Carbon Footprint

Product Category Rule (PCR)

(PCR Certification ID: PA-AX-01)

Product: ICT Hosting Service of

Cloud Service Providers

Carbon Footprint Calculation/Display Test Project

Made Public on February 22, 2009

* This certified PCR is valid during the term of the Carbon Footprint Calculation/Display Test Project (scheduled to end on March 31, 2012). However, if the certified PCR is modified during this term, the revised version shall be valid.

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Product Category Rule
“ICT Hosting Service of Cloud Service Providers”

Introduction

This PCR describes the rules, requirements and instructions for the “ICT Hosting Service of Cloud Service Providers” in carbon footprinting.

The content described in this PCR will continue to be discussed by related organizations during the carbon footprint test project period and will be revised as required upon approval of the PCR Council.

1. Scope of Application

1.1 Scope of Product

ICT hosting service is a service whereby an iDC etc. is rented, grouped ICT equipment configurations are allocated to companies by capacity as defined when signing the contracts, and companies obtain the rights to run their own ICT systems and ICT systems for customers and to use various ICT services.

This PCR assumes that the iDC and ICT equipment have already been constructed and installed. The scope of this PCR includes only the ICT hosting service part provided by such already installed facilities. Therefore, the scope of this PCR does not include greenhouse gas (GHG) emissions related to the construction of the iDC and the manufacturing, procurement and disposal of ICT equipment.

1.2 Calculation Unit

Service is provided per year per contract.

The unit of service provision is calculated from allocated server performance, allocated storage capacity and allocated network bandwidth defined at the signing of the contract.

1.3 Scope of Application in Each Lifecycle Phase

The Lifecycle Flow Diagram is indicated in Appendix A.

1.3.1 Raw Material Procurement Phase

The Raw Material Procurement Phase does not exist since GHG emissions for the manufacturing of ICT equipment is outside the scope of this PCR.

1.3.2 Manufacturing Phase

Signing of a contract can be regarded as manufacturing in the ICT hosting service, but this is included in the Distribution and Sales Phase. Therefore, there is no Manufacturing Phase in this PCR.

1.3.3 Distribution/Sales Phase

Processes related to the signing of a contract:

- GHG emission process for movement when signing the contract

- GHG emission process for creating the contract
- GHG emission process for sending the contract

1.3.4 Use/Maintenance Phase

Series of processes related to provision and maintenance/management of service:

- GHG emission process for electricity consumption by ICT equipment
- GHG emission process for electricity consumption other than ICT equipment (air condtioning, lighting etc)
- GHG emission process for energy consumption other than electricity
- GHG emission process for work required to maintain/manage services
- GHG emission process for using network infrastructure for information distribution

1.3.5 Disposal/Recycling Phase

Series of processes related to service cancellation:

- GHG emission process for cancellation of contracts (mid-term cancellation/termination at expiration)
- GHG emission process for the disposal of contracts

2. Quoted PCRs

There are no quoted PCRs as of January 13, 2010.

3. Terminology and Definitions

Terminology used in this PCR are defined as follows:

No.	Terminology	Definition
1	ICT	Pronounced: “Eye-See-Tee” Abbreviation of Information and Communication Technology. Generic name for overall technology regarding information and communication. This term has almost the same meaning as “IT” and is starting to be commonly used in Japan instead of “IT”.
2	ICT Equipment	In this PCR, ICT Equipment refers to the servers, network and storage placed at the iDC. Other iDC facilities such as power supply equipment, air conditioning and lighting are referred to as “Equipment Other Than ICT.”
3	Datacenter	Dedicated space/facilities (including air conditioning and power supply) to store the ICT Equipment to be operated.
4	iDC	Pronounced: “Eye-Dee-See” Abbreviation of Internet Data Center. Facilities and equipment for co-location services/housing services which provides internet connections and support/operation services, hosting services where servers are rented out to customers, or for engaging in ASP/SaaS businesses where software is provided via the internet.
5	Hosting	In this PCR, Hosting shall mean a service where one can rent a part of a computer’s (Server’s) capacity.
6	Server	A Server is computer equipment designed to operate 24/7 to provide services etc. to other computer equipment via the Network and consists of a CPU, main memory, I/O control equipment and power unit. A Server must be designed to include an operating system (OS), and must have the capability to install and run user applications. A Server is a computer that provides its functions and/or data to client computers via the computer Network. WWW servers on the internet is an example.
7	Storage/Storage Capacity	A device that stores data and programs within the computer. Many such decives use magnetic storage so that storage capacity is large and stored information is not lost when the power is turned off. Storage capacity is expressed in megabytes (MB) and gigabytes (GB).
8	Network	The state where multiple computers are inter-connected is generally called a network.
9	Portal Site/Server	Industry classification for the product in this PCR.

	Operator	Quoted from the following: Japan Standardized Industrial Classification (Revised November 2007) Large Classification G Information Communication Industry Medium Classification 40 Internet Based Services Industry Small Classification 401 Internet Based Services Industry Tiny Classification 4011 Portal Site/Server Operator
10	Server Performance Metrics	In this PCR, Server Performance Metrics refers to SPECint2006rate, SPECpower_ssj2008 or CTP.
12	Network Bandwidth	Communication speed of the network.

4. Data Items for Collection and Calculation Methods for Each Lifecycle Phase

4.1 Principle

Unless otherwise indicated, data will be collected and calculated according to the following principles in each lifecycle phase.

4.1.1 Data Retrieval Period

The data retrieval period shall be one year. One year means the most recent one year where data collection has been completed, or the most recent fiscal year where data collection has been completed. If data cannot be collected for one year because the service is being provided at a new iDC, data should be adjusted as described in Appendix C of this PCR.

4.1.2 Difference between Regions/Seasonal Changes

Difference between regions will not be considered. The effect of seasonal changes will be removed by collecting the data as annual data.

4.1.3 Priority of Activity Volume Data Retrieval

The priority of retrieving activity volume data used in this PCR is defined as follows:

① Primary data that meets the retrieval method defined in this PCR
② Secondary data that meets the retrieval and calculation methods defined in this PCR
③ If retrieving activity volume data using a method other than ① or ②, clearly describe the validity of the data (method of retrieval and calculation).

4.1.4 Usage Priority of GHG Emission Factor

The priority in using the GHG emission factor used in this PCR is defined as folllows:

① GHG emission volume per unit in manufacturing and use of materials/energy etc. gained from measurement
② Factor described in the "CFP Test Run CO_2 Common Factor Database (Tentative Version)" (hereinafter referred to as the CFP Common Factor)
③ Factor described in databases using other stack-up methods (LCA Japan Forum's LCA Database, JEMAI-LCA Database, Ecoleaf Factor Data)
④ Similar data within the CFP Common Factor
⑤ Similar data described in databases using other stack-up methods (LCA Japan Forum's LCA Database, JEMAI-LCA Database, Ecoleaf Factor Data)
⑥ Secondary data calculated from primary data under similar conditions
⑦ Secondary data gained from other resource documents
⑧ Secondary data gained using the inter-industry table

For ①, documents which objectively prove that the measurement method and measured results are correct must be attached. For ③ to ⑧, sources and the reasoning for using the source must be clearly indicated.

4.1.5 Cut-Off

GHG emission items that constitute less than 5% of the total GHG emission in each phase can be cut off. However, if a cutoff is done, data must be adjusted so that the remaining items are allocated proportionately according to the percentage share of each item to reach 100%.

4.2 Raw Material Procurement Phase

This phase is outside of the scope of this PCR.

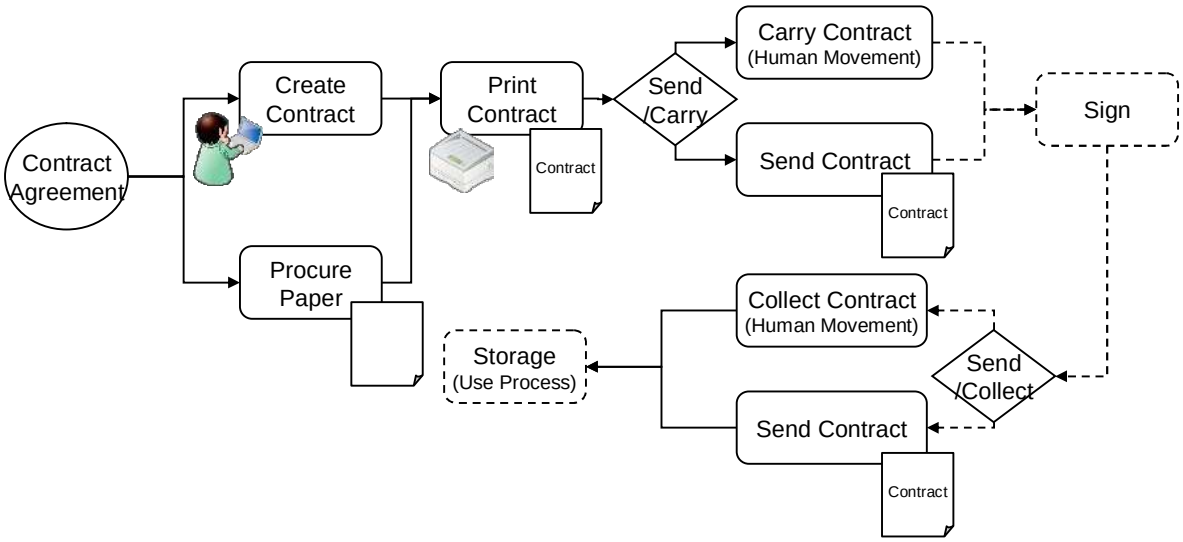
4.3 Manufacturing Phase

This phase is outside of the scope of this PCR.

Distribution/Sales Phase

4.3.1 Scenario of the Distribution/Sales Phase

The scenario of the Distribution/Sales Phase (contract signing) is defined as follows:



4.3.2 Calulation Method for GHG Emission in the Distribution/Sales Phase

The formula for calculating the GHG emission in the distribution/sales phase is defined as follows:

GHG Emission in the Distribution/Sales Phase (Per Year Per Contract)
= GHG Emission for Human Movement in Signing/Sending Contract (Per Year Per Contract)
+ GHG Emission for Creating the Contract (Per Year Per Contract)

4.3.3 GHG Emission of Human Movement in Contract Signing and Sending

4.3.3.1 Data for Retrieval and Retrieval Method

Data to be retrieved and the methods of retrieval for calculating the GHG emission for human movement and sending of contracts when signing contracts are defined as follows. If the retrieval period for an activity is less than one year, the data should be adjusted for one year (12/measured months).

ID	Item	Unit	Data Class	Retrieval/Calculation Method
C001	Number of New Contracts	contract	Primary	Number of new hosting service contracts for one year, which can be gained from the documents managed by the company
			Secondary	Secondary use is not allowed.
C002	Contract Years per New Contract	year	Primary	(If the length of the contract is clear at the time of signing) Number of contracted years indicated in the

				contract or similar document. Automatically updated contracts should be treated in the same way as when the contract length is not clear.
			Secondary	(If the length of the contract is not clear at the time of signing) If the length of the contract is not clear due to automatic update of the contract etc., the length of the contract should be set to "5 years" (legal depreciation term).
C003	GHG Emission for Movement in Signing Each Contract	kg-CO_2e	-	cf. Appendix B
C004	Number of Mailings	times	Primary	Actual number of mailings
			Secondary	2 times (assume 1 round trip)
C005	GHG Emission Factor (Mail)	kg-CO_2e/mail	Secondary	Follow "4.1.4 Usage Priority of GHG Emission Factor"

4.3.3.2 Calculation Method

The calculation method of GHG emissions for human movement and sending of contracts in signing contracts is defined as follows:

GHG Emission for Human Movement and Contract Sending in Signing Contracts (Per Year Per Contract)
= (Σ GHG Emission for Movement in Signing Each Contract
+ Σ GHG Emission for Sending Contracts[*C01]) / New Contracts / Average Contract Years[*C02]

*C01 GHG Emission for Sending Contracts = Number of Mailings * GHG Emission Factor (Mail)

*C02 Average Contract Years = (Σ (Contract Years for Each New Contract)) / Number of New Contracts

4.3.4 GHG Emission of Creating Contracts

4.3.4.1 Data for Retrieval and Retrieval Method

Data to be retrieved and the methods of retrieval for calculating the GHG emission for creating contracts are defined as follows:

ID	Item	Unit	Data Class	Retrieval/Calculation Method
C006	Contract Creation PC Electricity Consumption	kWh	Primary	Measured PC electricity consumption during contract creation
			Secondary	Rated PC Usage Electricity * Contract Creation

				Time - Rated PC Usage Electricity Rated usage electricity of the PC used for contract creation - Contract Creation Time Measured contract creation time or “0.25h”
C007	Contract Printer Electricity Consumption	kWh	Primary	Measured printer electricity consumption during contract creation
			Secondary	Rated Electricity During Printer Use * Contract Print Time - Rated Electricity During Printer Use Rated electricity during printer use - Contract Print Time Measured print time or “0.005h”
C008	Contract Paper Weight	kg	Primary	Weight of paper used for contract
			Secondary	0.004 **kg**/pg(A4) Paper Pulp Handbook (1998)
C009	GHG Emission Factor (Paper)	kg-CO_2e/**kg**	Secondary	0.9751 kg-CO_2e/**kg** JLCA-LCA Database, 2nd version 2004 (High Quality Printing Paper, 0% Recycled)
C010	GHG Emission Factor (Electricity)	kg-CO_2e/kWh	Secondary	0.484 kg-CO_2e/kWh (CO_2 Converted Common Factor Database for CFP Test Run (Tentative))

4.3.4.2 Calculation Method

The calculation method of GHG emissions for creating contracts is defined as follows:

GHG Emission of Contract Creation (Per Year Per Contract)
= (GHG Emission of Contract Creation[*C03]
+ GHG Emission of Paper Consumption[*C04]
+ GHG Emission of Contract Printing[*C05]) / Average Contract Years[*C01]

*C03 GHG Emission of Creating Contracts
= PC Electricity Consumption of Contract Creation * GHG Emission Factor (Electricity)

*C04 GHG Emission of Paper Consumption = Contract Paper Weight * GHG Emission Factor (Paper)

*C05 GHG Emission of Contract Printing
= Contract Printer Electricity Consumption * GHG Emission Factor (Electricity)

4.4 Usage/Maintenance and Management Phase

4.4.1 GHG Emission Calculation in the Usage/Maintenance and Management Phase

The calculation method of GHG emissions in the Usage/Maintenance and Management Phase is defined as follows:

GHG Emission in the Usage/Maintenance and Management Phase (Per Year Per Contract)
= GHG Emission of Service Provision and Maintenance in the iDC (Per Year Per Contract)
+ GHG Emission of Using Network Infrastructure for Information Distribution (Per Year Per Contract)
+ GHG Emission of Service Provision and Maintenance Other Than the iDC (Per Year Per Contract)

4.4.2 GHG Emission Calculation for iDC Service Provision/Maintenance and Management

4.4.2.1 Data for Retrieval and Retrieval Method

Data to be retrieved and the methods of retrieval in the iDC Service Provision/Maintenance and Management Phase are defined as follows:

ID	Item	Unit	Data Class	Retrieval/Calculation Method
D001	Overall iDC Electricity Consumption (Total electricity consumption including the Servers, Storage, Network Equipment, air conditioning and lighting)	kWh	Primary	Total Electricity Consumption for Entire iDC Over 1 Year - If the entire building is the iDC Electricity consumption described in the invoice from the utility company, or value measured by meters covering the entire iDC (including shared spaces) - If part of the building is the iDC Electricity consumption certificate for the iDC issued by the building manager, or value measured by meters covering the iDC part (shared space should be calculated proportionately by occupied area)
			Secondary	(If the measured period is over 1 month but less than 1 year) Calculation method is described in Appendix C.
				(If the measured period is less than 1 month) Electricity consumption for the entire iDC is not allowed (i.e. CFP cannot be calculated)
D002	Server Electricity	kWh	Primary	Electricity measured by meters covering all

	Consumption (Electricity consumption of all Servers used in the iDC over 1 year)			Servers (measured by the panelboard or IT equipment)
			Secondary	(If the measured period is more than 1 month and less than 1 year) Adjust the measured data to be equivalent to 1 year. A simple conversion is used assuming no fluctuation. Example) If the measured period is 2 months: Measured Electricity Value * 12/2
				(If the measured period is less than 1 month) A minimum of 1 month's measured data is required. Otherwise, the data will be regarded as not measured.
				(If data was not measured) Calculation method is described in Appendix D.
D003	Storage Electricity Consumption (Electricity consumption of all Storage used in the iDC over 1 year)	kWh	Primary	Electricity measured by meters covering all Storage (measured by the panelboard or IT equipment)
			Secondary	(If the measured period is more than 1 month and less than 1 year) Adjust the measured data to be equivalent to 1 year. A simple conversion is used assuming no fluctuation.
				(If the measured period is less than 1 month) A minimum of 1 month's measured data is required. Otherwise, the data will be regarded as not measured.
				(If data was not measured) Calculation method is described in Appendix D.
D004	Network Equipment Electricity Consumption (Electricity consumption of all Network Equipment used in the iDC over 1 year)	kWh	Primary	Electricity measured by meters covering all Network Equipment (measured by the panelboard or IT equipment)
			Secondary	(If the measured period is more than 1 month and less than 1 year) Adjust the measured data to be equivalent to 1 year. A simple conversion is used assuming no fluctuation.
				(If the measured period is less than 1 month) A minimum of 1 month's measured data is required. Otherwise, the data will be regarded as not measured.

				(If data was not measured) Calculation method is described in Appendix D.
D005	Contracted Server SPEC per Month (cf Appendix E for rules on Server SPEC)	SPEC	Primary	Total contracted Server SPECs per month for the entire iDC over the measurement period of electricity and other energy consumption. Values as of end of the measured month. Use values from reports etc. managed by the company.
			Secondary	Secondary data use is not allowed.
D006	Contracted Storage Capacity per Month	GB	Primary	Total contracted Storage Capacity per month for the entire iDC over the measurement period of electricity and other energy consumption. Values as of end of the measured month. Use values from reports etc. managed by the company.
			Secondary	Secondary data use is not allowed.
D007	Contracted Network Bandwidth per Month	Mbps	Primary	Total contracted Network Bandwidth per month for the entire iDC over the measurement period of electricity and other energy consumption. Values as of end of the measured month. Use values from reports etc. managed by the company.
			Secondary	Secondary data use is not allowed.
D008	Measured Months	months	Primary	Period in which electricity and other energy consumption were measured.
			Secondary	Secondary data use is not allowed.
D009	Server SPEC to be Contracted	SPEC	Primary	SPEC value due to be contracted with the customer. Calculated from allocated Server values described in the estimate documents etc.
			Secondary	Secondary data use is not allowed.
D010	Storage Capacity to be Contracted	GB	Primary	Allocated Storage to be contracted with the customer. Calculated from the allocated Storage described in the estimate document.
			Secondary	Secondary data use is not allowed.
D011	Network Bandwidth to be Contracted	Mbps	Primary	Network Bandwidth to be contracted with the customer. Calculated from Network Bandwidth described in the estimate document.
			Secondary	Secondary data use is not allowed.
D012	Other Energgy Consumption	liters square	Primary	- If the entire building is the iDC Electricity consumption described in

	(Consumed energy other than electricity used in air conditioning, in-house electricity generation etc.) <Data Candidates> - Bunker A - Light Oil - Kerosene - Gasoline - LNG - LPG - Municipal Water - Industrial Water - Groundwater - Gas for Air Conditioning	meters **kg**		theinvoice from the utility company, or value measured by meters covering the entire iDC - If part of the building is the iDC Electricity consumption certificate for the iDC issued by the building manager, or value measured by meters covering the iDC part
			Secondary	(If the measured period is more than 1 month and less than 1 year) Adjust the measured data to be equivalent to 1 year. A simple conversion is used assuming no fluctuation. For energy in which consideration of seasonal fluctuation is important such as energy for air conditioning, attach documents that clarify the grounds for fluctuation and calculate the fluctuation.
				(If the measured period is less than 1 month) Other Energy Consumption for the entire iDC is not allowed (i.e. CFP cannot be calculated)
D013	GHG Emission Factor (Consumed Energy)	**kg**-CO_2e/liter **kg**-CO_2e/sq m **kg**-CO_2e/**kg**	Secondary	cf. Appendix G

4.4.2.2 Calculation Method

GHG emission calculation in Service Provision/Maintenance and Management Phase is defined as follows:

GHG Emission in Service Provision/Maintenance and Management at the iDC (Per Year Per Contract)

= Server SPEC to be Contracted * Server SPEC Emission Factor[*D01]

+ Storage Capacity to be Contracted * Storage Capacity Emission Factor[*D02]

+ Network Bandwidth to be Contracted * Network Bandwidth Emission Factor[*D03]

*D01 Server SPEC Emission Factor (**kg**-CO_2e/SPEC)

$$= \frac{\text{(Server Elec. Consumption * GHG Emission Factor (Electricity) + Fixed Proportion GHG(Server)}^{*D04}\text{)}}{\text{((}\Sigma\text{ Contracted Server SPEC per Month) / Measured Months)}}$$

*D02 Storage Capacity Emission Factor (**kg**-CO_2e/GB)

$$= \frac{\text{(Storage Elec. Consumption * GHG Emission Factor (Electricity) + Fixed Proportion GHG(Storage)}^{*D04}\text{)}}{\text{((}\Sigma\text{ Contracted Storage per Month) / Measured Months)}}$$

*D03 Network Bandwidth Emission Factor (**kg**-CO_2e/Mbps)

$$= \frac{\text{(Network Elec. Consumption * GHG Emission Factor (Electricity) + Fixed Proportion GHG(Network)}^{*D04}\text{)}}{\text{((}\Sigma\text{ Contracted Network Bandwidth per Month) / Measured Months)}}$$

*D04 Fixed Proportion GHG (Server/Storage/Network)(**kg**-CO_2e)

This adjustment will be used for Server, Storage and Network Equipment.

$$= \frac{\text{iDC Fixed Electricity GHG Emission}^{*D05} + \text{iDC Fixed Other Energy GHG Emission}^{*D06}}{\text{Server Elec. Consumption+ Storage Elec. Consumption + Network Elec. Consumption}} * \text{Electricity Consumption per Equipment}$$

*D05 iDC Fixed Electricity GHG Emission (**kg**-CO_2e)

= (Overall iDC Electricity Consumption – (Server Electricity Consumption

+ Storage Electricity Consumption + Network Electricity Consumption))

* GHG Emission Factor (Electricity)

*D06 iDC Fixed Other Energy GHG Emission (**kg**-CO_2e)

= Σ (Other Energy Consumption * GHG Emission Factor (Consumed Energy))

4.4.3 GHG Emission Calculation of Usage of Network Infrastructure for Information Distribution

4.4.3.1 Data for Retrieval and Retrieval Method

Data to be retrieved and the methods of retrieval of using network infrastructure for information distribution are defined as follows:

ID	Item	Unit	Data Class	Retrieval/Calculation Method
D015	Annual Distributed Information Volume (Total of sent and received volumes)	MB	Primary	Measured information distribution volume for entire iDC, or annual information distribution volume gained from communication companies etc.
			Secondary	(If the measured period is more than 1 month and less than 1 year) Adjust the measured data to be equivalent to 1 year. A simple conversion is used assuming no fluctuation.
				(If the measured period is less than 1 month) Annual Distributed Information Volume calculation for the entire iDC is not allowed (i.e. CFP cannot be calculated)
D016	GHG Emission Factor (Info Dist)	**kg**-CO_2e/MB	Secondary	Follow "4.1.4 Usage Priority of GHG Emission Factor"

4.4.3.2 Calculation Method

GHG emission calculation in sending and receiving information within the iDC to/from service subscribers is defined as follows:

GHG Emission of Using Network Infrastructure for Information Distribution (Per Year Per Contract)
= Server SPEC to be Contracted * Network Factor (Server SPEC)[*D07]
+ Storage Capacity to be Contracted * Network Factor (Storage Capacity)[*D08]
+ Network Bandwidth to be Contracted * Network Factor (Network Bandwidth)[*D09]

*D07 Network Factor (Server SPEC)(**kg**-CO_2e/SPEC)

$$= \frac{\text{Network Proportion GHG (Server)}^{*D10}}{(\Sigma \text{ Contracted Server SPEC per Month}) / \text{Months of Measurement}}$$

*D08 Network Factor (Storage Capacity) (**kg**-CO_2e/GB)

$$= \frac{\text{Network Proportion GHG (Storage)}^{*D10}}{(\Sigma \text{ Contracted Storage Capacity per Month}) / \text{Months of Measurement}}$$

*D09 Network Factor (Network Bandwidth) (**kg**-CO_2e/Mbps)

$$= \frac{\text{Network Proportion GHG (Network Equipment)}^{*D10}}{((\Sigma \text{ Contracted Network Bandwidth per Month}) / \text{Months of Measurement})}$$

*D10 Network Proportion GHG (Server/Storage/Network Equipment)(**kg**-CO_2e)

$$= \frac{\text{Annual Distributed Information Volume} * \text{GHG Emission Factor (Info Dist)}}{\text{Server Elec. Consumption} + \text{Storage Elec. Consumption} + \text{Network Elec. Consumption}}$$

* Electricity Consumption of Each Equipment

4.4.4 GHG Emission Calculation of Service Provision/Maintenance and Management Other Than iDC

The items in this section are calculated only when service is provided or maintenance work is performed outside of the iDC (e.g. remote operation). If no work is performed outside of the iDC, all electricity consumption is included in the Overall iDC Electricity Consumption (Fixed) and the items described in this section do not need to be calculated.

4.4.4.1 Data for Retrieval and Retrieval Method

Data to be retrieved and the methods of retrieval for service provision/maintenance and management outside of the iDC are defined as follows:

ID	Item	Unit	Data Class	Retrieval/Calculation Method
D017	PC Electricity Consumption for Work Outside iDC	kWh	Primary	Measured PC electricity consumption for work outside the iDC
			Secondary	PC Rated Electricity for Work Outside iDC * Worked Hours per Day * Annual Worked Days * Number of Workers Outside iDC - PC Rated Electricity for Work Outside iDC Rated electricity for the PC - Worked Hours per Day Actual hours worked per day, or “8.0h” - Annual Worked Days Actual worked days, or “200 days” - Number of Workers Outside iDC Actual number of workers outside iDC, or Contracts at Measurement Completion/30
D018	Contracts per Month	contract	Primary	Number of signed contracts at the iDC during the measurement period of electricity and other energies. Use the value at the end of the month of measurement. Values should be gained from management reports of the company etc.
			Secondary	Secondary data use is not allowed.

4.4.4.2 Calculation Formula

GHG emission calculation in service provision/maintenance and management outside the iDC is defined as follows:

GHG Emission of Service Provision/Maintenance and Management Outside the iDC(Per Year Per Contract)

$$= \frac{\text{PC Electricity Consumption for Work Outside iDC} * \text{GHG Emission Factor (Electricity)}}{(\Sigma\ (\text{Contracts per Month}) / \text{Months of Measurement})}$$

4.4.5 Special Rule When Using Renewable Energy

For iDC Electricity Consumption, if renewable energy is used, the corresponding CO_2 reduction volume can be subtracted from the following values, with the Overall iDC Electricity Consumption as the upper limit. For proportion calculation using electricity consumption values for each equipment in each phase, use the values before subtracting renewable energy.

- Server Electricity Consumption
- Storage Electricity Consumption
- Network Equipment Electricity Consumption
- iDC Fixed Electricity

One type of renewable energy is permitted in this PCR, defined as follows:

■ Of renewable energy generated by solar generation or wind generation facilities located at the same site as the iDC, the actual amount used at the iDC

- Attach documentation that objectively proves the amount used at the iDC
- Subtract any electricity sold to outside parties

4.5 Disposal/Recycling Phase

4.5.1 GHG Emission Calculation for the Disposal/Recycling Phase

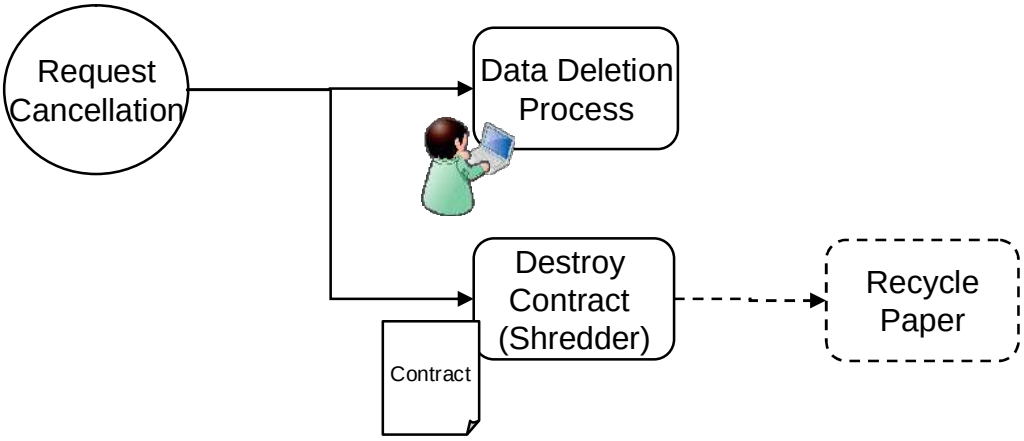
The method for GHG emission calculation in the Disposal/Recycling Phase is defined as follows:

GHG Emission in Disposal/Recycling (Per Year Per Contract) = GHG Emission of Service Cancellation (Per Year Per Contract)

4.5.2 GHG Emission Calculation for Service Cancellation

4.5.2.1 Service Cancellation Scenario

The scenario for service cancellation is defined as follows:



4.5.2.2 Data for Retrieval and Retrieval Method

Data to be retrieved and the methods of retrieval for service cancellation are defined as follows:

ID	Item	Unit	Data Class	Retrieval/Calculation Method
E001	PC Electricity Consumption for Data Deletion	kWh	Primary	Measured PC electricity consumption for deleting data
			Secondary	Rated PC Electricity * Data Deletion Time - Rated PC Electricity Rated electricity for PC used - Data Deletion Time Measured data deletion time or “1.0h”
E002	Shredder Electricity Consumption	kWh	Primary	Measured shreder electricity consumption for contract disposal
			Secondary	Shredder Rated Electricity * Contract Disposal Time - Contract Disposal Time Measured disposal time or “0.01h”

4.5.2.3 Calculation Method

The GHG emission calculation method for service cancellation is defined as follows:

GHG Emission in the Disposal/Recycling Phase (Per Year Per Contract)
= (GHG Emission of Data Deletion[*E01]
+ GHG Emission of Contract Disposal[*E02]) / Average Contract Years[*C01]

*E01 GHG Emission of Data Deletion = PC Electricity Consumption of Data Deletion * GHG Emission Factor (Electricity)

*E02 GHG Emission of Contract Disposal = Shredder Electricity Consumption * GHG Emission Factor (Electricity)

* Paper after shredding is assumed to be 100% recycled and the related GHG emission is not included in this PCR.
* If the PC Electricity Consumption of Data Deletion and Shredder Electricity Consumption are included in the Overall iDC Electricity Consumption, the following adjustment should be made to the iDC Fixed Electricity Consumption in order to avoid double counting.

iDC Fixed Electricity Consumption (After Adjustment)
= iDC Fixed Electricity Consumption (Before Adjustment)
- PC Electricity Consumption of Data Deletion * Annual Number of Cancellations
- Shredder Electricity Consumption * Annual Number of Cancellations

5. CFP Calculation Method

The CFP calculation method for the ICT Hosting Service is defined as follows:

CFP of ICT Hosting Service
= GHG Emission of Raw Material Procurement Phase (Per Year Per Contract)
+ GHG Emission of Manufacturing Phase (Per Year Per Contract)
+ GHG Emission of Distribution/Sales Phase (Per Year Per Contract)
+ GHG Emission of Usage/Maintenance and Management Phase (Per Year Per Contract)
+ GHG Emission of Disposal/Recycling Phase (Per Year Per Contract)

* GHG emissions for the Raw Material Procurement and Manufacturing phases are included in the formula, but are not actually used since they will not be calculated.

6 Display Method

6.1 Displayable Media

The carbon footprint label for this PCR can be displayed in the following media:

- Service Estimate Document
- Web pages of the company and corresponding services
- Brochures for the corresponding services which the company creates and distributes
- Other media approved by the PCR Council

6.2 Required Additional Display Items

The CFP calculation period and the Server SPEC, SPEC Unit Used in CFP Calculation, Storage Capacity and Network Bandwidth must be displayed. Additional items must also be displayed in the following cases:

If secondary data is used for Overall iDC Electricity Consumption, Server Electricity Consumption, Storage Electricity Consumption or Network Equipment Electricity Consumption

(Additional Display Items)

A. If the calculation is based on measured data less than 1 year

(Additional Display Item)

"iDC electricity consumption is calculated based on X months of measured data."

Replace X with the number of months data was measured

B. If measured data was not used in the calculation

(Additional Display Item)

"ICT equipment electricity consumption was calculated using model values."

- If renewable energy is used for Overall iDC Electricity Consumption, Server Electricity Consumption, Storage Electricity Consumption or Network Equipment Electricity Consumption

(Additional Display Items)

"This iDC uses approximately X% renewable energy."

Replace X with the percentage of renewable energy to the overall iDC electricity consumption in 10% units (round to the nearest 10)

6.3 Optional Additional Display Items

The following items can be displayed at the discretion of the provider.

- GHG Emission per Server SPEC
- GHG Emission per Storage Capacity
- GHG Emission per Network Bandwidth
- GHG Emission Reduced by Using Renewable Energy
- Other content approved as appropriate by the PCR Council

6.4 Display Size

The size of the display is not defined in this PCR. It should be determined by each provider.

6.5 CFP Display Example

An example of CFP display is shown below.

There is no rule for the location of required and optional items as long as they can be seen together with the CFP mark.

Calculation Period 2008/04/01 - 2009/03/31
SPEC 50 SPECint2006rate
Capacity 50 GB
Bandwidth 100 Mbps

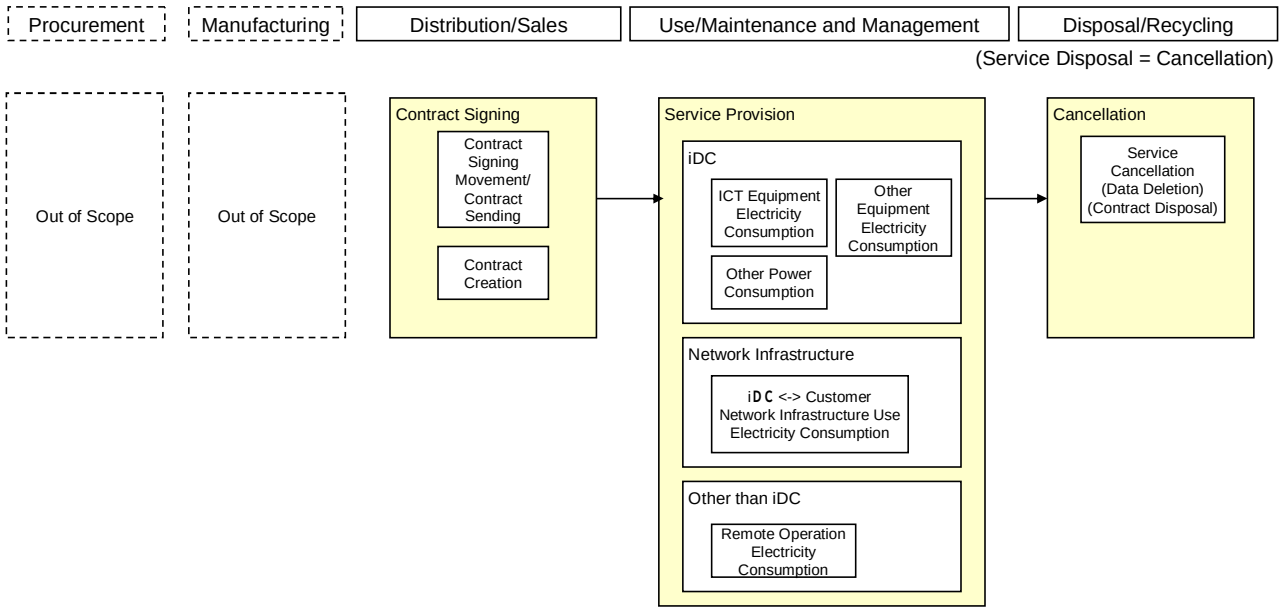
Required Items Example

ICT equipment energy consumption was calculated using model values.
Approximately 30% renewable energy is used.

Optional Items Example

GHG emission per server SPEC
1.234 **kg**-CO_2e/SPEC
GHG emission per storage capacity
2.345 **kg**-CO_2e/GB
GHG emission per network bandwidth
3.456 **kg**-CO_2e/Mbps

Appendix A (Reference)　Lifecycle Flow Diagram



Appendix B (Rule)　GHG Emission Calculation Method for Movement in Signing of Each Contract

B-1) Formula

GHG Emission for Movement in Signing of Each Contract
= Distance Traveled by Corporate Car/Private Car * Car Movement GHG Emission Factor
　+ Distance Traveled by Taxi * Taxi Movement GHG Emission Factor
　+ Distance Traveled by Bus * Bus Movement GHG Emission Factor
　+ Distance Traveled by Train * Train Movement GHG Emission Factor
　+ Distance Traveled by Plane * Plane Movement GHG Emission Factor
　+ Distance Traveled by Ship * Ship Movement GHG Emission Factor

B-2) Data for Retrieval

The following data should be gathered to calculate the GHG emission for movement in signing each contract.
For distance traveled, all movement data related to signing of the service contract must be gathered.

Item	Unit	Data Class	Retrieval/Calculatio Method
Distance Traveled by Corporate Car/Private Car	km	Primary	Travel distance gained from objectively proveable documentation such as daily sales activity report or records of in-car meters.
		Secondary	Distance per travel is set to “500 km”
Distance Traveled by Taxi	km	Primary	Route measured on the map for the traveled area
		Secondary	Described below
Distance Traveled by Bus	km	Primary	Distance made available by the bus company
		Secondary	Distance per travel is set to “15km”
Distance Traveled by Train	km	Primary	Distance made avilable by the rail company
		Secondary	Described below
Distance Traveled by Plane	km	Primary	Distance made avilable by the airline company
		Secondary	Secondary data use is not allowed.
Distance Traveled by Ship	km	Primary	Distance made avilable by the ship company
		Secondary	Secondary data use is not allowed.

Note) Gasoline powered cars are assumed for corporate/private cars and taxis.

■ Taxi Travel Distance Calculation Method (Secondary)

Travel distance is derived by applying the following calculation to each paid fare.

Distance Traveled by Taxi = Σ (2km + [(Fare per Ride – 710 Yen) / 90 Yen * 0.288km])

Note: No consideration given for late hour charges, discounts and rates determined by time.

Note: No consideration given for rate differences among taxi operators

■ Train Travel Distance Calculation Method (Secondary)

Travel distance is calculated using the table below.

Express, special express and green car fees should be subtracted from the calculation.

No consideration given for rate differences among rail operators

JR Rate Table		Values Adopted in This PCR		JR Rate Table		Values Adopted in This PCR	
Operating Kilometers	One-Way Fare	Traveled Distance	Fare per Ride	Operating Kilometers	One-Way Fare	Traveled Distance	Fare per Ride
km	Yen	km	Yen	km	Yen	km	Yen
1 - 3	140	3	- 140	1,201 - 1,240	13,760	2000	13441 -
4 - 6	180	6	141 - 180	1,241 - 1,280	14,070		
7 - 10	190	10	181 - 190	1,281 - 1,320	14,390		
11 - 15	230	20	191 - 320	1,321 - 1,360	14,600		
16 - 20	320			1,361 - 1,400	14,910		
21 - 25	400	40	321 - 570	1,401 - 1,440	15,230		
26 - 30	480			1,441 - 1,480	15,540		
31 - 35	570			1,481 - 1,520	15,860		
36 - 40	650	60	571 - 950	1,521 - 1,560	16,070		
41 - 45	740			1,561 - 1,600	16,380		
46 - 50	820			1,601 - 1,640	16,700		
51 - 60	950			1,641 - 1,680	17,010		
61 - 70	1,110	100	951 - 1620	1,681 - 1,720	17,330		
71 - 80	1,280			1,721 - 1,760	17,640		
81 - 90	1,450			1,761 - 1,800	17,850		
91 - 100	1,620			1,801 - 1,840	18,170		
101 - 120	1,890	200	1621 - 3260	1,841 - 1,880	18,480		
121 - 140	2,210			1,881 - 1,920	18,800		
141 - 160	2,520			1,921 - 1,960	19,110		
161 - 180	2,940			1,961 - 2,000	19,320		
181 - 200	3,260			2,001 - 2,040	19,640		
201 - 220	3,570	300	3261 - 4940	2,041 - 2,080	19,950		
221 - 240	3,890			2,081 - 2,120	20,270		
241 - 260	4,310			2,121 - 2,160	20,580		
261 - 280	4,620			2,161 - 2,200	20,900		
281 - 300	4,940			2,201 - 2,240	21,110		
301 - 320	5,250	500	4941 - 7670	2,241 - 2,280	21,420		
321 - 340	5,460			2,281 - 2,320	21,740		
341 - 360	5,780			2,321 - 2,360	22,050		
361 - 380	6,090			2,361 - 2,400	22,370		
381 - 400	6,300			2,401 - 2,440	22,580		
401 - 420	6,620			2,441 - 2,480	22,890		
421 - 440	6,830			2,481 - 2,520	23,210		
441 - 460	7,140			2,521 - 2,560	23,520		
461 - 480	7,350			2,561 - 2,600	23,840		
481 - 500	7,670			2,601 - 2,640	24,150		
501 - 520	7,980	800	7671 - 10500	2,641 - 2,680	24,360		
521 - 540	8,190			2,681 - 2,720	24,680		
541 - 560	8,510			2,721 - 2,760	24,990		
561 - 580	8,720			2,761 - 2,800	25,310		
581 - 600	9,030			2,801 - 2,840	25,620		
601 - 640	9,350			2,841 - 2,880	25,830		
641 - 680	9,560			2,881 - 2,920	26,150		
681 - 720	9,870			2,921 - 2,960	26,460		
721 - 760	10,190			2,961 - 3,000	26,780		
761 - 800	10,500			3,001 - 3,040	27,090		
801 - 840	10,820	1200	10501 - 13440	3,041 - 3,080	27,410		
841 - 880	11,030			3,081 - 3,120	27,620		
881 - 920	11,340			3,121 - 3,160	27,930		
921 - 960	11,660			3,161 - 3,200	28,250		

961 - 1,000	11,970			3,201 - 3,240	28,560		
1,001 - 1,040	12,290			3,241 - 3,280	28,880		
1,041 - 1,080	12,600			3,281 - 3,320	29,190		
1,081 - 1,120	12,810			3,321 - 3,360	29,400		
1,121 - 1,160	13,130			3,361 - 3,400	29,720		
1,161 - 1,200	13,440						

Source) Regular Fare Table of Major Lines of the 3 JR Honshu Companies

B-3) GHG Emission Factor

In this PCR, the following GHG Emission Factors will be used to calculate the GHG emission of movement in signing each contract.

Item	Value	Unit	Source
GHG Emission Factor for Car Movement	0.163	kg -CO_2e/Person,km	Passenger travel Factor defined by the Ministry of Land, Infrastructure and Tourism (2007)
GHG Emission Factor for Taxi Movement	0.388	kg -CO_2e/Person,km	
GHG Emission Factor for Bus Movement	0.051	kg -CO_2e/Person,km	
GHG Emission Factor for Train Movement	0.019	kg -CO_2e/Person,km	
GHG Emission Factor for Train Movement	0.109	kg -CO_2e/Person,km	
GHG Emission Factor for Ship Movement	0.00234	kg -CO_2e/Person,km	GHG calculation method by the Ministry of the Environment Using the Ship GHG Emission Factor, derived by assuming 60kg per person

Appendix C (Rule) Calculation Method for Overall iDC Electricity Consumption With Measurement Period of Greater Than One Month and Less Than One Year

Because seasonal fluctuations exist for electricity consumption of air conditioning, in the case where the measurement period is less than 1 year, a simple conversion to annual values will give different result depending on when the measurement was done. Therefore, air conditioning electricity consumption should be converted from ICT Equipment electricity consumption values, treating ICT Equipment electricity consumption as the load on air conditioning. Specifically, the method described below should be used to adjust the overall iDC electricity consumption.

The Annual Performance Factor (APF) is used for this adjustment. This value is defined by air conditioning equipment, so the APF for the equipment used should be adopted. If the APF is unknown, the Coefficient of Performance (COP) for the air conditioning including supplemental equipment such as pumps can be used for calculation, but this will yield larger annual values than if the APF is used.

If this adjustment is performed, the measurement period (Start Month and Day to End Month and Day) must be clearly indicated.

The following description assumes X months of measurement.

① If air conditioning electricity is measured separately

Assume that Pict is the measured ICT Equipment Electricity Consumption (Total of Server Electricity Consumption, Storage Electricity Consumption and Network Equipment Electricity Consumption), Pac is the Air Conditioning Electricity Consumption and Pall is the Overall iDC Electricity Consumption during the ICT measurement period. If Petc is the electricity consumption other than ICT equipment minus the electricity consumption of air conditioning (“Other Electricity Consumption”) during the measurement period, Petc＝Pall-Pict-Pac.

Adjustment calculation to annual values for ICT Equipment Electricity Consumption, Air Conditioning Electricity Consumption and Other Electricity Consumption are done using the formulas below. Note that the calculation for Air Conditioning Electricity Consumption does not use the measured value for air conditioning electricity consumption (Pac).

ICT Equipment Electricity Consumption for 1 Year: Pict-y＝Pict * 12/X
Air Conditioning Electricity Consumption for 1 Year: Pac-y＝Pict/APF * 12/X
(if the APF is unknown, Pac-y＝Pict/COP * 12/X)
Other Electricity Consumption for 1 Year: Petc-y＝Petc * 12/X (Petc＝Pall-Pict-Pac)

The adjusted Overall iDC Electricity Consumption can be described as “Pict-y＋Pac-y＋Petc-y”

② If air conditioning electricity is not measured separately

Since Pac is unknown in this case, if we assume that Pac-c is the calculated value of air conditioning electricity consumption during the measurement period, using Pall and APF (or COP) we can calculate Pac-c and Petc as below. Note that Petc also indirectly includes differences in air conditioning seasonality.

Pac-c＝Pict/APF (if APF is unknown, Pac-c＝Pict/COP)
Petc＝Pall-Pict-Pac-c

Adjustment calculation for annual values of ICT Equipment Electricity Consumption, Air Conditioning Electricity Consumption and Other Electricity Consumption can done using the following formulas in the same way as j.

ICT Equipment Electricity Consumption for 1 Year: Pict-y＝Pict * 12/X
Air Conditioning Electricity Consumption for 1 Year: Pac-y＝Pict/APF * 12/X
(if the APF is unknown, Pac-y＝Pict/COP * 12/X)
Other Electricity Consumption for 1 Year: Petc-y＝Petc * 12/X (Petc＝Pall-Pict-Pac-c)

* Basis of This Adjustment
Air conditioning electricity consumption is derived by dividing work (in the case of iDC, air conditioning load) by efficiency (APF or COP). Air conditioning load is the sum of equipment load and outer surface of the building. Further, efficiency differs between regions, so that the following formula can be used for air conditioning load:

Air Conditioning Electricity Consumption = (Equipment Load + Building External Surface Load) / (APF(or COP) * Regional Factor)

Since the iDC is the object of concern here and the building’s external surface load can be assumed to be very small as to be insignificant and regional differences are not considered in this PCR, the Air Conditioning Electricity Consumption can be derived by using the following approximate calculation.

Air Conditioning Electricity Consumption in This PCR
= Equipment Load / APF (or COP) (Equipment Load = ICT Equipment Electricity Consumption)

Appendix D (Rule) Elecrtricity Consumption Calculation in Case ICT Equipment Cannot Be Measured

If ICT Equipment electricity consumption cannot be measured because there are no measuring devices for electricity consumption, the following method should be used to derive the electricity consumption:

D-1) Server Electricity Consumption

Server Electricity Consumption = Σ (Rated Electricity for Each Server * 24 Hours * 365 Days)

Rated Electricity for Each Server: Maximum rated electricity specified in the catalog of each server

D-2) Storage Electricity Consumption

Storage Electricity Consumption = Σ (Rated Electricity for Each Storage * 24 Hours * 365 Days)

Rated Electricity for Each Storage: Maximum rated electricity specified in the catalog of each storage

D-3) Network Equipment Electricity Consumption

Network Equipment Electricity Consumption = Σ (Rated Electricity for Each Network Equipment * 24 Hours * 365 Days)

Rated Electricity for Each Network Equipment: Maximum rated electricity specified in the catalog of each network equipment

Appendix E (Rule)　Rule for Server Performance Metric SPEC

SPECint2006rate, SPECpower_ssj2008 or CTP must be used for server performance metrics. Also, the three metrics may not be used concurrently for calculation.

If updated server performance metrics are made public, this rule should be modified/revised as appropriate upon discussion among related parties and approval of the PCR Council.

E-1) Priority of Each Performance Metric

The priority of the server performance metrics is indicated below.

SPECint2006rate is a performance metric that indicates the number of tasks that can be processed within a certain period of time (throughput). Since the number of registered cases is large (3,024 cases as of December 18, 2009) and almost all manufacturers use it so that it is most suitable for comparison among services from the customers' standpoint, the highest priority is assigned.

SPECpower_ssj2008 measures electricity consumption with the performance metric, but only the server performance metric will be used in calculations of this PCR. This metric is assigned the second priority since the number of registered cases is rather small at 133 (as of December 18, 2009).

Because w/CTP is used in server equipment catalogs (as specified by the Energy Savig Act), it must be converted to CTP. To perform this conversion, the power value for ready mode is required, but it is not indicated in catalogs and one must inquire the manufacturer. Also, since the CTPs of each manufacturer is not centrally managed, form the customers' standpoint it is difficult to use it for performance comparison. Hence it is given the third priority.

Priority	Performance Metric
1	SPECint2006rate
2	SPECpower_ssj2008
3	CTP

E-2) SPECint2006rate

When adopting the SPECint2006rate, the SPECint2006rate value (performance metric) of the used Server will be used as the SPEC.

If the SPECint2006rate of the used Server is made public in the Standard Performance Evaluation (SPEC), that value will be used. If the value is not available, it should be measured by performing benchmarks on the actual machine.

[Brief Description of the Performance Metric]

SPECint2006rate is a throughput performance evaluation that uses 12 types of integer calculation applications. In the evaluation, each of the 12 types of applications are given input of the maximum number of jobs (in many cases, the same number as the number of cores) that the computer can execute simultaneously, and the computer's throughput is measured for each application by measuring the elapsed time until al jobs are completed.

(Reference: 12 types of applications) perl processing, zip processing, gcc compiling, mcf vehicle scheduling, gobmk go, hmmer DNA analysis, sjeng chess, libquantum physics simulation, h264ref movie compression, omnetpp event simulation, astar route search, xalancbmk XML processing

E-3) SPECpower_ssj2008

When adopting the SPECpower_ssj2008, the ssj_ops (performance metric) with 100% server load will be used as the SPEC.

If the SPECpower_ssj2008 ssj_ops@ 100% of the used Server is made public in the Standard Performance Evaluation (SPEC), that value will be used. If the value is not available, it should be measured by performing benchmarks on the actual machine.

[Brief Description of the Performance Metric]

The workload for SPECpower_ssjTM2008 is a three layer client-server system with Thread (Simulated User), Business Logic and Warehouse (Simulated Database), and consists of 6 different transactions (process order, record payment, confirm order status, confirm inventory and delivery management, and customer report). It consists of Java applications executed over multiple JVMs, all executed on the Server to be measured.

E-4) CTP

When adopting CTP, the CTP value (performance metric) of the used Server is used.

CTP can only be adopted when a CTP description exists for the used Server.

* Conversion from Energy Consumption Efficiency (W/CTP) to CTP as defined by the Energy Saving Act:

CTP = Ready Mode Power / Energy Consumption Efficiency as Defined by the Energy Saving Act

[Brief Description of the Performance Metric]

CTP is a measure of comuting performance measured in millions of logical computations per second (Mtops).

CTP Calculation Method:

- Calculate the actual computing speed R for each computing element (CE).

  R = 1/1 Computing Execution Time (Microsecond)

  Units that can process multiple computations at once such as ALUs and FPUs are regarded as having multiple CEs. If each CE can process multiple calculations at once, the maximum value is used. There are word length corrections and definitions depending on calculation type.

- Word length correction is applied to R to calculate each CE's logical performance TP. Then, the maximum TP value is selected.

  TP = R * (1/3+WL/96) WL:Word Length e.g. word length 32bit: R*2/3, word length 64bit: R*1

- If there are more than 2 CEs, combine the TPs to calculate the composite logical performance CTP.

  CTP = TP1 + C2 * TP2 + … + Cn * TPn

  TP1 is the maximum TP. For CEs sharing memory, C2=C3=…=Cn=0.75

  If not sharing memory, a formula is defined to calculate the Ci fron the bandwidth of the memory.

Appendix F (Reference)　GHG Emission in the ICT Equipment Production Phase

GHG emissions in manufacturing and transporting ICT Equipment is not included in this PCR because this PCR is for hosting services. For reference, the following method can be used to calculate GHG emission in the ICT Equipment (Servers, Storage, Network) Manufacturing Phase.

① If the PCR for ICT Equipment is established in the future, the GHG Emission excluding GHG Emission in the Use/Maintenance and Management Phase
② GHG Emission described in the database using the buildup method (LCA Japan Forum LCA Database, JEMAI-LCA Database, Ecoleaf Factor Data) (Excluding GHG Emission in the Use/Maintenance and Management Phase)
③ GHG Emission calculated from similar data in ② (Excluding GHG Emission in the Use/Maintenance and Management Phase)
④ GHG Emission of ICT Equipment in the LCA evaluation made available by each manufacturer (Excluding GHG Emission in the Use/Maintenance and Management Phase)

If ② to ④ is used, the source and reasoning must be clearly indicated.

Appendix G (Rule)　Rule for GHG Emission Factor

For the following items, use the “combustion” of each fuel in the CFP common Factor.

- Gasoline, Bunker A, Bunker B, Bunker C, LNG, LPG, NAFSA, Light Oil, Crude Oil, Coal, Wood, Municipal Gas 13A, Kerosene

For the following lifecycle GHG emissions for supplying other utilities, the CFP common Factor should be used.

- Electricity (Japanese average), Industrial Water, Tap Water

Appendix X (Reference)　Reference Materials

- SPEC CPU2006 web site(http://www.spec.org/cpu2006/)
- SPECpower_ssj2008 web site(http://www.spec.org/power_ssj2008/)
- <Explanation Release> Section 8, Article 1 of Export Trade Control Order Appendix (http://www.meti.go.jp/policy/anpo/moto/kankei-horei/kamotu/kaisyaku/k-8/kaisyaku-8.html#7)
- Japan Standard Industry Classification (http://www.stat.go.jp/index/seido/sangyo/19-3-1.htm#g)