

Environmental Efficiency of Hitachi Products Based on Factor X

Toward the Creation of a Recycle-oriented Society

We help customers improve lifestyle value
through our eco-friendly products.
The key to our success is the Factor X.



Hitachi Group

April 2007

“Factor X” in Relation to Our Lifestyles

In our world today, about 80% of the world’s resources and energy are consumed so that people in about 20% of the world’s countries can lead lives of abundance.

Therefore, we now need to rethink our co-existence with the global environment as we strive for greater comfort in our lives.

It is imperative that we make increases and decreases where necessary to improve our quality of life and at the same time pose less of a burden on our environment. A new affluence will result from our efforts to do this.

The Hitachi Group’s Factor X means making products that offer added convenience in a way that is more eco-friendly.



Factor X =

The numerator in the Factor X equation represents quality of life. The larger it is, the larger the resulting value of Factor X. The denominator of the equation represents environmental impact. A smaller value for environmental impact contributes to a larger Factor X index value.

Factor X provides a measure of how much to enhance quality of life in relation to how much environmental impact should be reduced.

Quality of life in regard to Factor X refers to product enhancements that offer ease of use and security and provide features for added convenience and comfort. Environmental impact in regard to Factor X is assessed in terms of three aspects of environmental impact; (1) global warming, (2) resources, and (3) specified chemical substances. These three aspects are explained in more detail on the following page.



Enhanced comfort and convenience

More safety and security

Universal design

For example, we can do this by:

- Providing products that are easier to use
- Offering brighter and more beautiful images

Improved quality of life

UP



Reduced environmental impact

DOWN



Global warming prevention

Conservation of resources

Less use of chemical substances

For example, we can do this by:

- Conserving energy, and moreover, reducing and discontinuing use of certain chemical substances
- Recycling and limiting the quantity of natural resources we use



What is Factor X^{*1} ?

Increasing comfort, convenience, safety → **Improved quality of life**
Making products in a way that is more environmentally friendly → **Reduced environmental impact**
= **Factor X**

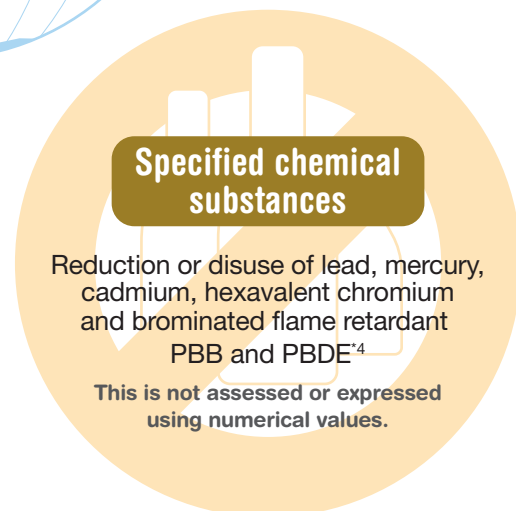
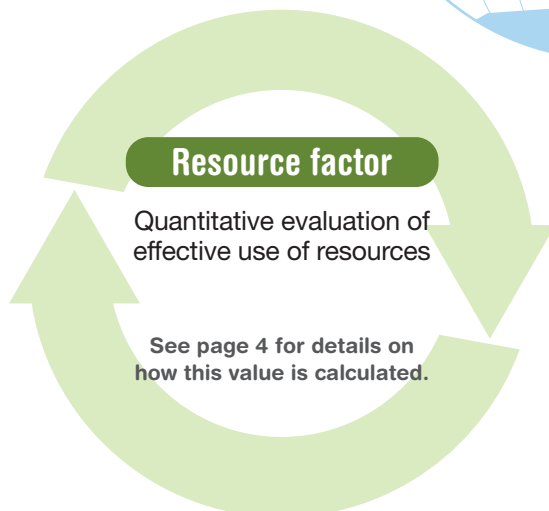
We strive to achieve a “new affluence” to improve quality of life through products that are easy to use, safe, and convenient, and at the same time, are manufactured in a way that is environmentally friendly.

Factor X is an index that enables us to consider products in terms of both of these aspects, quality of life^{*2} improvements and environmental impact, over the entire product life cycle.

The larger the value of the Factor X index, the more the "new affluence" is achieved.

Environmental impact is assessed from three aspects

The new affluence as viewed from Factor X incorporates three aspects of environmental impact.



*1, *2, *3, *4 See page 5 for an explanation of these terms.

How are the two environmental factors calculated?

Factor of global warming prevention

First, calculate the efficiency of global warming prevention in the following formula.

$$\text{Efficiency of global warming prevention} = \frac{\text{Product life span} \times \text{Product function}}{\text{Amount of greenhouse gas emission through the life cycle of product}}$$

Product life span

- Design for longer operating life and ease of maintenance and upgrade
- Technology development for function or performance improvement

Product function

- Design for longer operating life and ease of maintenance and upgrade
- Technology development for function or performance improvement

Amount of greenhouse gas emission through the life cycle of product

- Products designed to save energy during operation
- Products designed to require fewer manufacturing processes and less energy
- Products designed to enable mass distribution (product downsizing)
- Product parts and materials selected that emit less gas which leads to global warming over the entire product life cycle



Next, compare this with the existing base product.

$$\text{Factor of global warming prevention} = \frac{\text{Efficiency of global warming prevention for product being evaluated}}{\text{Efficiency of global warming prevention for reference product}}$$

The greater the numerical value of the factor of global warming prevention, the greater the Factor X value which helps achieve a new affluence.

Resource factor

First, calculate the resource efficiency of the new product.

$$\text{Resource efficiency} = \frac{\text{Product life span} \times \text{Product function}}{\sum \text{Each resource value coefficient}^*5 \times \text{Amount of resources used throughout the product's life cycle}^*6}$$

Product life span

- Design for longer operating life and ease of maintenance and upgrade
- Technology development for function or performance improvement.

Product function

- Design for longer operating life and ease of maintenance and upgrade
- Technology development for function or performance improvement.

Each resource value coefficient^{*5}

(Amount of new resources to be used + Amount of resources to be disposed)

||

Amount of resources used - amount of resources reused and recycled

- Compact and lightweight
- Reduction of materials for production
- Use of reused and recycled parts and materials

Amount of resources used throughout the product's life cycle^{*6}

||

Amount of resources used - amount of resources that are reusable and recyclable

- Products designed for easy disassembly
- Products designed for easy material's separation
- Use of parts and materials that can be reused or recycled
- Reduction of material types



Next, compare this value with the existing base products.



$$\text{Resource factor} = \frac{\text{Resource efficiency for product being evaluated}}{\text{Resource efficiency for reference product}}$$

The greater the numeric value of the resource factor, the greater the Factor X value which helps achieve a new affluence.

*5, *6 See page 5 for an explanation of these terms.

An explanation of terminology related to Factor X

*1: Factor X

In 1991, Dr. Friedrich Schmidt-Bleek of the Wuppertal Institute in Germany advocated that the idea that "In order to realize a sustainable economic society, over the next 50 years it will be necessary to increase the resource productivity rate (material input per unit service) of developed countries by a factor of 10," otherwise known as "Factor 10."¹⁾ In the future, this idea needs to be introduced under the argument for "future directionality towards industrial activity that will build a sustainable economic society" as indicated in Japan's 1999 Environmental White Paper²⁾, and must be proactively adopted by corporations. Furthermore, at the Conference on the Creation of "Wa-no-kuni" "An Eco-society Through Partnership" in the 21st Century convened by the Prime Minister Office, the opinion was put forward that "rapid improvement of environmental efficiency is necessary, and should be improved by at least a factor of ten, that is to say, we should aim for the achievement of Factor 10."³⁾

Source: 1) Factor 10 (for realizing a revolution in eco-efficiency); written by F. Schmidt-Bleek
 2) Environmental White Paper (an outline); published by the Ministry for the Environment (1999)
 3) Report on the Conference on the Creation of "Wa-no-kuni" "An Eco-society Through Partnership" in the 21st Century (July 2001)

*2: Life cycle

Each product process (material procurement, product manufacture and product usage and disposition) is likened to the period of a human life. It also covers reusing the parts or recycling the materials.

*3: Global warming prevention = saving energy

CO₂, steam, dinitrous monoxide (N₂O), ozone and chlorofluorocarbon fully pass solar insolation energy but they prevent ground heat from being discharged in the cosmic space, so that the global temperature increases. The gas heated in this way is called greenhouse gas.

Most greenhouse gas is CO₂. CO₂ is discharged in the air when coal or oil is burnt. When electricity is consumed in house, coal or oil is burnt for power generation, resulting in a large volume of CO₂. In addition, oil fuel is consumed in the production and distribution stages of the product life cycle, resulting in a large volume of CO₂.

Namely, if energy (electricity) consumption is reduced in each stage of product life cycle, the amount of CO₂ generation will also be reduced, so that global warming can be prevented.



*4: Bromine flame retardant (PBB, PBDE)

PBB stands for polybrominated biphenyls and PBDE stands for polybrominated diphenylether. Both are additives for making the polymeric materials (plastics, elastic gums, fibers, paper and wood) fire-resistant.

*5: Resource value coefficient

Weighted coefficient determined considering the scarcity and value of utilization. Initially, this value is set to 1.

*6: Amount of resources in life cycle of product

Amount of resources in life cycle of product = Amount of new resources to be used + Amount of resource to be disposed

(1) Input resource (product mass)

Amount of input resources =
 amount of new resources to be used + amount of resources to be reused and recycled

Amount of new resources to be used =
 amount of input resources – amount of resources to be reused and recycled

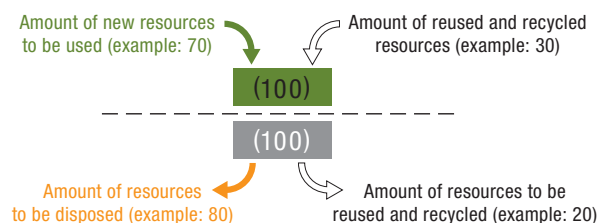
(2) Output resource (product mass)

Amount of input resources =
 amount of resources to be disposed + amount of resources to be reused and recycled

Amount of resources to be disposed =
 amount of input resources – amount of resources to be reused and recycled

(3) Amount of resources in life cycle =

Amount of new resources to be used (example: 70) + Amount of resources to be disposed (example: 80) = (example: 150)



Description of Products

Uninterruptible power supplies protect your servers and critical systems from power outages. They automate server power management by shutting down your servers when the power goes out, and re-activating your servers when the power comes on again.

Development Concept

1. Equipment mass has been reduced through use of 10 kVA modules running in parallel providing support for a 10 kVA to 40 kVA system.
2. Equipment mass has been reduced and higher recycling potential has been achieved as a result of using small-sized valve regulated lead acid batteries.

Base



Manufactured in 1998
Model name : H-777E
(JAPAN model)

Evaluation



Manufactured in 2006
Model name : H-UB Series
(JAPAN model)

Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		1998	2006
Model name (JAPAN model)		H-777E	H-UB Series
Product life span*1 (specified usage period (year))		15	10
Product mass (kg)		760	565
Annual power consumption*2(kWh/year)		14,016	14,016
Product function	Recycling potential (%)	100 (base year)	480
	Battery mass (%)	100 (base year)	64
	RoHS parts compatibility (%)*3	100 (base year)	200

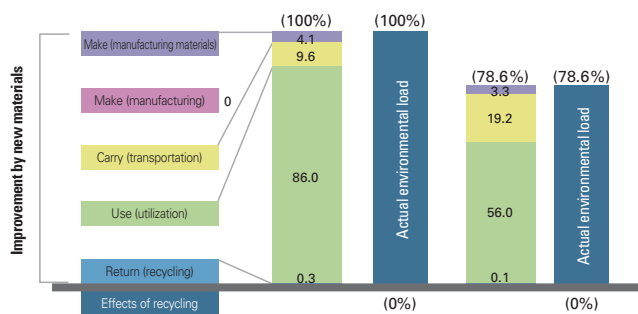
*1 Because it is more common to replace a medium-power UPS that is attached to a load apparatus than it is to replace one attached to a building, the usage period here refers to a load apparatus usage period.

*2 Yearly power consumption kWh/h = $(1/\eta - 1) \times Pf \times P \times 24 \text{ hours/day} \times 365 \text{ days/year} \times (1 + 1/C) = 14,016$
Both new and old:
efficiency $\eta = 0.90$; load factor $Pf = 0.8$; target capacity $P = 12\text{kVA}$
Air conditioning unit performance coefficient $C = 2$

*3 By using small-sized valve regulated lead acid batteries we reduced equipment mass increasing the potential for recycling. By using lead-free solder, we achieved RoHS compliance.

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
Reason for reduction:
Reduced equipment mass has been achieved through the use of multiple 10kVA module units.



■ Base ■ Evaluation

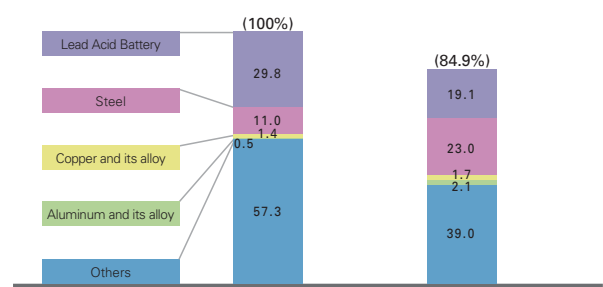
■ **Calculation Results** ■ 108,806 ■ 85,458
Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

■ **Efficiency of Global Warming Prevention** ■ 1.38E-2 ■ 2.62E-1

Factor of Global Warming Prevention **19**

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
Reason for reduction:
Reduced equipment mass has been achieved through the use of multiple 10kVA module units.



■ Base ■ Evaluation

■ **Calculation Results** ■ 1,667 ■ 938
Amount of resources per unit function in product life span (kg/unit function)

■ **Resource Efficiency** ■ 9.00E-1 ■ 2.39E+1

Resource Factor **27**



Description of Products

This compact tabletop microscope is simple to operate and offers powerful features. It does not require special set-up, and powers on in about three minutes. This microscope makes uncoated observation of non-conductive samples possible resulting in stereoscopic morphological observation with greater depth of focus.

Development Concept

The smaller size of this microscope results in energy savings of 84% as compared to previous models. And, because of its easy operation like digital-camera, it can be used in science classes and exhibits to introduce children in elementary, junior high, and high school to the world of microscopy.

Base



Manufactured in 2000
Model name : S-2600N

Evaluation



Manufactured in 2005
Model name : TM-1000

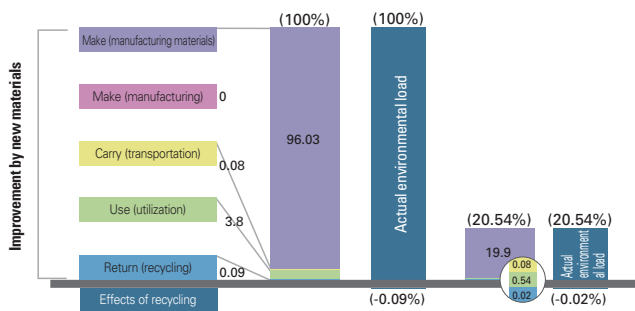
Outline of Products for Comparison

Item	Products	Base	Evaluation
Year of manufacture		2000	2005
Model name		S-2600N	TM-1000
Product life span*1 (specified usage period (year))		10	7
Product mass (kg)		400	89
Annual power consumption*2(kWh/year)		2,880	576
Product function*3	Set-up area (m ²)	3.3	0.96
	Resolution (nm)	5	30
	Observation efficiency (min.)	10	3

- *1 The service life of this product considers the reliability duration of parts in a usage environment.
- *2 Conditions for yearly energy output calculations
 $E = P \times T / 1000$ (kWh/year)
 P: power consumption in operation (W),
 T: standard yearly operating time (8 hours x 20 days x 12 months),
 and standby power consumption 0 (W)
- *3 Equipment specifications specific to increased observational efficiency in a compact set-up area.

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
 Reason for reduction:
 Miniaturization and lower power consumption have been made possible through the unit's electronic lens that uses a permanent magnet.



■ Base ■ Evaluation

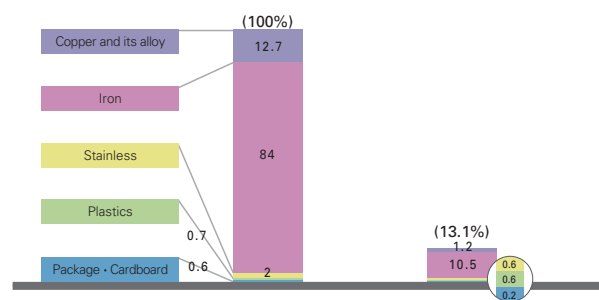
Calculation Results ■ 313,172 ■ 64,129
 Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

Efficiency of Global Warming Prevention ■ 3.28E-7 ■ 7.08E-6

Factor of Global Warming Prevention 22

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
 Reason for reduction:
 Fewer resources are required because no cooling water is needed and the unit's electron optical configuration has been miniaturized.



■ Base ■ Evaluation

Calculation Results ■ 315 ■ 57
 Amount of resources per unit function in product life span (kg/unit function)

Resource Efficiency ■ 3.26E-6 ■ 8.02E-3

Resource Factor 26



Description of Products

This elevator offers a sense of security, comfort, and convenience to each and every passenger. It features color liquid crystal display indicators in the elevator car for easy visibility, "careful sensors" to ensure safety when entering or exiting the elevator, and a "careful door system."

Development Concept

Through smaller equipment and devices in the elevator shaft, it was possible to achieve the industry's smallest* overhead measurement of 2,850 mm, a reduction of up to 350 mm from the previous overhead measurement. This is mainly achieved by limiting protrusions at the top floors for elevators installed in mid-sized buildings with low floor heights.

*As of December, 2006, Hitachi, Ltd.

Base



Manufactured in 2000

Evaluation



Manufactured in 2007

Standard elevator "Urban Ace"

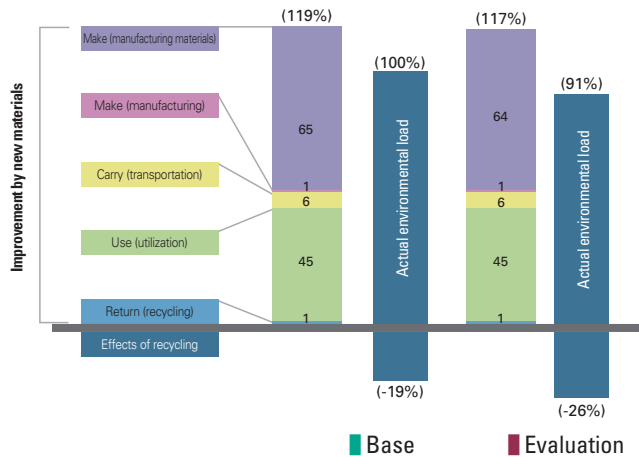
Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		2000	2007
Model name		UAR-9-2S60 (with trunk, 5 stops)	
Product life span*1 (specified usage period (year))		17	
Product mass (t)		4.33	4.19
Annual power consumption*2(kWh/year)		1,170	1,170
Product function	(Effective volume ratio x Output per weight)	7.7	11.7
	Effective volume ratio*3	0.73	0.76
	Output per weight*4 (kW/t)	10.6	15.4

- *1 Based on attached table 1 for ministerial ordinance concerning the longevity of depreciation assets (in Japan).
- *2 Based on the method for calculating the power consumption of the elevator $E = \{0.18 \times P_1 \times T_1 \times N_1 / 2000 + P_2 \times T_2\} \times 365$ (kWh/year)
 P_1 : Rated power consumption 3.7(kW)
 T_1 : Operation time 8 (hours/day)
 P_2 : Standby power consumption 0.05 (kW)
 T_2 : Standby time 16 (hours/day)
 N_1 : Startup count 900 (times/day)
- *3 Effective volume ratio: Ratio of stroke volume to the total volume
 Stroke volume = hoistway area (1.55 x 2.35) x stroke (12.75)
 Total volume = hoistway area x (stroke + overhead + pit) + machine room area x machine room height = (1.55 x 2.35) x (A + 12.75 + B) + 0
 A: Overhead height: 3.20 (manufactured in 2000) 2.85 (manufactured in 2007)
 B: Pit depth: 1.55 (manufactured in 2000) 1.25 (manufactured in 2007)
- *4 Output per weight: Ratio of traction machine weight to the rated output
 Output per weight = 3.7 (kW)/B(t)
 B: Traction machine weight: 0.35 (manufactured in 2000) 0.24 (manufactured in 2007)

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
 Reason for reduction:
 Environmental impact has been lessened at the material manufacturing stage as a result of product weight reduction.



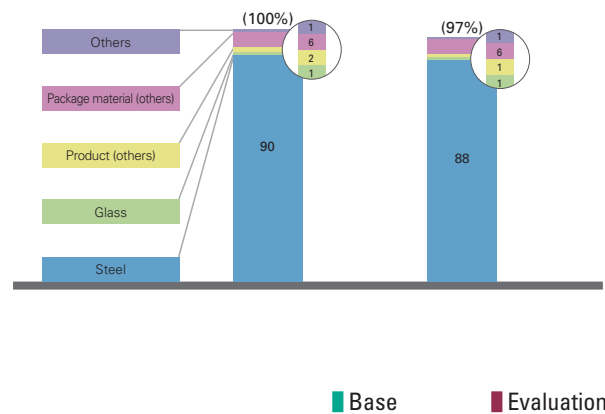
■ Calculation Results **18,200** **16,500**
 Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

■ Efficiency of Global Warming Prevention **7.20E-1** **1.20E+0**

Factor of Global Warming Prevention 1.7

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
 Reason for reduction:
 The elevator hoist weighs less, and rail lengths have been shortened due to space reductions.



■ Calculation Results **3,530** **2,830**
 Amount of resources per unit function in product life span (kg/unit function)

■ Resource Efficiency **3.71E+0** **7.00E+0**

Resource Factor 1.9



Description of Products

This product provides compressed air with no oil and less moisture, from the atmosphere. The major benefits of this scroll-type compressor are less noise and vibration.

Development Concept

1. Achieves lower energy consumption by enabling pressure control change through control panel settings for maximum air pressure.
2. The aluminum air tank generates no rusty drainage.
3. The dryer uses R407C refrigerant which is zero ozone depletion potential.

Base



Manufactured in 1998
Model name : SRL-5.5DA

Evaluation



Manufactured in 2006
Model name : SRL-5.5DMA

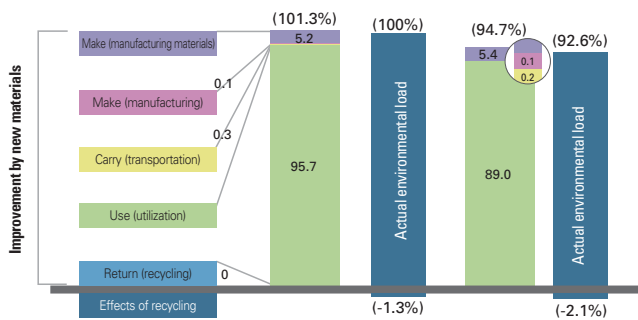
Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		1998	2006
Model name		SRL-5.5DA	SRL-5.5DMA
Product life span*1 (specified usage period (year))		16	
Product mass (kg)		254	241
Annual power consumption*2(kWh/year)		16,750	16,690
Product function	Control pressure change	not available	can be enabled with the operation panel
	Air tank materials	Steel	Aluminum alloy
	Dryer refrigerant	R22	R407C

*1 Product life, 40,000 hours (2,500 hours of operation per year); Assuming maintenance after 10,000 hours (mid-term maintenance), 20,000 hours (overhaul), 30,000 hours (mid-term maintenance)
*2 Calculated at 2,500 operation hours per year, discharge pressure at 0.83MPa

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
Reason for reduction:
Reduction of power consumption due to changeable control pressure and increased maximum pressure.



■ Base ■ Evaluation

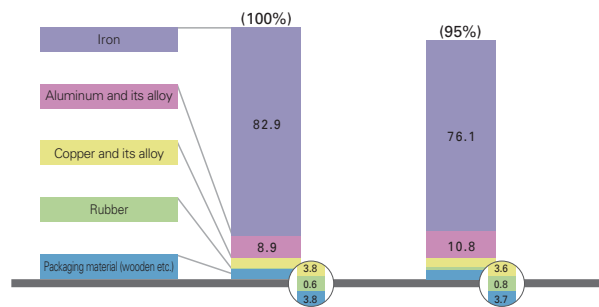
Calculation Results ■ 17,476 ■ 16,192
Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

Efficiency of Global Warming Prevention ■ 2.28E+1 ■ 2.52E+1

Factor of Global Warming Prevention **1.1**

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
Reason for reduction:
Downsizing of product due to more effective design of internal structure.



■ Base ■ Evaluation

Calculation Results ■ 214 ■ 171
Amount of resources per unit function in product life span (kg/unit function)

Resource Efficiency ■ 1.86E+3 ■ 2.38E+3

Resource Factor **1.3**



This product is manufactured and sold in Japan under the license from Mono Pumps Ltd.

Description of Products

This is a screen device installed on the top of a rainwater overflow weir in a storm water overflow chamber used to improve combined sewer systems. The storm screen protects the environment by blocking the discharge of debris contained in water overflow.

Development Concept

The storm screen is a passive device driven by the potential energy of wastewater. Because it does not require electric power, it enables reductions in CO₂ emissions, and contributes to the prevention of global warming.

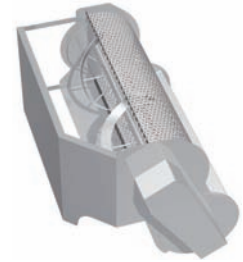
Base



Manufactured in 2002

Model name : Electric Storm Screen

Evaluation



Manufactured in 2004

Model name : Storm Screen

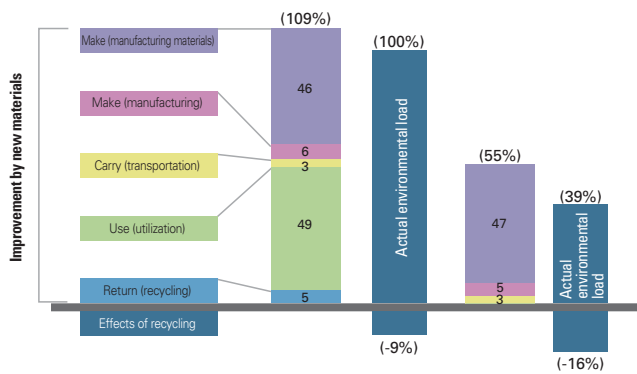
Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		2002	2004
Model name		Electric Storm Screen	Storm Screen
Product life span*1 (specified usage period (year))		15	
Product mass (kg)		182.5	126.0
Annual power consumption (kWh/year)		88*2	0
Product function*3 (Max. treatable water quantity)		0.175m ³ /s	0.175m ³ /s

*1 From "The Improvement of Sewage Treatment Facilities," vol. 77 of the National Sewerage Journal, Sewerage Operations Manager Notice, City and Regional Development Bureau, Ministry of Land, Infrastructure and Transport Japan, June 19, 2003
 *2 220 hours of operation per year, power consumption 0.4 kW
 *3 Device specifications: 4 mm screen mesh, 400 mm diameter screen, 1,000 mm length

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
 Reason for reduction:
 Electric power is not required because the device is driven by the potential energy of the wastewater.



■ Base ■ Evaluation

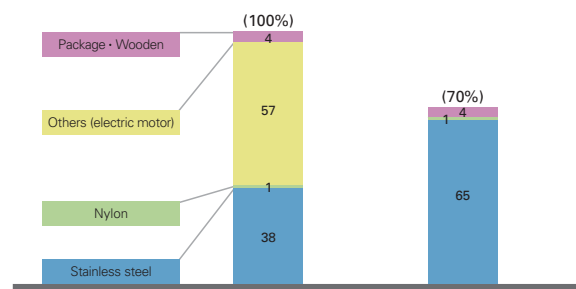
■ **Calculation Results** ■ 1,110 ■ 429
 Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

■ **Efficiency of Global Warming Prevention** ■ 5.09E-4 ■ 1.32E-3

Factor of Global Warming Prevention 2.6

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
 Reason for reduction:
 The storm screen is a passive device that does not require an electric motor.



■ Base ■ Evaluation

■ **Calculation Results** ■ 283 ■ 98
 Amount of resources per unit function in product life span (kg/unit function)

■ **Resource Efficiency** ■ 2.00E-3 ■ 5.76E-3

Resource Factor 2.9



Description of Products

This high definition plasma television offers beautiful high-definition images through its 1080ALIS panel featuring 1,080 vertical pixels as required by high definition broadcasting.

Development Concept

- Lower annual power consumption resulting from the energy saving design.
- Eco-friendly paint are used in the TV cabinet to inhibit the generation of volatile organic compounds VOCs* such as toluene and xylenes.

*Volatile Organic Compounds

Base



Manufactured in 2000

Model name : W42-PD2000
(JAPAN model)

Evaluation



Manufactured in 2006

Model name : W42P-H9000
(JAPAN model)

Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		2000	2006
Model name (JAPAN model)		W42-PD2000	W42P-H9000
Product life span* ¹ (specified usage period (year))		8	
Product mass (kg)		44.5	39.9
Annual power consumption* ² (kWh/year)		503	292
Product function	Brightness* ³	600	1,400
	Contrast (X:1)	700	4,000

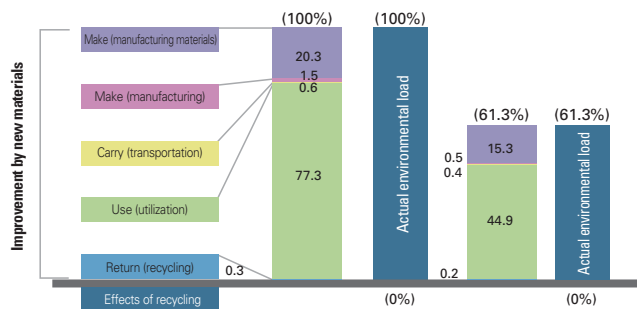
*¹ The product life span conforms to the spare parts storage term stipulated in article 5-1-5 of "The Fair Competition Rules for Labeling in the Industry of Home Electric Appliances".

*² Energy consumption amounts calculated for one year of television use based on a typical family's average daily television viewing time (4.5 hours), using formulas for various television sizes and receiver types as specified by "The Law Concerning the Rational Use of Energy" (the Energy Conservation Law).

*³ White peak brightness of panel (cd/m²)

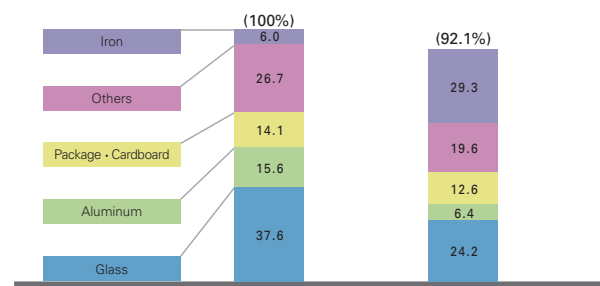
Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
Reason for reduction:
Approximately 42% less energy is consumed with this product (during operation and in standby mode).



Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
Reason for reduction:
Approximately 10% fewer materials are used in this product through use of a thinner front filter glass, and a more efficient internal design.



■ Base ■ Evaluation

Calculation Results ■ 2,164 ■ 1,324
Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

Efficiency of Global Warming Prevention ■ 3.10E+0 ■ 1.16E+2

Factor of Global Warming Prevention **38**

■ Base ■ Evaluation

Calculation Results ■ 56.9 ■ 40.9
Amount of resources per unit function in product life span (kg/unit function)

Resource Efficiency ■ 1.18E+2 ■ 3.75E+3

Resource Factor **32**



Description of Products

This refrigerator combines ease of use with energy conservation by placing the heat-affected zone of the compressor in the center of the unit where it is away from the freezer compartment. Moreover, through the use of materials such as high-performance vacuum heat insulation, this refrigerator has thinner internal insulation panels. With a footprint only 685 mm wide, this refrigerator boasts a 535-liter storage capacity.

Development Concept

Annual power consumption has been reduced to 590 kWh per year as a result of higher internal heat insulation efficiency through the use of high-performance vacuum insulation and high-fluidity urethane insulation. Moreover, this refrigerator uses R600a (Isobutane) refrigerant, and cyclopentane as a heat insulation foaming agent, resulting in a non-HFC unit with minimal contribution to environmental warming.

Base

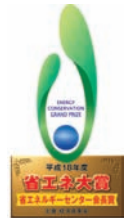


Manufactured in 2000
Model name : R-K46EPAM

Evaluation



Manufactured in 2007
Model name : R-SF54WM



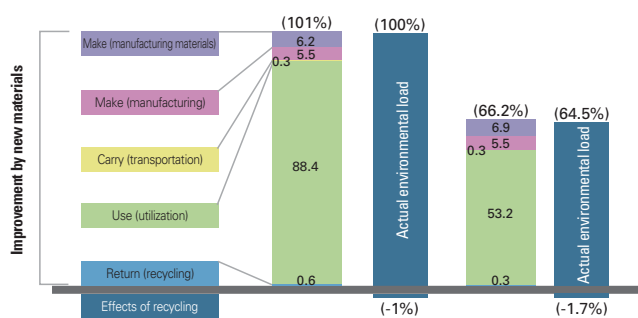
Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		2000	2007
Model name		R-K46EPAM	R-SF54WM
Product life span*1 (specified usage period (year))		10	
Product mass (kg)		91	90
Rated content volume (L)		456	535
Annual power consumption*2(kWh/year)		980	590
Product function	Adjusted content volume (L)*3	592	751
	Content volume efficiency : CER (%)*4	54.68	63.14

- *1 The product life span is 10 years including the manufacture year to meet the refrigerator spare parts storage term (9 years after end of life) stipulated in article 5-1-5 of "The Fair Competition Rules for Labeling in the Industry of Home Electric Appliances".
- *2 The specified load is imposed and measurements taken with the refrigerator compartment door opened and closed 35 times per day, and the freezer compartment door opened and closed 8 times per day. Yearly total consumption figures were compiled over 180 operation days at an ambient temperature of 30°C and subsequently over 185 days of operation at an ambient temperature of 15°C. Complies with JIS C9801:2006 "Properties and Test Methods for Home Electric Refrigerators and Electric Freezers."
- *3 2.20 x three star freezer compartment volume + 1.87 x three star freezer compartment volume + refrigerator compartment volume
- *4 (Rated content volume/product external volume) x 100

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
Reason for reduction:
Power consumption has been reduced when the refrigerator is in use due to improved insulation effectiveness through the use of materials such as high-performance vacuum heat insulation.



■ Base ■ Evaluation

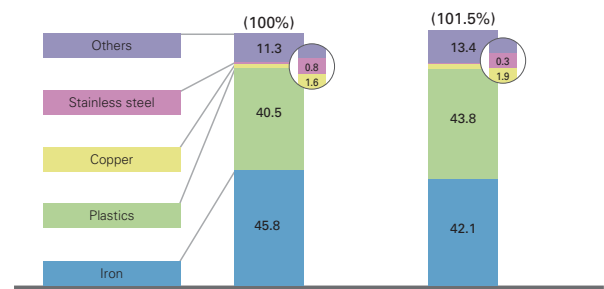
■ **Calculation Results** ■ 4,622 ■ 2,980
Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

■ **Efficiency of Global Warming Prevention** ■ 7.00E+1 ■ 1.59E+2

Factor of Global Warming Prevention **2.3**

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
Reason for reduction:
Less iron is used in the product and iron and plastics in the product are recycled.



■ Base ■ Evaluation

■ **Calculation Results** ■ 139.4 ■ 98.3
Amount of resources per unit function in product life span (kg/unit function)

■ **Resource Efficiency** ■ 2.32E+3 ■ 4.82E+3

Resource Factor **2.1**



Description of Products

This washing machine spreads clothes out and thoroughly washes them in its largest*1 diameter "Big Drum." The clothes are then lightly finished with fewer wrinkles. This is a washer-dryer two-in-one combination that implements exceptional water conservation design using the unit's bathwater extraction pump, the world's first*2, which makes efficient use of bathwater throughout the wash cycle.

Development Concept

By re-using bathwater even during the dryer phase, tap water consumption is kept to approximately 20 liters from the washer phase to the dryer phase. (7 kg of clothing with the standard wash-dry selection)
Electroplated steel plate that does not include chromium compounds is used and lead-free solder is used in circuit control boards. This product is J-Moss*3 compliant.

Base



Manufactured in 2001
Model name : NW-D8AX

Evaluation



Manufactured in 2006
Model name : BD-V1

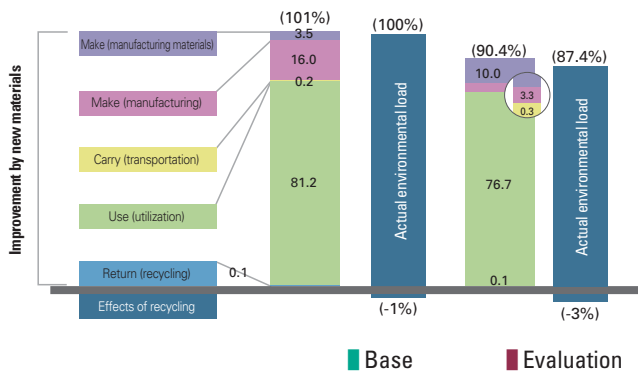
Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		2001	2006
Model name		NW-D8AX	BD-V1
Product life span*4 (specified usage period (year))		6	
Product mass (kg)		47	87
Amount of power consumption*5 (W·h)		64	90
Product function	Washing capacity (kg)	8.0	9.0
	Drying capacity (kg)	4.5	7.0
	Dry capacity/Wash-drying time (kg/min.)	0.0167	0.0424
	Detergency*6	1.08	1.28

- *1 As of November 9, 2006
- *2 As of May 30, 2006
- *3 Japan-The marking for presence of the specific chemical substances for electrical and electronic equipment (JIS C 0950:2005)
- *4 The product life span conforms to the spare parts storage term stipulated in article 5-1-5 of "The Fair Competition Rules for Labeling in the Industry of Home Electric Appliances".
- *5 This value obtained during continuous operation with the unit operated at close to the rated frequency and rated voltage. (JIS C 9606-1993 Electric Washing Machines)
- *6 Conforms to the washing performance specifications defined in JIS C 9811:1999, "Electric Clothes Washing Machines for Household Use – Methods for Measuring the Performance." In the test, designated soiled fabric was washed under specified test conditions, in both the washing machine to be evaluated and in a specified standard washing machine used for comparison purposes. The degree of cleanliness of the fabric washed in the standard washing machine was given a value of 1.0, and the cleanliness of the cloth washed in the washing machine being evaluated was scored in relation to that value of 1.0.

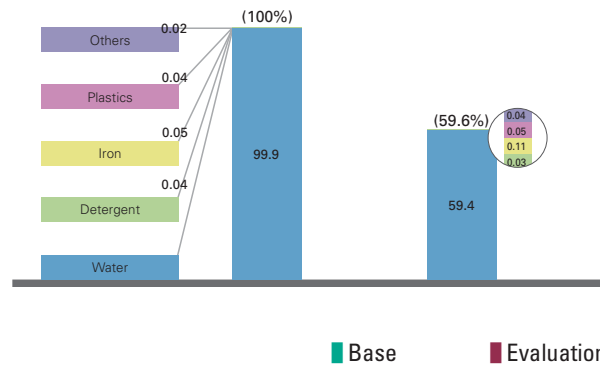
Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)
Reason for reduction:
CO₂ emissions that result from the process of supplying water and power have been reduced through lower water and electric power consumption.



Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)
Reason for reduction:
Water consumption has been greatly reduced as a result of water re-use from both the washing and drying phases.



Calculation Results 3,436 3,073
Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

Efficiency of Global Warming Prevention 1.13E-3 6.68E-3

Factor of Global Warming Prevention 5.9

Calculation Results 64.0 87.8
Amount of resources per unit function in product life span (kg/unit function)

Resource Efficiency 6.07E-2 2.34E-1

Resource Factor 3.9



Description of Products

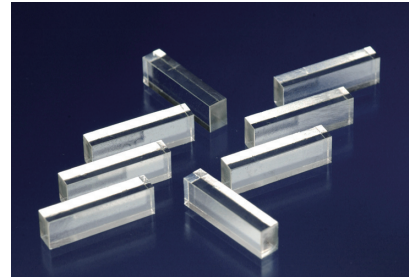
GSOZ* single crystal is used as a gamma-ray detector in medical imaging equipment like PET (Positron Emission Tomography) scanners which can see small size (less than 10 mm) cancer.

*Zr doped Ce: Gd₂SiO₅ (Zirconium and Cerium doped Gadolinium Silicon Oxide)

Development Concept

GSOZ single crystal enables quick and high-precision detection in PET scanners with its large light output, superior energy resolution and fast decay time. The productivity of GSOZ has been also improved.

Base/Evaluation



Manufactured in 1995

Model name : BGO* single crystal

Manufactured in 2005

Model name : GSOZ single crystal

*Bi₄Ge₃O₁₂ (Bismuth Germanium Oxide)

Outline of Products for Comparison

Item	Product	Base	Evaluation
Year of manufacture		1995	2005
Model name		BGO single crystal	GSOZ single crystal
Product life span*1 (specified usage period (year))		10	
Product mass (kg)		0.0051	0.0048
Product function*2	Light output (relative values)	100	167
	Energy resolution (%)	11	9
	Decay time (10 ⁻⁹ s)	300	60

*1 The product life of a PET scanner using the product

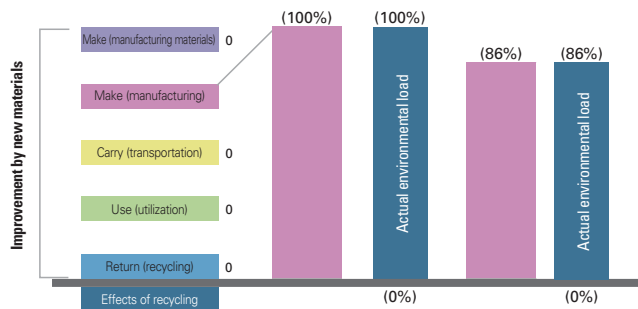
*2 All of the performance data measured using Hitachi testing methods which require irradiation with a ¹³⁷Cs (662 keV) source. Larger numerical values for light output are better. Smaller numerical values for energy resolution are better. Smaller numerical values for decay time are better.

Evaluation Results for the Factor of Global Warming Prevention

■ Calculation results for the amount of greenhouse gas emission (ratio to the base product)

Reason for reduction:

Manufacturing costs have been reduced through productivity gains.



■ Base ■ Evaluation

Calculation Results ■ 9,332 ■ 8,014
Amount of greenhouse gas emission per unit function in product life span (kg/unit function)

Efficiency of Global Warming Prevention ■ 3.25E-5 ■ 3.86E-4

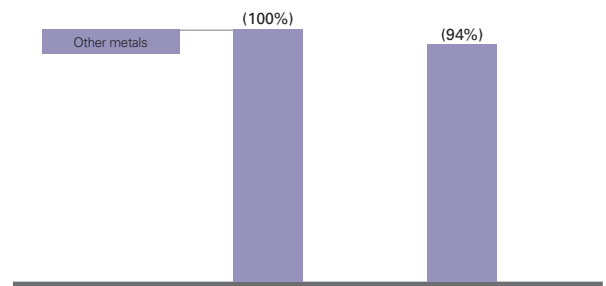
Factor of Global Warming Prevention 12

Evaluation Results for the Resource Factor

■ Calculation results for the amount of resources to be used (ratio to the base product)

Reason for reduction:

The product has been made lighter through changes in materials.



■ Base ■ Evaluation

Calculation Results ■ 0.0109 ■ 0.0103
Amount of resources per unit function in product life span (kg/unit function)

Resource Efficiency ■ 2.77E+1 ■ 3.01E+2

Resource Factor 11





This mark is used for Hitachi Group environmental activities and as a way of labeling products on datasheets that score over a certain number of points using the Design for Environment (DfE) assessment system and are registered as eco-products.

HITACHI

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