

“Visualization of CO2” as considered by the Japanese Electronics Industry

with examples of refrigerators & notebook computers

**Coordinating Committee on Environment
- Electric and Electronic Industry Associations of Japan
(JEITA / JEMA / JBMIA / CIAJ)**

Main trends in Life Cycle Assessment in Japan

	ISO/TC 207	Japan	JEITA/JEMA/JBMIA/CIAJ
1993	Begins to consider standards for LCA		
1994			
1995		Establishes Life Cycle Assessment Society of Japan (JLCA)	
1996			Case study on refrigerators
1997	ISO 14040	JLCA proposes national LCA Project	
1998	ISO 14041	Start of 5-year LCA Project	Supply of LCI data to LCA project Computers TVs Refrigerators Copiers Mobile phones
1999			
2000	ISO 14042, ISO 14043		
2001		"Ecoleaf" tried	
2002		"Ecoleaf" launched	
2003			Registration of following products for "Ecoleaf" system Computers Copiers Printers Telephones PBX Projectors, etc. (various products)
2004		Start of 2 nd cycle of LCA Project (3 years)	
2005			
2006	ISO 14040, ISO 14044		
2007		Start of 3 rd cycle of LCA Project (3 years)	
2008			
2009	Begins to consider standards for CFP	Start of CFP system trial project	
2010			

The Aim of CFP (Carbon Footprint of Products)

To take a step towards reducing CO2 emissions through making consumers aware of the CO2 emissions involved in purchasing, using and disposing of a product.

- Enable consumers to access reliable data regarding CO2 emissions in the products and services they choose. This information will raise consumer awareness of CO2, and become the first step to reducing emissions. Consumers will purchase products based on a consideration of the CO2 they emit, and the information will therefore lead to lower-carbon consumption, disposal and recycling.

To ensure manufacturers understand the focusing points of reducing CO2 emissions, and make further CO2 emissions reductions possible

- Through calculating the carbon footprint of their products, manufacturers can identify processes with high CO2 emissions and areas of inefficiency, making efficient CO2 emissions reductions possible. It is anticipated that there will be additional effects of encouraging manufacturers to work towards reductions in order to display lower carbon footprint labels on their products.

Inevitable elements of visualizing CO2 for electric and electronic products

Required conditions for “Visualizing CO2” in order to contribute to effectively reduced CO2 emissions and the realization of a low-carbon society are;

Display that facilitates substantive reductions of greenhouse gases (GHG)

- Products that emit a significant proportion of life cycle GHGs during use should display information regarding GHG emissions quantities during use, so that consumers are aware of this.
- Huge quantities of data (including data from suppliers) are required to understand the entire life cycle for any product where a comparatively large proportion of its life cycle GHGs are emitted during the materials & manufacturing processes

System that needs to be integrated in consistent with existing systems, in order to avoid market and consumer confusion

- Energy-saving “Top Runner” system (**refrigerators, computers**, etc.)
- Unified energy saving labels (**refrigerators**, TVs, toilet seats, etc.)
- Eco-points systems* (**refrigerators**, air conditioning units, digital TVs) *Time-limited systems

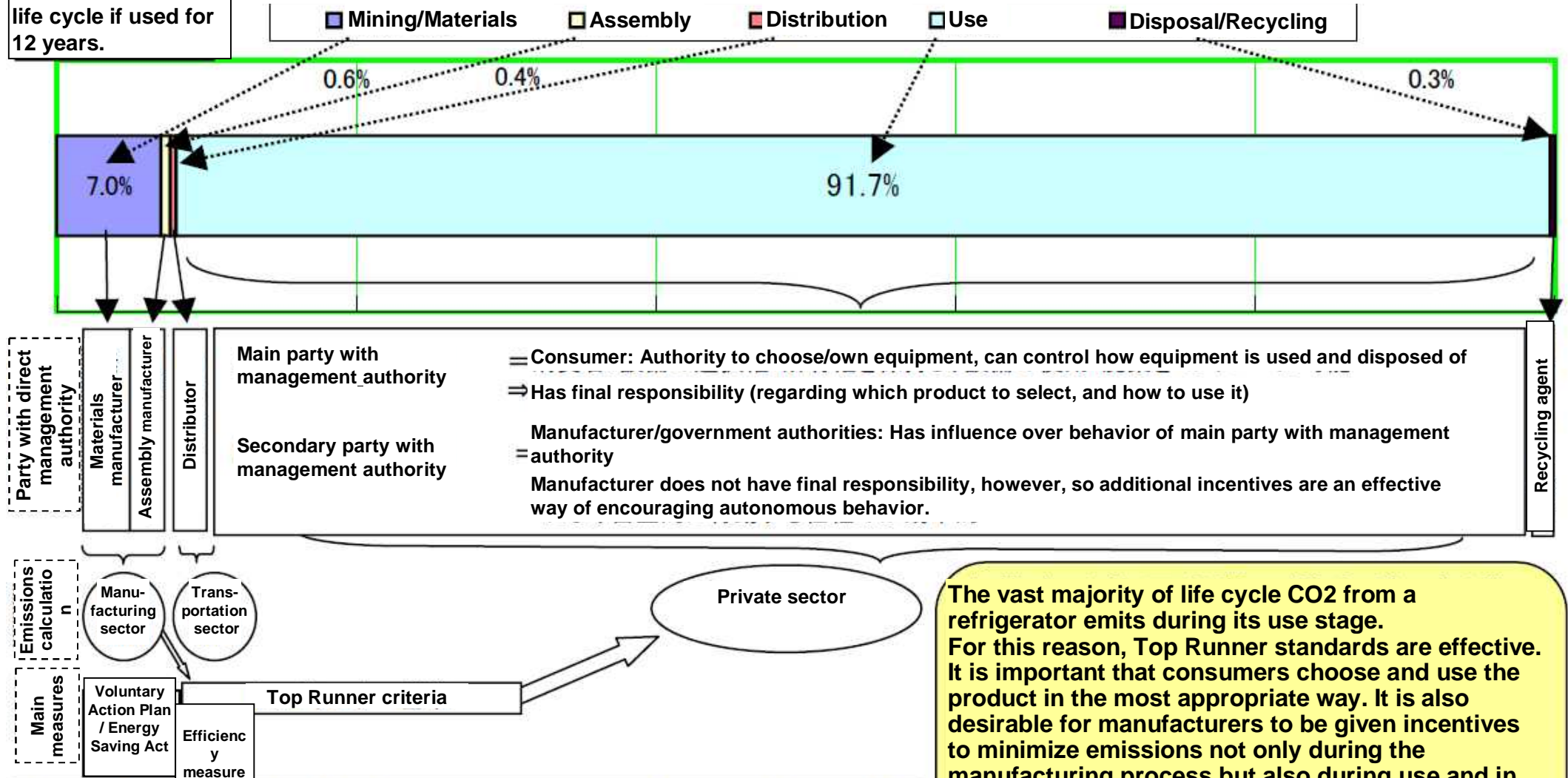
System that needs to be integrated in consistent with international energy-efficiency labeling systems for global products

- Many countries have implemented an energy-efficiency labeling system, such as the European ‘Ecodesign’ directive, USA ‘Energy Star,’ Chinese & Korean systems, etc.
- International comparisons are impossible unless energy measurement standards and calculation methods are globally unified. There is a need for international standards.

-1 90% of life cycle CO2 from a refrigerator emits while it is being used

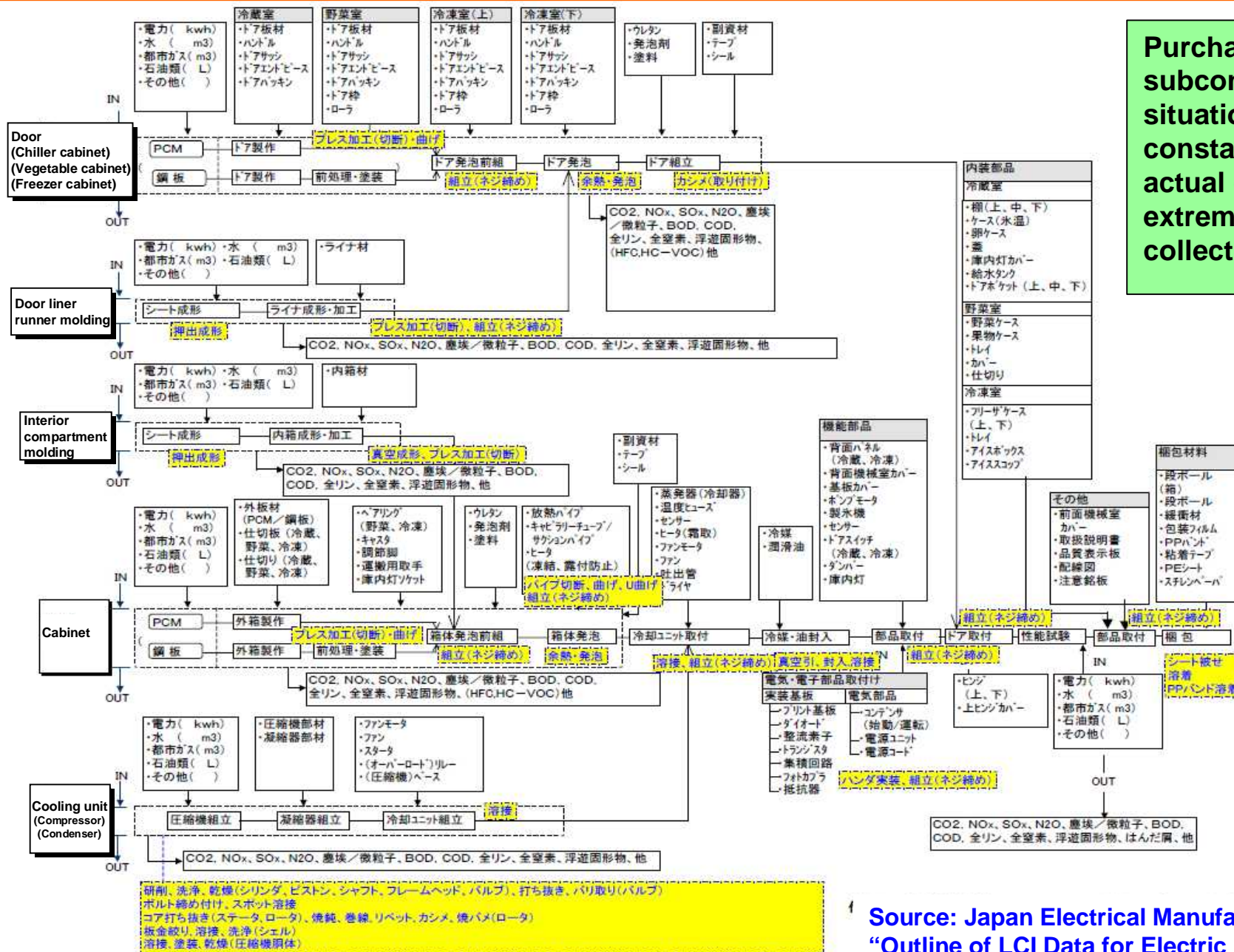
A 400L refrigerator will emit around 3 tons of CO2 over its life cycle if used for 12 years.

Diagram 1: Emission ratios of CO2 from the life cycle of a refrigerator, and the structure of those emissions.



Sources: METI Environmental Industries Office "The Current Status and Future Direction of LCA Projects", Data from 20th June 2003 Report from the LCA 5-Year Project, etc. Materials produced by Development Bank of Japan

-2 Huge number of input/output categories during refrigerator manufacturing



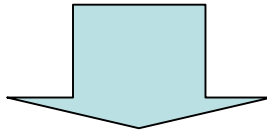
Purchasing and subcontracting situations are constantly changing, so actual data are extremely difficult to collect and evaluate

**Source: Japan Electrical Manufacturers' Association
"Outline of LCI Data for Electric Refrigerators" (30th
January 2003)**

-3 Lessons learned from participation in the Refrigerator LCA Project

There are limits to the extent to which inventory data can be acquired for upstream electric / electronic components (due to international purchasing of such components, etc.)

In line with the shift to overseas production, it has become more difficult to collect and evaluate data that reflects the true status of product manufacturing.



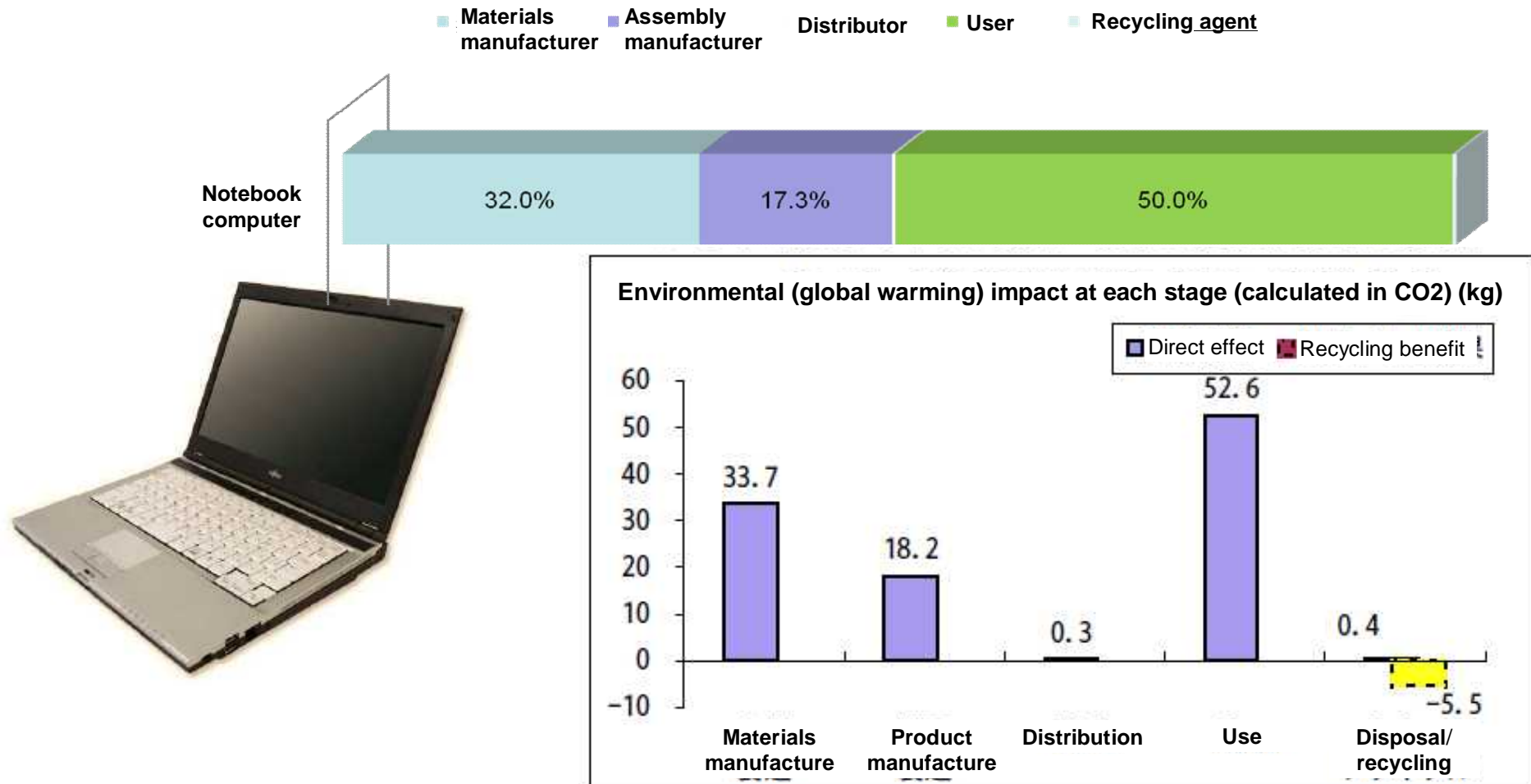
In the case of refrigerators, the collation of data that relates to a mere 10% of lifecycle is an extremely expensive process in terms of both time and money.

For consumers, the most valuable information is that relating to annual CO₂ emissions calculated from annual energy consumption. This, however, requires consistent CO₂ emissions coefficients.

-4 Characteristics of life cycle CO2 emissions of notebook computers

In contrast to refrigerators, around half of the life cycle CO2 emissions of notebook computers are emitted in their use stage. The other half is emitted during the materials & manufacturing process.

→ Emissions during materials & manufacturing processes therefore should be closely examined for notebook computers.



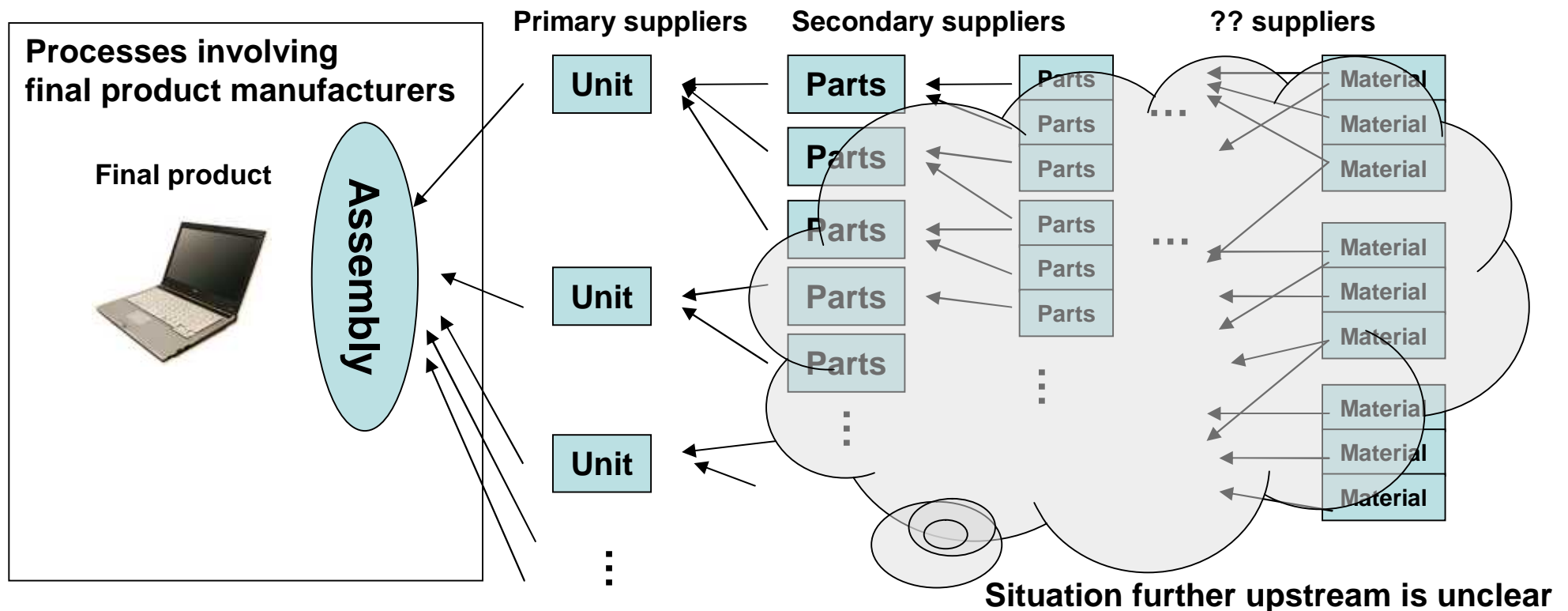
Source: The 'Ecoleaf' type III environmental labelling program, ID BJ-07-064 (27. Sep. 2007)

-5 The complexity of supply chains for component parts/materials

Establishing the full quantity of greenhouse gas emissions involved in the entire supply chain

requires an extremely significant expenditure of time and money, in order to collect data from materials and processing stages

A notebook computer comprises around 2,000 component parts, which are supplied by around 100 primary suppliers.



In addition to final assembly, primary data for the printed circuit board and LCD panel, etc. are needed. It is difficult, however, in reality, for most final product manufacturers to collect primary data for anything other than their own final assembly processes.

-6 Practical methods for “Visualizing CO2” in regard to notebook computers

A much wider range of companies – from materials manufacturers to final assembly manufacturers - need to participate in order for consumers to be able to select a product by referring to its CO2 emissions quantity.

In order to promote more widespread participation by businesses, [...] it is thought that it will be necessary to create a structure that facilitates diverse approaches depending on each industry, product or service's characteristics. For example, depending on the product in question, [...] there can be a huge difference in the level of difficulty involved in calculating emissions. These characteristics must be given due consideration.

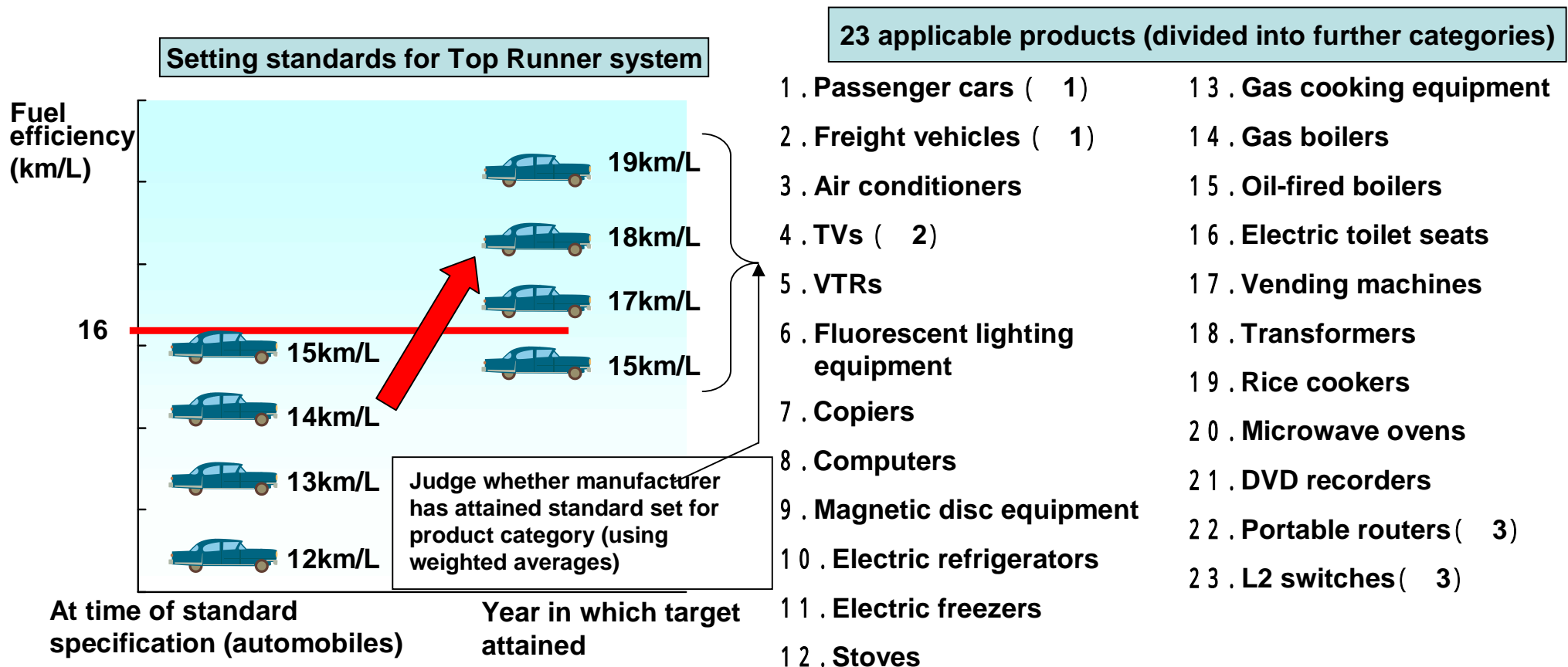
Taken from “Guidelines for establishing a CFP System in Japan”

- **Need for PCR that facilitates involvement of wide range of companies**
Existing PCR should be used as reference, but simple rules are required that meet the requirements of the situation, based on the characteristics of notebook computers (supply chain complexity, the fact that many companies use the same parts).
- **Need for economically rationalized inventory data collection and verification**
Burden of cost should reflect purpose of reference.
Overemphasis on need for accuracy leads to increased costs and becomes a barrier to “visualization.”
- **Need for internationally standardized LCA (CO2e emission) databases for parts and units**
Parts for which primary data collection is difficult should have LCA (CO2e emission) database for each part/unit. This is the most realistic method for calculating CO2 emissions.
Need for LCA (CO2e emission) databases that can handle parts and materials supplied from various international locations.

-1 The Top Runner system – introduced in 1999

Under the Top Runner system;

the standards that specify a level equivalent to the most efficient product currently on the market, or superior to it, apply to the target products.



1: Vehicles weighing over 3.5 tons (buses, trucks) were added to regulations in April 2006

2: LCD TVs and plasma TVs were added to regulations in April 2006

3: Portable routers and L2 switches were added to regulations in July 2009

-2 Market-established information provision systems regarding energy-efficiency performance

Energy-saving labeling (from August 2000)



Mark indicating
product meets criteria
(100% or more)



Mark indicating
product does not meet
criteria
(Less than 100%)

Information supplied in catalogs, etc., relating to “Energy-saving mark”, “Energy-saving standard attainment”, “Energy consumption” and “Target year”, based on JIS C 9901 (“Method of calculation and representation of energy efficiency standard achievement”), enables consumers to compare energy-saving performance when selecting a product

Applicable to 16 products:

Air conditioners, refrigerators, freezers, TVs, electronic calculators, microwave ovens, etc.

Unified energy-saving labeling (from October 2006)



Unified energy-saving
label

(For refrigerator)

Multi-level evaluation

Energy-saving label
(Energy-saving
labeling system)

Target annual
electricity charge

Retail businesses display a “unified energy-saving label” either on or near the product on display, including information on multi-level evaluation, energy-saving labels and the target annual electricity charge for the product.

Manufacturers register their data on the Energy Conservation Center Japan website, as a means of supplying it to retail businesses.

Applicable to 4 products:

Air conditioning units, refrigerators, TVs, and electric toilet seats

Added May 2009

Energy-efficiency performance labeling systems utilized worldwide

EU



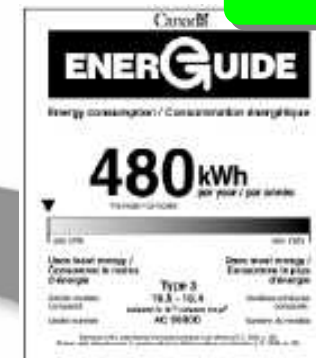
China



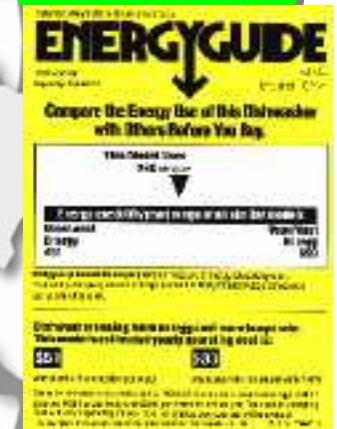
Korea



Canada



America



India



Hong Kong



Japan



Australia



Brazil



- Similar marks, but different standards
- All countries' indicators based on electricity consumption

“Visualization of CO2” as considered by the Japanese Electronics Industry

To contribute to the realization of a low-carbon society, an accurate scientific approach, and at the same time a rationalized method for the “visualization” of CO2 is necessary.

Effective “visualization” takes into account the characteristics of the product

For products such as refrigerators, where the majority of GHGs are emitted during use, it is sufficient to calculate CO2 emissions based on electricity consumption.

For products such as notebook computers, where a relatively large proportion of GHGs are emitted during the materials and manufacturing processes, and supply chains are extremely complex, it is important to establish rational rules.

Need a realistic introduction scenario that places importance on communication with consumers

For products where most CO2 is emitted during use, the implementation of a Top Runner system, preferably as an extension of the relatively well-known “Unified Energy-Saving Label” system, is most desirable in domestic areas.

There would also appear to be value in debating the development of a simplified mark or level display, in consideration of the systems and data organization situations in other countries.

Anticipate increased simplification and flexibility of international standards

In order to facilitate meaningful discussions with markets in other countries, and utilize the characteristics of each product, international standards must maintain flexibility.

International standards should be simple and clear to allow businesses worldwide to respond to them. If international consistency can be achieved, consumers in each country will be able to select products with lower CO2 emissions, contributing to reduced global CO2 emissions.