<Provisional Translation*>

Japanese Technical Specification : TS Q 0010

"General principles for the assessment and labeling of Carbon Footprint of Products"

(Extract)

***Official TS Q 0010 was issued in Japanese only**

Contents

Foreword

The Carbon Footprint System is to indicate the life cycle greenhouse gas (GHGs) emissions of commodities and services as converted to a quantity of CO2 with the method of Life Cycle Assessment (LCA) that assesses environmental impacts of commodities and services throughout their life cycle ranging from raw material acquisition to disposal and recycling. On-product indicating of the GHG emissions calculated by the LCA would be one of the important means of ”Visualization” of GHG emissions. It will enable consumers to obtain correct information oriented for a reduction of GHG emissions and enable organizations to effectively reduce GHG emissions after indexing at what life cycle stage GHGs emissions are high. At the same time, organizations will be in a position to appeal their action of GHGs emissions reduction to consumers.

The purpose of the Carbon Footprint System is, based on visualization of GHGs emissions, to prompt organizations to make more efforts for GHGs emissions reduction and consumers to renovate their consumer life into a low-GHGs emissions style, while making effective use of the information. To this end, organizations and people, that are asked to be responsible for their GHGs emissions, should behave wisely and responsibly for materializing a low-GHGs society. To realize such a system, the following two approaches are given consideration to:

- An approach that urges every business entity to strive to reduce emissions, with CFP labeling taken for an appeal of their emission-reducing efforts;
- An approach to provide consumers with information about how much GHGs emissions they are emitting with their own activities, information for their comparison basis to select relatively low-emission products and urge consumers to strive to reduce their GHGs emissions by making them aware of GHGs emissions from use and disposal phases, according as organizations and consumers have been progressively understanding and participating.

In both approaches, it is necessary to design a fair system so that both organizations and consumers, taking part in GHGs reduction, may quantitatively grasp their respective GHG reduction efforts subject to a definite standard.

This technical specification indicates general principles for the assessment and labeling of CFP in order to ensure fairness of CFP system.

To ensure the reliability on the CFP System, it is necessary not only that organizations assess and label CFP in accordance with the rules but also that a mechanism, which

properly verifies such assessments and labeling, is considered.

Basically, the core of the verification mechanism is independent third party verification. To this end, however, it is important to properly balance a viewpoint of securing the system reliability with that of increasing the efficiency at the business entry's expense. In addition, it is necessary to take the international harmonization into consideration. A study will be made while taking into account the international standards and trends overseas in relation to the verification.

In order that the CFP System may not bring about any effect like a trade barrier but could turn out to be a base of fair competition to the contrary, full consideration should be given to the international harmonization with ISO14020 and 14040 series and other ISO standards while taking into due consideration of the international treaty of the World Trade Organization as well.

1. Scope

This technical specification prescribes general principles for the assessment and labeling of CFP System.

The CFP System can inherently apply to any sorts of products.

NOTE: Organizations should be encouraged to take part in the CFP system autonomously and voluntarily. In order to encourage them to participate widely, therefore, it is considered necessary to establish those mechanisms which would not only give priority to the system preciseness but also allow for a wide diversity of approaches as tailored to each of business categories and products. Some products, for example, may have a calculation difficulty level vary in a great measure with a number of parts/components, acquisition route diversity and production process complexity. Due consideration to those characteristics is asked for, accordingly.

This technical specification is to be reviewed timely and properly, taking account of a variety of the activities being tackled by those consumers, organizations and governmental authorities, all of whom are supporting the CFP System.

2. Normative References

ISO 14040, Environmental management — Life cycle assessment — Principles and framework

3. Terms and Definitions

3.1

carbon footprint of products system

the system to intelligibly indicate, on products by a simple method, the CO2-equivalents emissions of GHGs emitted throughout the life cycle of such products ranging from their raw material acquisition to their disposal/recycling.

3.2

products

any goods or service

[ISO 14021:1997, definition 3.1.11]

3.3

life cycle

consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[ISO 14040:2006, definition 3.1]

3.4

life cycle assessment, LCA

compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

[ISO 14040:2006, definition 3.2]

3.5

greenhouse gas, GHG

gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds

[ISO 14064-1:2006, definition 2.1]

NOTE: GHGs are defined in this technical specification as the six gases covered by the Kyoto Protocol, carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF6).

3.6

product category rule, PCR

set of specific rules, requirements and guidelines for implementing CFP system for one or more product categories

3.7

system boundary

set of criteria specifying which unit processes are part of a product system

[ISO 14040:2006, definition 3.32]

3.8

product system

collection of unit processes with elementary and product flows, performing one or more defined functions, and which models the life cycle of a product

[ISO 14040:2006, definition 3.28]

3.9

unit process

smallest element considered in the life cycle inventory analysis for which input and output data are quantified

[ISO 14040:2006, definition 3.34]

3.10

global warming potential, GWP

factor describing the radiative forcing impact of one mass-based unit of a given GHG relative to an equivalent unit of carbon dioxide over a given period of time

[ISO 14064-1:2006, definition 2.18]

3.11

emission factor / GHG intensity of the product (pending)

factor relating activity data to GHG emissions

3.12

scenario

hypothetical reference case that best represents the conditions most likely to occur

3.13
primary data
the data which are collected by organization, that calculates CFP, on its own responsibility (including the data collected based on an established scenario)

3.14
secondary data
the data which are collected only by citing from the common data, reference data and other LCA studies, for organization, that calculates CFP and labels CFP, has difficulties with collection of data on its own responsibility

3.15
allocation
partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems
[ISO 14040:2006, definition 3.17]

3.16
cut-off criteria
specification of the amount of material or energy flow or the level of environmental significance associated with unit processes or product system to be excluded from a study
[ISO 14040:2006, definition 3.18]

4. Calculation Method of CFP

4.1 Subject of Calculation

GHGs to be calculated shall be 6 types, i.e. CO2, CH4, N_2O, HFCs, PFCs and SF6 (GHG covered by the Kyoto Protocol).

In this Technical Specification, CO2 equivalent is obtained by multiplying each GHG emissions by GWP. For GWP, in this technical specification, it is used a 100-year time horizon of Second Assessment Report (SAR) of Intergovernmental Panel on Climate Change (IPCC), that are used for calculation of each nation's emission in Kyoto Protocol.

Then, emission source includes emissions originated from nature (livestock and other agricultural process).

NOTE: Subject GHGs, however, is to be reviewed periodically, with future international

studies, etc. taken into due consideration. For example, all the gases specified in the IPCC SAR may be taken for subject GHGs.

Regarding the GWP, it is necessary to build up the rules so that a periodic review will be made, with the updated IPCC report data reflected on.

Whether or not nature-originated GHGs (discharged by livestock and in other agriculture processes, etc.) are to be calculated shall continue being studied while taking into account the international assertion etc.

4.2 Calculation Coverage

A calculation coverage shall be set so as to include the process that might fall within a range of functional unit of a product but could not be ignored from the viewpoint of what contribution such process has made to whole GHG emissions. A calculation shall be basically made on a throughout whole life cycle. The life cycle shall be composed of the following stages:

a) Raw material acquisition,
b) Production,
c) Distribution/selling,
d) Use/maintenance control and
e) Disposal/recycling

Moreover, organization should define a calculation coverage on each stage, with the system boundary concept.

NOTE: It may well be assumed in some stages, however, that there is a case where it is extremely difficult either to make a calculation or to gather data from other organizations. In this case, therefore, it is necessary to take flexible steps according to a characteristic of the individual products. In this sense, a calculation coverage in each of the above-mentioned stages should be defined in the “Product Category Rules” with the reason/grounds why a certain stage or part of the stage should be authorized to be omitted, while taking the trends in international assertions into consideration.

To proceed with such an approach, in order that consumers may be prevented from misunderstanding, labeling should be given so that anyone may intelligibly identify the boundary, of the calculation coverage. However, constant efforts are called upon to be made so that the excluded calculation coverage may go on being included all over again.

The calculation in each stage is to be undertaken by each organization involved on its respective own responsibilities.

4.3 Calculation Method

4.3.1 Basic Rules relating to Calculation

GHG emissions are calculated in each process as referred to in **4.2** and summed up according to the expression given below. Activity and emission factor are as exemplarily shown in the following *Table 1*:

GHG emissions = Σ (activity $_i$ × GHG emission factor $_i$)

Where $_i$ stands for a process.

Table 1 Examples of activity and emission factor for each calculation stage

Calculation stage	Exemplar Activity	Exemplar Emission Factor
Raw material acquisition	Quantity of material consumption	GHG emission factor to produce material per kilogram
Production	Weight as assembled	GHG emission factor to assemble material per kilogram.
	Consumption of electricity	GHG emission factor to generate electricity per kilowatt hour (kWh)
Distribution/ selling	Car loadings (kg•km) = transport distance × load ratio × loading capacity	GHG emission factor for product transport per kilogram•kilometer (kg•km)
Use/ maintenance control	Electricity consumption of usage	GHG emission factor to generate electricity per kilowatt hour (kWh)
Disposal/ recycling	Reclaimed mass/ recycled mass	GHG emission factor to reclaim per kilogram GHG emission factor to recycle per kilogram.

"Activity", that is to be multiplied by GHG emission factor, shall be collected by the organization calculating GHG emissions (material consumption, electricity consumption for production, etc.) or collected on the assumption of a scenario (electricity consumption of

usage, reclaimed mass, etc.)

It is desirable that an organization should use the common data for emission factor. Should an organization use an emission factor other than the common data for any calculation, they must verify that such emission factor is reasonable.

Whenever GHG emissions may be calculated, it should be made as a rule for each organization to calculate GHG emissions of its product with primary data in principle. Using the secondary data should be limited to the case where it is difficult to obtain primary data only.

NOTE: Immediately after placing a new product or an improved product on the market, or while repetitively remodeling a product in a short time, the organizations involved would not often be in a position to collect a sufficient primary data even if they want to calculate and indicate CFP simultaneously with such release of the product. If a design change from the similar past product should be slight, however, it is likely that a calculation almost completely free from an error may be made in some cases based on the past product data. It is also possible to envisage those mechanisms which allow for a tentative calculation and labeling, based on the data available in prototype/design stages, and for a reassessment in a certain time, based on the primary data accumulated after a certain period.

In case where there are difficulties in obtaining primary and secondary data as referred to above, it is necessary to consider a flexible approach for adoption of analogous or estimated data, with its reasonableness carefully assessed in advance based on product characteristics.

It is desired that the emission factor database has reliable, universal, widely coverable, and most updated possible data. To this end, it is necessary to make effective use of the existing LCA databases arranged by the Government. When setting up this emission factor database, it is necessary to make such a design that would allow both operational convenience and company information secrecy.

4.3.2 Allocation

In the process where products in two or more categories are flowing while being in stages of production and distribution/selling, organizations shall allocate the emission of an individual product from the total emissions.

Allocation method is to be established when preparing PCRs according to a product and process characteristic.

NOTE: In LCA, allocation is often taken in terms of weight ratio. In case where there is a

mixture of lightweight high added-value products flowing in the same process, such as a precious metals or the like, it might well be considered reasonable to allocate emissions in monetary value ratio. In some cases, such as factory lighting and the like, moreover, it could be considered reasonable to allocate emissions on the basis of a floor area for the production line of each product.

In distribution/selling stages, an immense number of product categories and items are being handled simultaneously in a store and in a warehouse. An allocation of their emissions, therefore, would be naturally complicated. It may be considered possible, therefore, to use a monetary value ratio (sales ratio) for an allocation of emissions rather than a weight or area ratio. Deliveries and sales, however, have their emissions vary in a great measure, depending upon their thermal conditions, such as room temperature, refrigeration, freezing, etc. In such a case, emissions should be calculated separately.

4.3.3 Cut-off Criteria

To determine the material composition of a certain product, it would be necessary to weigh the mass for as many as a few ten thousands of component parts and to identify their materials. In such a case, the organization concerned would bear an excessively large burden. To calculate emissions on an LCA basis, therefore, an agreement should be properly reached to the effect that those which may be less than a certain standard level (emission ratio, weight ratio, etc.) for all the parts and materials may be omitted from the calculation coverage, considering that they do not have a significant impact on a result of calculating GHG emissions as a whole (Cut-off Criteria).

NOTE: A cut-off criteria is to be established in PCRs, with fair discussions taken into consideration. This calls upon a mechanism to be established so that any parts and/or materials to be cut off cannot be purposefully selected by organizations to indicate lower emissions.

4.3.4 Criterion relating to Acquisition from two or more Suppliers

Where organizations collect primary data of a specific raw material procured from two or more suppliers, the data should be collected from all the suppliers. Where it is difficult to do so, however, the primary data collected from a principal supplier may be used as another supplier’s secondary data subject to some criteria.

4.4 Product Category Rules (PCR)

To draw up PCRs, it is necessary to go through a series of fair proceedings while being

participated by organizations and industry circles, etc. that try to label CFP. It is necessary, furthermore, to secure fairness and transparency of PCRs, which should be open to the public on Internet, etc. once drawn up.

NOTE: To secure PCRs' fairness and transparency, it is necessary to establish principles and procedures to draw up PCRs, which should be a concept common to all PCRs.

In order to prevent different PCRs from standing together in a disorderly way covering an identical category, it is necessary to study the mechanism that permits PCRs once drawn up to be controlled under a certain public involvement. In this case, it is necessary to study the mechanism capable of securing the international harmonization.

PCRs once drawn up, however, should not be unchanging but needs to be constantly reviewed and improved subsequently from a view point of calculation accuracy, simplicity and so on.

Table 2 Images by Item as Described in PCRs

Major Item (example)	Minor Item (example)
Applicable product definition	Product type and Calculation coverage (life cycle stages and system boundaries)
Each life cycle stage setting	Data items collected in each stage, Allocation method, Cut-off criteria, Disposal/recycling principles (scenario setting) , etc.
LCA computation	Emission factor for calculation, etc.
Labeling	Labeling location, size, additionally indicated items, etc.

4.5 Calculations in Each Stage

4.5.1 Raw Material Acquisition Stage

In the raw material acquisition stage, recycled and reused products may be effectively utilized as a raw material while used products may be recycled in the disposal/recycling stages. GHG is emitted in a series of those recycling processes to collect and regenerate used products. It should be considered that up to which process should such GHG be calculated in the raw material acquisition stage and from what process should it be calculated in the disposal/recycling stages. PCRs should individually define each calculation coverage while taking into account product characteristics and recycling processes so that

any emissions may not be doubly reckoned in the calculation coverage.

In this case, there should be an incentive to procure recycled raw materials (that is, using a recycled raw material would lead to a decrease in GHG emissions), and recycling used products is also an incentive by itself (putting a used product onto an appropriate recycling route would allow for a decrease in GHG emissions as compared with the disposal by incineration or reclamation.) Therefore, PCRs should be designed to realize such incentives.

NOTE: A calculation, moreover, should include those GHG emissions, which may have varied with a change in the facility/land use, including an increase in the GHG emissions, coupled with a new factory construction, etc. In preparation for a temporal increase in a calculation of GHG emissions especially following the construction of a new production facility, however, it is necessary to normalize the GHG emissions by adopting a calculation method similar to the depreciation system in tax accounting, as an example.

4.5.2 Production Stage

Where private power generation is applied in a production stage, the calculation of GHG emissions of input electricity should not be made in the emission factor applicable to power rates commercially available in general but it should employ another emission factor applicable to the private power generation as calculated in accordance with “Act on Promotion of Global Warming Countermeasures”.

NOTE: To collect production equipment-related information, there are some cases where the sections involved in direct production (direct section) only may have difficulties in being cut out of the related indirect sections, such as an office, R&D section, etc. if they exist at the same site. With such a case taken into consideration, therefore, it is necessary to review whether or not an indirect section should be included in a range of data to be collected.

4.5.3 Distribution/Selling Stages

Some products may have GHG emissions vary in a great measure with a shop or a mode of selling (Examples: canned juice selling between automatic vending machines and over the counter, between refrigeration and normal temperature in an identical shop, etc.). Calculating such varied emissions respectively would be too cumbersome and costly for organizations to label by type of distribution routing or by mode of selling. In such a case, a certain scenario may be also set up.

NOTE: As far as the distribution stage is concerned, however, a value actually measured should be taken in case where a route from a production site to a primary distribution base

could be identified or in case of the transport that has large GHG emissions, such as ocean or air freight. As far as the selling stage is concerned, a scenario, if set up, should be studied by envisaging that it may furnish consumers with appropriate information to allow for a proper selection according to the purpose of the CFP System.

To set up a scenario, meanwhile, the organizations involved in such product should be let to join fair and impartial discussions. In addition, it is necessary to allow for a review of the scenario, such as an expansion or contraction of the calculation coverage.

4.5.4 Use/Maintenance Control Stages

GHG emissions in the use/maintenance control stages may be assumed to fall in a variety of cases widely different from user to user similarly to the distribution/selling stages. When preparing PCRs, therefore, the most standard scenario should be set up to calculate the GHG emitted in these stages.

NOTE: In setting up a standard scenario in PCRs, it will be a challenge to set calculation coverage, which should be included as a CFP out of its use. The electricity consumed by a lighting lamp bulb, for example, is considered to be totally measured as the bulb's CFP. Nevertheless, it is expected to raise a question, "To calculate the consumptions of water and electricity for laundry, which should be reckoned for a CFP in a range of measurements, washing machine or detergent (or both should be reckoned, both should not, etc.)?

To set up a scenario, therefore, the organizations involved in such product should be let to join fair and impartial discussions. In addition, it is necessary to allow for a review of the scenario, such as an expansion or contraction of the calculation coverage.

4.5.5 Disposal/Recycling Stages

No consideration is taken into for those CO2 emissions, which are emitted upon combustion of the biomass of wood or the like in the disposal/recycling stages. This is because the biomass has fixed the CO2 in the atmosphere during its production (growth) and such CO2 is equivalent to that emitted upon combustion. (It is necessary, however, to add to the calculation those GHG emissions which are emitted, coupled with the activities that are input in biomass production, transport, etc.)

NOTE: Although wood is a circulating resource, however, its excessive consumption might well be predicted to raise a problem of precluding growth from catching up deforestation. With such a possible problem taken into consideration, the biomass combustion should be carefully handled in calculating the emissions. In this sense, some

restrictive conditions should be imposed on how to handle CO2 emissions from the biomass combustion. For example, if a disposed wooden material should be reused, the product should be marked to that effect and an exception of CO2 emissions from biomass combustion should be allowed by imposing a restrictive condition, such as to authorize the combustion of the biomass procured from planted/controlled woods only. To apply such a restrictive condition, it is necessary to give a consideration so that it may not be excessive enough to impair an expansion of biomass energy utilization.

5. Labeling Method of CFP

5.1 Basic Labeling Rules

5.1.1 Basic Conditions to Label CFP

Organizations who mark their products with CFP shall observe the following rules:

a) Mark each product with a value of the CO2-equivalents emissions throughout its life cycle per the product, in principle.

b) Unit of emissions shall be “g CO2-equivalents,” ”kg CO2-equivalents” and ”t CO2-equivalents.”

Actual markings, however, shall be “g (grams)”, ”kg (kilograms)” and ”t (tons).” It is necessary to describe fractions of a numerical value, with the effective number of digits in calculations taken into consideration.

c) Organizations who mark their products with CFP should strive to reduce GHG emissions continuously.

Products of an identical type shall be marked with CFP of the mean value, with consideration given to a difference from region to region (or between two or more production sites) and to a variation from season to season. This is intended to avoid an increase of new cost on subdivided markings of GHG emissions and confusion on the consumer.

NOTE: As a prerequisite for participation in the CFP System, continuous efforts are called upon to reduce GHG emissions. However, it should be that a specific numerical target is not to be given as a mandatory requirement. To declare a numerical target value, an additional and optional marking is authorized to apply so that organizations may convey their willingness to consumers. A further additional and optional marking to show the achievement of a target is to be considered. In addition, a study is to be also made about the mechanisms that would furnish organizations with an incentive to reduce GHG emissions.

Existing laws and regulations have already imposed a variety of mandatory marking obligations. Consumers have a remarkably high level of requirements for reliability of such

marking and marking space of products is limited. With these facts taken into account, utmost care needs to be taken in establishing the labeling rules.

For product labeling, use a common label as specified to operate the CFP System.

5.1.2 Contents of label

Carbon footprints are marked in the absolute value of CO2-equivalents emissions.

NOTE: To make labels more intelligible to consumers, it may be considered to jointly furnish the information to compare with another product and a standard valid in the industrial sector. In order that consumers may understand what is meant by CFP, enlightenment activities are to go on, such as some guidebooks, etc.

Organizations should put the detail information of CFP by life cycle stage open to the public, such as on Internet, etc.

5.1.3 Labeling Location, Size, etc.

Organizations shall label of CFP onto the body or packing material of a product in principle. For labeling other than on products, organizations can make a selection out of the means, such as website, leaflet, environmental report, price tag, over-the-counter, QR code and other ways that are to be studied.

NOTE: For labeling location and size, it is necessary to establish a certain rule from a viewpoint of compatibility between effectiveness of appealing to consumers and convenience of organizations. Respective standards may be established according to the product size (surface area or the like).

5.2 Selective / Optional Action

CFP should be labeled intelligibly to consumers, in principle. In some cases, however, a labeling deviated from the basic rules may allow for a more effective reduction of GHG emissions. In such a case, a study is to be made for the feasibility to authorize such a labeling exceptionally. Contents in such a label, however, should be limited to the information relating to GHG emissions only without marking any other information relating to the product's other functions, performance, features, etc. Specific cases envisaged and their principles are as referred to below.

5.2.1 Expression of Additional Information (reduction ratios, breakdown by process and by part)

From the viewpoint of properly advising consumers of the efforts made by organizations to reduce GHG emissions, organizations can mark a reduction ratio near the CFP labeling.

It is expected, moreover, if emissions by process and by part are “visualized”, every business entity may be effectively urged to make efforts to reduce GHG emissions. Therefore, organizations can mark a breakdown of such reduction by process or by part.

NOTE: Additional Expression Examples:

a) Reduction ratio to the conventional product,

b) Reduction ratio to the standard in the industrial sector,

c) Breakdown by process (calculation stage)/by part

d) Markings relating to usage (a supplementation saying, “Use this product in such a way and it will reduce GHG emissions more than the indicated CFP, or the like.”)

e) Markings relating to the recycle of containers (a supplementation saying, “This container once 100% recycled would reduce GHG emissions more than the indicated CFP, in order to promote recycling used containers, etc.) and

f) CO2-equivalents emissions per cycle of use.

5.2.2 Writing down Life (number of service years) Estimated in Durable Consumer Goods

In the case of a household electric appliance emitting a large volume of GHG emissions in use, it may be envisaged that an indication of GHG emissions per product throughout the life cycle would not always reflect the effort to reduce GHG emissions effectively.

As far as durable consumer goods are concerned, therefore, their estimated service life (estimated number of service years) is marked in addition to the GHG emissions throughout the life cycle.

On an as-required basis, the emissions per unit consumption (ex: “CO2 equivalent emissions per year consumption”) are authorized to be additionally marked.

NOTE: A bulb-shaped fluorescent lamp, for example, is not always advantageous to a candescent bulb when comparing their GHG emissions per product because the former has a longer life than the latter. In addition, an attempt to prolong the service life might raise a problem of increasing GHG emissions per product, to the contrary.

5.2.3 Expression of Regional Difference, Seasonal Variation and Supplier Difference

Where a reduction of GHG emissions may be expected by CFP by regional and seasonal aspect, regional and seasonal difference should be authorized to be indicated

comprehensibly. It is necessary to consider that primary productions, such as perishables, etc., have input materials and GHGs emissions/absorptions vary in a great measure according to weather conditions, etc., that there are a large number of items plus their diversification owing to their farm-operating architecture owing to regional characteristics, etc., and that the data necessary to “Visualization” have resorted to the agricultural logs made by individual farmers.

Even if product should be of identical type or produced at an identical base, moreover, an identical raw material may be procured from two or more different suppliers and their respective, CO2 emissions may differ from one supplier to another. In such a case, it is necessary to discriminate the final products by supplier so that different CFP may be labeled separately. Labels should be expected to promote the reduction of CO2 emissions by suppliers, with suppliers’ efforts directly “visualized”.