



# ECO SOLUTIONS

## FOR HP WEB JETADMIN

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### TABLE OF CONTENTS

Overview .....	2
Database Connectivity license.....	2
HP Eco Solutions reports.....	3
Device settings and capabilities .....	3
Copy/digital send capabilities exception.....	4
Device paper usage and digital processing.....	4
Top 10 paper usage .....	5
HP EcoSMART Fleet.....	5
Installation Checklist .....	5
.NET 4.0 and ASP.NET 4.0 .....	6
Microsoft IIS.....	6
IIS WMI Compatibility and Metabase and Configuration (IIS 6 and higher) .....	6
IIS Static Content .....	6
ASP.NET Extensions Allowed .....	6
Microsoft SQL Server 2005 SP2 or Higher version (Express or full).....	7
Mixed-Mode Authentication (SQL Authentication) .....	7
SQL Server Multi User Mode.....	7
Rights To Access the Web Jetadmin Database .....	8
Enable TCP/IP Connections .....	8
SQL Browser .....	8
Installation.....	8
Troubleshooting Installation .....	10
Launching HP EcoSMART Fleet .....	11
Add User .....	11
Data Source .....	11
Troubleshooting Data Source.....	13
Collect.....	14
Creating an Analysis.....	14
Analyze .....	15
View an analysis summary.....	16
Modify future settings .....	17
Export a Report.....	19
Set location data .....	20
View energy details .....	21
View paper details .....	22
Update Carbon Footprint Calculator Data.....	23
Summary.....	24
Appendix A.....	25
Carbon Footprint Calculator: Key Assumptions .....	25
Assumptions.....	25

## OVERVIEW

Successful enterprise businesses have always looked for ways to cut costs. Today, most enterprises are also seeing the value of introducing environmental programs and initiatives that both reduce their overall costs and help them engage in sustainable practices. For imaging and printing fleet administrators, this often results in management requesting a certain reduction in both costs and environmental impact. To accomplish this, print administrators need to understand their current situations, identify where changes could be made, and see how to implement those changes in a way that's both good for the environment and the business. HP Web Jetadmin software offers two potential solutions to help IT managers assess printing behaviors and lower their organization's environmental footprint.

HP EcoSMART Fleet, available for fee, combines HP Carbon Footprint Calculator data and Industry leading HP Web Jetadmin fleet data to provide eco analysis such as carbon, power, and paper usage information on a fleet of devices. A single dashboard is used to run real time scenarios against an imaging and printing fleet's eco usage to consolidate and convert printer data to environmental metrics. Simple PDF or XML reporting provides IT professionals with environmentally relevant data in a user friendly format.

HP Eco Solutions reports, available when ordering the free HP Database Connectivity Module, are pre-configured SAP Crystal Reports that display environmental settings of a print fleet. These reports pull information contained in HP Web Jetadmin database views and provide an intuitive presentation of environmentally relevant data from HP Web Jetadmin, allowing IT managers to quickly assess opportunities to reduce the environmental impact of their organization's printing and track progress toward green IT goals over time.

## DATABASE CONNECTIVITY LICENSE

Both HP EcoSMART Fleet and HP Eco Solutions reports require that data gathered from devices by HP Web Jetadmin is stored in a known schema or format in Microsoft SQL database views. For versions of HP Web Jetadmin prior to 10.2 SR6, in order to store device data in database views, the Database Connectivity license must be installed into HP Web Jetadmin. The license can be obtained through a link on the HP Web Jetadmin Web page by browsing to [www.hp.com/go/wja](http://www.hp.com/go/wja) and selecting **Extended Modules**. This module allows HP Web Jetadmin users to:

- Use a remote SQL database in place of local Microsoft SQL Express database.
- Export device lists and store data collections to SQL database views.
- Generate HP Eco Solutions reports to quickly assess opportunities to reduce the environmental impact of their organization's printing and track progress toward green IT goals over time.

The licenses are node-locked to an IP address; a separate license is needed for each HP Web Jetadmin server. An order number is supplied when requesting a license from HP. The order number is used to generate the actual licenses. Once a license is obtained, merely paste it into HP Web Jetadmin License Manager under the Windows® **Start Menu, Programs, HP Web Jetadmin** program group and restart the HP Web Jetadmin service.

For HP Web Jetadmin 10.2 SR6 and beyond, the Database Connectivity license is no longer needed to expose the device data in database views for use by both HP EcoSMART Fleet and HP Eco Solutions reports. Data that is collected for reports in HP Web Jetadmin will be written to a database view on a scheduled basis. The data that is populated into these database views is generated either by the HP Web Jetadmin background poller or by scheduled data collections for reports.

The HP Web Jetadmin device list background poller is responsible for collecting the data that represents device attributes. Reports data collections can be enabled to collect the remaining data,

typically those that represent page counts and consumables usage. Reports data collections are run once per day.

HP Web Jetadmin offers several types of data collections for reports. However, only two data collections are responsible for gathering data to be stored in database views:

- Device Utilization Data—Collected daily, this data contains page counts such as simplex, duplex, monochrome, color, media size (letter, legal, A4, and so on), and job type (copy, digital send, incoming fax, outgoing fax, or scan, for example).
- Supply Utilization—Collected daily, this data contains metrics on consumable utilization such as level value, percent remaining, supply coverage, pages remaining, and current page count. Additional data, if supported, may include install date, removal date, initial level, initial page count, product info (serial number, part number, max capacity, max pages, manufacturing date, and more) and consumable type (toner, fuser kit, ink, and so on).

## HP ECO SOLUTIONS REPORTS

HP Eco Solutions reports are pre-configured SAP Crystal Reports 2008 that display environmental settings of a print fleet. These reports pull information contained in the database views described in the previous section. They are included in a .zip file with the Database Connectivity Module. HP Eco Solutions reports provide an intuitive presentation of environmentally relevant data from HP Web Jetadmin, allowing IT managers to quickly assess opportunities to reduce the environmental impact of their organization’s printing and track progress toward green IT goals over time.

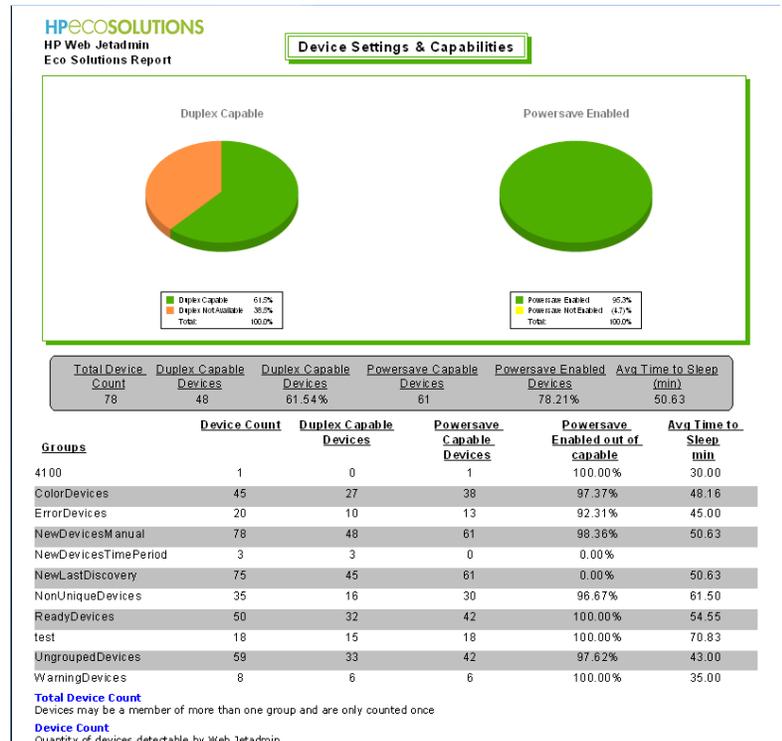
In order to use the reports, an ODBC connection to the HP Web Jetadmin database (HPWJA) can be created under Windows. Crystal Reports can then link to the appropriate ODBC connection containing the HP Web Jetadmin database (HPWJA) in order to populate the HP Eco Solutions reports with HP Web Jetadmin data.

The four HP Eco Solutions reports include the following detailed information:

### Device settings and capabilities

Reports the availability of paper-saving features as well as the availability and use of energy-saving features.

- Device count: Quantity of devices detectable by HP Web Jetadmin.
- Duplex-capable devices: The percentage of all reported devices with automatic duplex feature installed, listed by individual device status. This shows your total opportunity to drive paper savings via duplexing.
- Powersave-capable devices: Devices that have powersave capability. Highlights your potential to further decrease energy consumption.
- Powersave-enabled devices: Percentage of devices with powersave capability that have



Powersave features enabled, listed by individual device status. Shows untapped potential to decrease energy consumption by enabling powersave on capable devices.

- Average time to sleep: Average of “time to sleep” settings across a selected group, in minutes. Shorter “time to sleep” settings reduce energy consumed by moving devices out of higher energy states, such as Ready mode.

## Copy/digital send capabilities exception

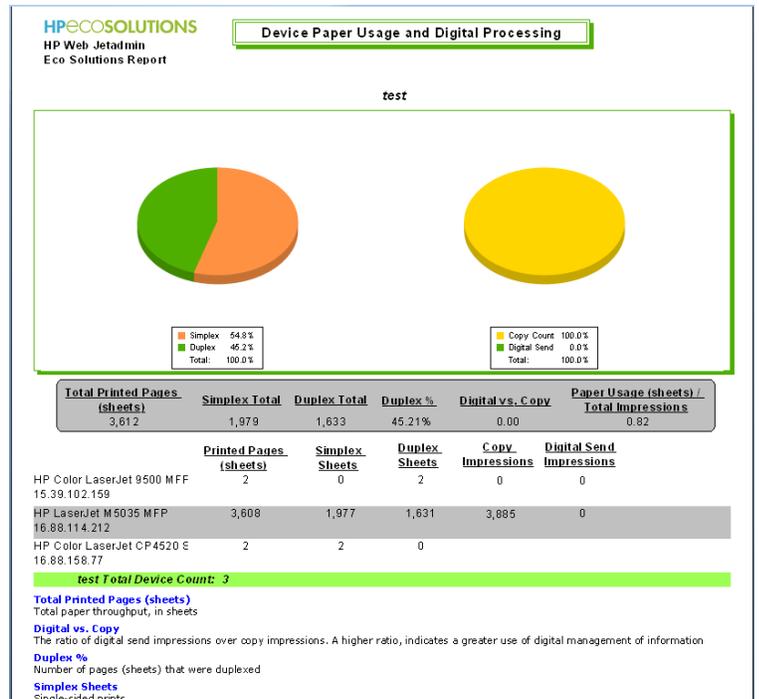
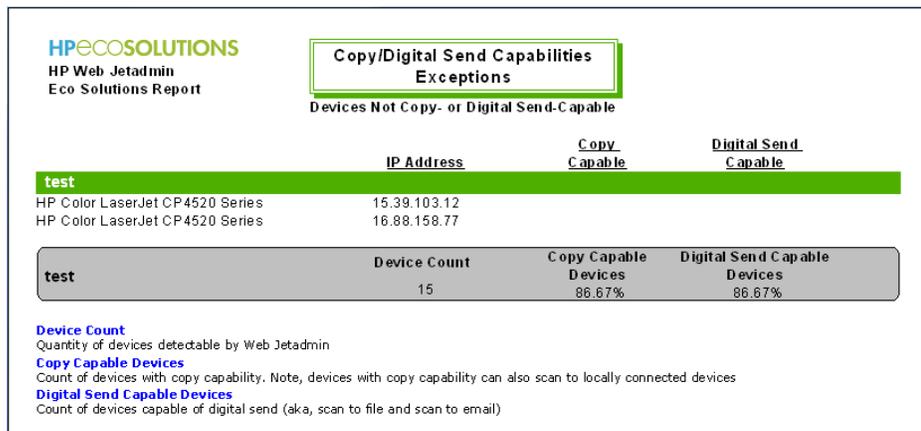
Reports devices without copy or digital send capability. The addition of digital send capability enables digital—rather than paper-based—information management, reducing paper consumption. This report can assist in uncovering alternatives to paper based processes. Using digital, green alternatives to printing or copying and sharing documents can help speed processes and decrease paper consumption.

- Device count: Quantity of devices detectable by HP Web Jetadmin.
- Copy-capable devices: Devices with copy capability; such devices can also scan to locally connected devices.
- Digital send-capable devices: Devices capable of scanning to file and digital sending.

## Device paper usage and digital processing

Reports device use, showing both paper-based and digital information management. This allows comparison of simplex and duplex printing, as well as the use of digital send capability rather than copy.

- Total count: Paper throughput, in sheets.
- Simplex sheets: Number of single-sided prints.
- Duplex sheets: Number of sheets of paper printed in duplex (double-sided) mode; includes sheets printed on one side while the device is in duplex mode.
- Simplex versus duplex: Percentages of one-sided and two-sided printing. A higher percentage of simplex pages indicates potential to save paper with duplex printing.
- Copy impressions: Number of impressions processed in copy mode; each impression counts once, regardless of whether



copied to a single-sided or double-sided copy.

- Digital send impressions: Number of impressions processed in digital send mode.
- Copy versus digital send: Percentage of copy count and digital sends presented as a graph. The higher your copy percentage, the greater the potential to save paper and reduce waste by moving to digital processes.
- Paper usage (sheets)/total impressions: Ratio indicating how much information (impressions) is managed with paper. The lower the ratio, the more efficiently the device is being used (for example, less paper is used to transfer information).

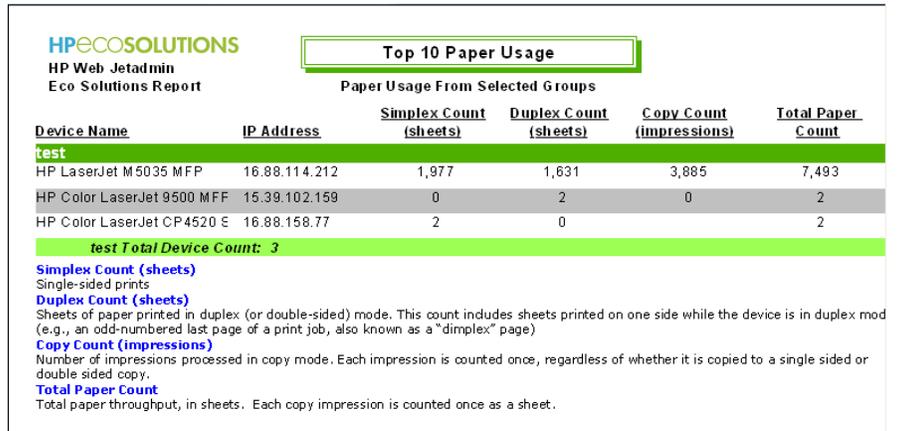
## Top 10 paper usage

Reports the printers with the greatest paper usage among selected groups, enabling prioritized follow-up.

- Simplex count: Number of single-sided prints.
- Duplex count: Number of sheets of paper printed in duplex (double-sided) mode; includes sheets printed on one side while the device is in duplex mode.
- Total count: Paper throughput, in sheets.
- Copy impressions: Number of impressions processed in copy mode; each impression counts once, regardless of whether copied to a single-sided or double-sided copy.

For more information regarding HP Eco Solutions reports, download the whitepaper titled “HP Eco Solutions with HP Web Jetadmin.” For instructions on generating HP Eco

Solutions reports, download the “HP Web Jetadmin Installation and Setup Guide.” Both of these documents may be found on the Self Help and Documentation tab at [www.hp.com/go/wja](http://www.hp.com/go/wja).



The screenshot shows a report titled "Top 10 Paper Usage" from HP Eco Solutions. The report includes a table with the following data:

Device Name	IP Address	Simplex Count (sheets)	Duplex Count (sheets)	Copy Count (impressions)	Total Paper Count
test					
HP LaserJet M 5035 MFP	16.88.114.212	1,977	1,631	3,885	7,493
HP Color LaserJet 9500 MFF	15.39.102.159	0	2	0	2
HP Color LaserJet CP4520 E	16.88.158.77	2	0		2

test Total Device Count: 3

**Simplex Count (sheets)**  
Single-sided prints

**Duplex Count (sheets)**  
Sheets of paper printed in duplex (or double-sided) mode. This count includes sheets printed on one side while the device is in duplex mode (e.g., an odd-numbered last page of a print job, also known as a "duplex" page)

**Copy Count (impressions)**  
Number of impressions processed in copy mode. Each impression is counted once, regardless of whether it is copied to a single-sided or double-sided copy.

**Total Paper Count**  
Total paper throughput, in sheets. Each copy impression is counted once as a sheet.

## HP ECOSMART FLEET

HP EcoSMART Fleet, available for fee, combines HP Carbon Footprint Calculator data and industry leading HP Web Jetadmin fleet data to provide eco analysis such as carbon, power, and paper usage information on a fleet of devices. A single dashboard is used to run real time scenarios against an imaging and printing fleet's eco usage to consolidate and convert printer data to environmental metrics. Simple PDF or XML reporting provides IT professionals with environmentally relevant data in a user friendly format.

## Installation Checklist

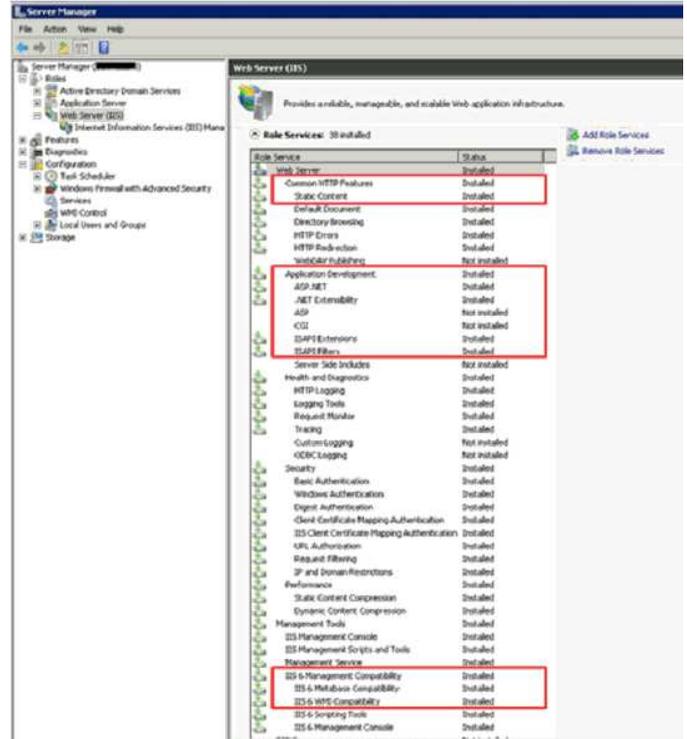
HP EcoSMART Fleet runs as an application through a browser interface using the Microsoft IIS Web service with a backend Microsoft SQL database. The following software must be installed with the proper configurations to prevent any errors during the installation process for HP EcoSMART Fleet. Completing these steps before running the HP EcoSMART Fleet installer will ensure a faster and smoother installation experience.

## .NET 4.0 and ASP.NET 4.0

The full Microsoft .NET 4.0 installer will copy the required system files to run the EcoSMART Fleet installer and application. It will also register ASP.NET into the IIS service which allows for viewing the EcoSMART Fleet application. If the .NET 4.0 Framework was installed prior to enabling IIS, run the full .NET 4.0 installer again to repair the existing installation and register ASP.NET with IIS.

## Microsoft IIS

The EcoSMART Fleet installer and application require that Microsoft IIS (Internet Information Services) be installed. Depending on the version of Windows, versions of IIS range from 5.1 to 7.5. IIS can be installed as a Windows feature when adding programs in most operating systems and as a role under Server Manager in other operating systems.



## IIS WMI Compatibility and Metabase and Configuration (IIS 6 and higher)

These features allow the installer to have access to the creation and management of web sites and application pools which allows the installer to create the necessary virtual directory and bindings to set up Eco Smart Fleet correctly.

*Note: If the installed version of IIS is lower than 7, there is no need to worry about enabling this feature. These features may also be disabled once Eco Smart Fleet is installed.*

## IIS Static Content

The installer requires IIS Static Content to allow the server to serve the Silverlight file types. This feature can be installed as a Windows feature when adding programs.

## ASP.NET Extensions Allowed

The EcoSMART Fleet application requires that the ASP.NET extensions (\*.aspx) are allowed. To verify this, open IIS management under Control Panel, Administrative Tools. Select the IIS server instance from the left panel. Select the



ISAPI and CGI Restrictions module. Verify that the ASP.NET 4.0.30319 extensions are allowed.

Note: If the installed version of IIS is lower than 7, there is no need to worry about enabling this feature.

### ISAPI and CGI Restrictions

Use this feature to specify the ISAPI and CGI extensions that can run on the Web server.

Description	Restrict...	Path
Active Server Pages	Allowed	C:\Windows\system32\inetns\asp.dll
ASP.NET v2.0.50727	Allowed	C:\Windows\Microsoft.NET\Framework\v2.0.50727\aspnet_isapi.dll
ASP.NET v4.0.30319	Allowed	C:\Windows\Microsoft.NET\Framework\v4.0.30319\aspnet_isapi.dll
ASP.NET v4.0.30319	Allowed	C:\Windows\Microsoft.NET\Framework64\v4.0.30319\aspnet_isapi.dll

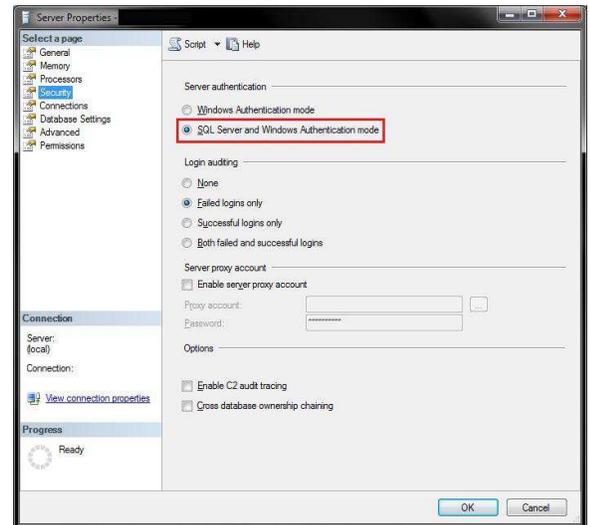


## Microsoft SQL Server 2005 SP2 or Higher version (Express or full)

EcoSMART Fleet collects data from HP Web Jetadmin SQL databases and stores it in its own SQL database. The EcoSMART Fleet installer requires an installed SQL server instance where the currently logged on user has rights to create a database. The installer either creates a new EcoSMART Fleet database or points to an existing one. In order to collect data from HP Web Jetadmin databases, a login will need to be created on the Web Jetadmin SQL instance that has db\_datareader rights on the Web Jetadmin database, at a minimum.

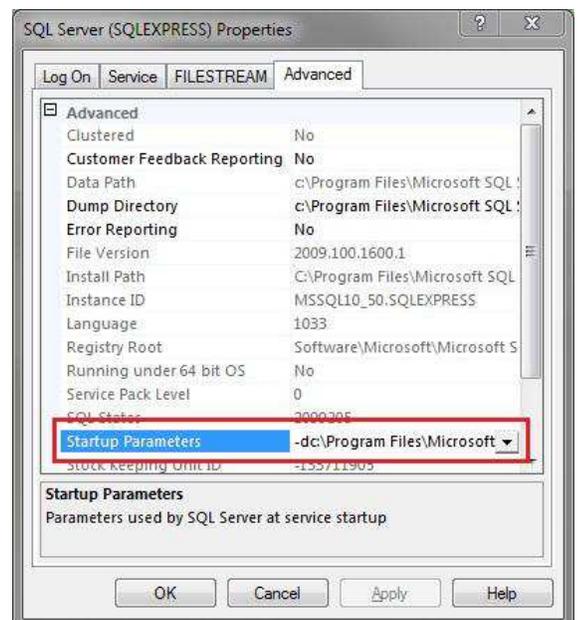
### Mixed-Mode Authentication (SQL Authentication)

Mixed-Mode Authentication (SQL Authentication) must be enabled on the SQL server instance where the EcoSMART database resides as EcoSMART Fleet will be using SQL credentials to login the database it creates. Mixed-Mode Authentication (SQL Authentication) is also required on all HP Web Jetadmin SQL instances so EcoSMART Fleet can login and collect data from the Web Jetadmin databases. SQL Management Studio can be used to ensure Mixed-Mode Authentication is set under **Properties, Security** when logging into the SQL instance.



### SQL Server Multi User Mode

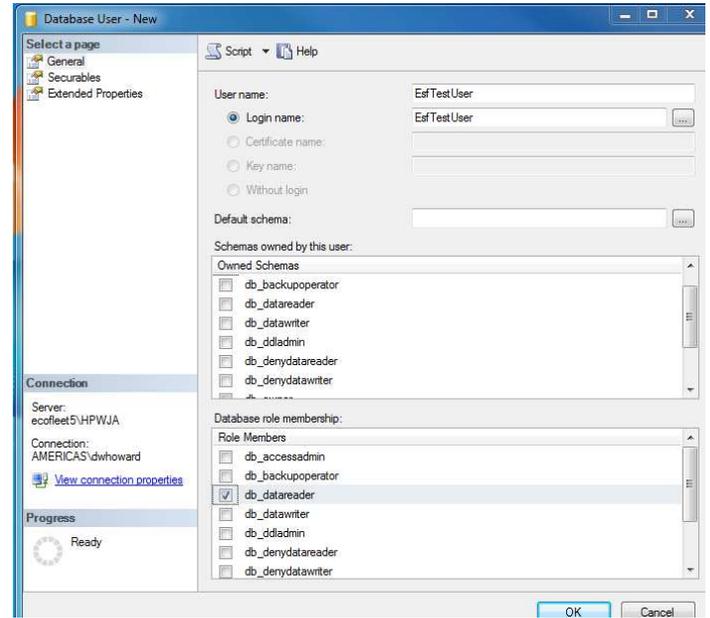
The EcoSMART installer requires that SQL server be running in multi user mode, which allows more than one user to log into the SQL Server instance. In some cases SQL server might be run under single user mode which only allows a single administrator user to log in at a time for the purpose of maintenance, upgrades or troubleshooting on SQL server. To verify that SQL server is running under multi user mode, open SQL Server Configuration Manager. Select **SQL Server Services** option from the left panel. Select the desired SQL Server instance from the content panel. Right click the instance and select the **Properties** option from the context menu. On the



**Properties** window, go to the **Advanced** tab. In the **Startup Parameters**, verify that the `-m;` parameter does not exist, if it does, remove it.

### Rights to Access the Web Jetadmin Database

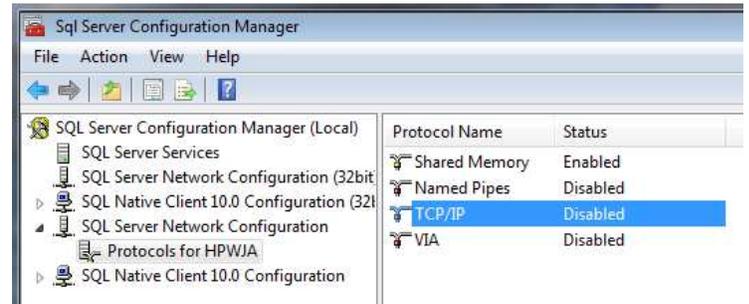
In order to successfully connect to an existing HP Web Jetadmin database, the HP Web Jetadmin instance must be changed to support Mixed Mode or SQL Authentication Mode, and a user must be created for that instance that has at minimum `db_datareader` rights to the HPWJA database. To create an account for SQL Server authentication to the WJA database, login to the Web Jetadmin instance using SQL Server Management Studio Express and create a login under **Security, Logins**. Add the user to the HPWJA database under **HPWJA, Security, Users**, and provide `db_datareader` access.



Change security on the HPWJA database to be **SQL Server Authentication** by right-clicking the connection and selecting **Properties**.

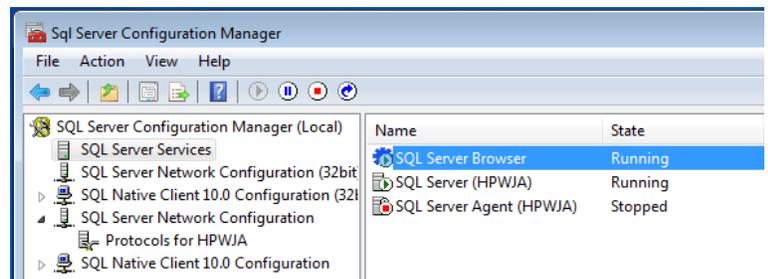
### Enable TCP/IP Connections

A TCP/IP connection must be available to the HP Web Jetadmin instance for EcoSMART Fleet to be able to connect to the database. To ensure TCP/IP is available on the instance, launch SQL Server Configuration Manager. Expand the **SQL Server Network** configuration category. Select **Protocols** for HPWJA. Enable **TCP/IP** for HPWJA by right-clicking on **TCP/IP** and selecting **Enable**.



### SQL Browser

The SQL Server Browser must be started under **Services** in order for the connection to the HP Web Jetadmin instance and database to succeed. Open **Services** under **Administrative Tools** and ensure the SQL Server Browser is started.



## Installation

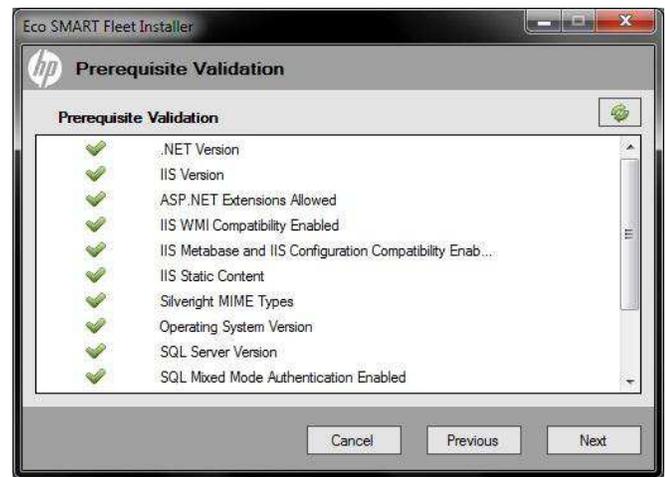
Once the prerequisites in the installation checklist have been met, installing HP EcoSMART involves the following steps:

1. Run the EcoSMART Fleet Setup file as an administrator.



database and a login to access the database using the credentials entered under **User Name** and **Password**. The password must be secure by SQL standards meaning it must contain 8 characters minimum and at least one each of upper case, lower case, numeric, and special characters.

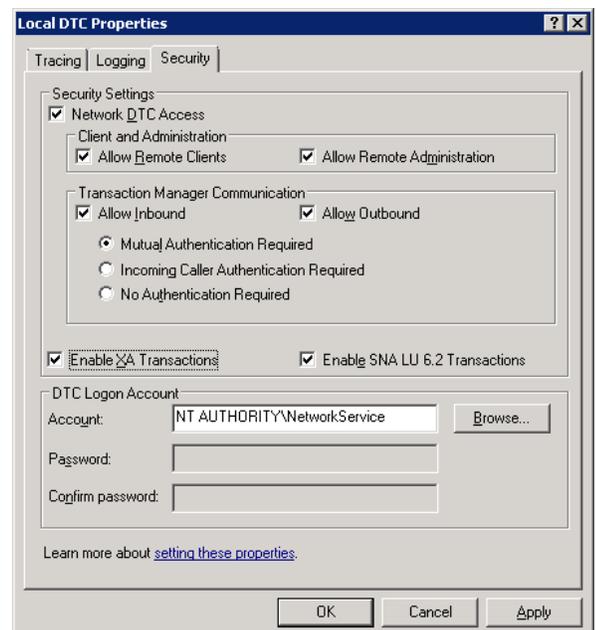
5. In the Prerequisite Validation screen, the installer verifies that the required Windows components, IIS features, SQL configuration and installation files are in enabled or in place. The validation screen marks any requirement that is not met and provides details on how to resolve it.



## Troubleshooting Installation

The following tips may help to resolve issues that arise during installation:

- Check the installation log file, created in the same directory as the installation executable. File name is ESFInstallerLog.txt. Helpful clues may be found in this file such as the SQL Server instance must support MixedMode Authentication or that the currently logged on user does not have permissions to create a database.
- If a SQL server instance cannot be accessed, try accessing the remote instance using SQL Server Management Studio. If it cannot connect, neither can EcoSMART Fleet.
- If a SQL server instance cannot be accessed, make sure the SQL Browser is running and TCP/IP is enabled on the SQL instance where the installer is attempting to create a database.
- If a SQL server instance cannot be accessed, double check that the currently logged on user has access to at least create database rights on the SQL instance (sysadmin rights would be ideal). If the SQL instance is remote, the machine may be trying to access the database as the machine name rather than Windows user name. Try providing rights to the machine name as well as Windows user name. For example, if the machine is named "americas\test", grant "sa" rights to "americas\test\$" (Windows account adding the '\$' at the end).
- Make sure the password is secure by SQL standards (8 characters minimum and at least one each of upper case, lower case, numeric, and special characters).
- Check tips on validation screen. Hints will be provided if something is missing. Typically the ASP.NET extensions are forgotten to be allowed.
- Check properties for the Microsoft Distributed Transaction Coordinator (MSDTC) service. The EcoSMART Fleet installation requires enabling the MSDTC service on the EcoSMART Fleet server and as well as verifying it was enabled on a remote SQL server. Although MSDTC is typically enabled by default, policies may have been set to either disable it or features of MSDTC such as inbound or outbound connections. Make sure all Local DTC Properties under Component



Services are enabled on both the EcoSMART Fleet machine and any remote SQL database machines, if applicable for the operating system.

## Launching HP EcoSMART Fleet

HP EcoSMART Fleet is launched through a browser by typing the machine name and virtual directory name entered during installation. For example, if ESF had been entered as the virtual directory, HP EcoSMART Fleet would be launched as such:

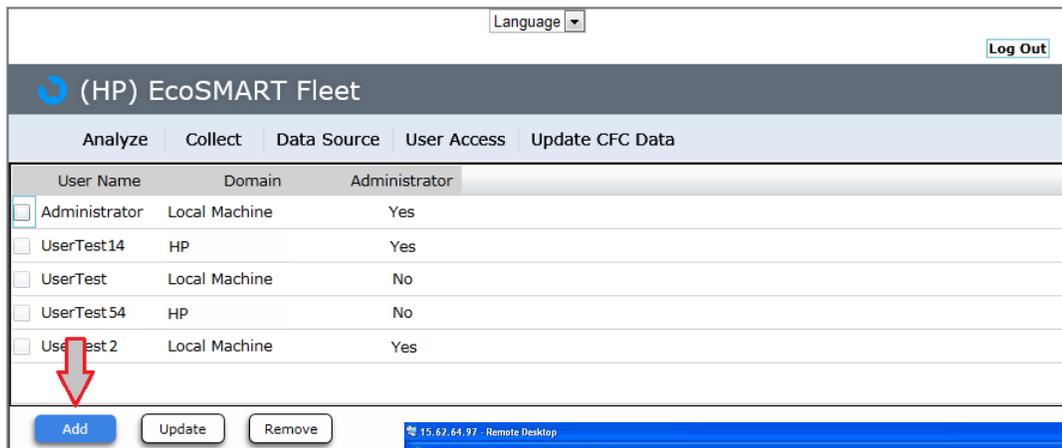
[HTTP://localhost/esf](http://localhost/esf)

Once the application has been opened, select **Log In** and provide appropriate credentials to begin using the application.

Any credentials that are members of the Administrators group on the machine will be able to login. Once inside the application, other users can be granted access to login as either regular users or administrators.

## Add User

To grant additional users access to EcoSMART Fleet, click on the **User Access** tab. This tab is only accessible by an admin account. A list of all users that have access will be displayed, including local administrators. Click on the **Add** button to grant access to additional users.



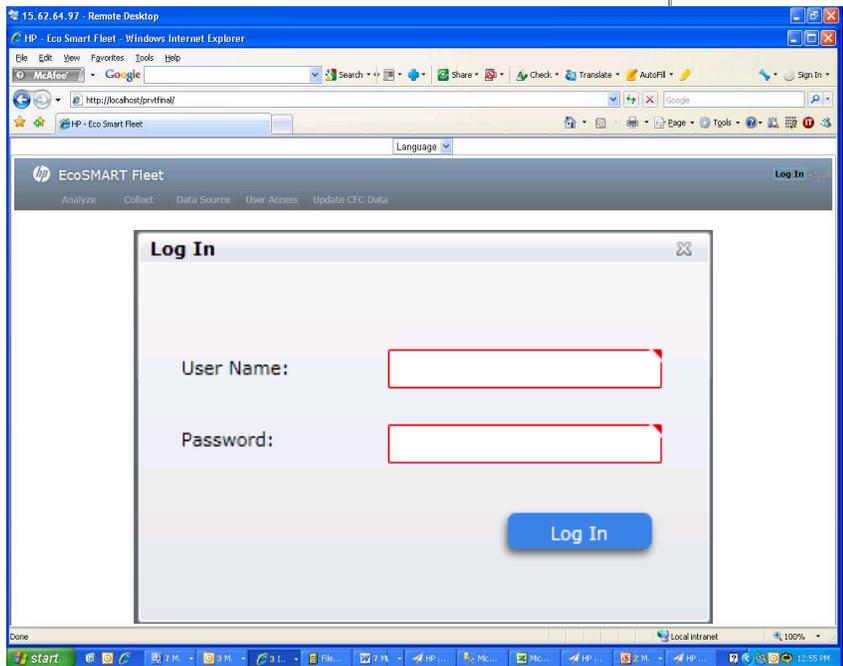
The screenshot shows the HP EcoSMART Fleet interface with the 'User Access' tab selected. At the top right, there is a 'Language' dropdown menu and a 'Log Out' button. Below the header, there are navigation tabs: 'Analyze', 'Collect', 'Data Source', 'User Access', and 'Update CFC Data'. The main area contains a table with the following columns: 'User Name', 'Domain', and 'Administrator'. The table lists five users: Administrator (Local Machine, Yes), UserTest14 (HP, Yes), UserTest (Local Machine, No), UserTest54 (HP, No), and UserTest2 (Local Machine, Yes). A red arrow points to the 'Add' button at the bottom left of the table.

User Name	Domain	Administrator
<input type="checkbox"/> Administrator	Local Machine	Yes
<input type="checkbox"/> UserTest14	HP	Yes
<input type="checkbox"/> UserTest	Local Machine	No
<input type="checkbox"/> UserTest54	HP	No
<input type="checkbox"/> UserTest2	Local Machine	Yes

Buttons: Add, Update, Remove

## Data Source

Data Sources must be setup before EcoSMART Fleet can perform an analysis. Data sources are HP Web Jetadmin databases where the Database Connectivity Module license has been installed and device/supplies utilization collections have been started. In HP Web Jetadmin 10.2 SR6, the Database



The screenshot shows a Windows Internet Explorer browser window displaying the HP EcoSMART Fleet login page. The browser address bar shows 'http://localhost/briffinal'. The page has a 'Language' dropdown menu and a 'Log In' button at the top right. The main content area features a 'Log In' dialog box with two input fields: 'User Name:' and 'Password:'. A 'Log In' button is located at the bottom right of the dialog box.

Connectivity Module license is no longer required to be installed in order for data from data collections to be populated in Views.

To access the Data Sources screen, click the **Data Source** tab. A grid appears that provides information on each of the WJA Data Sources that have been added to the application.

To add a Web Jetadmin database as a data source, click **Add** and enter data into the required fields:

- **Server Name/IP** – Enter the server name or IP address of the server where the WJA Data Source is hosted. Must include the Web Jetadmin instance i.e. machine name\hpwja.
- **WJA Data Source** – Enter the name of the Web Jetadmin data source, or database (typically hpwja).
- **User Name** – Enter the user name of a user with select privileges on the Web Jetadmin data source. This user must have a minimum of db\_datareader rights on the Web Jetadmin database.
- **Password** – Enter the user’s password.
- **Active** – Select **Yes** in order to use the data source.
- **Location/Provider** – Specify the location where the majority of devices managed by this data source are located, or the specific energy provider if applicable. The location/provider is used to determine the appropriate Greenhouse Gas (GHG) Emission Factor to apply to these devices. The location/provider can be modified for specific groups of devices after a collection is finished, if desired.



Select	Server Name/IP	WJA Data Source	Location/Provider	Currency	Local Cost Per KWH	Paper Size	GHG Emission Factor	Active
<input type="checkbox"/>	jmetz2\hpwja	HPWJA	United States	U.S. Dollar	0.095	Office A/A4 20lb 80gsm	618.2469	Yes
<input type="checkbox"/>	ecofleet4\hpwja	HPWJA	United States	U.S. Dollar	0.095	Office A/A4 20lb 80gsm	618.2469	Yes

Buttons: Add, Update, Remove

- **Currency** – Specify the currency used to express the cost per kWh for the devices managed by this data source.
- **Cost/kWh** – Denotes the default cost per kWh is shown based on the selected currency which may or may not reflect the actual cost for energy at your location. If you know the cost per kWh for the devices managed by this data source, enter the actual value. This can be modified for specific groups of devices after a collection is finished, if desired.
- **Paper Type** – Currently all calculations are based on a standard office size and weight of paper.

## Troubleshooting Data Source

- Remember, the credentials entered here must match a user login that had been created for the instance that has at minimum db\_datareader rights to the HPWJA database (dbo would be ideal).
- A TCP/IP connection must be available to the HP Web Jetadmin instance for EcoSMART Fleet to be able to connect to the database. Ensure SQL Browser is running also.
- Attempt to connect to the SQL instance with the same credentials using SQL Server Management Studio and selecting SQL Authentication. If it fails, so will EcoSMART Fleet.
- Make sure the Web Jetadmin installation contains database views. Web Jetadmin 10.2 SR6 and above automatically adds data collections to database views, but a Database Connectivity module is required for previous versions.
- Check the application log file for errors. It may provide helpful clues as to why the data source attempt is failing. The log is accessible by browsing to the same location as the EcoSMART Fleet application, and appending "/log/EsfLog.aspx". For example:

**<http://server/esf/log/EsfLog.aspx>** (if running on machine "server", with virtual directory "esf")

On the log page, specify a desired date range to query and click **Get Logs**. To save the log information into a text file format, click **Export Logs** and specify a file name and location.

http://ecofleet5/esf/log/esflog.aspx

Start Date: 10/4/2011

End Date: 10/5/2011

Get Logs Export Logs

Timestamp	Title	Message
-----------	-------	---------

## Collect

The Collect section of the EcoSMART Fleet application allows the user to schedule Web Jetadmin data extractions from one or more Web Jetadmin databases for a specified period of time. These extractions collect information about device models, energy settings, and paper usage, and consolidate them into a named Analysis. The analysis then studied and manipulated to create reports and cost saving scenarios. The collection can take anywhere from a few seconds to several hours depending on the number of devices in the Web Jetadmin data sources, the number of data sources, the hardware of the servers involved, and other factors.

### Creating an Analysis

To create an analysis that can generate reports, click the **Collect** tab (administrator access only). The Web Jetadmin Data Sources section lists all the active Web Jetadmin databases registered in EcoSMART Fleet. In order to execute an analysis, at least one Web Jetadmin data source needs to be registered in EcoSMART Fleet, and at least one Web Jetadmin data source needs to be selected in the collect window.

**NOTE:** For Windows 2008 R2 and Windows 7, the following additional steps are required for proper operation of running an analysis:

- a. Open the HP EcoSMART Fleet Web Folder.  
The default location is C:\inetpub\wwwroot\ESF, but the location varies depending on the IIS configuration and the virtual directory specified in the HP EcoSMART Fleet installer.
- b. Right-click the **License** directory, and then select **Properties**.
- c. Click the **Security** tab, and then click **Edit**.
- d. Select the **IIS\_IUSRS** user, and then select **Write permissions** in the **Allow** column.
- e. Click **OK**. Then click **OK** again.

The Scheduling and Recurrence section defines when the extraction is going to happen. One time occurrences allow the user to execute an analysis now, or alternatively schedule it to execute at one time in the future. Weekly, monthly and yearly scheduled occurrences can also be defined.

The collection date range defines the snapshot that is going to be taken from the Web Jetadmin data sources. This information is required only in one time analyses (now or future) and is not relevant when recurrence is defined. A recurring collection will always use the time period specified in the recurrence. For example, if the user selected monthly recurrence, for each occurrence the start date will be the last execution date, and the finish date is going to be the current date.

**Note:** The calculation of projected annual savings is based on the date range of available device usage data which may be less than the date range specified in the collection. For example, if a collection was defined for a one month period, but all the devices only had one week of data collected, then the annual savings will be computed based on a week, rather than a month. For best results, all devices in the collection should have Web Jetadmin device usage data collected for the specified collection time period.

The analysis name defines the identifier for the analysis instance. Analysis names cannot be duplicated.

The screenshot shows the 'EcoSMART Fleet' interface with the 'Collect' tab selected. The interface is divided into four numbered sections:

- Select one or more data sources for this analysis.** A table with columns: SelectName, GHG Emission Factor, Local Cost Per kWh, Date Inserted, and Date Updated. Two rows are visible, both checked with a checkbox.
 

SelectName	GHG Emission Factor	Local Cost Per kWh	Date Inserted	Date Updated
<input checked="" type="checkbox"/> ecofleet5\hpwja\HPWJA	1.33	0.102	9/30/2011 4:28:44 PM	9/30/2011 4:28:44 PM
<input checked="" type="checkbox"/> ecofleet1\hpwja\HPWJA	1.33	0.102	9/30/2011 4:29:16 PM	9/30/2011 4:29:16 PM
- Specify how often to collect data for analysis.** Radio buttons for 'Once', 'Weekly', 'Monthly', and 'Yearly'. Below, radio buttons for 'Now' (selected) and 'Future'. A 'Start Date/Time' field is set to 10/12/2011 11:57 AM.
- Specify the device usage date range (if collecting once).** 'Start Date' is 2/1/2011 11:57 AM and 'End Date' is 5/1/2011 11:57 AM.
- Specify a name for this analysis data set.** A text box contains 'Eco1 and Eco5 2Q 2011'. An 'Accept' button is at the bottom.

Once all the sections are completed the user can proceed and click on the **Accept** button to save the Analysis. If the collection was scheduled to start immediately, it will start extracting data from the Web Jetadmin data sources.

## Analyze

The **Analyze** tab is used to view and analyze data that has been collected in an analysis. Data is viewed for the entire analysis or down to individual Web Jetadmin data sources and device groups. A user can modify various factors affecting energy and paper usage to estimate and report the potential future savings.

Click the **Analyze** tab (administrator and normal user access allowed). A list of all the available analyses appears along with their creation dates, recurrence pattern, and device usage date range. If the list is empty, then no data has been collected for analysis. Make sure the data sources have been added on the **Data Source** tab, and run a collection on the **Collect** tab to create an analysis.

hp EcoSMART Fleet Log Out About

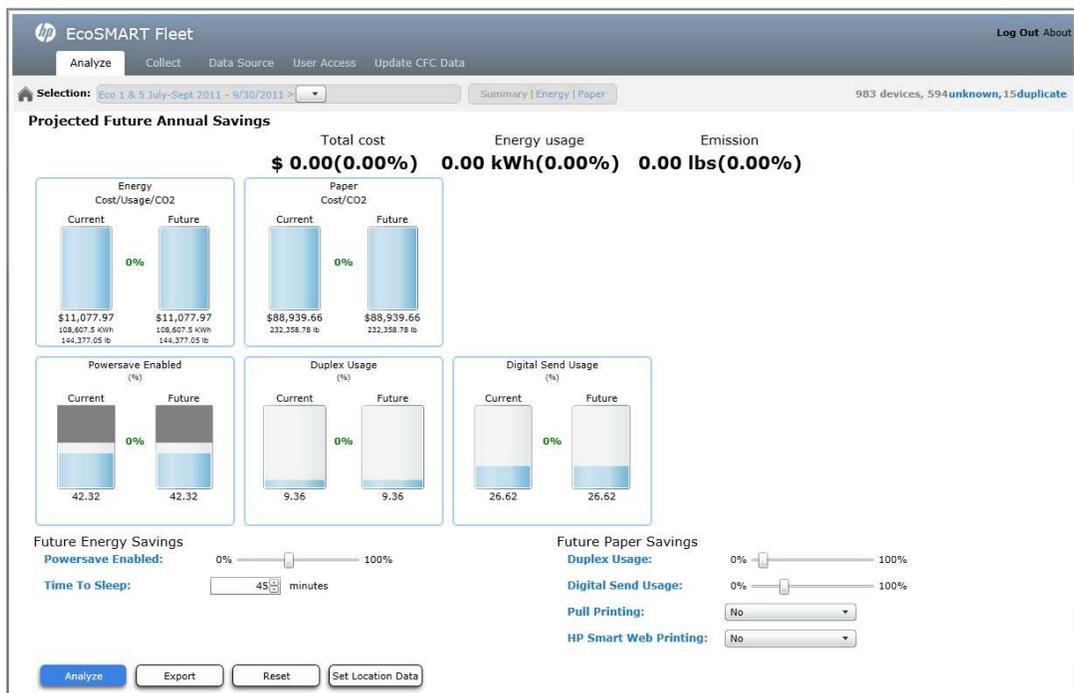
Analyze Collect Data Source User Access Update CFC Data

Analysis Data Set	Recurrence	Previous Execution Status	Device Usage Start	Device Usage End
<input type="checkbox"/> Eco 1/5 6 months - 9/30/2011	OneTime	Successful	3/30/2011 4:32:25 PM	9/30/2011 4:32:00 PM
<input type="checkbox"/> Eco 5 August 2011 - 9/30/2011	OneTime	Successful	8/1/2011 12:00:00 AM	9/1/2011 4:32:00 PM
<input type="checkbox"/> Eco 1 August 2011 - 9/30/2011	OneTime	Successful	8/1/2011 12:00:00 AM	9/1/2011 4:32:00 PM
<input type="checkbox"/> Eco 1 & 5 July-Sept 2011 - 9/30/2011	OneTime	Successful	7/1/2011 4:33:55 PM	9/30/2011 4:32:00 PM
<input type="checkbox"/> 5000 Devices WjaHigh1 6 months - 9/30/2011	OneTime	Successful	3/30/2011 4:34:50 PM	9/30/2011 7:34:00 PM

Refresh Rename Delete

## View an analysis summary

To view an analysis, click the analysis data set name. The **Summary** page appears, showing graphs of the energy and paper data collected for the entire analysis set of devices. The data is organized in a hierarchical fashion. An analysis data set contains one or more Web Jetadmin data sources, depending on how many were selected for the collection. Each Web Jetadmin data source contains multiple device groups, depending on how device groups are set up and organized within Web Jetadmin.



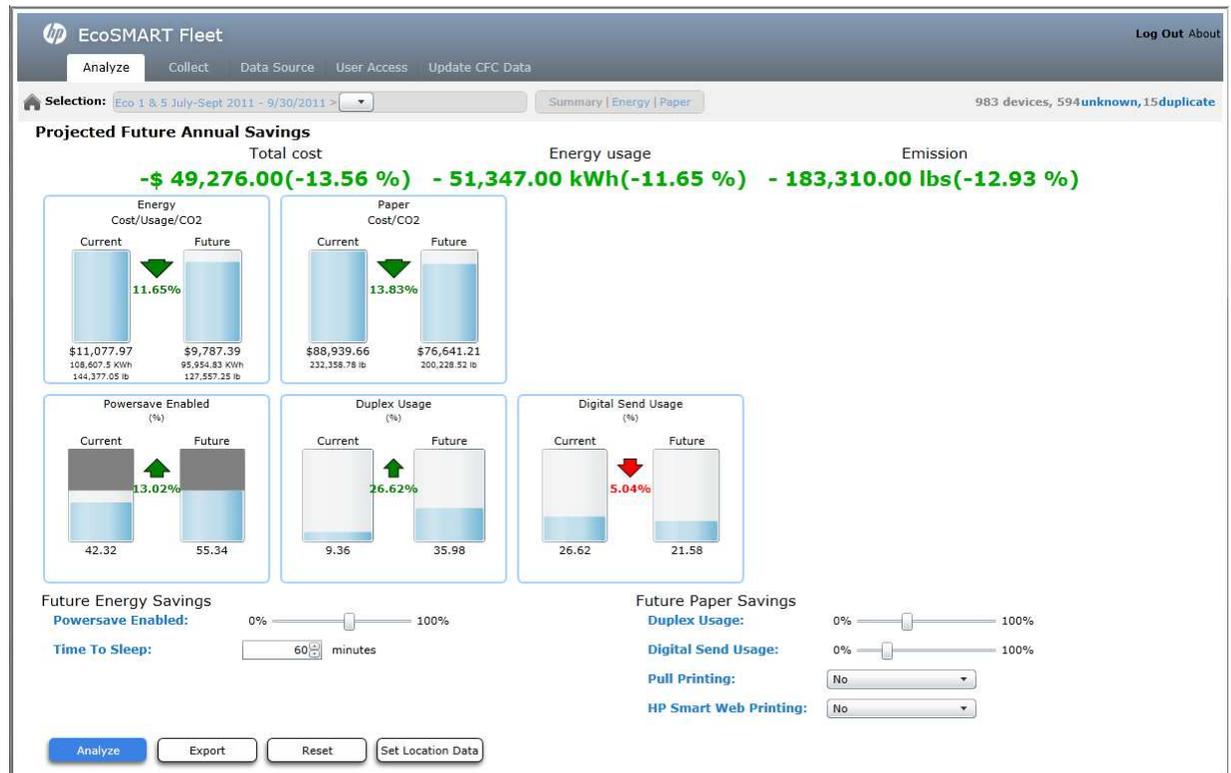
The **Analyze** tab contains a navigation bar across the top which shows the current selection. It allows users to navigate to different selection levels and pages. On the **Summary** page, a user can navigate down to the next level by clicking the dropdown button at the end of the selection string and selecting the desired data source or group. A user can navigate up to previous levels by clicking the desired portion in the selection string. To return to the top level list of analyses, a user can either click the **Home** icon on the left side of the navigation bar or click on a different tab and then click the **Analyze** tab again.

The right side of the navigation bar contains counters showing the total number of devices in the current selection, the number of unknown devices, and the number of duplicate devices. Unknown devices are device models for which EcoSMART Fleet is unable to determine power usage rates. For unknown devices, the calculations assume power usage rates based on the average of all known device power usage rates. Duplicate devices are devices where the IP address was reported by more than one Web Jetadmin data source. Duplicate devices are only counted once for calculations, but the device collection data may be different from one data source to another.

### Modify future settings

A user can modify various Eco-relevant settings to analyze the potential impact on future carbon footprint and Eco-related costs. By running future scenarios on targeted groups of devices, a user can identify potential areas of improvement and estimate the potential savings in terms of cost, energy usage, and CO2 emissions.

**NOTE:** Any projected future savings is an estimate only and is not a guarantee of actual savings. See the assumptions and calculations section in the Appendix for more details about the assumptions used and the sources of supporting data.



The graphs on the **Summary** page show a comparison of current and future values for the time period specified in the collection.

- **Powersave Enabled %** - the percentage of total devices that have a powersave or sleep delay setting that is not 0 (Off). This graph may have a maximum limit that is less than 100% if some percentage of devices is not capable of enabling powersave.
- **Duplex Usage %** - the percentage of pages that were printed two-sided rather than one-sided.
- **Digital Send Usage %** - the percentage of copy and digital send pages that were digitally sent rather than copied.
- **Energy** - an estimated cost in USD of usage in kWh and CO2 emissions based on the power usage rates of each known device model and a calculation of time spent printing, idle, and in sleep mode. This graph reflects the cost and usage over the specified collection time period.
- **Paper** - an estimated cost in USD of CO2 emissions based on the physical paper usage of each device and industry standard values for cost and emissions per sheet of paper. This graph reflects the cost and emissions over the specified collection time period unless the device collection data is not available for the entire time period. If the device collection data is only available for a shorter time period than the specified collection period, then the shorter period is reflected in the graphs and used for the annual projections.

The following settings can be modified and used for future analysis:

### **Powersave Enabled**

Increasing the total number of powersave enabled devices may result in decreased energy usage by allowing more devices to go into a low-power state when not in use. This setting calculates the average energy used by devices in the collection with powersave enabled or disabled and models the shift of a percentage of devices from one category to the other. If the sample set of devices does not contain enough data to determine actual average energy usage for one category or the other, then it assumes that devices use approximately 3 times as much energy when powersave is disabled compared to enabled. This assumption is based on HP internal calculations based on average energy usage rates and print speeds for known devices and 10,000 pages printed per year. To modify this setting on actual devices, a user can use a device management tool such as HP Web Jetadmin, the device control panel, or embedded web server if applicable.

**NOTE:** This value can only be increased up to the maximum number of powersave capable devices since powersave cannot be enabled on devices that do not support that feature.

### **Time to Sleep**

Decreasing the average time to sleep (sleep delay or powersave timeout) for devices may result in decreased energy usage by allowing devices to go into a low-power state more quickly when not in use. This setting models a small change in overall energy usage per minute of change based upon internal HP calculations and samples using modified settings. To modify this setting on actual devices, a user can use a device management tool such as HP Web Jetadmin, the device control panel, or embedded web server if applicable.

### **Duplex Usage**

Increasing the percentage of pages printed duplex versus simplex may result in decreased physical paper usage and thus decreased cost and environmental impact. Duplex usage is calculated based upon total, duplex, and simplex counts from the device utilization reports. If a total count is available from a device but duplex and simplex counts are not available, then all pages are assumed to be simplex pages. Duplex percentage is based on the distribution of total possible pages. For example, 100 total pages at 0% duplex would result in a simplex count of 100 and a duplex count of 0. The same page count at 100% duplex would result in a simplex count of 0 and a duplex count of 50. Since duplex printing is typically controlled by the end user in the print driver, modifying the actual duplex usage on devices may require some method of end user behavior change. This modification might occur through a company policy/user education program or through policies implemented in print servers or print drivers such as the HP Universal Print Driver.

## **Digital Send Usage**

Increasing the percentage of pages digitally sent to a destination such as email or a network folder may result in decreased physical paper usage compared to paper-based workflows and thus decreased cost and environmental impact. Digital Send usage is calculated based on digital send counts and copy counts from the device utilization reports. This setting calculates the contribution that copy pages make to the total physical paper usage and models changes to the number of copy pages based on redirecting them to digital destinations. Since end users decide whether to copy or digitally send documents, modifying the actual digital send usage on devices may require some method of end user behavior change. This modification might occur through a company policy/user education program or through increasing the availability of devices capable of digital sending.

## **Pull Printing**

Implementing some sort of Pull Printing solution may result in decreased physical paper usage and thus decreased cost and environmental impact. This setting assumes that implementing a Pull Printing solution from either HP or another vendor can reduce paper usage by about 10% overall. It also assumes a slight reduction in energy usage (1%) as a result of the reduction in printing based upon internal HP calculations. This setting assumes that a Pull Printing solution is not currently in use and only models adding such a solution to the current environment. Pull Printing can reduce paper waste from print jobs that are never retrieved since it requires users to go to the printer and release their print job.

## **HP Smart Web Printing**

Implementing the HP Smart Web Printing or similar solution may result in decreased physical paper usage and thus decreased cost and environmental impact. This setting assumes that 37% of pages printed come from the internet, according to internal HP data. This also assumes that a smart web printing solution can save up to 45% of the total pages printed through a browser based upon third-party testing for a combined reduction in total paper usage of about 16.65%. This setting assumes that a smart web printing solution is not currently in use and only models adding such a solution to the current environment. HP Smart Web Printing allows users to select and print only the portion of web content they are interested in rather than entire web pages with extraneous content. It also assumes a slight reduction in energy usage (1.5%) as a result of the reduction in printing based upon internal HP calculations.

After modifying one or more of the above settings, click **Analyze** to view the results of the change. The graphs will show a positive or negative change for the indicated time period. A change will appear as green if it decreases cost or red if it increases cost. The **Projected Annual Savings** section shows the increase or decrease in cost extrapolated to an annual figure. This extrapolation for paper usage is based upon the device utilization date range which may be less than the defined collection date range. For example, if the collection was defined for 1 month, and there was 1 month of device utilization data, then the paper savings would be multiplied by 12 to compute the annual savings. However, if there was only 1 week of device utilization data, then the paper savings would be multiplied by 52 to compute the annual savings.

To return all of the data to the original settings, click the **Reset** button. Also, navigating to a different selection level (such as a data source or group) will cause the future settings to be reset to current values. To save the results of a future scenario, see **Export a report**.

## **Export a Report**

A user can save a report of any scenario, including both current and future information, in either a PDF or XML format. The PDF format is ideal for printing, while the XML format is ideal for automated processing or parsing from another program. To save a report, click the Export button, select either To PDF or To XML, provide a file name and location for the report, then click Save.

## Set location data

A user can set the location data for specific groups of devices if the default location data specified in the data source is incorrect or out of date. Once a device has been identified (by its IP address) and saved in any collection in EcoSMART Fleet, it is assigned the default location data settings specified for the data source. These settings are used to calculate energy cost and GHG emission factors for

The screenshot displays the HP EcoSMART Fleet interface. At the top, there are buttons for 'To PDF' and 'To XML'. The main header reads 'hp EcoSMART Fleet' and 'Eco Settings Summary Report'. Below this, the 'Report Details' section provides the following information:

- Analysis Data Set: Eco 1 & 5 July-Sept 2011 - 9/30/2011(07/01/11 - 09/30/11)
- Current Selection: Eco 1 & 5 July-Sept 2011 - 9/30/2011
- Device Count: 983 Total, 594 Unknown, 15 Duplicate
- Time Period: 07/01/11 - 09/30/11
- Report Creation: 10/12/11
- User: americas.cpqcorp.net/dwhoward

The 'Projected Future Annual Savings' section shows the following data:

Total cost	Energy usage	Emission
-\$ 49,276.00(-13.56 %)	- 51,347.00 kWh(-11.65 %)	- 183,310.00 lbs(-12.93 %)

The 'Analysis Results for Time Period' section features five bar charts comparing 'Current' and 'Future' values:

- Energy Cost/Usage/CO2:** Current: \$11,077.97 (105,607.5 kWh, 144,377.05 lb); Future: \$9,787.39 (95,954.83 kWh, 127,587.25 lb). Change: -11.65%.
- Paper Cost/CO2:** Current: \$88,939.66 (232,358.79 lb); Future: \$76,641.21 (200,220.52 lb). Change: -13.83%.
- Powersave Enabled (%):** Current: 42.32; Future: 55.34. Change: +13.02%.
- Duplex Usage (%):** Current: 9.36; Future: 35.98. Change: +26.62%.
- Digital Send Usage (%):** Current: 26.62; Future: 21.58. Change: -5.04%.

The 'Analysis Settings' table is as follows:

Setting	Current	Future
Powersave Enabled (%)	42.32	55.34
Time to Sleep (min)	45	60
Duplex Usage(%)	9.36	35.98
Digital Send Usage (%)	26.62	21.58
Pull Printing	No	No
UP Smart Web Printing	No	No

The 'Set Location Data' dialog box is overlaid on the report, containing the following information:

Location data will be set for all devices in the current selection. This data will be permanently saved for this analysis set and selection.

Location: Albania  
Paper Size: Office A/A4 20lb 80gsm  
Currency: U.S. Dollar  
GHG Emission Factor (lb CO2e/kWh): 0.03  
Cost/kWh (USD): 0.10

Buttons: Ok, Cancel

that device. In order to use different location settings for a device, the location data must be set for a

group, data source, or analysis that includes that device. Once set, the new location data will be used for future calculations and analyses that include that device.

Data Source	Total Devices	Unknown Devices	Powersave Capable	Powersave Enabled %	Avg. Time to Sleep
<input type="checkbox"/> ecofleet5\hpcwja\HPWJA	22	4	21	59.09	44.57
<input type="checkbox"/> ecofleet1\hpcwja\HPWJA	974	591	535	42.51	45.61

To set the location data, click the **Set Location Data** button. Modify the following location settings:

- **Location/Provider** – Specify the location where the selected set of devices are located, or the specific energy provider if applicable. The location/provider is used to determine the appropriate Greenhouse Gas (GHG) Emission Factor to apply to these devices.
- **Currency** – Specify the currency used to express the cost per kWh for the selected set of devices.
- **Cost/kWh** - The default cost per kWh is shown based on the selected currency, which may or may not reflect the actual cost for energy at your location. If you know the cost per kWh for the selected set of devices, enter the actual value.
- **Paper Type** – Currently all calculations are based on a standard office size and weight of paper.

## View energy details

A user can view energy details to analyze which devices or groups of devices are contributing to higher energy usage and thus may be candidates for improvement. To view details about the energy settings, click the **Energy** page link on the navigation bar. A table is displayed with a list of data sources and details about the energy usage.

To view details about a specific data source, click the name of the data source in the table. A new table is displayed with a list of device groups and details about the devices in those groups. To return to the entire analysis, click the analysis name shown in the selection string on the navigation bar.

To view details about a specific device group, click the name of the device group in the table. A new table is displayed with a list of individual devices, and details about those devices. Device details include the IP Address, whether it is an Unknown device, whether it is capable of powersave, whether it has powersave enabled, and the time to sleep setting.

**NOTE:** EcoSMART Fleet relies on data from Web Jetadmin, which in turn relies on data from individual device models. Some device models may not report this data correctly, or at all.

The Energy link displays the following data

- **Powersave Capable** - an indication of how many devices are capable of powersave or sleep mode according to the reported device capabilities. This can be useful in analyzing the potential to enable powersave on more devices.
- **Powersave Enabled %** - the percentage of total devices that have their powersave or sleep delay set to a value other than 0, or off.
- **Avg. Time to Sleep** - the average of the powersave or sleep delay setting for all devices, in minutes. Devices with a lower time to sleep setting will enter powersave or sleep mode more quickly after a print job finishes.

## View paper details

A user can view paper details to analyze which devices or groups of devices are contributing to higher paper usage, and thus may be candidates for improvement. To view details about the paper usage, click the **Paper** page link on the navigation bar. A table is displayed with a list of data sources and paper details.

To view details about a specific data source, click the name of the data source in the table. A new table is displayed with a list of device groups and details about the devices in those groups. To return to the entire analysis, click the analysis name shown in the selection string on the navigation bar.

To view details about a specific device group, click the name of the device group in the table. A new table is displayed with a list of individual devices and details about those devices.

NOTE: EcoSMART Fleet relies on data from Web Jetadmin device usage collections which in turn relies on data from individual device models. Some device models may not report this data correctly, if at all.

The **Paper** link displays the following details:

- **Total Estimated Sheets** - an estimate of how many physical sheets of paper the device has printed. This value is calculated from the total count minus the duplex count. The total count for devices is typically a count of images, not sheets, so duplex sheets count as two instead of one. By subtracting the duplex count from the total count, this number is a close estimation of actual sheets printed by the device. This number does not factor in differences in page sizes as that data is not available for all device models.
- **Total** - the total count from Web Jetadmin which is typically a count of images. This number is a factor in calculations involving the time spent actively printing.
- **Duplex % and Simplex %** - the percent of the total possible pages printed that were two-sided or one-sided, respectively. It assumes that every page printed had the potential to be sent as either a simplex or duplex page, so the total possible pages are the simplex count plus twice the duplex count. For example, a device with 50 simplex pages and 50 duplex pages has the potential of printing 150 simplex sheets. Since 100 of those sheets were printed on 50 duplex pages, the duplex % is  $100/150 = 66.6\%$ , and the simplex % is 33.3%.
- **Copy + Dig. Send** - a sum of the copy count and the digital send count from Web Jetadmin. Digital send pages are counted once, while copy pages are counted as many times as they are copied.
- **Dig. Send % and Copy %** - the percent values of the copy + digital send counts that are attributed to digital sending and copying, respectively. This is an indication of what percentage of scanned documents results in physical paper usage and how much usage.
- **Duplex Capable** - an indication of how many devices are capable of printing duplex. This can be useful in analyzing the potential to shift more printing to duplex pages.

- **Digital Send Capable** - an indication of how many devices are capable of digital sending. This can be useful in analyzing the potential to shift more copy pages to digital sending.

## Update Carbon Footprint Calculator Data

A user can use the **Update CFC Data** tab to update the data used in the EcoSMART Fleet calculations if updated data is available from HP. HP may periodically release updated data files which can affect the list of known or unknown devices and power rates, the GHG emission factors for each location, default energy and paper cost values, currency exchange rates, and more. For the most accurate results, the most current CFC data files should be applied.

To update carbon footprint data, download the latest CFC data files from HP if newer files are available on the EcoSMART Fleet download site. Save this set of XML files on your local computer. Click the **Update CFC Data** tab (administrator access only). Click the **Browse File** button and select all of the downloaded XML data files. Data files must all be updated together, and cannot be updated individually. Once all the files are selected and validated, click **Update CFC Data**.

Data Source	Total Devices	Unknown Devices	Total Estimated Sheets	Total	Duplex %	Simplex %	Copy + Dig. Send	Dig. Send %	Copy %	Duplex Capable	Dig. Send Capable
<input type="checkbox"/> ecofleet5\hpwja\HPWJA	22	4	349441	358023	4.84	95.16	64552	53.38	46.62	18	12
<input type="checkbox"/> ecofleet1\hpwja\HPWJA	974	591	10776929	11318912	9.57	90.43	282230	20.63	79.37	454	326

hp EcoSMART Fleet

Analyze Collect Data Source User Access Update CFC Data

All CFC data files must be selected and updated together.

File Name	Data Store	Validated
a4_paper_factor.xml	urn:schemas-hp-com:hpecosf:A4PaperFactor	✓
base_device.xml	urn:schemas-hp-com:hpecosf:BaseDevice	✓
currency.xml	urn:schemas-hp-com:hpecosf:Currency	✓
emission_factor_reference.xml	urn:schemas-hp-com:hpecosf:EmissionFactorReference	✓
geo_region.xml	urn:schemas-hp-com:hpecosf:GeoRegion	✓
manufacturer.xml	urn:schemas-hp-com:hpecosf:Manufacturer	✓
region_emission_factor.xml	urn:schemas-hp-com:hpecosf:RegionEmissionFactor	✓

Browse File Clear Update CFC Data

## SUMMARY

HP Web Jetadmin software offers two potential solutions to help IT managers assess printing behaviors and lower their organization's environmental footprint. HP EcoSMART Fleet, available for fee, combines HP Carbon Footprint Calculator data and Industry leading HP Web Jetadmin fleet data to provide eco analysis such as carbon, power, and paper usage information on a fleet of devices. HP Eco Solutions reports, available when ordering the free HP Database Connectivity Module, are pre-configured SAP Crystal Reports that display environmental settings of a print fleet. Both solutions can pull information contained in HP Web Jetadmin database views and provide an intuitive presentation of environmentally relevant data from HP Web Jetadmin, allowing IT managers to quickly assess opportunities to reduce the environmental impact of their organization's printing and track progress toward green IT goals over time.

# APPENDIX A

## Carbon Footprint Calculator: Key Assumptions

### ASSUMPTIONS

The following are key assumptions used by the HP EcoSMART Fleet application.

1. The EcoSMART Fleet application generates estimates of energy consumption during use of a printer, emissions of carbon dioxide from production of that electricity, and carbon dioxide emissions from production of estimated volumes of paper consumed during printing (i.e. estimated CO<sub>2</sub> from electricity production and CO<sub>2</sub> from paper production). The EcoSMART Fleet application also estimates the user's costs for the electricity and paper a printer consumes. It is based on certain key assumptions and makes use of data and models generated by third parties described below.
2. The carbon dioxide equivalent (CO<sub>2</sub>-e) results are for a 100 year global warming potential (GWP) horizon if default emission factors are employed by the user.
3. The energy consumption calculation is based on the calculations used in the ENERGY STAR Qualified Imaging Equipment Typical Electricity Consumption (TEC) test procedure, documented here: <http://www.eu-energystar.org/downloads/specifications/200601/FinalTECTestProcedure.pdf>. More specifically, the application utilizes the job table to estimate the number of jobs printed per day, given the number of pages printed. It assumes a usage pattern as described in the TEC procedure, where jobs are divided evenly between morning and afternoon periods. The usage pattern is based on a 5-day work week with no activity on the weekend, and 8-hour work days with a 1-hour lunch period of no activity. Furthermore, it calculates the time spent in different power usage modes, given the number of jobs per day, print speed of the device, and time to go into sleep mode.
4. The published power rates for active, idle, and Powersave or sleep mode are used for devices when those rates are known and can be matched to the device model by EcoSMART Fleet. These are considered "known" devices. All other devices are considered "unknown" devices, which use power rates and speeds equivalent to the average of all known device power rates and speeds, when calculating energy consumption.
5. The electricity carbon dioxide equivalent (CO<sub>2</sub>-e) factors used in the calculations comes from the following sources:

Region	Note
All regions unless otherwise noted below	2008 CO <sub>2</sub> Emissions per kWh from Electricity and Heat Generation. Source: CO <sub>2</sub> Emissions from Fuel Combustion – Highlights. 2010 Edition. International Energy Agency. Available at <a href="http://www.iea.org/co2highlights/CO2highlights.pdf">http://www.iea.org/co2highlights/CO2highlights.pdf</a>
Australia	2007 Full fuel cycle emissions factor. Source: National Greenhouse Accounts (NGA) Factors, January 2008, Commonwealth of Australia, Department of Climate Change. Available at <a href="http://www.climatechange.gov.au/workbook/pubs/workbook-feb2008.pdf">http://www.climatechange.gov.au/workbook/pubs/workbook-feb2008.pdf</a> Overall Australian CO <sub>2</sub> emissions factor a population weighted average.
Canada	Source: Greenhouse Gas Division, Environment Canada, National Inventory Report, Greenhouse Gas Sources and Sinks in Canada - 1990-2005. (Submission to the

	United Nations Framework Convention on Climate Change), 2007, Tables A9-1 through A9-12
United Kingdom	Energy Suppliers' Fuel Mix Disclosure from 1 April 2006 to 31 March 2007. Source: energywatch. Available at <a href="http://www.energywatch.org.uk/help_and_advice/green_tariffs/fuel_mix_disclosure.asp">http://www.energywatch.org.uk/help_and_advice/green_tariffs/fuel_mix_disclosure.asp</a>
United States	Year 2005 Data. Source: eGrid2007 Version 1.1, United States of America, Environmental Protection Agency. Available at <a href="http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html">http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html</a>

6. The default plain paper carbon dioxide equivalent (CO<sub>2</sub>-e) factor used in the calculator is 1.9 kg CO<sub>2</sub>-e per kg of plain paper. Source: Printing and Writing Papers Life Cycle Assessment Summary Report. American Forest & Paper Association, 2011, retrieved from [www.afandpa.org/PWLCAMaterials/](http://www.afandpa.org/PWLCAMaterials/). The study assumes (based on data from the U.S. EPA) that 71.8% of office paper is recovered, 5.2% is burned for energy, and 23% is landfilled. The study also assumes that 4% of the fiber needed to produce the office paper comes from recovered fiber.
7. The currency list and exchange rates used in the calculations are from [http://www.bloomberg.com/markets/currencies/americas\\_currencies.html](http://www.bloomberg.com/markets/currencies/americas_currencies.html) on 12/10/2010.
8. The default electrical costs used in the calculations are for a regional average of industrial sector prices, or commercial prices where available, in 2008, except for the US which uses data from 2009. Source: <http://www.eia.doe.gov/emeu/international/elecprii.html>
9. The calculations assume that a "page" of paper is A4 size, 80 gsm weight or A size, 20 lb Bond. Each page is estimated to cost \$0.008 (USD).
10. The "Pull printing" scenario assumes that all devices in the fleet have some means of Pull-printing, either from HP or a third-party. It assumes a paper savings rate of 10% resulting from pull printing. Source: Gartner. "Cost Cutting Initiatives for Office Printing." Sharon McNee. 22 February 2008.
11. The "Smart Web Printing Scenario" assumes that 37% of the pages printed on HP's printers come from the internet (according to internal data). Based on a third-party testing done by Industry Analysts, using HP SmartWebPrint can save up to 45% of the total pages printed through a browser.
12. The Powersave Enabled calculation assumes that devices with Powersave or Sleep Delay enabled use less energy overall than devices with Powersave disabled. The difference in energy usage is based on the average energy usage of devices in the selected set. If there is insufficient data to calculate a difference based on selected devices, then devices are assumed to use 3 times as much energy with Powersave disabled, compared to enabled. This assumption is based on HP internal calculations based on average energy usage rates and print speeds for known devices, and 10,000 pages printed per year.
13. The paper usage calculations rely on device utilization data collected from devices by HP Web Jetadmin. They assume that devices report total counts, duplex, simplex, copy, digital send, color, and mono counts correctly. If only total counts are reported, all pages are assumed to be simplex mono pages.

