

Guidelines for Standardization of Electronics Product Eco-Efficiency Indicators

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Japan Eco-efficiency Forum

WG for Standardization of 'Factor-X'

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Introduction

The idea of 'eco-efficiency,' which was proposed by the WBCSD*, has gained importance as an integral concept for social systems and business management - seeking to strike a balance between conservation of the environment and economic activities.

We, the eight companies involved in this initiative, have applied the concept of 'eco-efficiency' to a wide variety of electrical appliances - taking on the role of world leaders and seeking to manufacture products which can simultaneously achieve improvements in performance and usability while reducing the adverse impact on the environment - using 'Factor-X.' However, because the methods used to calculate and display 'Factor-X' in the past have varied, depending on the company, and because not all the data used in the calculations were disclosed, the results were, unfortunately, sometimes difficult for consumers to understand.

In response, a variety of measures to uniform 'Factor-X' were therefore implemented. First, in November 2006, five electrical appliance manufacturers (those companies marked with **) chose four categories of products which used a lot of electricity in the home, namely air conditioners, refrigerators, lamps (light bulbs and fluorescent tubes), and lighting equipment (including lamps), and developed the method used for calculating indicators and other relevant details.

Specifically, these companies established 'standardization guidelines' with which to develop the method of calculation used for indicators and other relevant details under certain operating conditions in order to quantify the 'functional value' (the sum total of all benefits obtained from its fundamental functions) and the 'environmental impact' (the amount of greenhouse gas emissions over the life cycle of the product), thereby deriving each product's 'eco-efficiency', which could then serve as the basis for calculating 'Factor-X.'

Then, as the second step towards standardization, in April 2007, the 'WG for Standardization of Factor-X' was created within the 'Japan Eco-efficiency Forum' (Chairman: Professor Ryoichi Yamamoto of the University of Tokyo), for which the Japan Environmental Management Association for Industry serves as the secretariat. The eight existing electrical appliance manufacturers mentioned above all participated in the Forum and have made efforts to develop new 'standardization guidelines' for three further categories of products: televisions (which consume a lot of electricity in the home), washing/drying machines (for which demand is expected to increase), and personal computers (whose use has grown rapidly and which are of particular interest to consumers). These products follow on from the four categories of products already mentioned above.

We have now finished our examination of the major issues affecting two of these additional categories (washing/drying machines and personal computers) and have completed new 'standardization guidelines' for six categories of products in total, including the four categories mentioned above. As a matter of course, the existing standardization guidelines already established for the first four categories of products will continue to be applied. However, despite repeated in-depth discussions, no guidelines have yet been made for televisions as too many difficult issues still remain unresolved.

Using these guidelines, it is possible to clearly indicate the level of improvement that has been achieved regarding the 'eco-efficiency' of current products, in terms of both their improved value (functions) and their reduced environmental impact (the amount of greenhouse gas emissions), compared with previous product models from the same company. At the moment, it is not yet possible to make a direct comparison with products manufactured by other companies because past products used as reference data vary from company to company. However, we can still use such comparisons as a useful indication of the 'replacement effect' for products manufactured by the same company.

Going forward, as part of our 'Japan Eco-efficiency Forum' activities, we will continue our efforts to publicize, disseminate and raise awareness about standardization among all relevant industry associations and other organizations, as best we can, while proactively engaging in further international standardization activities.

March 2009

WG for Standardization of 'Factor-X,' Japan Eco-efficiency Forum
Sanyo Electric Co., Ltd., Sharp Corporation, Toshiba Corporation**, NEC Corporation
Panasonic Corporation**, Hitachi, Ltd.** , Fujitsu Limited**, Mitsubishi Electric Corporation**

*World Business Council for Sustainable Development

1. Purpose

These guidelines have been established in order to give the method of calculation and other relevant details regarding 'eco-efficiency' (which presents the value of each specific product in numeric terms, compared with its environmental impact), and 'Factor-X' (which expresses the relative level of improvement in 'eco-efficiency' in simple numeric terms), and to provide a uniformed eco-efficiency indicator which can help users select and purchase more environmentally conscious products.

2. Name/Method of Indication

- 1) The eco-efficiency indicator, or 'Factor-X' (the indicator which represents the level of improvement in eco-efficiency of the target product), is uniformed under the following name, and the marks and simple numeric values (defined separately) should be used for indication purposes.

[Name]: Common Factor

- 2) Each company can individually make use of its own, specific eco-efficiency indicators, already in use, as appropriate. However, the company concerned must state that this is the company's own specific eco-efficiency indicator.
- 3) For any product to which the 'Common Factor' is applied, the company's specific eco-efficiency indicator can be indicated together with the 'Common Factor.'
- 4) The size, location and other requirements for the indication of the 'Common Factor' on products shall be defined separately.

3. Definition of the 'Common Factor'

- 1) The 'Common Factor' is expressed by the following definition and formulae:

[Definition]: The ratio of the eco-efficiency (expressed as the ratio of the 'Functional value' to the 'Environmental impact' of the product) of the evaluated product compared to the same type of product for the specified reference year

$$\text{Eco-efficiency} = \frac{\text{Functional value of the product}}{\text{Environmental impact of the product}} \quad \cdot \cdot \text{Formula 1}$$

$$\text{Common Factor} = \frac{\text{Eco-efficiency of the evaluated product}}{\text{Eco-efficiency of the same type of product for the reference year}} \quad \cdot \cdot \text{Formula 2}$$

- 2) As a general rule, the 'Functional value of the product (the numerator of Eco-efficiency' in Formula 1, as shown above) represents the sum total of all particular benefits obtained from the use of the product (product specific functions), as defined for each product category in Clause 5, based on consideration of the key functions and performance which best represent the characteristics of the product. The 'Functional value of the product' may also be expressed as the product of the performance of the key functions ('Fundamental function') multiplied by the period for which those functions are fulfilled ('Utility duration').
- 3) As a general rule, in order to determine the 'Fundamental function', as described in the preceding paragraph, the following 3 conditions must be taken into consideration:
 - the functions must clearly indicate the characteristics of the target product and be intuitively understandable for the general consuming public;
 - the product of these functions multiplied by the 'Utility duration' must confer some practical sense of the 'Functional value of the product' (the benefits to consumers); and
 - the functions must be positively related with the 'Environmental impact of the product' (the denominator of 'Eco-efficiency') and set at such a level that the degree of difficulty in improving both the numerator and the denominator is as equal as possible.
- 4) In addition, the 'Fundamental function' needs not necessarily be limited to just one per product. For example, if the users' needs are divided between the functional capability offered by the product and the usability of the product, the 'Common Factors' may be set separately (based on both the functional capability and the usability) so that the indicators provided can help users when making a selection that meets their needs.
- 5) Similarly, as a general rule, the 'Utility duration' can be defined as the number of years or the period of time for which the product can normally be used in an ordinary household under normal service conditions, or the corresponding number of times of use, etc. However, in the case of a product for which figures in a catalog or other reference materials are used instead and where the period of time for which spare parts are kept in stock is officially defined, the duration may be set as the 'period for which spare parts are kept in stock + 1 year', providing the source is clearly indicated.
- 6) For the time being, the denominator of 'Eco-efficiency' in Formula 1, given above, shall be the 'amount of greenhouse gas emissions over the life cycle of the product'. This shall be calculated as the amount of greenhouse gas emissions, such as CO₂, estimated using the global warming factors for each phase throughout the product's life cycle (for which the relevant details shall be defined in Clause 5 for each product category). In addition, for those products subject to a comparative evaluation, the same database should be used for all calculations and the source or foundation of the original measurement units used and the evaluation boundaries of all inventory data used must be stated as clearly as possible.

- 7) A target product for comparison should be chosen, in line with the purpose of these guidelines, and used for evaluation purposes for the reference year. A fictitious product, which can be derived from a common model already in production or from a number of models, may be created as a target and used as a standard model, for comparison.

4. Application of the 'Common Factor'

- 1) The products to which these guidelines are applied shall be selected on the basis of their energy consumption and the level of interest shown by consumers. The companies involved shall calculate the 'Common Factors' using their own methods, and the common items required for calculation and the common environmental intensity data used (hereinafter referred to as the 'common intensity data') shall be applied to the product, subject to agreement among the companies, in order to keep the numerical variations in the calculation processes and the resulting figures (based on common inventory data relating to the selected product) within an appropriate range (rough indication: up to approx. $\pm 10\%$ for 'Eco-efficiency' and $\pm 3\%$ for the 'Common Factor').
- 2) The companies which apply these guidelines shall calculate the 'Common Factor' using the common items and the 'common intensity data' described in the preceding paragraph. If a new company desires to apply these guidelines, approval shall be given subject to the consent of the existing companies which have already adopted these guidelines.

5. Method for Calculating the 'Common Factor' of Individual Target Products

- 1) These guidelines shall be applied as follows, starting with the following six categories of products subject to consent, as described in Clause 4. If, in future, these guidelines are applied to any other product, the calculation method used should be examined on a case-by-case basis in accordance with the above requirements:
 - Air conditioners;
 - Refrigerators;
 - Lamps (light bulbs and fluorescent lamps);
 - Lighting equipment (including lamps);
 - Washing/drying machines; and
 - Personal computers.
- 2) This section provides the 'Common Factor' for each category of applicable products in accordance with the description in the above sections. At the moment, the calculation for 'Eco-efficiency' used for the 'Common Factor' applied to the six categories of products mentioned above is as shown in Formula 3, below, and the details may be changed as appropriate:

$$\text{Eco-efficiency} = \frac{(\text{Fundamental function}) \times (\text{Utility duration})}{\text{Amount of greenhouse gas emissions over the life cycle of the product}} \quad \cdot \cdot \text{Formula 3}$$

3) When calculating the 'Amount of greenhouse gas emissions over the life cycle of the product' (the denominator of 'Eco-efficiency'), the life cycle of the applicable product shall be divided into the five phases shown in Table 1, below. The amount of greenhouse gas emissions can then be calculated for each item in each phase and aggregated. When calculating the amount of greenhouse gas emissions, the amount of emissions of various greenhouse gases which have an effect on global warming (such as CO₂) must be included as defined in Clause 3, where appropriate, at the discretion of the company.

Table 1: Items taken into consideration during each phase of the product life cycle

Phases during the life cycle	Item	Unit (Example)	Phases during the life cycle	Item	Unit (Example)
Material/ part manufacture	Steel (plated sheet steel)	kg	Product manufacture	Energy consumption at the time of manufacture	MJ
	Stainless steel	kg	Product transportation	Transportation distance	km
	Copper	kg	Use	Power consumption	kWh
	Aluminum	kg		Consumable supplies	kg
	Other metals	kg	Disposal/ recycling	Landfill	MJ
	PP	kg		Destruction	MJ
	PVC	kg		Recovery	MJ
	PS	kg			
	EPS	kg			
	ABS	kg			
	Other thermoplastic resins	kg			
	Rubber elastomers	kg			
	Thermoset resins	kg			
	Cardboards	kg			
	Expanded polystyrene	kg			
	Paper	kg			
	Glass	kg			
	Other materials	kg			
	Circuit boards/ electronic parts	kg			

5-1. 'Common Factor' for Air Conditioners

- The type of the products shall be limited to 'home air conditioners.'
- For the time being, the reference year shall be FY2000.

5-1-1. Fundamental Function

- The function shall be the 'numerator of the cooling and heating performance calculation formula derived using the APF (Annual Performance Factor) method' and shall be expressed in units of [kWh].
- 'APF' is the value of the cooling and heating capacity required for the air conditioner throughout one year of use, divided by the energy consumed by the air conditioner (the periodic energy consumption), which represents the total quantity of heat added to or removed from the room by the air conditioner.

5-1-2. Utility Duration

- The utility duration (normal duration of use) shall be 10 years.
- The duration is equal to the 'period for which spare parts are kept in stock (9 years)' in accordance with the 'Fair Competition Codes and the Ordinance for Enforcement of Indications on Home Electric Appliances' established by the 'Home Electric Appliances Fair Trade Conference' plus 1 year.

5-1-3. Amount of Greenhouse Gas Emissions over the Life Cycle of the Product

- The amount shall be the total amount of all greenhouse gas emissions calculated throughout all the following phases:

[Material/parts manufacturing]]

- For electronic parts, it is deemed that the amount of greenhouse gas emissions from electronic parts have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'circuit boards/electronic parts'.
- Refrigerants and other materials shall be included in 'other materials.'

[Product manufacturing]

For product manufacturing, it is deemed that the amount of greenhouse gas emissions from each processes for production have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'energy consumption at the time of manufacturing'.

[Product transportation]

- As a general rule, the amount of greenhouse gas emissions shall be calculated in accordance with the transportation method actually used (such as airplanes, ships, vehicles etc.), including the transportation of used products.

[Use]

- The power consumption shall be measured in accordance with 'JIS C 9612:2005 Air conditioners - Test and method of calculation for the efficiency of periodic energy

consumption.'

[Disposal/recycling]

- If the product can be recycled and reused as a material, etc., it shall be deemed that the amount of material or energy recovered and dissipated in recycling process may also be taken into consideration and included in the calculation.
- For refrigerants and other materials, the amount of greenhouse gas emissions shall be calculated after taking collection into account.

5-2. 'Common Factor' for Refrigerators

- The type of the products shall be limited to household freezing and refrigerating appliances.
- For the time being, the reference year shall be FY2006.

5-2-1. Fundamental Function

- The function shall be the 'adjusted inner volume,' expressed in units of [l (liter)].
- The 'adjusted inner volume' is the value equal to the rated inner volume of the freezer compartment multiplied by 2.15, 1.85 or 1.55 for the freezer compartment of three-, two- or one-star types, respectively, added to the rated inner volume of any storage areas other than the freezer compartment.
- The calculation standards shall be as provided in the Ministry of International Trade and Industry Notice No. 704 dated December 22, 1999, relating to the Energy Saving Act, 'The Judgmental Standards of Manufacturers on Improvement of Performance of Electric Household Refrigerators' (final amendment: the Ministry of Economy, Trade and Industry Notice No. 53, March 29, 2006) and the Ministry of International Trade and Industry Notice No. 705 also dated December 22, 1999, 'The Judgmental Standards of Manufacturers on Improvement of Performance of Electric Household Refrigerators' (final amendment: the Ministry of Economy, Trade and Industry Notice No. 54, March 29, 2006).

5-2-2. Utility Duration

- The utility duration (normal duration of use) shall be 10 years.
- The duration is equal to the 'period for which spare parts are kept in stock (9 years)' in accordance with the 'Fair Competition Codes and the Ordinance for Enforcement of Indications on Home Electric Appliances' established by the 'Home Electric Appliances Fair Trade Conference' plus 1 year.

5-2-3. Amount of Greenhouse Gas Emissions over the Life Cycle of the Product

- The amount shall be the total amount of all greenhouse gas emissions calculated throughout all the following phases:

[Material/parts manufacturing]

- For electronic parts, it is deemed that the amount of greenhouse gas emissions from electronic parts have only a minor impact on the overall evaluation, at a level where

variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'circuit boards/electronic parts'.

- Refrigerants and other materials shall be included in 'other materials.'

[Product manufacturing]

For product manufacturing, it is deemed that the amount of greenhouse gas emissions from each processes for production have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'energy consumption at the time of manufacturing'.

[Product transportation]

- As a general rule, the amount of greenhouse gas emissions shall be calculated in accordance with the transportation method actually used (such as airplanes, ships, vehicles etc.), including the transportation of used products.

[Use]

- The power consumption shall be measured in accordance with 'JIS C9801:2006 Household refrigerating appliances -- Characteristics and test methods.'

[Disposal/recycling]

- If the product can be recycled and reused as a material, etc., it shall be deemed that the amount of material or energy recovered and dissipated in recycling process may also be taken into consideration and included in the calculation.
- For refrigerants and other materials, the amount of greenhouse gas emissions shall be calculated after taking collection into account.

5-3. 'Common Factor' for Lamps

- The type of the products shall be limited to incandescent bulbs and self-ballasted compact fluorescent lamps.
- Comparisons may be made between incandescent bulbs and self-ballasted compact fluorescent lamps, as appropriate.
- For the time being, the reference year shall be FY2000.

5-3-1. Fundamental Function

- The fundamental function shall be the 'total luminous flux,' expressed in units of [lm (lumen)].
- The measurement method shall be as provided in the following Japanese Industrial Standards: 'JIS C7801 Measuring methods of lamps for general lighting'

5-3-2. Utility Duration

- The utility duration (normal duration of use) shall be the 'rated life', expressed in units of [h (hour)].
- The 'rated life' is the average value for the lifetime of a number of lamps tested under predetermined testing conditions, and refers to data published in a catalog or any other

such reference material which correspond to the utility duration in an ordinary household.

- The definition shall be as provided in the Japanese Industrial Standards, such as 'JIS C7501', 'C7617-2' and 'C7620-2.'

5-3-3. Amount of Greenhouse Gas Emissions over the Life Cycle of the Product

- The amount shall be the total amount of all greenhouse gas emissions calculated throughout all the following phases:

[Material/parts manufacturing]

- For electronic parts, it is deemed that the amount of greenhouse gas emissions from electronic parts have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'circuit boards/electronic parts'.

[Product manufacturing]

For product manufacturing, it is deemed that the amount of greenhouse gas emissions from each processes for production have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'energy consumption at the time of manufacturing'.

[Product transportation]

- As a general rule, the amount of greenhouse gas emissions shall be calculated in accordance with the transportation method actually used (such as airplanes, ships, vehicles etc.), including the transportation of used products.

[Use]

- The power consumption shall be measured as 'input wattage' of 'JIS C7801 Measuring Methods of Lamps for General Lighting.'

[Disposal/recycling]

- If the product can be recycled and reused as a material, etc., it shall be deemed that the amount of material or energy recovered and dissipated in recycling process may also be taken into consideration and included in the calculation.

5-4. 'Common Factor' for Lighting Equipment

- The type of the products shall be limited to home lighting fixtures.
- The type of lamp specified by the manufacturer and the number of bulbs/tubes consumed during the 'Utility Duration' under normal service conditions should also be considered.
- For the time being, the reference year shall be FY2000.

5-4-1. Fundamental Function

- The fundamental function shall be the 'total luminous flux,' expressed in units of [lm (lumen)].
- For measurement purposes, the type of lamp specified by the manufacturer should be used.

- The measurement method shall be as provided in the 'Japan Luminaires Association's technical data 128-1999' and following the Japanese Industrial Standards:
 - 'JIS C8105 Luminaires'
 - 'JIS C8020 Method of calculation on Fluorescent luminaire efficacy index'
 - 'JIS C7612 Illuminance measurements for lighting installations'

5-4-2. Utility Duration

- The utility duration (normal duration of use) shall be 10 years.
- The duration is equal to the 'period for which spare parts are kept in stock (9 years)' in accordance with the 'Fair Competition Codes and the Ordinance for Enforcement of Indications on Home Electric Appliances' established by the 'Home Electric Appliances Fair Trade Conference' plus 1 year.

5-4-3. Amount of Greenhouse Gas Emissions over the Life Cycle of the Product

- The amount shall be the total amount of all greenhouse gas emissions calculated throughout all the following phases:

[Material/parts manufacturing]

- For electronic parts, it is deemed that the amount of greenhouse gas emissions from electronic parts have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'circuit boards/electronic parts'.

[Product manufacturing]

For product manufacturing, it is deemed that the amount of greenhouse gas emissions from each processes for production have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'energy consumption at the time of manufacturing'.

[Product transportation]

- As a general rule, the amount of greenhouse gas emissions shall be calculated in accordance with the transportation method actually used (such as airplanes, ships, vehicles etc.), including the transportation of used products.

[Use]

- The power consumption shall be measured in accordance with the 'Japan Luminaires Association's technical data 128-1999' mentioned above.

[Disposal/recycling]

- If the product can be recycled and reused as a material, etc., it shall be deemed that the amount of material or energy recovered and dissipated in recycling process may also be taken into consideration and included in the calculation.

5-5. 'Common Factor' for Washing/Drying Machines

- The type of the products shall be limited to single-tub home washing and drying machines.
- For the time being, the reference year shall be FY2000.

5-5-1. Fundamental Function

- The function shall be the 'washed/dried volume' (tentative term) defined by the following formula, expressed in units of [kg].
- For the time being, the 'washed/dried volume [kg]' shall be deemed equal to $365 \times$ (the sum of the 'washed volume [kg]' + the 'dried volume [kg]').

5-5-2. Utility Duration

- The utility duration (normal duration of use) shall be 7 years.
- The duration is equal to the 'period for which spare parts are kept in stock (6 years)' in accordance with the 'Fair Competition Codes and the Ordinance for Enforcement of Indications on Home Electric Appliances' established by the 'Home Electric Appliances Fair Trade Conference' plus 1 year.

5-5-3. Amount of Greenhouse Gas Emissions over the Life Cycle of the Product

- The amount shall be the total amount of all greenhouse gas emissions calculated throughout all the following phases:

[Material/parts manufacturing]]

- For electronic parts, it is deemed that the amount of greenhouse gas emissions from electronic parts have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'circuit boards/electronic parts'.
- When calculating the amount of greenhouse gas emissions for 'circuit boards/electronic parts,' the 'common intensity data' (to be determined) should be used.
- Refrigerants and other materials shall be included in 'other materials.'

[Product manufacturing]

For product manufacturing, it is deemed that the amount of greenhouse gas emissions from each processes for production have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'energy consumption at the time of manufacturing'.

[Product transportation]

- As a general rule, the amount of greenhouse gas emissions shall be calculated in accordance with the transportation method actually used (such as airplanes, ships, vehicles etc.), including the transportation of used products.

[Use]

- The power consumption shall be measured in accordance with the voluntary standards of the Japan Electrical Manufacturers' Association, the 'Washing Performance Evaluation Method' and the 'Drying Performance Evaluation Method' (revised on July 11, 2008).

- In the case of 'consumable supplies,' evaluation should be performed for 'detergents' and 'water,' and calculations must be carried out using the 'common intensity data' (to be determined).
- Until standard values are set by the industry, the 'frequency of use' shall be once/day.

[Disposal/recycling]

- If the product can be recycled and reused as a material, etc., it shall be deemed that the amount of material or energy recovered and dissipated in recycling process may also be taken into consideration and included in the calculation.
- For refrigerants and other materials, the amount of greenhouse gas emissions shall be calculated after taking collection into account.

5-6. 'Common Factor' for Personal Computers

- The type of the products shall be limited to laptop computers.
- Since personal computers are a multifunctional product associated with a great variety of users' needs, two types of 'Common Factors' should be established to represent both processing performance and mobility, respectively.
- For the time being, the reference year shall be FY2005 and FMV-C6200 shall be used as a reference product.

5-6-1. Fundamental Function

- For determination of the 'Common Factor' used to represent processing performance, the performance of the personal computer should be taken into consideration and the results of a standard benchmark test (ENERGY STAR Ver. 5.0 or later) should be used as a reference.
- For determination of the 'Common Factor' used to represent mobility, the mobility performance of the personal computer should be taken into consideration, expressed as the ratio of the operating time of the batteries (JEITA's Battery Operating Time Measurement Method Ver. 1.0)^{*1} to the weight of the device.

*1; <http://it.jeita.or.jp/mobile/>

5-6-2. Utility Duration

- For the time being, the utility duration (normal duration of use) shall be 4 years, in accordance with the EcoLeaf BJ 01 PCR (Product Category Rule).

5-6-3. Amount of Greenhouse Gas Emissions over the Life Cycle of the Product

- The amount shall be the total amount of all greenhouse gas emissions calculated throughout all the following phases:

[Material/parts manufacturing]

- No LCDs, HDDs or batteries shall be included in the calculation of the amount of greenhouse gas emissions for 'circuit boards/electronic parts'.

- When calculating the amount of greenhouse gas emissions for LCDs, HDDs and batteries, these 3 items shall be added to the 'material/part manufacture' phase in Table 1 as 'common original units' (to be determined).

[Product manufacturing]

For product manufacturing, it is deemed that the amount of greenhouse gas emissions from each processes for production have only a minor impact on the overall evaluation, at a level where variations in the calculation results can be ignored, the greenhouse gas emissions shall be calculated for the single item of 'energy consumption at the time of manufacturing'.

[Product transportation]

- As a general rule, the amount of greenhouse gas emissions shall be calculated in accordance with the transportation method actually used (such as airplanes, ships, vehicles etc.), including the transportation of used products.

[Use]

- The power consumption shall be measured in accordance with the EcoLeaf BJ 01 PCR (Product Category Rule).

[Disposal/recycling]

- If the product can be recycled and reused as a material, etc., it shall be deemed that the amount of material or energy recovered and dissipated in recycling process may also be taken into consideration and included in the calculation.

6. Revision of Guidelines

As a general rule, these guidelines shall be reviewed every two years, taking into account the status of implementation of these guidelines and prevailing social conditions, and then implementing appropriate measures on the basis of the results (unless an urgent need arises because of changes in social conditions or any other reasons, in which case a review and revision can be performed without waiting the full two years).

7. History of Revisions

2009.7.22 The descriptions in 5-3-1 'Measurement Method' and 5-3-3 'Use' were revised following the issuance of 'JIS C7801 –Measuring Methods of Lamps for General Lighting' as of June 20, 2009.