

# Consideration for the Environment in Product Development

## Examples of Green Products

### A high-performance, elegant, slim credit card size digital camera [EXILIM CARD EX-S500]

This is a digital camera that realized a slim credit card-size body with the use of a new slim 3X optical zoom lens and the high-density packaging technology. Thanks to low power consumption, it has an extended battery life, enabling approximately 200 still pictures and 1 hour and 20 minutes of video time. The signal process technology called "Anti-Shake DSP" used in the EXILIM engine enables high sensitivity shots, and the fast shutter speed reduces blurring from

hand motions and movements of the objects when still pictures are being taken.

#### [Green Product Technology Points]

- "EXILIM Engine," a proprietary ultra-compact image processing module that achieves energy saving and a size reduction, is installed.
- A metal (SUS316) that is easily recyclable is used for the outer case.
- No cadmium, mercury or hexavalent chromium is used in the product.
- No polyvinyl chloride (PVC) is used in the packaging materials.



EXILIM CARD EX-S500 Digital Camera

### A digital camera that saves energy and resources [EXILIM ZOOM EX-Z57]

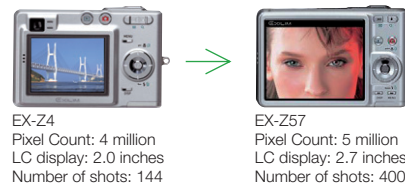
Using the latest semiconductor process and large capacity batteries, as well as a low voltage driver system, this camera has a high-resolution 5 megapixel CCD, in addition to a 3X optical zoom lens and a large 2.7-inch display. Nonetheless, it has a longer life than the previous 2.0-inch model (EX-Z4), and can take approximately 400 shots on a single battery charge. (EX-Z4 takes 144 shots.) (The battery life is about 2.7 times longer.)

#### [Green Product Technology Points]

- An easily recyclable metal (aluminum) is used for the outer case.
- No cadmium, mercury or hexavalent chromium is used in the product.
- The volume of the package box is reduced by 51% (compared with Casio's QV-4000).
- No polyvinyl chloride (PVC) is used in the packaging materials.



EXILIM Zoom EX-Z57 Digital Camera



EX-Z4  
Pixel Count: 4 million  
LC display: 2.0 inches  
Number of shots: 144

EX-Z57  
Pixel Count: 5 million  
LC display: 2.7 inches  
Number of shots: 400

### Electronics dictionaries made with easily recyclable materials [EX-word Series]

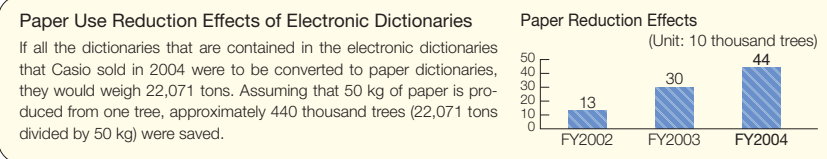
Super-high resolution liquid crystal (HVGA) enables the industry's first 480 x 320 dot display, replacing the 320 x 240 dot display used in the company's earlier electronic dictionary models. Even small letters and Chinese characters with numerous strokes are displayed beautifully and smoothly. A variety of user-friendly features are added, including TAFCOOT, a strengthening design that softens the shock of an accidental drop.

#### [Green Product Technology Points]

- An easily recyclable metal (aluminum) is used for the outer case.
- No cadmium, mercury or hexavalent chromium is used in the product.
- No polyvinyl chloride (PVC) is used in the packaging materials.



Ex-word Series of Electronic Dictionaries



### Electronic musical instrument contributes to energy and resource savings [Privia PX-100]

Casio performed a computer-assisted strength analysis and built a resin-made body structure that combines a wood cabinet, a keyboard unit and a metal reinforcement board into a single unit, the very first in the industry. The company succeeded in an approximately 40% weight reduction and an approximately 20% reduction in depth in comparison with its conventional models. Capitalizing on the company's high-density packaging technology, the sound source board was also reduced in size at the same time. In comparison to previous models, the LSI count

was slashed by 50% and the board area was cut by 17%. With these improvements, Privia provided the basis for greening of future electronic pianos.

#### [Green Product Technology Points]

- An approximately 40% reduction in weight.
- An approximately 20% reduction in depth.
- A 50% reduction in the LSI count.
- A 17% reduction in the board area.
- \* In comparison with Casio's PS20.
- No cadmium, mercury or hexavalent chromium is used in the product.
- No polyvinyl chloride (PVC) is used in the packaging materials.



Privia PX-100 Electronic Musical Instrument

## Examples of Green Products

### A Solar-powered, radio-controlled watch with lower power use and smaller size [Oceanus]

Casio has worked on reducing the size of internal antenna and its power consumption, as well as performance improvement of solar recharge systems, since it adopted the technology to correct time by receiving standard radio waves through an antenna in its wristwatches. For Oceanus, a system that improves the efficiency of radio reception was developed and adopted, together with a reduction in the size of an antenna. In addition, low power consumption was realized with the use of a low power consuming

motor and the SOI (rapid process low voltage transistor) technology. Together with a solar battery, the technology gives Oceanus a long life.

#### [Green Product Technology Points]

- Power consumption is reduced with the development of a low power consumption motor.
- An easily recyclable metal (SUS) is used for the outer case.
- No cadmium, mercury or hexavalent chromium is used in the product.
- No polyvinyl chloride (PVC) is used in the packaging materials.



Oceanus Watch

### Compact, lightweight and energy efficient cell phone A5512CA

The compact body of approximately 89 cc holds a 1.28-megapixel camera. Shots of up to the SXGA size (1280 x 960 dot) are possible. Sub liquid crystal display comes loaded with a practical and fun watch. The screen is designed to display FLASH animation, using FLASH Lite.

#### [Green Product Technology Points]

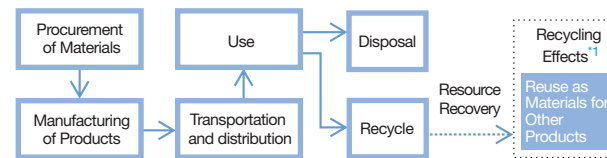
- This cell phone was developed under the concept of a compact, lightweight and energy efficient. Semiconductors, which were conventionally packaged on a board, are integrated into on system LSI. By making parts' pad pitch narrow, the board was made smaller and the number of parts was reduced by 13%.

	A5406CA (2004 Model)	A5512CA (2005 Model)	Comparison with A5406CA
Size (when folded)	Approximately 51 (width) x 102 (height) x 28 mm (depth)	Approximately 49 (width) x 94 (height) x 25 mm (depth)	A 21% reduction in volume
Weight (including batteries)	Approximately 125 g	Approximately 105 g	A 16% reduction
Battery life	Continuous stand-by: Approximately 200 hours (when folded)	Continuous stand-by: Approximately 270 hours (when folded)	A 35% increase
	Continuous talk: Approximately 160 minutes	Continuous talk: Approximately 180 minutes	A 12% increase

## Evaluation of Casio Green Products (Cellular Phones) by the LCA

Casio Green Products A5406CA (2004 model) and A5512CA (2005 model) were evaluated, using Casio's LCA standards.

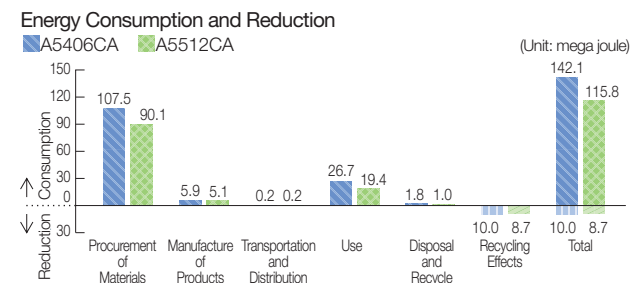
### [Life Cycle Stages Assessed]



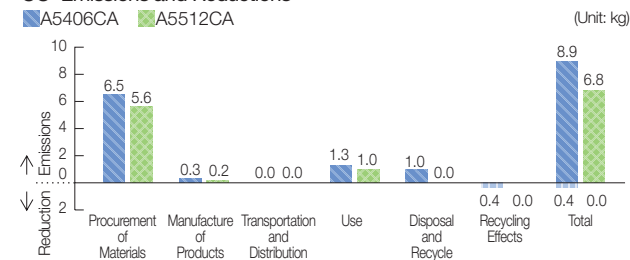
Assumption for LCA Calculations: Products are used for five years.

### [LCA Evaluation Results]

Inventory Analysis<sup>2</sup> (per unit of product)



### CO<sub>2</sub> Emissions and Reductions



### [Conclusions]

#### 1. Comparison at the material procurement stage

The environmental impact of A5512CA (2005 model) is smaller than that of A5406CA (2004 model) in terms of both relative energy consumption and CO<sub>2</sub> emissions. This is the result of a reduction in the number of parts used in A5512CA and its weight reduction, which manifested themselves in the LCA evaluation.

#### 2. Comparison at the use stage

At the use stage, the environmental impact of A5512CA (2005 model) is smaller than that of A5406CA (2004 model) in terms of both relative energy consumption and CO<sub>2</sub> emissions. This is the result of reduced power consumption and the extended battery life of A5512CA, which manifested themselves in the LCA evaluation.

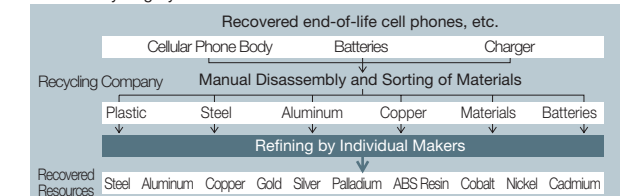
#### 3. Comparison of Recycling Effects

The recycling effects of A5406CA are greater than those of A5512CA in terms of both energy reductions and CO<sub>2</sub> reductions. This indicates the high content of recyclable materials in A5406CA, which raises its likelihood of post-disposal use as materials for other products.

#### \*1 Recycling Effects

When a product is reused for materials (recycled materials) for other products after the recycling stage, the materials are assumed to be used in the material procurement stage of the other products for computation purposes. In this example, the recycling rate of 100% was assumed with respect to recovery and recycling, based on the recycling system of KDDI Corporation to whom the end-of-life products were sold.

#### KDDI's Recycling System



#### \*2 Inventory Analysis

Creating a list of the environmental impact input (energy, raw materials, parts, etc.) and the environmental impact output (CO<sub>2</sub>, waste, etc.) at every stage that are quantified. This enables quantification of environmental input and output.