
Table 1. Total Power Consumption per day

Total Power Consumption for a day	Calculation
Power (in kWh)	Sum of values of analysis property Computer Power Usage in kWh / Day
Cost	Sum of values of analysis property Computer Power Usage in Cost / Day
Carbon	Sum of values of analysis property Computer Power Usage in CO2 / Day

- Scenario 1: Minimal power profile applied on all the end points (Calculated on a per day basis initially)
- Scenario 2: Moderate Power Profile applied on all the end points (Calculated on a per day basis initially)
- Scenario 3: Aggressive Power Profile applied on all the end points (Calculated on a per day basis initially)

Calculation measures used for potential power savings

There are three possible scenarios when applying the potential power savings: minimal, moderate, and aggressive.



The following image shows the Potential Total Savings and Potential Average Savings Per Computers for each of the 3 scenarios.

Power Profile	Potential Standby Settings		Potential Total Savings			Potential Average Savings Per Computer		
	System	Monitor	Power	Cost	Carbon	Power	Cost	Carbon
Minimal	Never	60 Min	-5 kWh	\$0	-6 lb	-2 kWh	\$0	-3 lb
Moderate	60 Min	30 Min	+2,165 kWh	+\$175	+3,059 lb	+1,093 kWh	+\$87	+1,530 lb
Aggressive	30 Min	10 Min	+2,242 kWh	+\$179	+3,139 lb	+1,121 kWh	+\$90	+1,570 lb

- Scenario 1: Minimal power profile applied on all the end points (Calculated on a per day basis initially)

Table 2. Potential Total Savings when a moderate power profile is applied on all the end points.

Potential Total Savings	Formula
KwH	Total Current Power Consumption (in KwH) - Total Power Consumption if Minimal Power Profile was applied on all the end points => Total Current Power Consumption (in KwH) – Scenario Usage for Minimal power profile scenario (in KwH)
Cost	Total Current Power Consumption (in Cost) - Total Power Consumption if Minimal Power Profile was applied on all the end points => Total Current Power Consumption (in Cost) – Scenario Usage for Minimal power profile scenario (in Cost)
CO2	Total Current Power Consumption (in CO2) - Total Power Consumption if Minimal Power Profile was applied on all the end points => Total Current Power Consumption (in CO2) – Scenario Usage for Minimal power profile scenario (in CO2)

- Scenario 2: Moderate Power Profile applied on all the end points (Calculated on a per day basis initially)

Table 3. Potential Total Savings when a moderate power profile is applied on all the end points.

Potential Total Savings	Formula
KwH	Total Current Power Consumption (in KwH) - Total Power Consumption if Moderate Power Profile was applied on all the end points => Total Current Power Consumption (in KwH) – Scenario Usage for Moderate power profile scenario (in KwH)
Cost	Total Current Power Consumption (in Cost) - Total Power Consumption if Moderate Power Profile was applied on all the end points => Total Current Power Consumption (in Cost) – Scenario Usage for Moderate power profile scenario (in Cost)
CO2	Total Current Power Consumption (in CO2) - Total Power Consumption if Moderate Power Profile was applied on all the end points => Total Current Power Consumption (in CO2) – Scenario Usage for Moderate power profile scenario (in CO2)

- Scenario 3: Aggressive Power Profile applied on all the end points (Calculated on a per day basis initially)

Table 4. Potential Total Savings when an aggressive power profile is applied on all the end points.

Potential Total Savings	Formula
KwH	Total Current Power Consumption (in KwH) - Total Power Consumption if Aggressive Power Profile was applied on all the end points
	=> Total Current Power Consumption (in KwH) – Scenario Usage for Aggressive power profile scenario (in KwH)
Cost	Total Current Power Consumption (in Cost) - Total Power Consumption if Aggressive Power Profile was applied on all the end points
	=> Total Current Power Consumption (in Cost) – Scenario Usage for Aggressive power profile scenario (in Cost)
CO2	Total Current Power Consumption (in CO2) - Total Power Consumption if Aggressive Power Profile was applied on all the end points
	=> Total Current Power Consumption (in CO2) – Scenario Usage for Aggressive power profile scenario (in CO2)

The Potential Average Savings Per Computer (in KwH, Cost, CO2) = Potential Total Savings (in KwH, Cost, CO2) / Total number of computers

The Daily, Weekly, Monthly and Yearly savings are calculated by multiplying the daily savings by 1, 7, 30 and 365 respectively.

The computer breakdown chart displays the breakdown of computers in the deployment according to notebooks, desktops, and servers. The computers are categorized using the Computer Type [ID 25] analysis property.

Power Consumption Over Time

The Power Consumption Over Time web report captures the following information:

- the average power consumption data (in terms of cost, power, or carbon) per computer over a selected period of time
- the average savings realized compared to the average cost on the start date

You can set the parameters that the report will cover. The image shows that the selected Report Grouping Policy and Report Groups were for 'All Computers', covering the Start Date of 04/29/2012 and the End Date of 06/04/2012.

Power Consumption Over Time*
Printable Version ::
Save Report
Save Report As

Filter
Save Filter
Load Filter
Clear

Edit Source

Description:
The following report shows the average power consumption data (in cost, power, or carbon) per computer over a selected period of time. It also shows the average savings realized compared to the average cost on the start date.

Select the reporting groups on which to report:
Report Grouping Policy: All Computers
Report Groups: Find Group names containing:

☒ All Computers

Select All
Deselect All

Show results for: ☒ Notebooks ☒ Desktops ☒ Servers
Consumption Period:
Start Date 04/29/2012 End Date 06/04/2012
Generate Report

General Assumptions used

The calculations in the report are made with the following assumptions:

- A “Missing data” error is reported when the selected start date or end date has no historical data.
- If there is no data available for a specific day, they are excluded from the calculation of Total Consumption and Savings.

Calculation measures used for average power consumption data

The *Detailed Cost (\$) per Computer History* section of the report shows values for cost (\$), power (kWh), and carbon (lb) consumption per computer in graph and tabular (embedded) format.

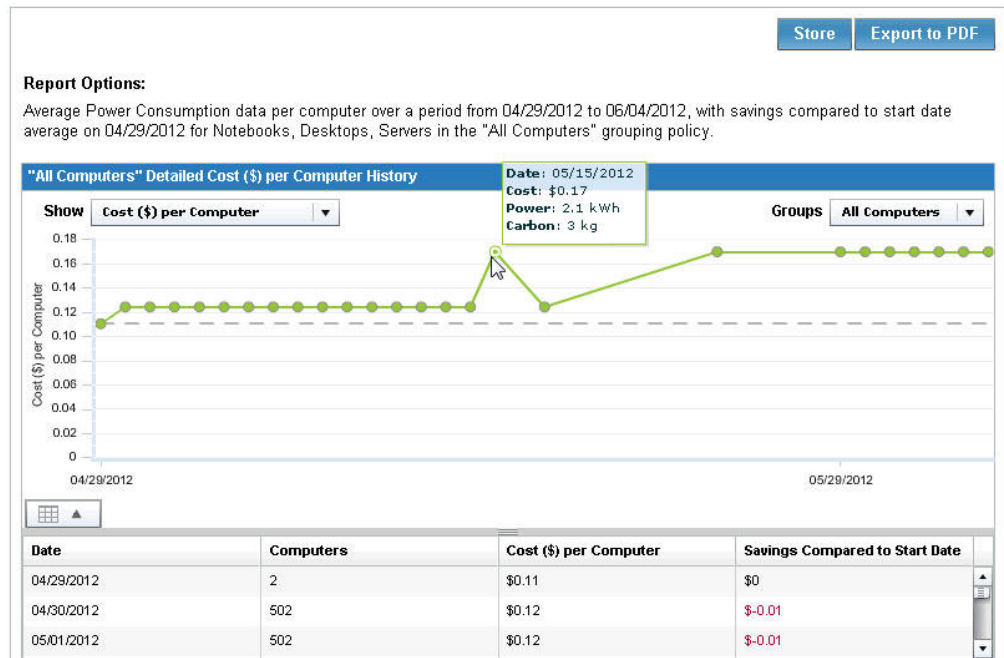
- **Power Consumption per computer, for a specific date (In terms of Power (kWh), Cost (\$), and Carbon (lb))**

The average of analysis property “Computer Power Usage in kWh/Day” (or Computer Power Usage in CO2/Day or Computer Power Usage in Cost/Day, depending on the selected measure) over all computers of the selected group captured on a specific day.

- **Savings Compared to Start Date**

The difference of the power consumption of the start date compared to power consumption of the selected date.

Each data point in the graph captures the average power consumption values on a specific day in terms of cost, power, and carbon. You can also see the summarized values when you point the mouse cursor over a data point.



Note: The Web Reports show rounded off values but the calculation takes into account the actual data values.

Calculation measures used for comparing the average savings realized to cost of the start date

The *Average per Computer Consumption Over Period by Group* section shows the following values in terms of Cost, Power, and Carbon:

- **Total Consumption over Period**

The sum of power consumption of all days that have historical data during the selected period. In the following image, under the *Cost* column, the value of \$3.63 is the total consumption cost of all computers from April 29 to June 4. This is the sum of the added values found in the *Cost (\$) per Computer* column.

Average per Computer Consumption Over Period by Group						
Groups	Total Consumption over Period			Savings Compared to Start Date		
	Cost	Power	Carbon	Cost	Power	Carbon
All Computers	\$3.63	45.3 kWh	63 kg	\$-0.76	-9.5 kWh	-13 kg

- **Total Savings Compared to Start Date**

The sum of the Savings Compared to Start Date of all the days that have historical data during the selected period. In the previous image, the value of \$-0.76 is the total of all the entries in the *Savings Compared to Start Date* column. However, since the value is negative, it means that there were no savings made and that the cost consumption is actually higher as compared to the Start date.

Daily Activity State Breakdown

The Daily Activity State Breakdown web report captures the following information:

- the average time a computer in the deployment spends in the following power states: active, idle, standby, and powered off
- a comparison of the improvements between two different days

You can set the parameters that the report will cover for the Report Grouping Policy and Report Groups. Use the **Show data for:** drop-down menu. To set a relative date comparison, select **Custom Dates**, the **Compare against date:** checkbox, and the specific dates.

Description:

This report displays the time an average computer in the deployment spends in different power states on a specific day. This report is useful for informing how you might make changes to your power policies (for instance, if many computers have high "idle" times, then setting a Standby power policy will likely save significant power). It can also be set to compare the improvements between two different days. The comparison functionality requires that historical power tracking is enabled.

Select the reporting groups on which to report:

Report Grouping Policy: os

Report Groups: Find Group names containing:

☒ Win2008R2 6.1.7600
☒ Win2008R2 6.1.7601
☒ Win7 6.1.7600
☒ WinXP 5.1.2600

[Select All](#) [Deselect All](#)

Show results for: ☒ Notebooks ☒ Desktops ☐ Servers

Show data for: Custom Dates

Show data for date: 07/30/2012 ☐ **Compare against date:** 05/15/2012

[Generate Report](#)

Calculation measures used in the Daily Activity State Breakdown web report

The Daily Activity State Breakdown report uses the following calculations:

Change

Change is found on the last row of the table in the generated report. Change is the difference between the start date and end date values between the various properties depicted in the table.

Total computers

The total number of valid results of the analysis properties used in the calculations.

Active State

Average of [Analysis properties Average Time in multiple users state in hours/day + Average Time in active state in hours/day]

Idle State

Average of [Analysis properties Average Time in idle state in hours/day + Average Time in logged off state in hours/day].

Standby State

Average of [Analysis property Average time in standby state in hours/day].

Powered Off

Average of [Analysis property Average Time in powered off state in hours/day].

PM Efficiency

The measure of the total amount of user idle time that is spent in the standby power state. The lower the rating, the more opportunity an organization has to save power. The calculation for rating is standby time / (standby time + idle time).

The table in the following image shows the comparison of activities state by groups:

Group	Total Computers	Active	Idle	Standby	Powered Off	PM Efficiency
Win2008R2 6.1.7600						
05/15/2012	501	6.54	17.39	0.00	0.07	0%
07/06/2012	1	0.48	23.51	0.00	0.01	0%
Change	-500	-6.06	+6.12	0.00	-0.06	0%
Win7 6.1.7600						
05/15/2012	0	0.00	0.00	0.00	0.00	0%
07/06/2012	0	0.00	0.00	0.00	0.00	0%
Change	0	0.00	0.00	0.00	0.00	0%
WinXP 5.1.2600						
05/15/2012	1001	0.01	23.98	0.00	0.00	0%
07/06/2012	1000	0.01	23.98	0.00	0.00	0%
Change	-1	0.00	0.00	0.00	0.00	0%

Power Management Settings

The Power Management Settings web report captures the percentage of computers which have Power Management settings enabled.

Calculation measures used in the Power Management Settings web report

The four Power management settings captured in the report each correspond to a property of the Power Consumption Analysis:

- Monitor Power Management: *Turn Off Monitor* analysis property
- Hardware Power Management: *Turn Off Hard Disks* analysis property
- System Standby Power Management: *System Standby* analysis property
- Hibernate Power Management: *Hibernation* analysis property

A setting is enabled when its analysis property result is in the format "dd:dd", where d is a digit. In the analysis, a "Hibernate" that returns "01:30" means that the hibernate setting is enabled and the computer goes to Hibernation after being idle for 1 hour 30 minutes. The setting is not enabled if there are other return values such as "Never"; the computer will not enter that state.

The calculation of the percentage of computers having Power Setting (Monitor, Hard Disk, System Standby, or Hibernation) enabled is: [Number of computers having the Power Setting enabled / Total number of computers in the selected group].

Weekly Power Consumption Over Time

The Power Consumption Over Time web report captures the following information:

- the average power consumption data (in terms of cost, power, or carbon) per computer over a selected period of time
- the average power savings per computer over a time period
- Detailed breakdown of power and savings into three time buckets: Office Hours, Outside Office Hours, and Weekends

General Assumptions used

The calculations in the report are made with the following assumptions:

- A week starts on Monday and ends on Sunday.
- The weekly data measures power activity for the last 7 days from the time data is captured. The weekly data captured on Sunday is used to represent the corresponding week. If the data captured on Sunday is missing, the whole week data is considered missing.
- A “Missing data” error is reported when the selected start date or end date is missing.
- If there is missing data for a specific week between start week and end week, the week’s data are removed from the calculation of Total Consumption and Total Savings.

Calculation measures used in the weekly power consumption chart

Power Consumption per Computer for Office Hours (or Outside Hours during Workdays, or Weekend), for a specific week (in terms of Power, Cost or CO2)

The average of the “Computer Power Usage in Usage_Unit Last Week (Time_Bucket)” analysis property over all computers under the selected group captured on a specific week’s Sunday, where:

- Usage_Unit can be either Cost, Power, or CO2
- Time_Bucket can be Office Hours, Outside Office Hours - Workdays, or Weekend

Power Consumption per Computer for a specific week (in terms of Power, Cost or CO2):

The sum of Power Consumption per Computer for all three time buckets of a specific week.

Savings Compared to Start Date

The difference of the power consumption of the start week compared to the power consumption of the selected week.

Calculation measures used in the Average per Computer Consumption Over Period by Group table

Total Consumption over Period (for a time bucket, or full week)

The sum of power consumption (for a time bucket, or full week) of all weeks that have historical data during the selected period.

Total Savings Compared to the Start Week (for a time bucket, or full week)

The sum of Savings Compared to Start Week (for a time bucket, or full week) of all weeks that have historical data during the selected period.

Weekly Idle Time Breakdown

The Weekly Idle Time Breakdown Over Time web report captures the following information:

- the average weekly idle time breakdown per computer over a selected time period
- the reduction of idle time (in hours) realized compared to the start week

Notes:

- When selecting the weeks for the report to cover, the dates that are in gray mean that there is no data.
- You might notice some cases where there is a slight difference in the actual data and the value in the dashboard. This difference in values happens because the calculation uses real data while the dashboard uses rounded off values.

General assumptions used

The calculations in the report are made with the following assumptions:

- A week starts on Monday and ends on Sunday.
- A “Missing data” error is reported when the selected start week or end week has no historical data.
- The data used in calculations is Sunday's data for each week. The data for Sunday incorporates all the data collected for the last 7 days or 1 week. If Sunday's data is missing, the week is excluded from the calculations.

Calculation measures used in the Weekly Idle Time Breakdown web report

To calculate values for the Weekly Idle Time Breakdown:

- **Detailed Idle Time (hours) per Computer History**

The idle time in hours for each week is represented by a stacked area chart with each section area representing weekend idle time, Outside Office Hours (Workdays) idle time and Office hours idle time per computer in the group selected.

- Idle Time (hours) – Office Hours
- Idle Time (hours) – Outside Office Hours (Workdays)
- Idle Time (hours) – Weekend

Report Options:

Weekly Idle Time Breakdown data per computer over last 4 weeks, with savings compared to start date 06/11/2012 - 06/17/2012 for Notebooks, Desktops in the "All Computers" grouping policy.

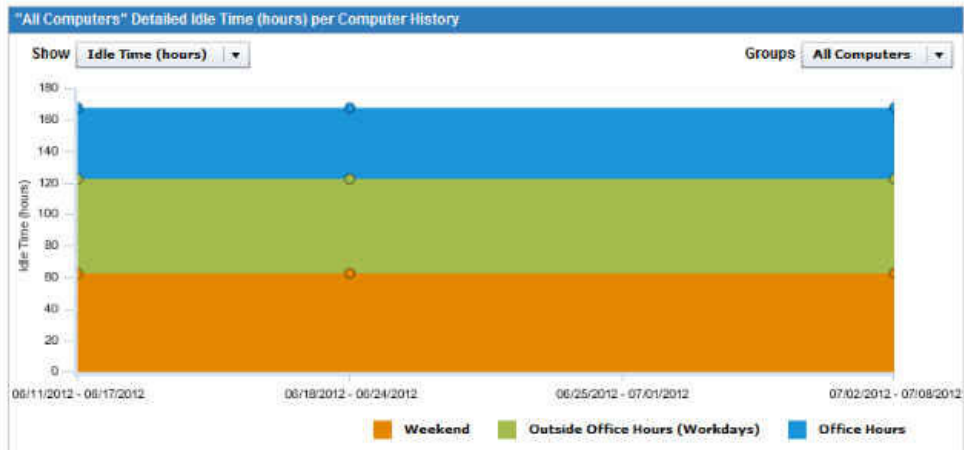


Table 5. Formula for calculating the Detailed Idle Time in hours per Computer History

	Formula	Formula represented in the chart
Idle Time (hours) – Outside Office Hours (Workdays)	Idle Time (hours) during Office hours for a computer = Sum of values of analysis properties	The value of Idle Time (hours) during Office hours represented in the chart = Average of the Idle Time (hours) during office hours per computer for the group selected.
	Sum of the values of the analysis properties = Time in idle state in hours last week (Office Hours) + Time in idle state in hours last week (Office Hours)	
Idle Time (hours) – Outside Office Hours (Workdays)	Idle Time (hours) Outside Office Hours - Workdays for a computer = Sum of the values of the analysis properties	The value of Idle Time (hours) Outside Office Hours - Workdays represented in the chart = Average of the Idle Time (hours) Outside Office Hours - Workdays per computer for the group selected.
	Sum of the values of the analysis properties = Time in idle state in hours last week (Outside Office Hours - Workdays) + Time in idle state in hours last week (Outside Office Hours - Workdays)	
Idle Time (hours) – Weekend	Idle Time (hours) during Office hours for a computer = Sum of the values of the analysis properties	The value of Idle Time (hours) during Weekend represented in the chart = Average of the Idle Time (hours) during Weekend per computer for the group selected.
	Sum of the values of the analysis properties = Time in idle state in hours last week (Weekend) + Time in idle state in hours last week (Weekend)	

- **Weekly Idle Time Breakdown per Computer Over Period by Group**

The idle time in hours for each week is represented in a table that displays the groups selected, the average weekly idle time (hours) during the period, and the average weekly reduction compared to the start week.

Each group displayed is divided into:

- Office Hours Idle Time
- Outside Office Hours Idle Time (Weekend and Workdays)

The Average Weekly Idle Time (hours) during the period and the Average Weekly Reduction Compared to Start Week is the sum of idle times in all the time buckets.

Weekly Idle Time Breakdown per Computer Over Period by Group		
Groups	Average Weekly Idle Time (hours) during period	Average Weekly Reduction Compared to Start Week
▶ Win2008R2 6.1.7600	0	0.00 (N/A)
▶ Win2008R2 6.1.7601	0	0.00 (N/A)
▶ Win7 6.1.7600	0	0.00 (N/A)
▼ WinXP 5.1.2600	157.73	0.00 (0.00%)
Office Hours	45	0.00 (0.00%)
▼ Outside Office Hours	122.73	0.00 (0.00%)
Weekend	62.73	0.00 (0.00%)
Workdays	60	0.00 (0.00%)

Table 6. Formula for calculating the Weekly Idle Time Breakdown per Computer Over Period by Group

	Formula	
Average Weekly Idle Time (hours) during period	Average Weekly Idle Time (hours) during period = Total Weekly Idle Time (hours) / Total number of weeks	This value is calculated by summing up the Weekly Idle Time Breakdown per computer over the period (number of weeks) and averaging it over the number of weeks.
Average Weekly Reduction Compared to Start Week	Total Reduction in Weekly Idle Time compared to start date / Total number of weeks = [Sum of (Weekly Idle Time (hours) per computer for Nth week – Weekly Idle Time (hours) of start week)] / Total number of weeks	

Power Consumption Summary Dashboard

The Power Consumption Summary dashboard has different sections that highlight the different aspects of your power usage. The Power Consumption summary dashboard captures the following information:

- Aggregate Power Usage for the deployment
- Average day breakdown of the activity states (Idle, Active, Standby, Powered off)
- Average Idle Time breakdown for last week
- Total tracked computers and computers removed from calculations

The dashboard provides filtered results for notebooks, desktop, and servers.

Calculation measures used for the Aggregate Power Usage section

The *Aggregate Power Usage* section uses the following formulas:

- Current Power Usage for last week

Table 7. Formulas used in the Aggregate Power Usage section

Current Power Usage for Last Week	Formula for Current Power Usage for Last Week	Power Usage during Office Hours (on Workdays)	Power Usage during outside Office Hours (Weekends)	Power Usage during outside CO2
Current Power Usage for last week in kWh	Power Usage in kWh during Office Hours (on Workdays) + Power Usage in kWh during outside Office Hours (Weekends) + Power Usage in kWh outside Office Hours (on Workdays)	Sum of values of analysis property Computer Power Usage in kWh Last Week (Office Hours)	Sum of values of analysis property Computer Power Usage in kWh Last Week (Weekend)	Sum of values of analysis property Computer Power Usage in kWh Last Week (Outside Office Hours – Workdays)
Current Power Usage for last week in Cost Units	Current Power Usage for last week in Cost Units = Power Usage in Cost during Office Hours (on Workdays) + Power Usage in Cost during outside Office Hours (Weekends) + Power Usage in Cost outside Office Hours (on Workdays)	Sum of values of analysis property Computer Power Usage in Cost Last Week (Office Hours)	Sum of values of analysis property Computer Power Usage in Cost Last Week (Weekend)	Sum of values of analysis property Computer Power Usage in Cost Last Week (Outside Office Hours – Workdays)

Table 7. Formulas used in the Aggregate Power Usage section (continued)

Current Power Usage for Last Week	Formula for Current Power Usage for Last Week	Power Usage during Office Hours (on Workdays)	Power Usage during outside Office Hours (Weekends)	Power Usage during outside CO2
Current Power Usage for last week in CO2 Units	Current Power Usage for last week in CO2 Units = Power Usage in CO2 during Office Hours (on Workdays) + Power Usage in CO2 during outside Office Hours (Weekends) + Power Usage in CO2 outside Office Hours (on Workdays)	Sum of values of analysis property Computer Power Usage in CO2 Last Week (Office Hours)	Sum of values of analysis property Computer Power Usage in CO2 Last Week (Weekend)	Sum of values of analysis property Computer Power Usage in CO2 Last Week (Outside Office Hours – Workdays)

- Usage Scenarios

The *Aggregate Power Usage* section has a usage panel on the left to explain the following scenarios that applies to the power spectrum:

Minimum Power Consumption

The minimum level of consumption occurs when computers are powered on only when users are active and powered off at all other times

No Idle Time Outside Office Hours

This scenario occurs when there is no idle time during outside office hours. Power usage is calculated by converting idle state to standby state.

No Idle Time During Weekends

This scenario occurs when there is no idle time during weekends. Power usage is calculated by converting idle state to standby state.

Full power consumption

The maximum level of power consumption occurs when all the computers are always on at full power. All computers are always on at full power and all monitors are always on.

Table 8. Formulas used for the usage scenarios

	kWh	Cost	Carbon
Minimum Power Consumption	{ (Computer Active Power Draw (W) * Time in active state in hours last week) + [minimum (Time in active state in hours last week ; Monitor On Time in Hours Last Week) * Monitor Active Power Draw (Single Monitor) (W) * Average Monitor Count] } / 1000	{ (Computer Active Power Draw (W) * Time in active state in hours last week) + [minimum (Time in active state in hours last week : Monitor On Time in Hours Last Week) * Monitor Active Power Draw (Single Monitor) (W) * Average Monitor Count] } * Power Cost per kWh / 1000	{ (Computer Active Power Draw (W) * Time in active state in hours last week) + [minimum (Time in active state in hours last week; Monitor On Time in Hours Last Week) * Monitor Active Power Draw (Single Monitor) (W) * Average Monitor Count] } * Carbon Dioxide per kWh / 1000
No Idle Time Outside Office Hours (in kWh)	{[Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend) + Time in idle state in hours last week (Outside Office Hours – Workdays) + Time in logged off state in hours last week (Outside Office Hours - Workdays)] * [Computer Active Power Draw (W) - Computer Sleep Power Draw (W)]} / 1000	{ [Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend) + Time in idle state in hours last week (Outside Office Hours – Workdays) + Time in logged off state in hours last week (Outside Office Hours - Workdays)] * [Computer Active Power Draw (W) - Computer Sleep Power Draw (W)] } * Power Cost per kWh / 1000	{[Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend) + Time in idle state in hours last week (Outside Office Hours – Workdays) + Time in logged off state in hours last week (Outside Office Hours - Workdays)] * [Computer Active Power Draw (W) - Computer Sleep Power Draw (W)] } * Carbon Dioxide per kWh / 1000
No Idle Time During Weekends (in kWh)	{ [Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend)] * [Computer Active Power Draw (W) - Computer Sleep Power Draw (W)] } / 1000	{ [Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend)] * [Computer Active Power Draw (W) - Computer Sleep Power Draw (W)] } * Power Cost per kWh / 1000	{[Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend)] * [Computer Active Power Draw (W) - Computer Sleep Power Draw (W)] } * Carbon Dioxide per kWh / 1000

Table 8. Formulas used for the usage scenarios (continued)

	kWh	Cost	Carbon
Full power consumption (in kWh)	[(Analysis property Computer Active Power Draw (W) * 24 * 7) + (Analysis property Average monitor count * Monitor Active Power Draw (Single Monitor) (W) * 24 * 7)] / 1000	[(Computer Active Power Draw (W) * 24 * 7) + (Average monitor count * Monitor Active Power Draw (Single Monitor) (W) * 24 * 7)] * Power Cost per kWh / 1000	[(Computer Active Power Draw (W) * 24 * 7) + (Average monitor count * Monitor Active Power Draw (Single Monitor) (W) * 24 * 7)] * Carbon Dioxide per kWh / 1000

Calculation measures used in the Monthly Potential Savings table

The *Monthly Potential savings* table shows the possible savings for each usage scenario, in terms of power, cost, carbon, cars, and trees).

The assumptions for this table are:

- 1 Car = 11560 CO₂ (CO₂ Generated Per Car)
- 1 Acre Tree Planted = 7333 CO₂ (CO₂ equivalent to 1 acre of tree planted)

The following table shows the formulas used in the Monthly Potential Savings table. For example, the formula to find out the potential savings using the Minimum Power Consumption in kWh is Current Power Usage (in kWh) minus the Power Usage for No Idle Time Outside Office Hours (in kWh).

Table 9. Formulas used in the Monthly Potential Savings table

Formulas for:	Scenario A– Minimum Power Consumption	Scenario B – No Idle Time outside office hours	Scenario C– No Idle Time during Weekends
Power Saving (in kWh)	Current Power Usage (in kWh) – Power Usage at Minimum Power Consumption (in kWh)	Current Power Usage (in kWh) – Power Usage for No Idle Time Outside Office Hours (in kWh)	Current Power Usage (in kWh) – Power Usage for No Idle Time during Weekends (in kWh)
Cost Saving	Current Power Usage (in Cost unit) - Power Usage at Minimum Power Consumption (in Cost unit)	Current Power Usage (in Cost unit) - Power Usage for No Idle Time Outside Office Hours (in Cost unit)	Current Power Usage (in Cost unit) - Power Usage for No Idle Time during Weekends (in Cost unit)
Carbon Saving	Current Power Usage (in CO ₂ unit) - Power Usage at Minimum Power Consumption (in CO ₂ unit)	Current Power Usage (in CO ₂ unit) - Power Usage for No Idle Time Outside Office Hours (in CO ₂ unit)	Current Power Usage (in CO ₂ unit) - Power Usage for No Idle Time during Weekends (in CO ₂ unit)

Table 9. Formulas used in the Monthly Potential Savings table (continued)

Formulas for:	Scenario A– Minimum Power Consumption	Scenario B – No Idle Time outside office hours	Scenario C– No Idle Time during Weekends
Cars Removed	[Current Power Usage (in CO2 unit) - Power Usage at Minimum Power Consumption (in CO2 unit)] / CO2 Generated Per Car	[Current Power Usage (in CO2 unit) - Power Usage for No Idle Time Outside Office Hours (in CO2 unit)] / CO2 Generated Per Car	[Current Power Usage (in CO2 unit) - Power Usage for No Idle Time during Weekends (in CO2 unit)] / CO2 Generated Per Car
Acres of Trees Planted	[Current Power Usage (in CO2 unit) - Power Usage at Minimum Power Consumption (in CO2 unit)] / CO2 equivalent to 1 acre of tree planted	[Current Power Usage (in CO2 unit) - Power Usage for No Idle Time Outside Office Hours (in CO2 unit)] / CO2 equivalent to 1 acre of tree planted	[Current Power Usage (in CO2 unit) - Power Usage for No Idle Time during Weekends (in CO2 unit)] / CO2 equivalent to 1 acre of tree planted

Calculation measures used for the Idle Time Breakdown for Last Week table

The *Idle Time Breakdown for Last Week* table shows the average idle time breakdown for a deployment over the last week for Office Hours, Outside Office Hours (on Weekends) and Outside Office Hours (on Workdays). The table also presents the percentage of time a computer is in idle state for each of the 3 time buckets

Table 10. Formulas used in the Idle Time Breakdown for Last Week table

	Office Hours	Weekends	Workdays	Full Week
Idle Time (hours)	[Time in idle state in hours last week (Office Hours) + Time in logged off state in hours last week (Office Hours) for each computer] / Total number of computers	[Time in idle state in hours last week (Weekend) + Time in logged off state in hours last week (Weekend) for each computer] / Total number of computers	[Time in idle state in hours last week (Outside Office Hours - Workdays) + Time in logged off state in hours last week (Outside Office Hours - Workdays) for each computer] / Total number of computers	Sum of the values obtained for each time bucket.
Total Hours/Week	[Sum of Number of Office Hours Per Week for each computer] / Total number of computers	[Sum of Number of Weekend Hours Per Week for each computer] / Total number of computers	[Sum of Number of Outside Office Hours (Workdays) Per Week for each computer] / Total number of computers	Sum of the values obtained for each time bucket.

Table 10. Formulas used in the Idle Time Breakdown for Last Week table (continued)

	Office Hours	Weekends	Workdays	Full Week
Idle Time (%)	Idle Time (Office hours) / Total Office Hours/Week	Idle Time (Weekend hours) / Total Weekend Hours/Week	Idle Time (Outside Office Hours - Workdays hours) / Total Outside Office Hours - Workdays Hours/Week	Idle Time (hours during Full Week) / Total Hours in Full Week

Calculation measures used for the Total Tracked Computers table

The total tracked computers table shows the total number of computers that are tracked for Power Management. The computers are divided into 3 categories – Notebooks, Desktops and Servers which are identified with the use of the *Computer Type* analysis property.

Any computer that reports back an <error> in the analysis is removed from calculations and represented in the 'Removed due to errors' section. Any computer that have less than a week's worth of data is also removed from calculations and represented in the 'Removed due to lack of data' section. This is calculated based on the *Total Power Time Tracked in Days* analysis property. If the value is less than 7 days then the computer is assumed to lack enough data to be used accurately in the calculations.

Support

For more information about this product, see the following resources:

- [Tivoli Endpoint Manager Support site](#)
- [Tivoli Endpoint Manager wiki](#)
- [Knowledge Base](#)
- [Forums and Communities](#)

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