

## Green IT Energy Study Guidelines

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### Green IT Energy Study Guideline Requirements

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Rev000

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#### Green IT Energy Study Guideline Requirements

Power Smart wishes to welcome its Alliance approved Green IT Consultants to create value added Energy Studies. This document is meant to be a guide for Green IT Consultants to help answer your questions and help guide you about standards and requirements for successfully delivering a Green IT Energy Study.

# Green IT Energy Study Guidelines

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### **1 Pre-Energy Study Green IT Program – The Opportunity Assessment**

Only BC Hydro Key Account Commercial Partner Customers are eligible to participate in BC Hydro's Power Smart Green IT Program.

The BC Hydro Key Account Commercial Partner Customer completes and signs the latest version of the Green IT Opportunity Assessment with the assistance of their BC Hydro Key Account Manager. The Opportunity Assessment is a pre-qualification tool to substantiate that the selected IT energy conservation measures may meet the minimum electrical energy savings threshold of 50,000 kWh/yr in savings.

The IT energy conservation measures selected by the customer in the signed Opportunity Assessment forms the basis for the scope of work for the energy study. It is very important that customers are aware that after the Opportunity Assessment is signed no subsequent changes may be made to the selected energy conservation measures.

The Green IT Opportunity Assessment is reviewed and approved by BC Hydro.

The BC Hydro Key Account Customer selects a BC Hydro Power Smart Alliance approved IT Consultant.

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BC Hydro creates the Energy Savings Opportunity Identification Study Request Application for Commercial Power Smart Partners and which identifies the IT Consultant.

The IT Consultant provides an energy study proposal including a fee quotation for their proposed energy study. Please see the section below for The Energy Study Proposal.

BC Hydro approves the energy study proposal.

The customer and BC sign the Energy Savings Opportunity Fund Energy Study Agreement for Commercial Power Smart Partners.

### **2 The Work Flow - The Green IT Energy Study**

The customer delivers their computer and/or server inventory on a per site basis to the consultant. This inventory needs provide the model descriptions as well as counts per site.

In cases where the customer has either no or only partial computer and/or server inventory, the consultant will need to determine and consultant completes the latest version of the Green IT Calculator or Calculators. Please see the Energy Study Proposal deliverables section below.

Consultant completes the latest version of the Green IT Calculator for each of the IT energy conservation measures specified in the energy study

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proposal and Opportunity Assessment. Please see the Sections below on the latest version of the IT Calculator and the Energy Conservation Measures.

The consultant presents their latest version of the Green IT Energy Study and the latest version of the IT Calculator to the customer.

The customer sends copies of the Energy Study and latest version of the IT Calculator to his/her BC Hydro Key Account Manager.

BC Hydro Power Smart reviews the consultants Green IT Energy Study.

BC Hydro Power Smart approves the consultants Green IT Energy Study.

BC Hydro Power Smart may approve 50% payment to the Key Account customer for the Energy Study.

BC Hydro will pay 50% for the Energy Study costs to Commercial Key Account customers, and the remaining 50% for the approved Energy Study costs to the customer if the customer proceeds with at least one of the Energy Study's recommendations.

### 3 What to Include in The Green IT Energy Study Proposal

The energy study proposal needs include all of the following information:

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The Energy Study Proposal needs be written using clear language to describe the scope of work and deliverables for the Energy Study.

The Consultant and the Customer need be very careful to agree on the contents of the Energy Study Proposal.

The contents of the Energy Study Proposal may not be changed once the Energy Study Agreement is signed.

Include in the Energy Study Proposal a scanned copy of the customer signed latest version of the Opportunity Assessment.

The IT Opportunity Assessment forms the basis for the energy study and plays a large part in calculating the energy study cost.

The IT Opportunity Assessment cannot be changed after the Energy Study Agreement has been signed.

The energy study fee is based on the signed IT Opportunity Assessment and the consultants' energy study proposal. Even if the customer changes their mind and elects to not include any ECM which he signed off as being included in the original Opportunity Assessment these ECM's need be covered off in the energy study.

Give the total number of model types to any of the following IT devices which currently exist at any of the customer sites and will be included in the energy study: computer desktops, MAC computer desktops, notebooks,

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Thin Clients and mobile computing devices (iPads/Tablets). For example: The energy study will include covering 15 desktop computer models, 2 MAC desktop model types, 8 notebook model types and so on.

State in the energy study proposal whether the customer will provide complete and or partial computer and or server inventory.

In the case where the customer provides partial or no computer and/or server inventory, the energy study proposal needs indicate which methodology the consultant proposes to use to determine inventory model counts. The following are example methods for determining inventory: (a) walk through inventory counts, (b) network inventory software deployment, (c) documentation such as invoices and IT staff testimonials/emails.

The consultant will estimate how many baseline computer model types will be covered in the energy study. Miscellaneous models should not account for over 20% of total models.

The consultant will give his best estimate for the number of sites which will be covered in the energy study.

The energy study fee in \$ Canadian needs be broken out in terms of hours and fee amounts by covering the following energy study work related areas:

Table 1. Energy Study Work Description and Hours of Work and Fees.

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Work Description	Hours	Fee
On Site Work Time		
Travel Time and Expenses		
Inventory Work Time		
ECM work Time		
Report Writing Time		
Totals		
Consultants hourly rate \$/hr.		

The Energy Study Proposal needs clearly show the below check list of items marked 3.14.1 to 3.14.8 in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

Existing IT Inventory description and counts per site will be provided in the study



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Inventory idle demand metering results and meter details will be provided in the study

All IT ECM's selected in the Opportunity Assessment will be covered in the study

The studies work on ECM's will follow the Guideline Requirements of this document

For each IT ECM proved a Financial Review following guideline in this document

For each IT ECM the study will discuss challenges and suggest solutions for overcoming these challenges following guidelines in this report

All appropriate cells of the most current version of the IT Calculator will be fully completed and attached with the energy study

The consultants own supporting calculation spreadsheets will be attached with the energy study

The consultant's energy study proposal needs provide a time-line for delivering the energy study.

The consultant will provide his energy study proposal in a timely manner to Power Smart and this should be less than 15 working days from the time the customer requests the proposal.

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The consultant will not proceed with the energy study till he/she has been officially notified by BC Hydro Power Smart to proceed with it.

### 4 What is included in The Green IT Energy Study

#### Deliverables

The consultants Green IT Energy Study will include the following:

- (1) Green IT Energy Study,
- (2) BC Hydro Power Smart latest version of the IT Calculator and
- (3) Provide their excel spreadsheets showing all their electrical energy saving calculations.

#### The Green IT Energy Study

The consultant's energy study objective is to deliver validated electrical energy savings and electrical demand reduction for each IT energy conservation measure and broken down per site that the customer has selected for the study.

The Executive Summary of the Energy study shows a table to include the following information:

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Green IT ECM Description	Quantity	Annual Energy Savings kWh/yr	Annual Energy Savings \$	Annual Maintenance Savings \$	Total Annual Savings \$	Capital Cost \$	Simple ROI Years
EE Laptops/Mini PC's							
EE Mobile Computers							
Top Tier Energy Star							
Virtual Desktops							
Virtual Servers							
Server Load Management							
Power Management							

Following the Executive Summary the energy study will provide a table showing on the left hand side the estimated savings from the IT Opportunity Assessment and on the right the savings estimated by the energy study as follows:

Power Smart Qualified ECM  Energy Conservation Measure	Savings Amounts			
	Opportunity Assessment		BCH IT Calculator	
	kWh/yr	\$/yr	kWh/yr	\$/yr
EE Laptops/Mini PC's				
EE Mobile Computers				
Top Tier Energy Star				
Virtual Desktops				
Virtual Servers				
Totals				

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Power Smart Non-Qualified ECM  Energy Conservation Measure	Savings Amounts			
	Opportunity Assessment		BCH IT Calculator	
	kWh/yr	\$/yr	kWh/yr	\$/yr
Power Management Software				
Totals				

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The consultant's written energy study will provide descriptions for the electrical energy savings for each of the IT energy conservation measures associated with the study following the descriptions of work in the Section below entitled: The Green IT Energy Study - Energy Conservation Measures.

The consultant will attach a scanned copy of the original customer signed latest version of the IT Opportunity Assessment on the first or second page of the energy study.

If the customer made errors in completing the original latest version of the Opportunity Assessment the consultant will use a corrected version when comparing it to the energy study results.

It's essential that the number of IT Energy Conservation Measures in the Energy Study must be the same number as that in the original Energy Study Proposal as well as the original signed latest version of the Opportunity Assessment.

The consultant cannot change the scope of work that they stated in writing in their original energy study proposal.

The consultant will attach a table in the energy study which compares the original customer signed latest version of the Opportunity Assessment to the estimated electrical energy savings established from their energy study broken down per ECM. This table will be based on numbers derived

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by the consultant using the latest version of the IT Calculator and show demand (kW) reduction and electrical energy savings (kWh/yr) per IT energy conservation measure.

The consultant will provide in an Appendix software copies of the original baseline inventory spreadsheets showing per building the building: name, and the number, description and wattages of computers and/or laptops and or any other computers, and servers as covered in the projects scope of work.

The consultant will provide their energy study in a timely manner to the customer by the agreed completion date for the Green IT Energy Study.

The consultant will present their final energy study and IT Calculator and all their calculations to the customer.

### **IT Inventory:**

If the customer does not have inventory showing the numbers of computer models and/or servers per site, the consultant may use an 8% random sampling of the complete number of computers and/or servers. For example if there are 1,000 computers then a minimum of 80 randomly selected computers may be measured. Note: Only demand reading needs be taken per each computer model.

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In cases where the customer did not provide IT inventory or only partial inventory, the consultant needs provide in their energy study details of the approach they took to determine IT inventory. This description needs provide any assumptions taken and the methodology used to determine the IT inventory.

The energy study needs include all IT Inventory counts and model descriptions.

Each model type needs be metered to determine its average idle electrical demand.

The consultant needs provide in their energy study photographs for existing computer models and IT equipment covered in the energy study.

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The Consultant needs provide in their energy study photographs of the proposed new IT energy conservation measures.

In cases where customers have numerous baseline computer models, some of the least prevalent models may be placed under a miscellaneous category provided that the miscellaneous computer category does not include more than 20% of all baseline computer counts.

In general where it's necessary to conduct site walk throughs' to measure computer model average electrical demand and baseline computer hours of usage, 8% random sampling may be done.

### **Metering:**

The consultant will use an approved electrical meter to suitably measure the electrical demand for random samples of baseline computers on a model by model basis.



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The consultant needs show a photograph of the meter they used for the energy study. The consultant needs provide the model number for this meter plus provide technical specifications of the meter.

For proposed IT energy conservation measure new hardware the consultant will need take demand readings using the same methodology described above for metering baseline computers.

### **Financial Review:**

The energy study needs show clearly how each new IT Energy Conservation Measures will benefit the customer in terms of electrical energy savings as well as financial benefits.

The Energy Study needs make a strong case to the customer that the cost savings provided by the new energy conservation measures will not only cover their initial costs but offer the customer total cost savings over time.

Provide Net Present Values on comparing existing IT Inventory Cash Flow Streams compared with new Cash Flow Streams provided by the new IT Energy Conservation Measures.

The Energy Study needs help educate the customer in their best interests that by adopting new IT Energy Conservation Models the benefits over 10 years will be significant and provide a \$ value.

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### **Challenges and Barriers to IT ECM Adoption Discussion**

For each IT Energy Conservation Measure the energy study will provide a discussion on the challenges to their adoption within the customer's unique environment. Such issues as: staff and end user acceptance, budgetary constraints, education and lack of awareness are examples of such challenges.

For each ECM a discussion will provide suggestions for overcoming these challenges and barriers. For example discussions on how savings from reduced power consumption may be used to procure refurbished IT inventory using new ECM's covered in the energy study. Suggestions may include having seminars, workshops or meetings to help educated key stakeholders in how the adoption of new IT ECM's covered in the energy study will reduce maintenance requirements, enhance work flow performance and reduce overall costs.

Discuss how the results of the financial review may overcome some of the challenges and barriers to adopting new IT Energy Conservation Measures.

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### **The IT Calculator and Consultants Calculations:**

The consultant will provide their completed latest version of the IT Calculator and complete all cells required to complete each calculation per customer site and per energy conservation measure.

In addition to the consultant completing the latest version of the IT Calculator and providing accurate supporting kWh/yr electrical energy saving calculations per each IT energy conservation measure included in the energy study, they will provide their own supporting calculations clearly showing how they calculated both baseline and ECM annual hours of usage.

The consultant will show all their calculations and explain their electrical energy savings calculations methodology approach.

The consultant will provide accurate kW electrical demand reduction calculations per IT energy conservation measure included in the energy study. The consultant will provide supporting calculations to clearly show how the average baseline computer demand was calculated as well as average IT ECM hardware electrical demand was derived.

In cases where computer and/or server inventory mapping software or scripting tools are used the energy study needs include screen shots showing results of the inventory or partial inventory software consults.

### **Completing the IT Calculator**

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Always ensure that you are using the correct latest version for the IT Calculator. Please contact the BC Hydro Power Alliance to make sure you use the latest version of the IT Calculator. This Calculator tool is for use by approved BC Hydro Power Smart Alliance IT consultants as part of its Green IT Program. The tool will help you identify future and past IT electrical energy savings for BC Hydro Key Account (KA) customers who are considering retrofitting their IT infrastructure with IT Energy Conservation Measures (ECM's).

When all data on existing and proposed systems has been entered the calculator will estimate electrical energy and demand savings and provide a simple cost analysis. Please note only enter data in the yellow fields, other cell fields are locked and contain formulae to calculate savings.

Please read the description for IT Calculator work for each IT Energy Conservation Measure described in the above section entitled The Green IT Energy Study – Energy Conservation Measures. Be sure to not leave any empty yellow colour coded cells which are relevant to the specific calculation you are working on.

Please read the IT Calculator's **User Guide**

### **Worksheet - ES (Energy Study) Report**

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Enter all the relevant fields in the Energy Study Report in cells colour coded yellow.

### **Worksheet - Computer Baseline Inventory**

Use a Killawatt meter (or equivalent) and measure the electrical demand for each baseline computer and enter in this worksheet.

### **Worksheet - Computer Electrical Baseline**

Add in the quantities and hours of operation for each site and usage zone

### **Worksheet - Computer ECM Inventory**

Same procedure as for Baseline Inventory but applied to new IT hardware ECM's.

### **Worksheet - Computer Energy ECM**

Select the number of project sites and usage zone per site. Add in the quantities and hours of operation and % of ECM OFF at 6pm in LM for each site and usage zone.

### **Worksheet - Computer Power Management\***

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Same procedure as for Computer Energy ECM except baseline computer number will be same. \* No longer eligible for Power Smart incentives or for claiming electrical savings.

### **Worksheet - Top Tier Energy Star - Plug Load Only**

Add existing and then proposed % of Plug Load using top tier (10%) Energy Star.

### **Worksheet - Server Virtualization**

Add number of decommissioned physical servers, new ESX type servers and new storage and electrical UPS efficiency.

### **Worksheet - Server Load Management**

Same as Server Virtualization except add reduced server annual operation hours.

## **Green IT Calculator Menu and Acronyms**

### **5 Menu**

This calculator tool is an Excel spreadsheet which requires data entry up to 9 worksheets.

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The Menu for the entire Workbook is as follows:

### Green IT Calculator User Guide

- 1 ES Report
2. Computer Baseline Inventory
3. Computer Electrical Baseline
4. Computer ECM Inventory
5. Computer Energy ECM
6. Computer Power Management
7. Top Tier Energy Star
8. Server Virtualization
9. Server Load Management
10. Electrical Energy Savings

### The IT Calculator's Acronyms

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1. BCH - BC Hydro
2. ECM - Energy Conservation Measure
3. EUI - Energy Use Index
4. IT - Information Technology
5. KA - Key Account (Customer)
6. KAM - Key Account Manager
7. kW - Kilowatt is 1,000 watts
8. kWh/yr - Kilowatt Hours per Year
9. PE - Program Enabled
10. PS - Power Smart (BC Hydro)
11. PSA - Power Smart Alliance (BC Hydro)
12. PSE - Power Smart Engineering (BC Hydro)
13. SOW - Scope of Work



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### Glossary

Program Enabled (PE): This Power Smart program claims electrical energy savings from past projects in the last 6 months.

### Notes:

- I. Drop Down Rows: If you wish to move rows up go back to the first drop down first and then move down to select.
- II. Drop Down Columns: If you wish to change the number of Columns moves one Column at a time.

## 6 The Green IT Energy Study – Energy Conservation Measures ECM

This section provides the information to cover for the descriptions of each IT energy conservation measure in the energy study.

Each ECM has different description requirements in the energy study.

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study

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- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document
- e. For each IT ECM proved a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions
- g. All appropriate cells of the current version of the IT Calculator will be fully completed
- h. The consultants supporting calculation spreadsheets will be included in the energy study

### What Energy Conservation Measures can and cannot be Included in the Energy Study.

<i>ITEM</i>	<i>Plug Load Conservation Measures (ECM) FAQ's Electrical Energy Savings</i>	<i>Claimable Savings: Yes or No</i>	
1	Computer Power Management Software		No
2	Add Current Sensing Plug Load Control Power Bar		No
3	CRT Computer Monitors to LCD Monitors		No
4	Any savings associated with CRT computer Monitors		No

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5	Any savings associated with adding LCD Monitors unless Top Tier Energy Star LCD's are the ECM (See 4 below)		No
6	Top Tier Energy Star. Top 10% Energy Star devices see note 1 below.	Yes (PE)	
7	End User Control of Power Management		No
8	Replace Desktop computer or Thin Client or Virtual Desktop	Yes (PE)	
9	Add new additional EE computer and keep existing computer		No
10	Replace desktop computer with EE computer above the median rated Energy Star energy efficiency	Yes (PE)	
11	Computer Power Management User Button		No
12	Enable Computer Power Management from server software		No
13	Server Virtualization	Yes (PE)	
14	User behavioural control of Plug Load		No
15	Replace copiers/printers/scanners and fax machines with Multifunctional Devices (MFD). Please see note 2 below.	Yes (PE)	
16	Enable Server Load Power Management Software	Yes (PE)	

### Notes:

- (PE): Program Enabled Electrical Energy savings are claimable savings derived without incentives and which Power Smart can prove to have influenced the outcome.
  - Top 10% most energy efficient Energy Star devices. Savings may be claimed between the wattage of a Top Tier Energy Star device and the median wattage of same category Energy Star devices. Please use Energy Stars web-site for each Top Tier Energy Star device.
  - Average MFD saves approx. 550 kWh/yr when consolidating printers by 6:1
  - CRT Monitors cannot be part of a Green IT Energy Study and must not be included in any baselines or energy saving calculations.
  - Computer with in-built monitors such as iMac's may be included in baselines and energy saving calculations.
  - Top Tier Energy Star LCD or LED or OLED computer monitors maybe included in a Green IT Energy Study.

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### Energy Efficient Notebooks and/or Mini Computers

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document
- e. For each IT ECM proved a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions

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g. All appropriate cells of the current version of the IT Calculator will be fully completed

h. The consultants supporting calculation spreadsheets will be included in the energy study

Complete the latest version of the IT Calculator without leaving any empty cells relevant to the calculation you are working on and provide a summary of the electrical savings provided by replacing existing notebooks and desktops with energy efficient models. You will need to complete the Computer Baseline Inventory and Computer Electrical Baseline worksheets. You will also need complete the Computer ECM (Energy Conservation Measure) Inventory and Computer Energy ECM worksheets.

Please provide screen shots showing photographs for the existing notebooks and new energy efficient models for notebooks and/or Mini Computers and provide details of their technical descriptions.

Please provide example electrical energy saving calculations for specific models of energy efficient notebooks and/or Mini Computers. For example take an existing customer's notebook model and compare its electrical energy usage to a proposed energy efficient notebook's energy usage. In your examples please give product description details for each product.

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Make comments on how the proposed energy efficient notebooks and/or mini computers will impact electrical energy consumption in each of the customer's usage zones.

Provide some examples of the cost and paybacks from energy savings for the proposed energy efficient notebooks and/or mini computers.

### Top Tier Energy Star

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document

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- e. For each IT ECM provide a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions
- g. All appropriate cells of the current version of the IT Calculator will be fully completed
- h. The consultants supporting calculation spreadsheets will be included in the energy study

This section of work in the energy study needs more attention in the actual write up of the study than other energy conservation measures. Though the work involved in completing the Top Tier Energy Star worksheet of the latest version of the IT Calculator is modest, the real value to customer from studying the impacts offered by Top Tier Energy Star IT products comes from the consultant showing them in their energy study how this ECM will help them save electrical energy. A good narrative description in this section of the study is required.

Top Tier Energy Star products are the Top 10% most energy efficient products listed by Energy Star using model idle demand in watts as the criteria. Energy Star provides Excel spreadsheets for IT Energy Star rated



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products and showing model numbers and idle watts at the following internet site:

[http://www.energystar.gov/index.cfm?c=products.pr\\_find\\_es\\_products](http://www.energystar.gov/index.cfm?c=products.pr_find_es_products)

The energy study will show lists of Top Tier models showing their Energy Star rated idle watts and model descriptions, for IT products of interest to the customer.

The following list IT Plug Loads shows items listed by energy star:

- Computers
- Desktops & Integrated Computers
- Workstation Computers
- Thin Clients
- Notebooks
- Small Scale Servers
- Displays

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- Imaging Equipment
- Audio/Video
- Cordless Phones

Customers may appreciate knowing which energy star models qualify as being in the Top Tier Energy Star category. Provide Excel spreadsheets showing the top 10% most energy efficient I products.

Provide examples for calculations showing how much energy a customer's existing IT equipment is using compared to an equivalent Top Tier Energy Star qualifying product. Use specific models i.e. say the customer's latest computer desktop model No. (xxx) when changed to a Top Tier Energy Star desktop computer model (YYY) would save the customer (Z) kWh/yr.

Make comments on IT Equipment usage zones in relation to the impact Top Tier Energy Star equipment may have on them. Some examples of the cost for Top Tier Energy Star IT Products may be appreciated by customers and should be given in the energy study. Provide screen shot photographs of examples of customer's existing IT equipment has and photographs for the proposed equivalent Top Tier energy star products.

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### Energy Efficient Mobile Computers such as iPads and/or Tablets

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document
- e. For each IT ECM proved a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions

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g. All appropriate cells of the current version of the IT Calculator will be fully completed

h. The consultants supporting calculation spreadsheets will be included in the energy study

Complete the latest version of the IT Calculator without leaving any empty cells relevant to the calculation you are working on and provide a summary of the electrical savings provided by replacing existing desktop and/or notebooks with energy efficient mobile computers such as iPads and/or tablets. You will need to complete the Computer Baseline Inventory and Computer Electrical Baseline worksheets. You will also need complete the Computer ECM (Energy Conservation Measure) Inventory and Computer Energy ECM worksheets.

Please provide screen shots showing photographs for the new energy efficient models of energy efficient mobile computers such as iPads and/or tablets and provide technical descriptions on them.

Please provide example electrical energy saving calculations for specific model. For example take an existing customer's existing desktop model and compare its electrical energy usage to a proposed energy efficient computer such as iPads and/or tablets Give product description details for each product.

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Make comments on how the proposed energy mobile computers will impact electrical energy consumption in each of the customer's usage zones.

Provide some examples of the cost and paybacks from energy savings for the proposed energy efficient mobile computers such as iPads and/or tablets.

### **Virtual Desktops/Thin Clients**

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study

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- d. The studies work on ECM's will follow the Guideline Requirements of this document
- e. For each IT ECM proved a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions
- g. All appropriate cells of the current version of the IT Calculator will be fully completed
- h. The consultants supporting calculation spreadsheets will be included in the energy study

Complete the latest version of the IT Calculator without leaving any empty cells relevant to the calculation you are working on and provide a summary of the electrical savings provided by replacing existing desktop and/or notebooks with energy efficient Virtual Desktops/Thin Clients. You will need to complete the Computer Baseline Inventory and Computer Electrical Baseline worksheets. You will also need complete the Computer ECM (Energy Conservation Measure) Inventory and Computer Energy ECM worksheets.

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Virtual Desktop/Thin Clients offer significant overhead and maintenance savings for customers. Please make reference to white papers and/or studies in particular pointing out the significant cost saving opportunities Virtual Desktops/Thin Clients offer. For example consider using the following link to the Forrester Consultant study entitled: The Total Economic Impact™ of Deploying Sun Ray™ Technology Ref.

[http://sosc-dr.sun.com/sunray/whitepapers/wp\\_tei\\_sun\\_ray.pdf](http://sosc-dr.sun.com/sunray/whitepapers/wp_tei_sun_ray.pdf)

You could provide an analysis showing how Virtual Desktop/Thin Clients could benefit your customer's organization in terms of costs and electrical savings.

Please provide screen shots showing photographs for the existing computers as well as the new energy efficient Virtual Desktop/Thin Client models and provide technical descriptions on them.

Please provide example electrical energy saving calculations for specific Virtual Desktop/Thin Client models. For example take an existing customer's current desktop computer model and compare its electrical energy usage to a proposed energy efficient Virtual Desktop/Thin Client. Give the product description details for each product.

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Make comments on how the proposed energy efficient Virtual Desktop/Thin Client will impact electrical energy consumption in each of the customer's usage zones.

Provide some examples of the cost and paybacks from energy savings for the proposed energy efficient Virtual Desktop/Thin Client.

### Server Virtualization

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document



## Green IT Energy Study Guidelines

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- e. For each IT ECM provide a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions
- g. All appropriate cells of the current version of the IT Calculator will be fully completed
- h. The consultants supporting calculation spreadsheets will be included in the energy study

Complete the latest version of the IT Calculator without leaving any empty cells relevant to the calculation you are working on and provide a summary of the electrical savings provided by replacing existing physical servers with energy virtual servers.

For each customer site which have servers its necessary to complete all the yellow cells in the IT calculator showing:

### **Server Baseline:**

Baseline Total Number of Non-ESX Physical Servers at Project Sites

Baseline Total Number of ESX Type Physical Servers at Project Sites

## Green IT Energy Study Guidelines

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### Server Virtualization - Energy Conservation Measure:

Quantity of Removed Physical Servers through Server Virtualization

Quantity of Avoided Physical Servers through Server Virtualization (within past 18 months)

Quantity of New ESX Physical Servers through Server Virtualization

Quantity of New Physical Storage through Server Virtualization

Electrical Energy Efficiency of Servers UPS System (Default 92% or change if known)

Please provide screen shots of the server virtualization software console for example the VMWare Console. This may show the total number of VM (Virtual Machines) as well as the total number for physical hosting (ESX type) servers.

Please provide example electrical energy saving calculations for specific model. For example take an existing customer's physical server model and compare its electrical energy usage to a proposed virtual server. Give product description details for each product. Remember to subtract the additional electrical equivalent power usage from the new virtual hosting servers.

## Green IT Energy Study Guidelines

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### Server Power/Load Management

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document
- e. For each IT ECM proved a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions
- g. All appropriate cells of the current version of the IT Calculator will be fully completed
- h. The consultants supporting calculation spreadsheets will be included in the energy study

## Green IT Energy Study Guidelines

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Server Power management is not commonly used. Despite this if customers ask to include this energy conservation measure in the Green IT Energy Study please complete the Server Load Management worksheet in the latest version of the IT Calculator.

For each customer site which have servers its necessary to complete all the yellow cells in the latest version of the IT calculator showing:

### **Server Power Management - Energy Conservation Measure:**

The Energy Study Proposal needs clearly show the below check list of items marked a, to h. in bullet form clearly showing that each of these required work items for each energy conservation and site will be covered in the Energy Study and elaborate on them as the customer requires:

- a. Existing IT Inventory description and counts per site will be provided in the study
- b. Inventory idle demand metering results and meter details will be provided in the study
- c. All IT ECM's selected in the Opportunity Assessment will be covered in the study
- d. The studies work on ECM's will follow the Guideline Requirements of this document
- e. For each IT ECM proved a Financial Review following guideline in this document
- f. For each IT ECM the study will discuss challenges and suggest solutions

## Green IT Energy Study Guidelines

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g. All appropriate cells of the current version of the IT Calculator will be fully completed

h. The consultants supporting calculation spreadsheets will be included in the energy study

*Include* the Number of Physical Servers with Server Power Management Enabled

*Include* the Number of Physical ESX Type Servers with Server Power Management Enabled

*Include* the Average Number of Reduced Annual Operating Hours per Physical Server from Server Load Management

*Include* the Electrical Energy Efficiency of Servers UPS System (Default 92% or change if known)

Include the electrical energy savings in the energy study. Comment on the various types of server power management currently available in the market and how they may impact the customer. Discuss how different server loads lend or do not lend themselves to being candidates for server power management. Discuss other savings to the customer offered by server power management in addition to electrical energy savings.

## Green IT Energy Study Guidelines

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### **Computer Power Management is No Longer Eligible for BC Hydro Power Smart to Claim Savings**

Please note that BC Hydro Power Smart no longer claims electrical savings provided by stand-alone computer power management software controls. BC Hydro wishes to continue encouraging customers to deploy computer power management controls.

If the customer requests to include computer power management in the energy study the consultant may do so. There will be a clearly marked section of the energy study for computer power management. The consultant will provide a clear statement explaining that Power Smart no longer accepts that computer power management is an ECM and can no longer claim any savings from it. The electrical energy savings from stand-alone computer power management software will be derived using the latest version of the IT Calculator and added to this section of the energy study.

In cases where a new IT energy conservation measure will include reducing the hours of operation, these reduced hours may be included in the latest version of the IT Calculator and associated electrical energy savings by be included in the Energy Study results.

In cases where customers' baseline includes the use partial computer power management settings for desktop computers (not for laptops) the

## Green IT Energy Study Guidelines

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consultant will show sample demand readings in watts for each power management states. The consultant will give calculations to determine an estimate for each computer model's average electrical demand.

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### **7 Consultant Deliverables Check List for their Green IT Energy Study**

The consultant's energy study objective is to deliver validated energy savings and demand reduction per each IT energy conservation measure and broken down per BC Hydro metered site that the customer has selected for the study.

The consultant will ensure that they attach a scanned copy of the original latest version of the IT Opportunity Assessment and which had been signed and agreed to by the customer, on the first or second page of the energy study.

The consultant will ensure that they only use the final version of the IT Opportunity Assessment. If for any reason the Opportunity Assessment was changed and only prior to the Energy Study Agreement being changed it's the responsibility of the consultant to use the final signed version of the Opportunity Assessment.

If the original customer signed IT Opportunity Assessment contained errors the consultant needs correct these errors and clearly describe in the energy study what these errors were and how they were corrected.

The consultant will deliver in the energy study all the work described in their original customer signed energy study proposal.



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After the attached copy of the original latest version of the IT Opportunity Assessment in the energy study report, the consultant will attach a table showing their validated electrical energy (kWh/yr) savings and demand (kW) reduction per each IT energy conservation measure included in the energy study.

The consultant will complete and provide BC Hydro Power Smart with their completed latest version of the IT Calculator.

The consultant will complete and provide BC Hydro Power Smart with their own excel spreadsheets showing their electrical energy saving calculations covering all IT energy conservation measures.

The consultant will provide his energy study proposal in a timely manner to Power Smart. The consultant we agree with the customer and the BC Hydro Key Account manager to a completion date for the Green IT Energy Study.

The consultant will provide accurate kWh/yr electrical energy saving calculations per each IT energy conservation measure included in the energy study.

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The consultant will provide accurate kW electrical demand reduction calculations per IT energy conservation measure included in the energy study

Upon being notified from the customer that their IT energy study has been approved, the consultant may then go ahead and bill the customer for their energy study.

The consultant will follow the Energy Study Guideline Requirements in this document.

The final energy study report will be delivered to the customer by the consultant.

### **8 The Energy Study – BC Hydro Internal Review Check List**

The customer is fully satisfied with the IT Energy Study.

The format for the Energy Study needs be clear and easy to read.

Baseline system and new energy conservation system descriptions need be clear.

The consultant has successfully completed the entire IT Energy Study following the instructions provided in this document.

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Metered idle electrical demand for baseline computer models and IT ECMs is provided.

Metered electrical demand for new energy conservation measures be provided or credible sources provided for the correct electrical demand in idle mode for all new measures.

The consultant has successfully completed all required entries in the IT Calculator.

The consultant has provided their own spreadsheet calculations for baseline and ECM hours of operations and electrical energy savings which need be accurate and correct.

The consultant has attached a copy of the original IT Opportunity assessment to the Energy Study.

The consultant has compared the original Opportunity Assessment with the electrical savings for each of the ECM's covered in the original Opportunity Assessment and Energy Study

The number of Energy Conservation Measures covered in the Energy Study must be the same as the original customer signed IT Opportunity Assessment.

Financial benefits for each energy conservation measure are provided with calculations and discounted cash flow analysis.

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Implementation plans and suggestions for removing challenges need be stated clearly.

There are no discrepancies between the Energy Study and the consultants Energy Study Proposal, i.e. hours of site work in the proposal must equal actual site work done.

### **9 APPENDIX:**

#### **Step 1 Determine the Average Electrical Base load and hours of Operation**

##### *Suggested Methodologies*

#### **Method 1: Script of Power Management Agent Software**

1. To determine hours of baseline computer usage deploy a Script without the Power Management (PM)
2. Agent on an appropriate sample number of computers at PSHA on at least 8% of total computer physical inventory or sites.
3. Script can be deployed without the PM Agent by electing to use the never command in when to shut down or place desktops into PM modes.
4. Run the non-Agent Script for a period of time at least one week.
5. The Energy Audit Consul of Script will give the numbers of hours of use for the computer workstations.
6. Use the Kill a Watt hour meters on desktop workstations to determine an average electrical demand in watts per workstation.

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7. If baseline computers has deferred modes of operation i.e. hard drive switch off after specified times, all differed and non-deferred states need be measured for electrical demand and the annual estimated hours in each state need be taken into account to show the calculated average electrical demand for each computer model type. The calculations need be shown in the energy study.
8. In terms of the numbers of computers sampled for electrical demand in 5. above we recommend following Power Smart Evaluation's recommendations. These recommendations are that a minimum of 8% random sampling be done. The random sampling applies to computer electrical demand where the 8% is that for the total baseline physical computer inventory or sites.
9. Not more than 20 of physical computers should be added to the miscellaneous group.
10. All calculations need be shown in the energy study.

### Method 2: Walk Through Evaluations

1. 8% computer baseline random sampling is required to inspect baseline computers for work hours and electrical demand baseline.
2. It will be necessary to carry out the walk through during and after normal work hours.
3. Use the Kill a Watt hour meters on desktop workstations and monitors and screens to determine an average electrical demand in watts per workstation.
4. If baseline computers has deferred modes of operation i.e. hard drive switch off after specified times, all differed and non-deferred states need be measured for electrical demand and the annual estimated hours in each state need be taken into account to show the

## Green IT Energy Study Guidelines

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calculated average electrical demand for each computer model type. The calculations need be shown in the energy study.

5. Not more than 20 of physical computers should be added to the miscellaneous group.
6. All calculations need be shown in the energy study.

### **Step 2 Determine the Average Electrical load and hours of Operation for Proposed New IT Energy Conservation Measures**

#### *Suggested Methodologies*

#### **Method 1 Estimate based on the Proposed Elected Power Management Settings**

1. Having determined the average base load kWh/yr used by a desktop computer workstation from Step 1 we may determine the future base load by estimating it from the PM settings.
2. Determine the average number of desktop shut down hours per year for example if the computers are switched off on average at 5pm and come on at 8am including weekends then the total shut down hours per year will be (15 hrs per day x 365 days/yr) – patching hours. Patching hours will be assumed to be using Method 1. 2 hrs/week = 104 hrs/yr so in this example the Total estimated shut down hours per year = 5,475 – 104 = 5,371 hrs/yr.
3. Determine the average number of desktop sleep mode hours per year.
4. For 3. above the sleep mode watts is determined by sampling with the Kill a Watt hour meter on an appropriate number of samples using 8% random sampling when the computer is in sleep mode. Using an example to help explain the methodology we will take the average

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desktop power consumption in ON mode = 100W and the average desktop power consumption in sleep mode to be 25W.

5. For 3. above the purposes of estimating sleep mode hours we refer to LBNL 39466 Pg. 15 “standard operation as defined in [Nordman, et al.] of 9.5 hours/day of operation including 5.5 hours/day of idle time.” we suggest 5.5 out of 9.5 hrs of idle time is high and recommends using 4 hrs per day and use the hours on per day from Step 1. 4. above.
6. For 3. above we suggest the total hours in sleep mode per year to be taken as  $52 \times 5 \times 4 = 1040$  hrs/year.
7. Having deployed the PM Agent or completed an 8% random sampling the estimated new energy consumption per desktop workstation using the example numbers above would be calculated as follows: ON hours/yr =  $8,760 - 5,371 - 1,040 = 1,589$  hrs per year and the average kWh/yr used in ON mode =  $1,589 \times 100W = 158.9$  kWh/yr, the energy used by the average desktop in sleep mode per year =  $1,040 \times 25W = 26$  kWh/yr so the Total Average Power Consumption of a desktop Workstation in Power Management Mode =  $158.9 + 26 = 184.9$  kWh/yr. The Total Estimated Average Energy Savings per Desktop Workstation =  $7,500 \times 100W - 184.9$  kWh/yr =  $750$  kWh/yr –  $184.9$  kWh/yr =  $565.1$  kWh/yr.

### **Method 2 Scrip Energy Audit Network Tools to determine hours of use after Power Management is deployed**

1. Deploying the script the total average hours of use per desktop workstation after power management has been deployed may be determined.
2. If the script can also determine the hours in sleep mode then these sleep mode hours need be used.

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3. If the script cannot determine the hours in sleep mode then the calculation methodology used in Method 1 of Step 2. above sections 3-6.
  
4. Having determined new average desktop workstation On and Shutdown and Sleep hours after the PM Agent is deployed we may use the measured average electrical demand for desktops in ON and Sleep mode and then calculate the new PM average kWh/yr per desktop.
  
5. The average electrical energy savings per desktop in PM mode will be taken from the result of Step 2 Method 1.

### Revisions

Date	Change	Acknowledgments
2014/04/28	Initial Version Rev000 V1	