

2010.9.28

*ATMOsphere 2010*  
*Ecodesign for Green-Growth*

**Ryoichi YAMAMOTO**

**Professor Emeritus of the University of TOKYO**

**Chair of IGPN**

# Ryoichi YAMAMOTO

- (1) Professor Emeritus of The University of Tokyo**
- (2) President of the Life-Cycle Assessment Society of Japan**
- (3) President of Sustainable Management Forum**
- (4) Chair of Eco-efficiency Forum**
- (5) President of Environmental Planning Society**
- (6) Honorary chair of Green-Purchasing Network ,Japan**
- (7) Chair of the International Green Purchasing Network**
- (8) Chair of the organizing committee of EcoProducts exhibition**
- (9) President of the Japan Green-Business Federation**

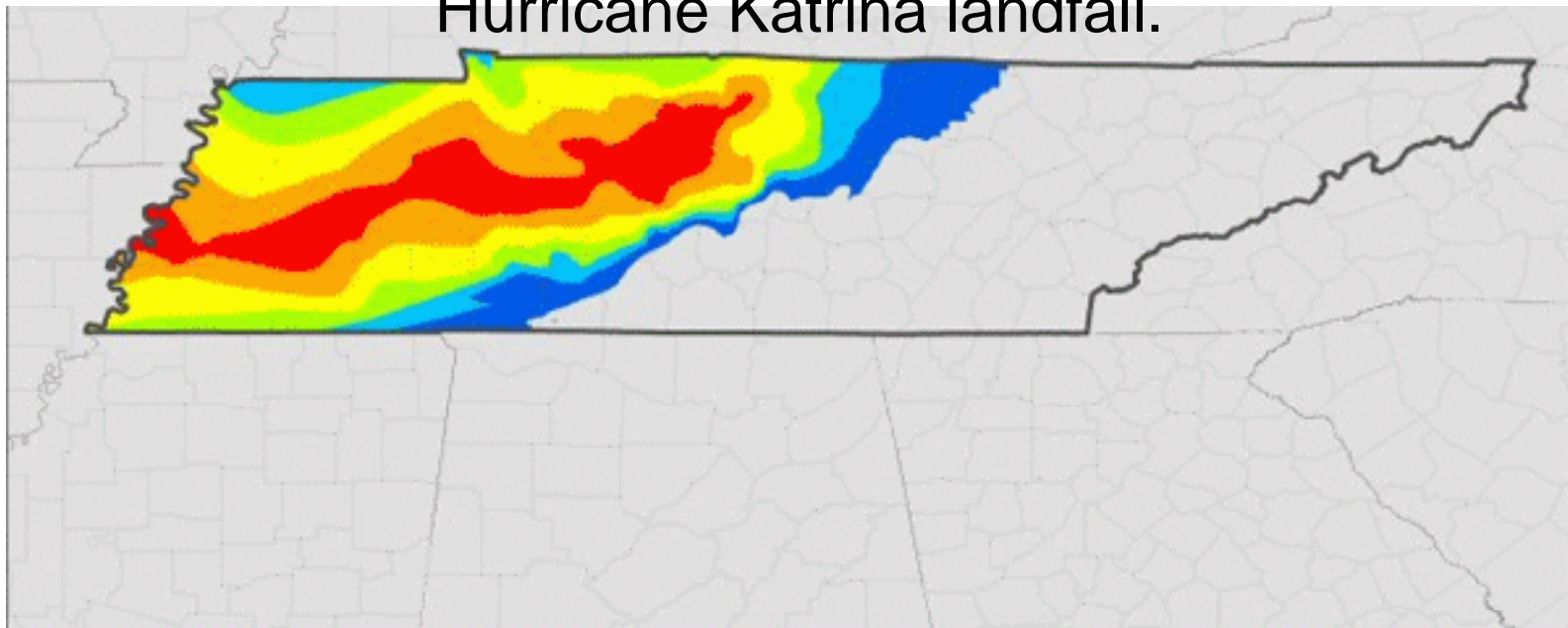
# Extreme Weather in 2010

“While a longer time range is required to establish whether an individual event is attributable to climate change, **the sequence of current events matches IPCC predictions**” the WMO said.

- The record heatwave and wildfires in Russia,
- Monsoonal flooding in Pakistan,
- Rain – induced landslides in China,
- Calving of a large iceberg from the Greenland ice sheet,
- Droughts and wildfires in Australia,
- A record number of high temperature days in the eastern USA NASA reports hottest January – July, 2010 on record

# Stunning NOAA map of Tennessee's 1000-year deluge May 1-2, 2010

15 sites had rainfall exceeding maximum associated with Hurricane Katrina landfall.



Tennessee Extreme Event of May 1-2, 2010  
Average Recurrence Intervals (ARI) for 48-Hour Duration



Created by Hydrometeorological Design Studies Center  
Office of Hydrologic Development  
National Weather Service  
National Oceanic and Atmospheric Administration

ARI (years)



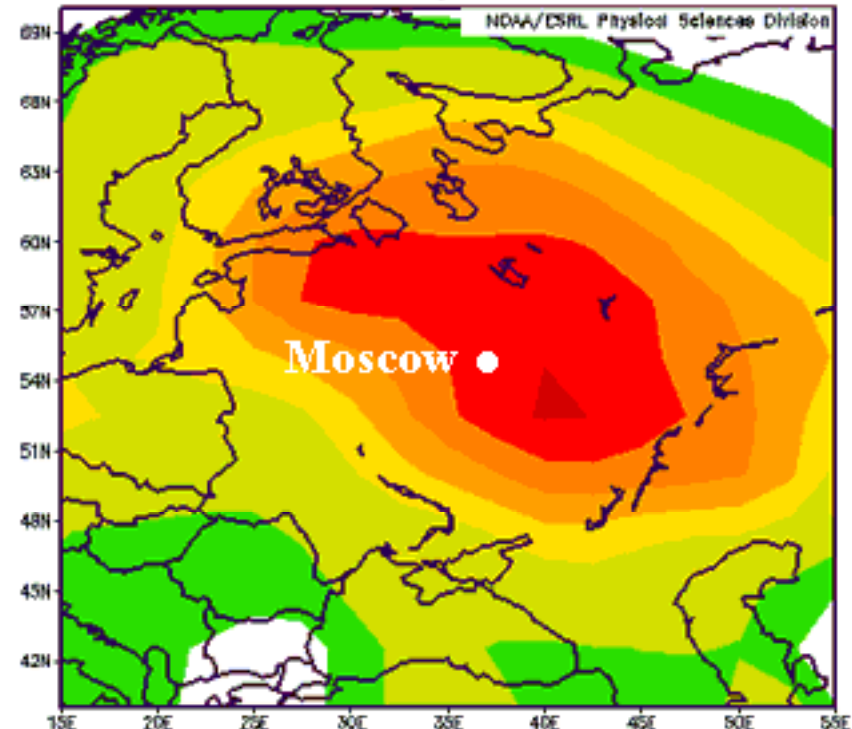
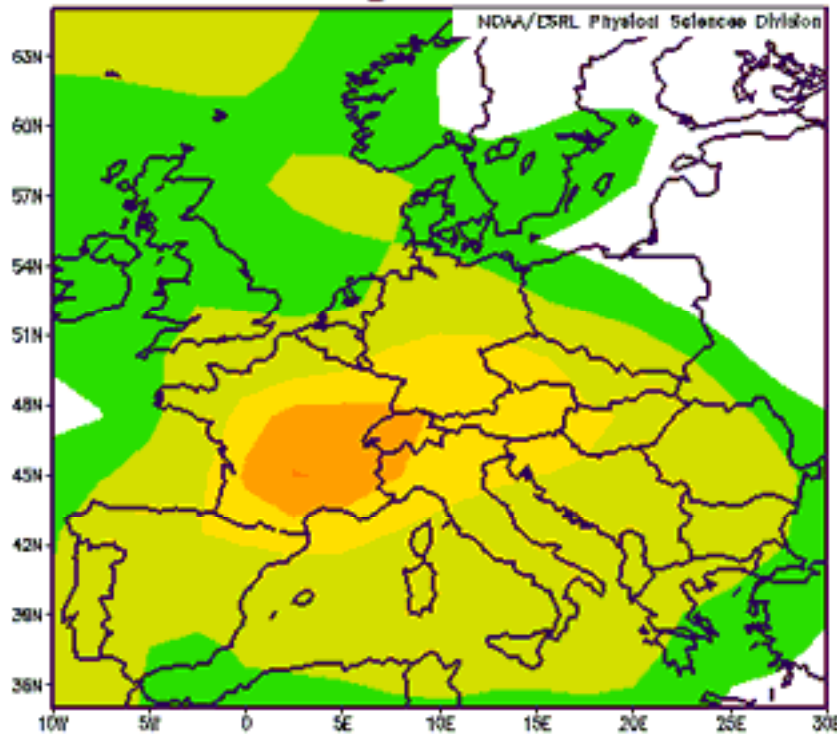
0 0.25 0.5 1 1.5 2  
Centimeter Degrees

**Russian Meteorological Center:  
“There was nothing similar to this on the territory of  
Russia during the last one thousand years in regard to  
the heat.”**

**Departure of Temperature from Average for Two Great Heat Waves**

**August 2003**

**July 2010**



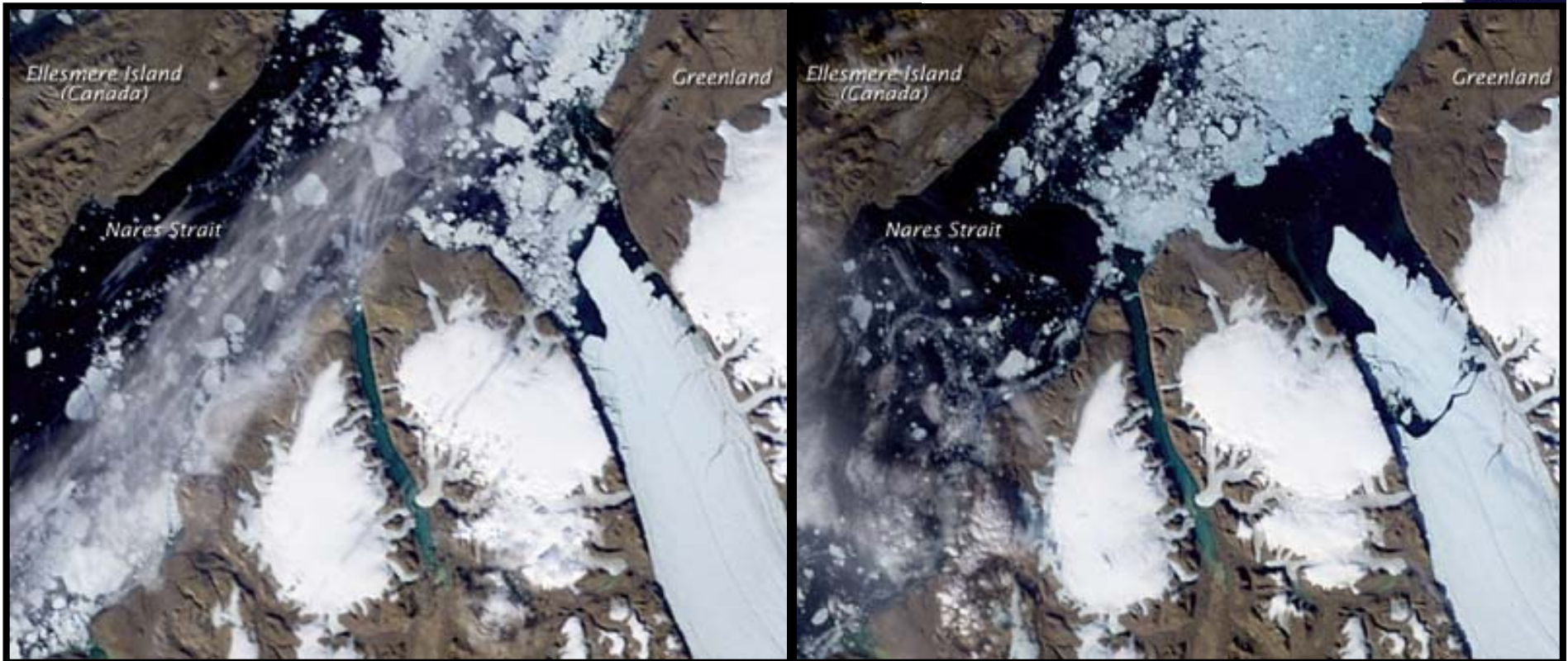
# Huge icebergs break off Greenland glacier

## Ice Island Calves off Petermann Glacier



Image acquired July 28, 2010.

Image acquired Aug. 5, 2010.



# Pakistan Floods

**A man marooned by flood waters, alongside his livestock, waves towards an Army helicopter for relief handouts in the Rajanpur district of Pakistan's Punjab province on August 9, 2010.**



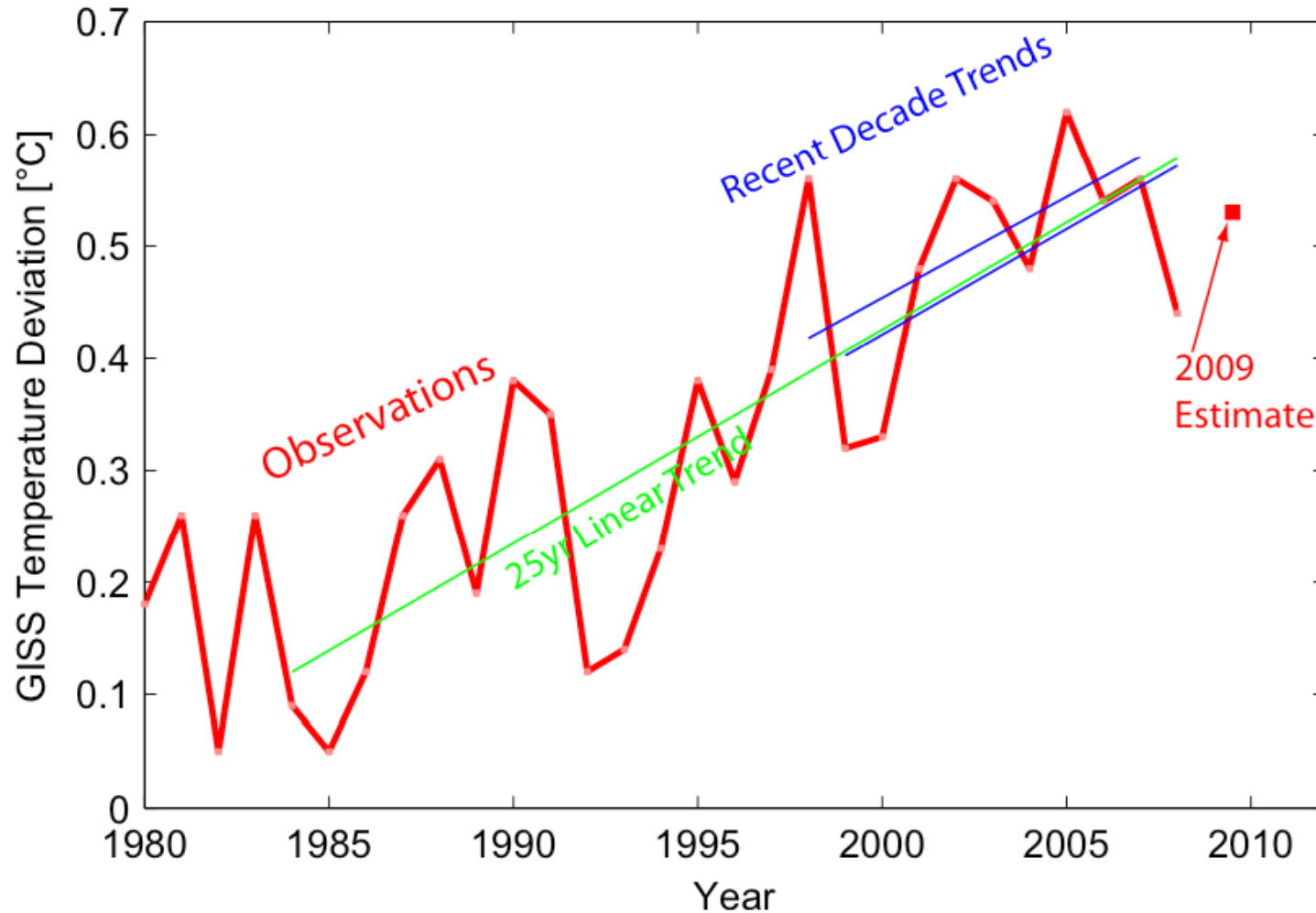
# Pakistan Floods

**A man wades through flood waters towards a naval boat while evacuating his children in Sukkur, located in Pakistan's Sindh province August 8, 2010**





# Global temperature according to NASA GISS date

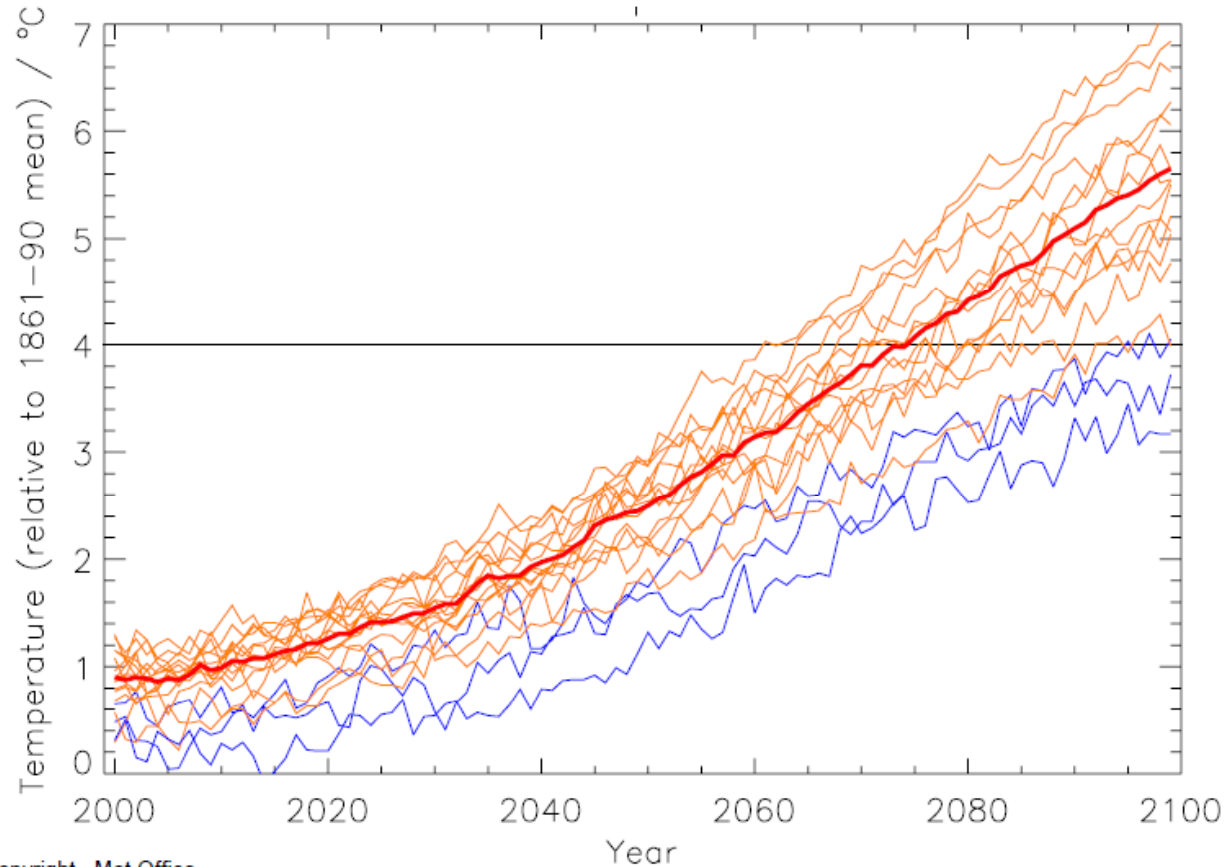


# Plausible Worst Case; 4°C by 2060

*Richard Betts, Mike Sanderson, Debbie Hemming,  
Mark New, Jason Lowe, Chris Jones*



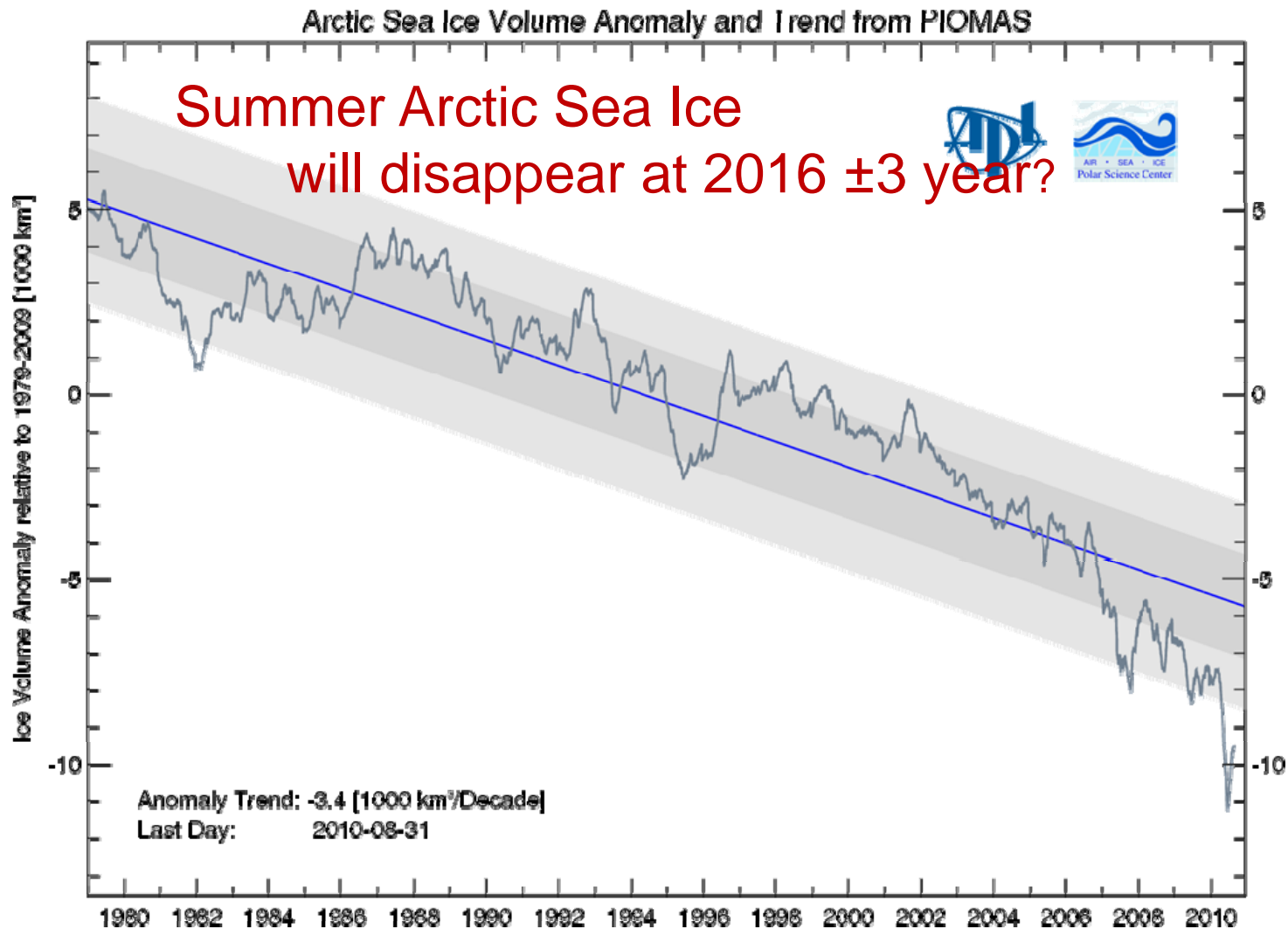
## Global warming with A1FI scenario: MOHC ensemble



Ice-free Arctic Sea in Summer may be within a few decades.



# Arctic Sea Ice Volume Anomaly

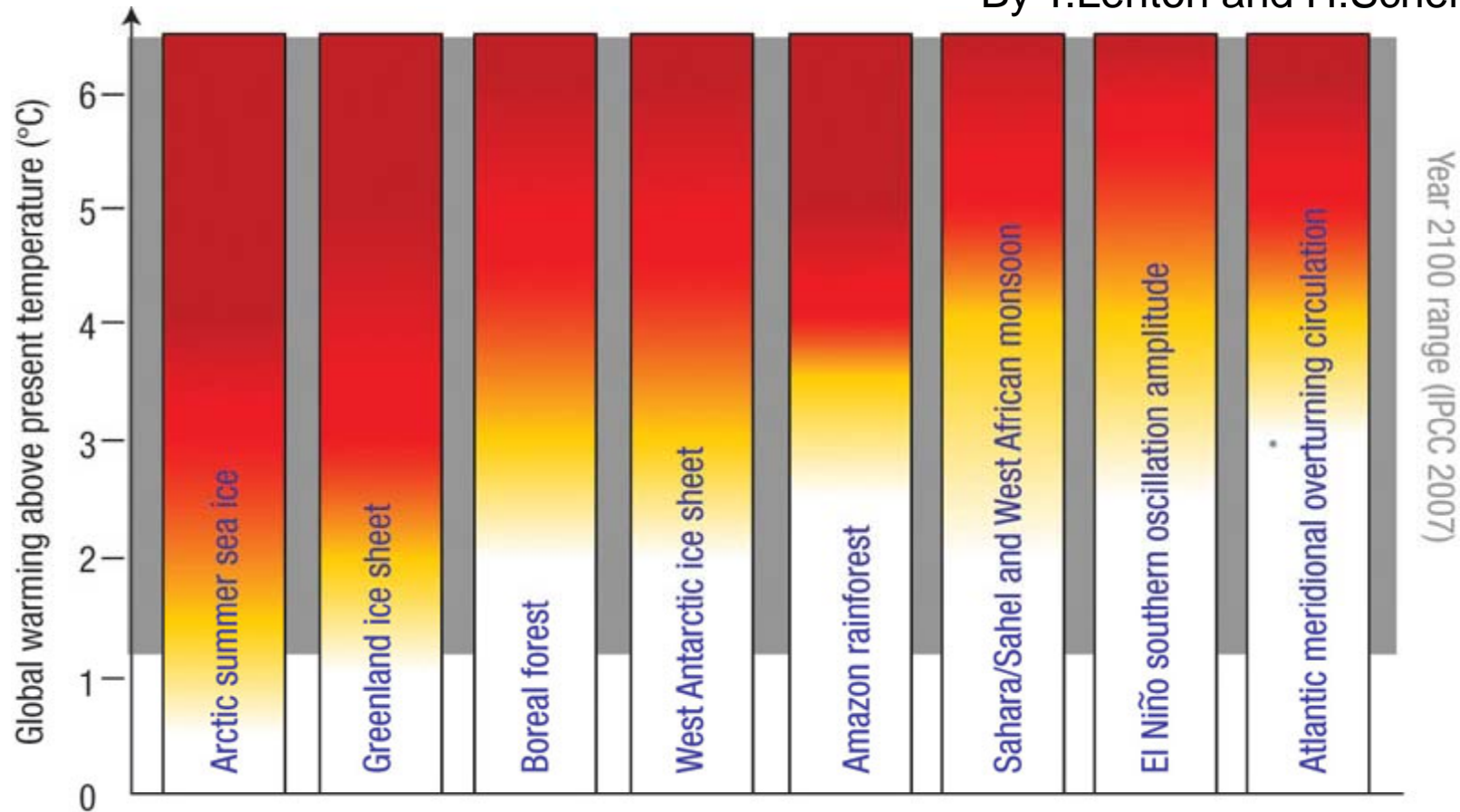


Continuously updated Arctic Sea Ice Volume Anomaly from PIOMAS. Daily Sea Ice volume anomalies for each day are computed relative to the 1979 to 2009 average for that day. The trend for the 1979- present period is shown in blue. Shaded areas show one and two standard deviations from the trend.

Source: Polar Science Center

# Passing Tipping Points

By T.Lenton and H.Schellnhuber



Potential policy-relevant tipping elements that could be triggered by global warming this century, with shading indicating their uncertain thresholds.

# L'aquila Summit, Italy, G8 and MEF

2009, July



「2°C target」 was recognized clearly by political leaders.

# G8 L'Aquila Declaration 2009

“We recognize the broad scientific view that the increase in global average temperature above pre industrial level ought not to exceeds 2°C.

Because this global challenge can only be met by a global response, we reiterate our willingness to share with all countries the goal of achieving at least a 50% reduction of global emissions by 2050, recognising that this implies that global emissions need to peak as soon as possible and decline there after. As part of this, We also support a goal of developed countries reducing emissions of green house gases

in aggregate by 80% or more by 2050 compared to 1990 or more recent years”

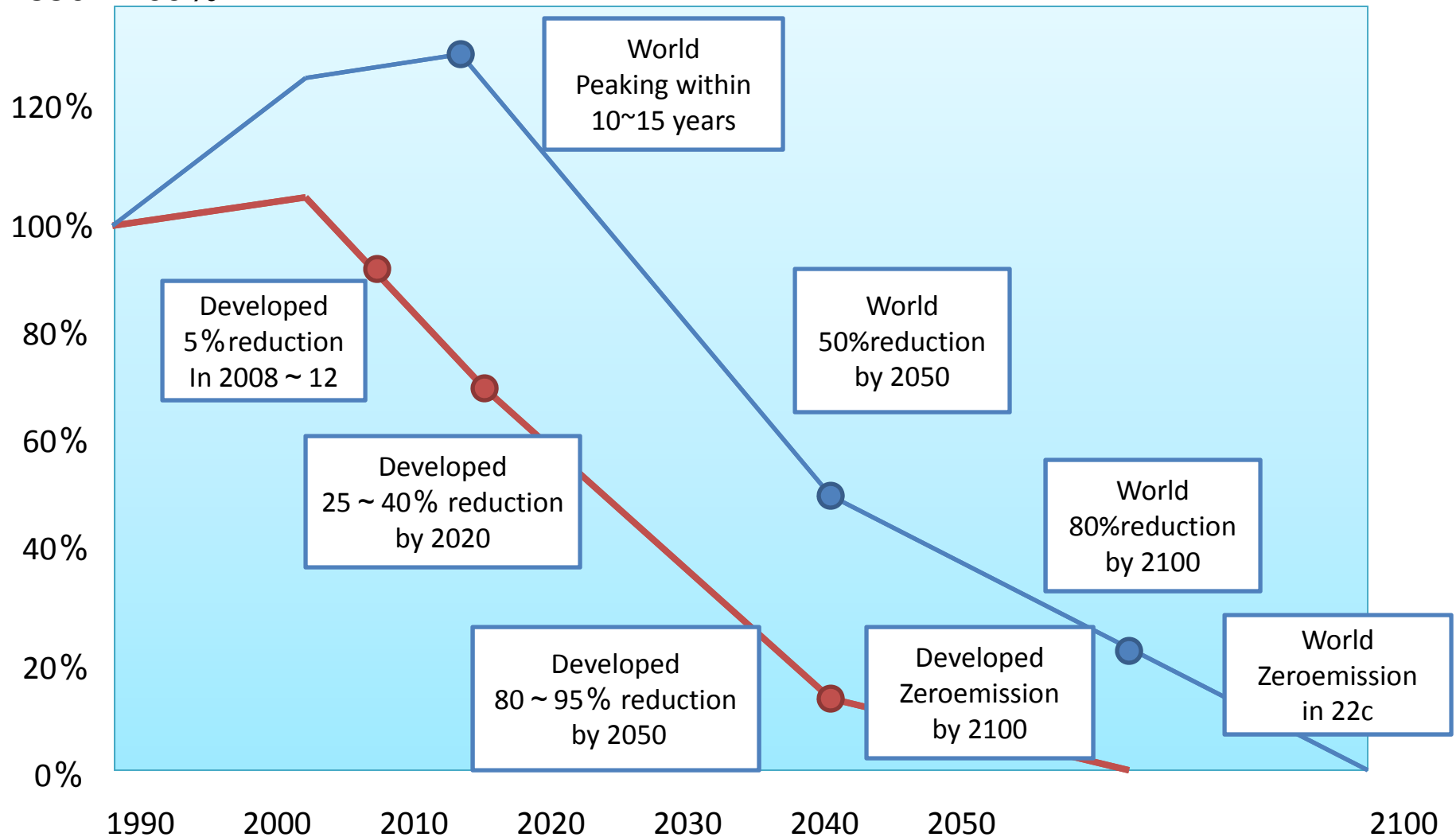
**Japan's Ex Primeminister, Mr. Yukio HATOYAMA  
declaired "25% reduction of Green House Gas  
Emission by 2020" September 7, 2009**





# Zero-carbon Economy is our final Goal.

GHG Emissions  
1990 = 100%



Emission Pathway needed to keep 2°C target

# **Decoupling Status of Metal Consumption from Economic Growth**

**Kohmei Halada, Masanori Shimada and Kiyoshi Ijima**

**National Institute of materials Science, Tsukuba, JAPAN**

**World will need a few times more metallic  
resources at 2050 than present.**

**Forecasting of the consumption of metals at 2050**

**Fe, Mo, W, Co, Pt, Pd Present resources will be  
exhausted completely**

**Ni, Mn, Li, In, Ga The consumption will  
increase more than doubling**

**Cu, Pb, Zn, Au, Ag, Sn The consumption will  
exceed even its resource base**

# **Declaration World Resources Forum-Sep,16.2009**

## **Resource Governance –Managing Growing Demands for Material on Finite Planet**

“Global resource extraction grew from **40** billion tons in 1980 to about **55** billion tons in 2002 and is expected to grow to **80** billion tons by 2020.

If one also takes into account the materials displaced from their natural setting, but not used to create commercial value, this number more than doubles, We should seek to stabilize resource use at 6 to 10 tons per capita per year 2050 with reductions at the top of global society and catch-up from the bottom”

# Long-term Reduction Targets for Carbon- dioxide Emission and Material consumption

	Present	2050
Annual per capita CO <sub>2</sub> emission	5 <sub>ton</sub> (World)	→ 2 <sub>ton</sub> (60%reduction)
	10.8 <sub>ton</sub> ( Japan )	→ 2 <sub>ton</sub> (80%reduction)
Annual per capita Material Consumption (except Oxygen and Water)	20 <sub>ton</sub> (World)	→ 6 <sub>ton</sub> (70%reduction)
	14.2 <sub>ton</sub> ( Japan )	→6 <sub>ton</sub> (57%reduction)

# Principles of Ecodesign

## Material

- ① Long –life
- ② Resource Saving
- ③ Recyclable
- ④ Recycled
- ⑤ Non-Toxic
- ⑥ Produced from Renewable Resources
- ⑦ Cleaning Environment
- ⑧ Improving Energy • Efficiency
- ⑨ Produced by Low-Environmental Impact Processing
- ⑩ Producing Alternative-Energy

## Product

- ⑪ Easy Disassembly
- ⑫ Reuse of Parts(Remanufacturing)

## Building

- ⑬ Use of Alternative Energy
- ⑭ Energy Saving

## City

- ⑮ Recycling System of Resources
- ⑯ Sustainable Water Management
- ⑰ Sustainable Transport System
- ⑱ Sustainable Foods Management
- ⑲ Sustainable Culture and Entertainment
- ⑳ Sustainable Consumption
- Eco service(green-IT and Servisizing)

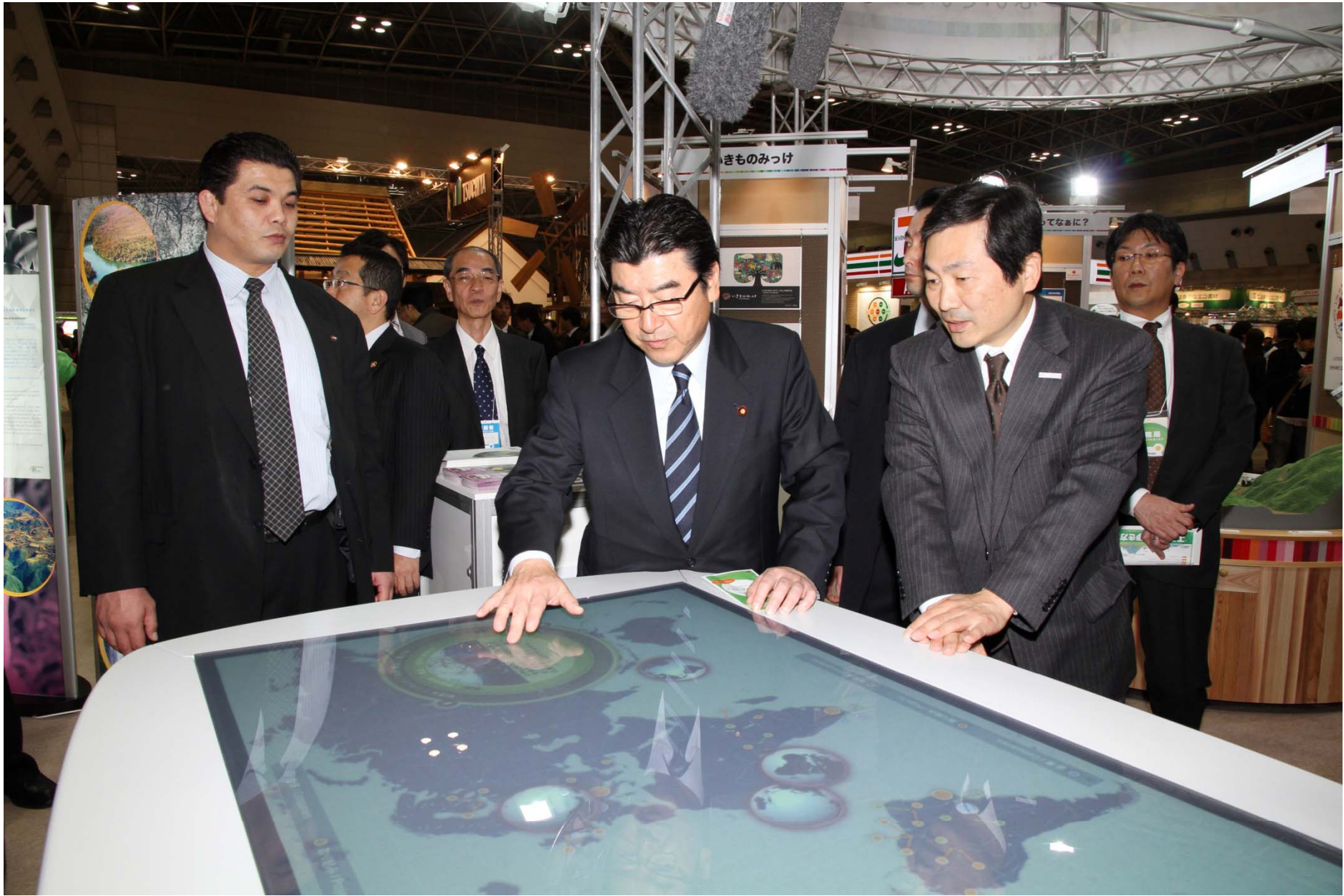














東芝は、  
エネルギーの安定供給と  
地球温暖化防止に貢献します

の星のエネルギーとエ

の星のエネルギー

# APO

## Eco-products International Fairs

Year	2004	2005	2006	2008	2009
Venue	<b>Malaysia Mid Valley Exhibition Center, KL</b>	<b>Thailand IMPACT, Bangkok</b>	<b>Singapore Suntec Singapore international Convention &amp; Exhibition Center</b>	<b>Vietnam National Convention Center, Hanoi</b>	<b>Philippines SMX Convention Center, Manila</b>
Organizers	APO, Federation of Malaysian Manufacturers (FMM), and National Productivity Corporation, Malaysia (NPC)	APO, Federation of Thai Industries, and Thailand Productivity Institute (FTPI)	APO, Waste Management and Recycling Association of Singapore (WMRAS), and SPRING Singapore	APO, Vietnam Association for Conservation of Nature and Environment (VACNE), and VPC	APO, Philippine Business for the Environment (PBE), and DAP, Philippines
Theme	Living in harmony with the environment: Towards sustainable production & consumption	New environmental challenges for the global community	A better environment for all	For sustainable development and better life	Sustainable, Production, Sustainable Consumption, Sustainable Future
Date	<b>2 – 4 Sept.</b>	<b>6 – 9 Oct.</b>	<b>31 Oct. – 2 Nov.</b>	<b>1 – 4 Mar.</b>	<b>19 – 22 Mar.</b>
Number of Exhibitors	<b>76</b>	<b>59</b>	<b>107</b>	<b>91</b>	<b>128</b>
Area of Exhibition	<b>3,600 sqm</b>	<b>5,000 sqm</b>	<b>7,300 sqm</b>	<b>10,000 sqm</b>	<b>5,500 sqm</b>
Number of Visitors	<b>12,000</b>	<b>23,000</b>	<b>35,000</b>	<b>98,000</b>	<b>83,000</b>

# EPIF2004 in Malaysia



GPAC Chairperson Mr. Yoichi

# Eco-products International Fairs



Opening Ceremony



Booth of Exhibitor



Prof. Yamamoto handed over the Eco-products Directory to Minister of International Trade and Industry

# EPIF2009 in the Philippines



Opening Ceremony

# Eco-products International Fairs



President VIP Tour



Booth of Exhibitors



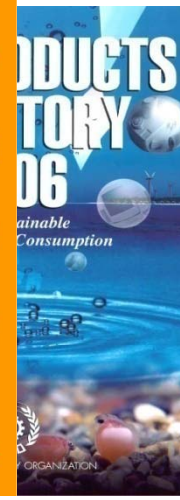
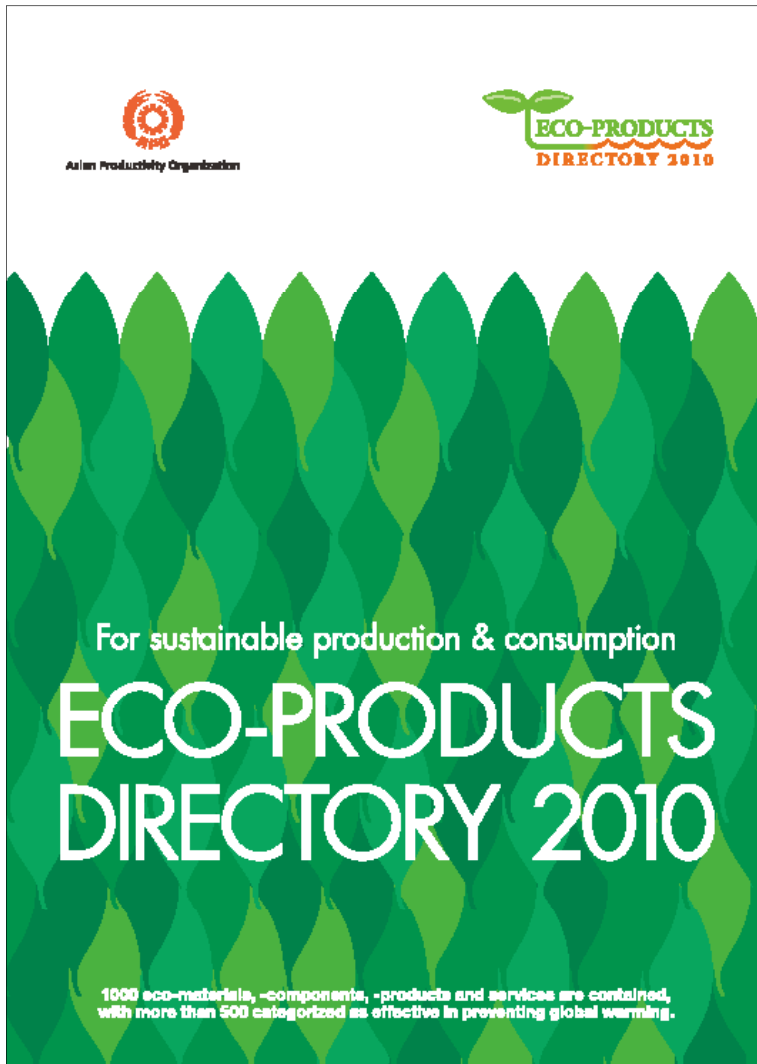
Handing Over Ceremony from EPIF2009 to EPIF2010



2010 March, Jakarta, EPIF



# Eco-products Directory 2004-2010



# Eco-Products Directory

- Published annually since 2004 by APO
- Purposes: To promote the concept and practice of environmentally responsible purchasing among businesses and consumers in the region.
- Products covered: Eco products, eco services, eco components, eco materials totaling 1,000 items in 2010 version
- Criteria: if the items have been received, declared or registered with:
  - ISO environmental labels (type I, type II and/or type III)
  - environmental labels by consumer electronics industry and automotive industry
  - GPN Japan’s database ‘Eco Products Net’
- Produced by Eco Product Working Group and financed by APO



EP-1-018 Home electric appliances/lighting refrigerators

Refrigerator-Freezer which realized large capacity, energy saving, clean and usability, GR-850F

**Environmental performance**

- Mitigation of climate change: Adoption of R600a refrigerant whose ozone-depleting potential and global warming potential are both low.
- 219kg/year (80%) reduction in CO<sub>2</sub> by "i-been" and 2 zone layout.

**Product performance**

- Keep cold and freshness by "i-been cooling".
- Keep clean inside by "Picotin unit".

**TOSHIBA HOME APPLIANCES CORPORATION**

991, Anada-cho, Seto-shi, Aichi, 489-9810, Japan  
 URL: <http://www.toshiba.co.jp/index.htm>  
 URL: <http://www.toshiba.co.jp/evn/report/index.htm>

Large capacity, energy saving and clean GR-850F

EP-1-095 Home electric appliances/lighting digital cameras

Digital Camera: LUMIX DMC-FZ38/35

**Environmental performance**

Achieved power consumption of approx. 1.3W due to low power circuit technology.  
 Power saving performance realizing about 470 continuous shots.  
 Circuits have been integrated to promote energy saving, and compactness and light weight of circuit boards and fundamental parts have been improved.  
 Non-Use of Specific Chemical Substances \*\*  
 (\*\*: Lead, mercury, cadmium, hexavalent chromium, two specific brominated flame retardants, designated by the EU RoHS Directive.)

**Product performance**

12.1 Megapixel Digital Camera.  
 High Definition AVCHD Lite Movie Recording.  
 Ultra High-Speed A.F.  
 Wide-angle 27mm LEICA DC VARIO-ELMARIT lens and 18x optical zoom.

**Panasonic Corporation, AVC Networks Company**

1-15 Matsuo-cho, Kadoma City, Osaka, 571-8504, Japan  
 Tel: +81-6-6905-8356 Fax: +81-6-6905-4755  
 URL: <http://panasonic.co.jp/>  
 URL: <http://panasonic.net/csr/>

Available in: Worldwide

Digital Camera: LUMIX DMC-FZ38

## Properties of listed products and services

- **Among more than 1,000 data entries submitted, the 2010 Directory contains 1,000 eco-products and –services.**

	2004	2005	2006	2008	2009	2010
Eco-materials	199	80	71	70	73	103
Eco-components	134	39	39	73	83	118
Eco-products	421	432	453	526	604	688
Eco-services		16	28	56	44	91
Total	754	567	591	725	804	1,000

- **More than 550 are categorized as effective in preventing global warming in 2010.**

	2004	2005	2006	2008	2009	2010
Global warming prevention	263	274	289	429	441	566

# **Eco-materials listed in the Eco-products Directory must meet the following six criteria:**

- (1) They do not use scarce resources.
- (2) They have functions to clean and conserve the environment.
- (3) They create only low environmental impact when manufactured.
- (4) They do not contain any hazardous substances.
- (5) They provide high performance when used.
- (6) They are easy to recycle.

## Eco-materials

EM-1-011

Metals

sheet steel

### NFG, Ultrafine grained steel sheets

Reducing the grain size of steel increases the strength. Ultrafine grained steel has a fine grain of 1-5microns. The steel has less rare earth alloy, and is expected to have the characteristics of low temperature toughness, high fatigue strength and good workability. This material is expected to contribute greatly to realization of the social demands such as energy saving, resource saving and environment conservation. We developed facilities and constructed an actual hot strip mill introducing new concepts. We succeeded in producing ultrafine grained steel sheets of 2-5microns industrially.



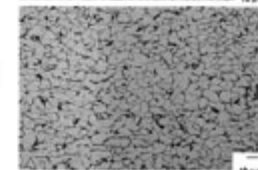
#### Comparison of grain size

Grain size of NFG is 1/3 smaller compared to Conventional steel

NFG



Conventional steel



### Nakayama Steel Works, Ltd.

1-1-66, Funamachi, Taisho-ku, Osaka 551-8551, Japan

Tel 81-6-6555-3106 Fax 81-6-6555-4026

E-mail

URL <http://www.nakayama-steel.co.jp>

## Eco-materials

EM-1-021

Metals

steel materials

### High Performance Weathering Steel

This steel product suppresses the corrosion of steel products and eliminates painting process in the air by forming dense rust in the air. It reduces environmental loads due to painting.



### JFE Steel Corporation

2-3, Uchisaiwai-cho 2-chome, Chiyoda-ku, Tokyo 100-0011, Japan  
Tel Fax  
E-mail  
URL <http://www.jfe-steel.co.jp>



High Performance Weathering Steel

## Eco-materials

EM-1-028

Metals

rolled and drawn brass products

### ECO BRASS (High performance Lead-free Copper Alloy)

ECO BRASS is a lead-free brass and environmentally friendly brass material. Instead of using heavy metal harmful to the human body, a precipitating metallic compound in the metal structure realizes good machinability.

Key Features:

- 1) Lead-free environmentally friendly brass material
- 2) High strength equivalent to stainless steel
- 3) Good machinability nearly equal to brass rod containing 1% lead
- 4) Excellent machined surface
- 5) Excellent de-zincification corrosion resistance
- 6) Excellent stress corrosion cracking resistance
- 7) Excellent warm brittleness cracking resistance
- 8) Excellent hot forgeability
- 9) Easily accepts soldering and brazing
- 10) Good castability

Applications:

- 1) Water supply devices such as faucets, valves, fittings, etc.
- 2) Precision parts as a substitute for stainless steel such as shafts, screw, bearings
- 3) Electrical parts and connectors
- 4) Automobile parts: lead-free requirements
- 5) Medical devices

**Mitsubishi Shindoh Co., LTD (the former Sambo Copper Alloy Co., LTD)**

374, 8-cho, Sambo-cho, Sakai-ku, Sakai-shi, Osaka 590-0906, Japan

Tel 81-72-233-1161 Fax 81-72-227-6590

E-mail [tech@sambo.co.jp](mailto:tech@sambo.co.jp)

URL <http://www.sambo.co.jp>



Available in : Except North America & Europe

Machined Products using ECO BRASS rods

## Eco-materials

EM-5-001

Ceramics and Glass

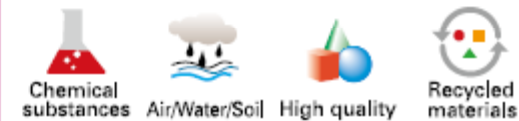
optical glass materials

### Optical glass (Eco-glass) without harmful lead & arsenic

There are more than 100 types of optical glass and, in the past, NIKON used huge amounts of lead as a primary ingredient for about half of these optical glasses, while a small amount of arsenic was used in most types. These two elements have highest risk of damaging to the environment among all of ingredients used for optical glass.

However, we have now developed almost full types of optical glass, being referred to Eco-glass, without using these two elements.

We have secured optical performance solely with Eco-glass for most optical apparatus through appropriate optical design.



### NIKON CORPORATION

Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo 100-8331, Japan

Tel 81-3-3214-5311 Fax

E-mail

URL <https://www.nikon.co.jp>

Available in : World wide



Lenses and prisms made with Eco-glass



## Eco-materials

EM-5-002

Ceramics and Glass

building bricks

### Crystal Clay CLB-series : ceramic quality blocks

#### < Environment-friendly >

- The product is resource-saving goods, in which the amount of clay was suppressed by the use of 70% of the waste glass.
- By using the waste glass as the raw material, the baking at a low temperature is realized, and thereby, the CO<sub>2</sub> discharge can be reduced in the manufacturing process.

#### < Performance >

- On account of its high strength, the blocks are usable at the car-passing zone.
- Because of the property of burned products, the discoloration is small for a long period, and the changes in other properties are also small.
- A large sliding friction makes it hard to slip down.

#### CRYSTAL CLAY CORP.

4-11-4, Roppongi, Minato-ku, Tokyo , Japan  
Tel 81-3-5775-0021 Fax 81-3-5775-0024  
E-mail sokato@crystalclay.co.jp  
URL <http://www.crystalclay.co.jp/>



Crystalclay CLB Series

## Eco-components

EC-2-013

Electrical and electronic components

Organic Light Emitting Diode for mobile phones

### Organic Light Emitting Diode for mobile phones, pursuing beauty and extreme thinness

This product is a next generation display module, which has a function of the spontaneous light emission like the CRT. The image of wide angle, vivid color, and less afterimage was realized in spite of the compact module. In addition, the backlight is unnecessary. This contributes greatly to the thinness and the light weight of cellular phones. Moreover, although the organic electroluminescence needs the electric power for light emission, energy saving on the whole of the display system can be expected owing to the needless of backlight.

- **Energy saving:** For the power cut of back light source, the power consumption was reduced by about 270mV as the back light of liquid crystal.
- **Resource Saving:** Reduction of the number of back light parts ( Number of the parts was reduced by 50% and back light weight by about 4.5g in the comparison of liquid crystal panel.)
- **Elimination of harmful chemical substances:** Mercury inclusion "zero" of the small fluorescent lamp which is light source was realized.

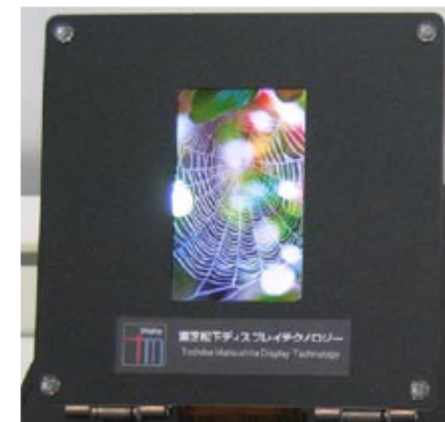
#### Toshiba Matsushita Display Technology Co., Ltd.

Rivage Shinagawa4-1-8, Konan, Minatoku, Tokyo 108-0075, Japan

Tel 81-3-5462-7331 Fax 81-3-3458-0075

E-mail

URL [http://www.tmdisplay.com/tm\\_dsp/jp/index.html](http://www.tmdisplay.com/tm_dsp/jp/index.html)



3.2inch WQVGA organic light emitting diode for mobile phones

## Eco-components

EC-5-003

Automobile parts

tires for trucks and buses

### Fuel economy Truck and Bus Tires ECOPIA M891II

It is necessary to develop the new generation tire for fuel saving and preserving environment of the earth. Especially, it is useful for truck and bus which are gas-guzzling cars to reduce the rolling resistance of its tires.

Bridgestone corporation has developed the low rolling resistance truck and bus tires, and has already launched to the market, dubbed ECOPIA line. ECOPIA has superior low rolling resistance for a long haul users keeping basic tire performances.

ECOPIA M891II has launched to the market as successor of ECOPIA M881.

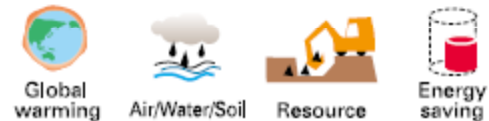
#### Bridgestone Corporation

10-1, Kyobashi 1-chome Chuo-ku, Tokyo 104-8340, Japan

Tel 81-3-3563-6972 Fax 81-3-3563-1165

E-mail

URL <http://www.bridgestone.co.jp/english/index.html>



TBR ECOPIA M891 II  
11R22.5 16PR '0611

ECOPIA M891II 11R225 for Truck

## Eco-components

EC-6-007

Packaging

cartcan

### CARTOCAN, an environment-conscious paper container for soft drinks

“CARTOCAN” is a paper container used for storing soft drink. The raw material comprises more than 30% domestic paper chips of Japan, and more than 15% forest-thinning wood which is obtained when the foresters take care of forest. The effective use of forest-thinning wood creates an income to the foresters and it contributes to the maintenance of the forest resource absorbing CO<sub>2</sub>. As the barrier film to protect the contents in the container, a ceramic deposited film (GL film) is used. Recycling of the containers is being promoted as that of non-metallic ones. Container sizes are 125ml, 195g, and 250g. “CARTOCAN” has won a Minister of Agriculture, Forestry and Fisheries Prize in the eco-products section of the eco-products grand prix in 2006.

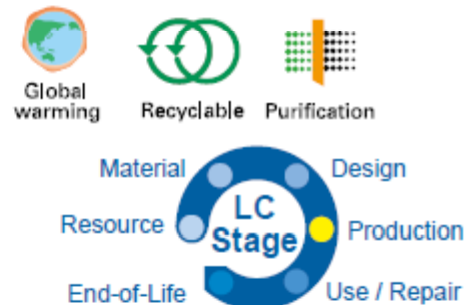
#### Conference for Spreading Paper Soft Drink Containers that Protect the Environment

1-5-1Taitou, Taitou-ku, Tokyo 110-8560, Japan

Tel Fax

E-mail [junji.nonoguchi@toppan.co.jp](mailto:junji.nonoguchi@toppan.co.jp)

URL <http://www.morikami.com>



## Eco-components

EC-7-003

Others

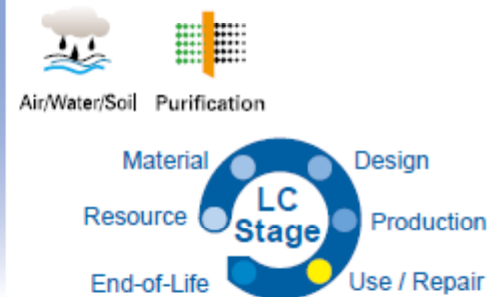
water treatment membranes

### Water Treatment Membranes & Systems

There are various types of water treatment methods and systems to adequately treat the water, and Toray specializes in water treatment by membrane separation technology. There are 4 types of membranes which can be selected by the size of the impurities which have to be separated from the raw water in order to produce the right water for the required purpose. The types of membranes are, from the smaller pore size sequentially: Reverse Osmosis (RO), Nanofiltration (NF), Ultrafiltration (UF) and Microfiltration (MF). The RO membrane has been used for the production of ultrapure water and seawater/brackish water desalination. Recently, it is used for the recycling and reuse of various wastewaters. The NF membrane has been used for the softening of water, removal of toxic and pesticide and the pretreatment for seawater desalination. The UF and MF membranes are used for recycling sewage water and producing drinking water from contaminated water.

#### Toray Industries, Inc.

2-2-1, Nihonbashi-Muromachi, Chuo-ku, Tokyo 103-8666, Japan  
Tel 81-3-3245-5115 Fax 81-3-3245-5344  
E-mail [Product@nts.toray.co.jp](mailto:Product@nts.toray.co.jp)  
URL <http://www.toray.jp>



Reverse Osmosis Membrane

## Eco-products

EP-1-024

Home electric appliances / Lightings

electric washing machines

### Full Auto Washer Dryer with Heat Pump System

#### <Heat pump dry system>

The latest heat pump technology achieves one third of power consumption (electricity cost), a half of water consumption, and a half of time while washing and drying 6kg of load in comparison with the previous model;NA-V81. 65C-degree dehumidified air dries even delicate cloths gently.

#### <Innovative 'Dancing wash technology'>

In addition to the traditional tumble washing, the brand new 'Dancing wash technology' makes your clothes very clean. This new function reverses the rotation quickly to squeeze the dirt out from cloths.

#### <'Mist refresh' function>

The mist generated by supersonic wave moistens the clothes to remove odor and to stretch the wrinkles. The mist is so fine that the water molecule can penetrate deeply into the fiber. The laundry will be refreshed after drying.

#### Matsushita Electric Industrial Co., Ltd.

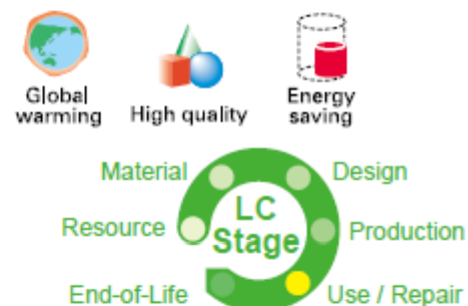
1-2 Kamisu-cho, Toyonaka, Osaka 561-0823, Japan

Tel 81-6-6331-6826 Fax 81-6-6334-0567

E-mail

URL

Available in : Japan



Full Auto Washer Dryer : NA-VR2200

## Eco-products

EP-1-038

Home electric appliances / Lightings

fluorescent lamps

### Self-ballasted compact fluorescent lamp with 1/4 power consumption

Self-ballasted compact fluorescent lamp "Neo-Ball Z REAL" is the substitute of an incandescent 100W lamp. It is an energy saving lamp having equal brightness with about 1/4 power consumption.

- **Energy Saving:** Power consumption has been reduced by 16% compared to that of the conventional product (EFA25EL).
- **Resource Saving:** In comparison with 120g of the conventional product (EFA25EL), the weight of this product is 110g; the resources of about 10% have been saved.
- **Elimination of harmful chemical substances:** Lead-free glass and solder are adopted.



EFA25EL/21-R and two other models

#### TOSHIBA LIGHTING & TECHNOLOGY CORPORATION

1-201-1, Funakoshi-cho, Yokosuka-shi, Kanagawa 237-8510, Japan  
Tel 81-46-862-2155 Fax 81-46-860-1203  
E-mail [takeo.yasuda@tlt.co.jp](mailto:takeo.yasuda@tlt.co.jp)  
URL <http://www.tlt.co.jp/>

## Eco-products

EP-1-076

Home electric appliances / Lightings

batteries

### eneloop HR-3UTG

As part of the new "eneloop lifestyle", eneloop is thought of as a "living battery", not a disposable one. eneloop can be used repeatedly and can be recycled. eneloop was created by SANYO Electric as the first "ready to use" rechargeable battery that can replace dry cells.

We believe that by creating this necessary product we are contributing to and helping maintain a beautiful world for our children and their future. eneloop was developed as the first product that embodies the "Think Gaia" SANYO vision. It can be safely recycled, is resource efficient and of course RoHS compliant. eneloop is more powerful than dry batteries, especially useful at low temperatures, longer lasting and rechargeable. Moreover, it can be used about 1000 times, which makes it economical. SANYO's eneloop unites a more comfortable lifestyle with a concern for the global environment.

#### SANYO Electric Co., Ltd.

1-1, Seta, 1-chome, Otsu City, Shiga 520-2134, Japan  
Tel 81-77-543-5671 Fax 81-77-543-5618  
E-mail [hira074299@sanyo.co.jp](mailto:hira074299@sanyo.co.jp)  
URL <http://www.sanyo.co.jp/>



eneloop HR-3UTG



## Eco-products

EP-1-077

Home electric appliances / Lightings

primary batteries

### Mercury-Free Silver Oxide Batteries

Silver oxide batteries, used in wristwatches and other small products, traditionally contain mercury to prevent the generation of hydrogen gas; a cause of the deterioration of batteries. Because the production of silver oxide batteries without mercury has generally been seen as unfeasible, the use of mercury in these batteries is exempted <sup>※1</sup>. Sony has been conducting research with the aim of realizing mercury-free silver oxide batteries since the 1990s. These efforts led to the development of the technologies; new zinc alloy powder, new anticorrosion material in anode and new zinc anti-corrosion process onto the collector. These technologies have facilitated the production of mercury-free batteries that deliver equal safety and performance as their conventional batteries.

※1 Under the EU Directive 2006/66/EC on batteries and accumulators, exemption provided for mercury content of maximum 2% by weight.

#### Sony Corporation

1-7-1 Konan Minato-ku, Tokyo 108-0075, Japan

Tel 81-3-6748-2111 Fax 81-3-6748-2244

E-mail

URL <http://www.sony.net>



Mercury-free silver oxide battery, SR626SW

## Eco-products

EP-1-121

Home electric appliances / Lightings

electric refrigerators

### Energy saving refrigerator for families with excessive cooling technology

A refrigerator for families using excessive cooling technology. It refrigerates food deliciously as it prevents the destruction of the cell.

-----<< M : Material >>-----

It uses recycled plastic for a board case or a caster. It is made easy to be recycled by the materials indication of the resin part.

-----<< E : Energy >>-----

For consumption electricity 620kWh/year of the product (ME-G50M) one year ago, MR-G52N the capacity of it is increasing realizes 530kWh/year. It turned the compressor smoothly by the new control (named "the new smooth wave inverter") and prevented outbreak of useless torque which improves energy saving and silence.

-----<< T : Toxicity >>-----

It uses non-Freon refrigerant isobutane R600a that global warming potential is extremely low.

#### Mitsubishi Electric Corporation

2-7-3, Marunouchi Chiyoda-ku, Tokyo 100-8310, Japan

Tel 81-3-3218-9024 Fax 81-3-3218-2465

E-mail eqd.eco@pj.MitsubishiElectric.co.jp

URL <http://www.mitsubishielectric.co.jp/>

Available in : Japan



Energy saving



Global warming



Recycled materials



Recyclable



MR-G57N-W

## Eco-products

EP-2-003

Carriers / Automobiles

automobiles

### New eco-friendly Prius with hybrid power

The new Prius model is equipped with THS, a new-generation Toyota Hybrid System known as Hybrid Synergy Drive, which means simultaneous evolution of ecology and power. It achieves world-beating fuel consumption of 35.5km/L and low emissions. The drive has been dramatically improved by the development of hybrid power. 10-15 mode drive.

(Ministry of land, Infrastructure and Transport figure)



Global warming



Energy saving



### Toyota Motor Corporation

1, Toyota-cho, Toyota-shi, Aichi 471-8571, Japan  
Tel 81-565-23-1341 Fax 81-565-23-5754  
E-mail [satoshi\\_aida@mail.toyota.co.jp](mailto:satoshi_aida@mail.toyota.co.jp)  
URL <http://www.toyota.co.jp>



Prius

## Eco-products

EP-6-015

Interior decoration / Exterior decoration or furniture

sanitary pottery, accessories

### NEOREST AH type : A toilet saving electricity and water

This toilet is equipped with "Hybrid Ecology system", which is a cleaning system of water flow from direct water pipes and new pump developed for this product. This technology reduces a quantity of water for cleaning the toilet to 5.5 liters, resulting in significant saving water compared with 13 liters of existing products. In addition, "Wonder Wave Cleaning" function, technology of washing a hip, repeats strong and weak spouting more than 70 times a minute, reducing a quantity of water nearly half compared with existing products with feeling fully washed. Also, this toilet achieved saving electricity. The timer saving power function turns off a power of the seat heater at the every time users set. Additionally, the super automatic saving power function learns the use's life pattern, and turns down the surface temperature of the seat and turns off the power of the seat heater automatically at the time user almost never use, achieving farther saving electricity.

#### TOTO LTD.

2-24-2, Sakurashinmachi, Setagaya-Ku, Tokyo 154-8540, Japan

Tel 81-3-5451-1110 Fax 81-3-5451-1049

E-mail

URL <http://www.toto.co.jp>



Global warming



Energy saving



NEOREST AH type CES9793Y

## Eco-products

EP-6-026

Interior decoration / Exterior decoration or furniture

ceramic tableware

### Recycling Ceramics "Rebirth of tableware - Re-shokki"

- The product is the ceramic tableware "RE-shokki" which used circulating-type resources for the first time in Japan. It is yielded by the recycling technology and the regeneration system at the place of manufacture, and by the network between the users in land. The green life 21 project was set up by the collaboration of 32 companies.
- The product in the photograph contains 20% of regeneration material, namely the crushed product of the spent tableware. The bending strength is 131MPa, which is 1.6 times large compared to that of the conventional tableware. The product has safety and practicability in the point of the water-absorbing capacity and the thermal shock resistance. The CO<sub>2</sub> discharge at the production is 2450kg/t, which is 3% less than that of the conventional tableware. The reduction effect is larger, as the blend ratio of the regeneration material is higher.
- We intend to contribute to the environment efficiency through the ceramic circulation system. It includes the simplification of manufacturing process, the restraint coloring agent, the loading efficiency at the distribution, the design considering life and washability, the repair service, etc.

#### Gifu Prefectural Ceramics Research Institute

3-11 Hoshigadai, Tajimi City, Gifu Pref. 507-0811, Japan  
Tel 81-572-22-5381 Fax 81-572-25-1163  
E-mail [hasegawa-yoshikazu@pref.gifu.lg.jp](mailto:hasegawa-yoshikazu@pref.gifu.lg.jp)  
URL <http://www.gl21.org/>

Available in : Japan, France and other countries



Recycled-Tableware "GL21-Oliva"

## Eco-products

EP-6-039

Interior decoration / Exterior decoration or furniture

heat pump hot-water supply system

### Eco-friendly water heater for residential use

Eco Cute is a household water heater that offers dramatic energy savings on the use of hot water, which normally accounts for about a third of a household's entire energy consumption. It generates hot water using atmospheric heat by means of a heat pump system and offers energy savings of around 30% compared with a conventional combustion type water heater together with a reduction in green house gas emission. The use of natural refrigerant CO<sub>2</sub> contributes to environmental conservation including the prevention of global warming.



#### Tokyo Electric Power Company

1-1-3 Uchisaiwai-cho Chiyoda-ku, Tokyo 100-8560, Japan  
Tel 81-3-4216-1111 Fax 81-3-4216-3479  
E-mail [kawashima.toshiyuki@tepco.co.jp](mailto:kawashima.toshiyuki@tepco.co.jp)  
URL <http://www.tepco.co.jp/en/index-e.html>



Available in : Japan, Europe

CO<sub>2</sub> refrigerant heat pump water heater (Eco Cute)

**Air Purifier Using Plasmacluster HD****Environmental performance**

DC motor and inverter control contribute to reducing energy consumption and achieving an annual electric bill of about 330 yen. (This is calculated based on power consumption during silent running and power charge per unit of 22 yen/kWh (tax included) as a rough standard.) Standby power consumption is 0.3W. The specific bromine flame retardants, which may produce poison gas, are not used, and soy ink and recycled paper are used for the instruction manual. Also, lead-free solder is applied to the basal plate and the bicapsular cable cord allows to place unit on the floor.

**Product performance**

Newly introduced high density Plasmacluster Ion enhances to inactivate airborne mold fungi and harmful bacteria and to eliminate airborne house dust in interior spaces.



Air Purifier FU-W53CX-W

**Sharp Corporation**

22-22 Nagaike-cho, Abeno-ku, Osaka, 545-8522, Japan

Tel +81-6-6625-0438 Fax +81-6-6625-0153

E-mail [eco-info@sharp.co.jp](mailto:eco-info@sharp.co.jp)

URL <http://sharp-world.com/>

URL [http://sharp-world.com/corporate/eco/csr\\_report/2008pdf/sharp\\_eall.pdf](http://sharp-world.com/corporate/eco/csr_report/2008pdf/sharp_eall.pdf)

Available in: Japan, ASEAN, Middle East

## LED solar power lighting

## Eco-friendly Earthquake-resistant Lighting System of the 21st Century

## Environmental performance

The solar LED lighting system directly converts solar energy to electric energy, which is stored in the batteries mounted in the system. When it gets darker outside and solar battery voltage output gets lower, electric energy stored during the daytime turns the LED lights on. It is a self-generation system without any utility power supply required.

- Solar power generation reduces CO<sub>2</sub> emissions by about 48 kg per year
- The LED light sources lasts about 40,000 hours and is free from mercury, resulting in significant waste reduction

## Product performance

- The system achieves the industry's brightest flux for solar LED lights at 1,800lm. (Classified as Class A for the safety illuminance recommendation when set up in 13m intervals along a 5m-wide street)
- Equipped with a seismoscope, the system provides light for two night at full mode when it detects seismic intensity of level 5(130-200gal) or stronger

## Sharp Corporation

22-22 Nagaike-cho, Abeno-ku, Osaka, 545-8522, Japan

Tel +81-6-6625-0438 Fax +81-6-6625-0153

E-mail [eco-info@sharp.co.jp](mailto:eco-info@sharp.co.jp)

URL <http://sharp-world.com/>

URL [http://sharp-world.com/corporate/eco/csr\\_report/2008pdf/sharp\\_eall.pdf](http://sharp-world.com/corporate/eco/csr_report/2008pdf/sharp_eall.pdf)



Solar-LED streetlight LN-LW3A1

Available in: Japan



**CY-SPA26D electric hybrid bicycle****Environmental performance**

- (1) More lightweight with a mounted lithium-ion battery (approx. 30% lighter in capacity ratio than the previous model, which uses a nickel metal-hydrde battery); extended mileage (by approximately 20% compared with the previous CY-SPE26DH model)
- (2) Comfortable running with automatic control program & long running distance. Includes a smart automatic control system that changes the motor output on uphill slopes depending on gradient and automatically switches the motor to a generator on downhill slopes. (Mileage can be extended by about 70% compared with Standard Mode without regeneration charging.)
- (3) Environmental BAA-compliant
- (4) Abolition of polystyrene foam for packaging.

**Product performance**

- (1) Battery light with reflector and four high-intensity white LED lights for the headlamp of the bike's light system. The taillight uses a brake lamp whose blink rate changes when the brake is applied in association with the operation of the rear brake lever.
- (2) Simple design with a new S-shaped frame featuring built-in cords and wiring

**SANYO Electric Co.,Ltd.**

Keihan Hondori 2-5-5 Moriguchi-city Osaka, 570-8677, Japan



Global warming



High quality



## Highly functional and eco-friendly office chair "Spina"

### Environmental performance

Spina chair has the following eco-friendly features.

Use of recycled materials: Parts made from 100% recycled polypropylene out of recovered battery cases are used for the mechanism cover, levers, etc.

Reduction of material use: The inner shell with numerous slits in the seat pan named "float bending seat" provides a cushion effect, reducing the amount of urethane compared with conventional products.

Material labeling: The materials used in most plastic parts are labeled to facilitate separation and recycling at the time of disposal.

### Product performance

With the passive slide seat (PSS) system that makes the seat sink and slide back when seated, and the active lumber support (ALS) system that makes the lumber part of the chair's backrest push forward, Spina chair supports the user's back properly even when sitting back and leaning or sitting forward. Instead of the user having to adjust to the chair, the chair adjusts to the user. This human-friendly Spina chair won the Gold Prize of the Good Design Award in 2007.

## ITOKI CORPORATION

4-12, Imafukuhigashi 1-chome, Joto-ku, Osaka, 536-0002, Japan

Tel +81-6-6935-2200 Fax +81-6-6935-2268

URL <http://www.itoki.jp/>

URL <http://www.itoki.jp/spina/>

URL <http://www.itoki.jp/udeco/communication/erreports.html>



Spina Chair

**NonFron Vending Machine with Heat Pump System: NS-9P36HP****Environmental performance**

A waste heat recovery heat-pump system of the NS-9P36HP is realized by placing the two external heat exchangers, one for cooling and the other for heating cycle, together in one unit. Equipped with this technology, the model provides more than twice effective heating operation than the FY 2005 model (NS-5R30) and achieves the year 2012 energy regulation by the Japanese government.

**Product performance**

The model contains a wide range of drinks and its easy-to-find color promotes sales.

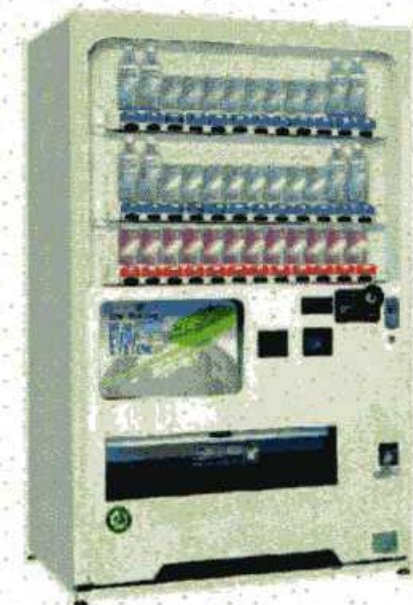


eco ideas

**Panasonic Corporation, Home Appliances Company**

3-4-74 Noji-higashi, Kusatsu City, Shiga, 525-0058, Japan  
Tel +81-77-566-4805 Fax +81-77-566-4843  
URL <http://panasonic.net/csr/>

Available in: Japan



NS-9P36HP

## Eco-products

EP-7-038

Building and civil engineering  
residential house

### Zero-utility-cost Houses

Combination of the above mentioned technologies can realize zero utility cost. While utility cost/year at an ordinary residential house amounts to 226,000 yen, that at highly heat insulated house adopting highly effective hot water unit, all electrification and mounting the photovoltaic generation system of 5.5 kW capacity amounts to minus 1,000 yen.

Annual CO<sub>2</sub> emission as environmental value can be reduced to 580 kg from 3090 kg of an ordinary residential house.

Evaluating by life cycle cost, the initial costs increase by approximately 2.6 million yen in total in order to equip the house with these systems, but considering the increased costs to be depreciated by the reduction of the utility charges, they can be repaid by approximately 13 years, which may be able to be proposed to possible users as economical advantages.

This house is becoming an important housing model, leading to the expansion of renewable energy and to the reduction of CO<sub>2</sub> emissions in Japan.

#### **Sekisui Chemical Co., Ltd.**

2-3-17, Toranomon, Minato-ku, Tokyo , Japan

Tel Fax

E-mail [kankyo@sekisui.jp](mailto:kankyo@sekisui.jp)

URL <http://www.sekisui.co.jp/>



Global  
warming



Energy  
saving



## Eco-products

EP-7-040

Building and civil engineering  
architectures

### NEC Tamagawa Renaissance City

This office is designed so that it has high earthquake performance and adequate capacity of building facilities for IT environment as well as comfortable indoor environment. From the planning and conceptual design stage, our way of thinking is based on “the environment management cycle”. The concrete targets for the environment countermeasure was set up and practiced through the life cycle of design, building, management, renovation and disposal. Taking the phrase “the thing we can do for the global environment” as a keyword, we are promoting the construction of ecology building, which contributes to maintenance and preservation of the global environment.

#### NIKKEN SEKKEI LTD

2-18-3 lidabashi, Chiyoda-ku, Tokyo 102-8117, Japan  
Tel 81-3-5226-3030 Fax 81-3-5226-3038  
E-mail [webmaster@nikken.co.jp](mailto:webmaster@nikken.co.jp)  
URL <http://www.nikken.co.jp>

Available in : Worldwide



An ecological super high-rise building that is considerate of global environment

## Eco-products

EP-7-047

Building and civil engineering  
architectures

### TOKYO GAS "Earth Port"

This building is aimed at being the Life-cycle Energy-saving Office. It was built on the concentration of the techniques of building, environment and facilities. The issue of building was to pursue the compatibility of the comfortable environment with the energy saving through the life cycles of the materials, while making the best use of natural energy.

The core space of building which had been traditionally closed was reexamined and "the ecological core" which works as a vertical path of light and wind was offered. Namely, corridor, elevator and staircase were connected with the showroom, and they were made to develop as atrium space which connects the each floor. Both sides lighting of the office and the maximum use of natural energy by natural ventilation are being attempted. The effective use of energy and resources is thoroughly being pursued: the use of heat-insulating material that has performance most suitable to the part of building; the active use of regenerated material; the use of rain water, etc.

#### NIKKEN SEKKEI LTD

2-18-3 Iidabashi, Chiyoda-ku, Tokyo 102-8117, Japan  
Tel 81-3-5226-3030 Fax 81-3-5226-3038  
E-mail [webmaster@nikken.co.jp](mailto:webmaster@nikken.co.jp)  
URL <http://www.nikken.co.jp>

Available in : Worldwide



Environmental Friendly Techniques

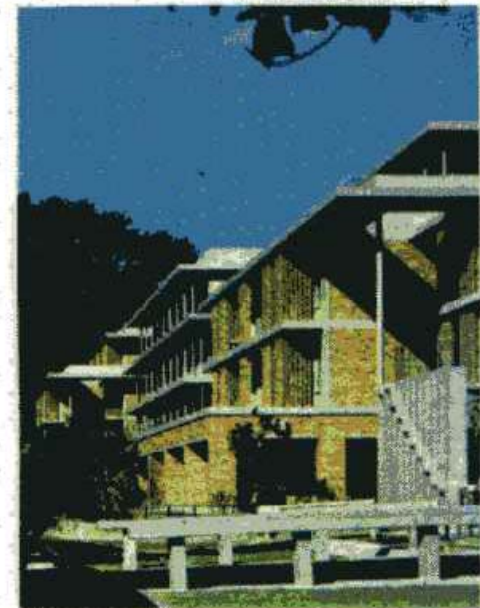


Life-cycle energy-saving architecture

## Amami Hospital for Foundation Jiaikai "The Wind Terrace Draws Breezes into the Wards"

## Environmental performance

The typical image of a psychiatric hospital is of sealed windows. The aim of this hospital was to make a "healing building," which would enjoy the benefits of Amami's abundant nature. The climate of Amami is subtropical, but there is a pleasant breeze in the shade of the trees. The building has deep eaves to take the strong sunlight gently into the interior. They allow open windows even on rainy days, so that the breeze flows throughout the building. The four wards have big bay windows, called "Wind Terraces." When the bay windows are opened, a natural breeze moves through the day room. Groundwater at a stable year-round temperature of 21°C is used for drinking, and also for cooling outside air. Roof planting and a solar water heating system are among other measures used, with the combined result that energy consumption is 1/3 of the consumption per unit area in a standard hospital.



## Nikken Sekkei Ltd

2-18-3 Iidabashi, Chiyoda-ku, Tokyo, 102-8117, Japan

Tel +81-3-5226-3030 Fax +81-3-5226-3038

E-mail [webmaster@nikken.co.jp](mailto:webmaster@nikken.co.jp)

URL <https://www.nikken.co.jp/en/>

URL <https://www.nikken.co.jp/en/projects/>

Available in: Worldwide

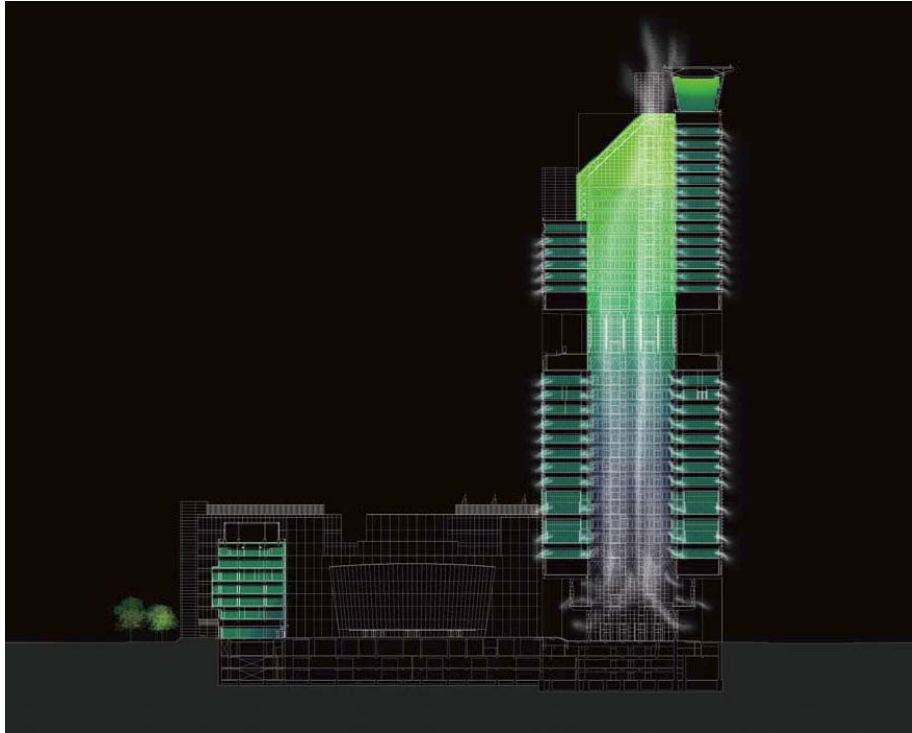


# China Beijing TV Station (Green Building)

by NIKI



180m high atrium uses gravity ventilation to create natural airflows

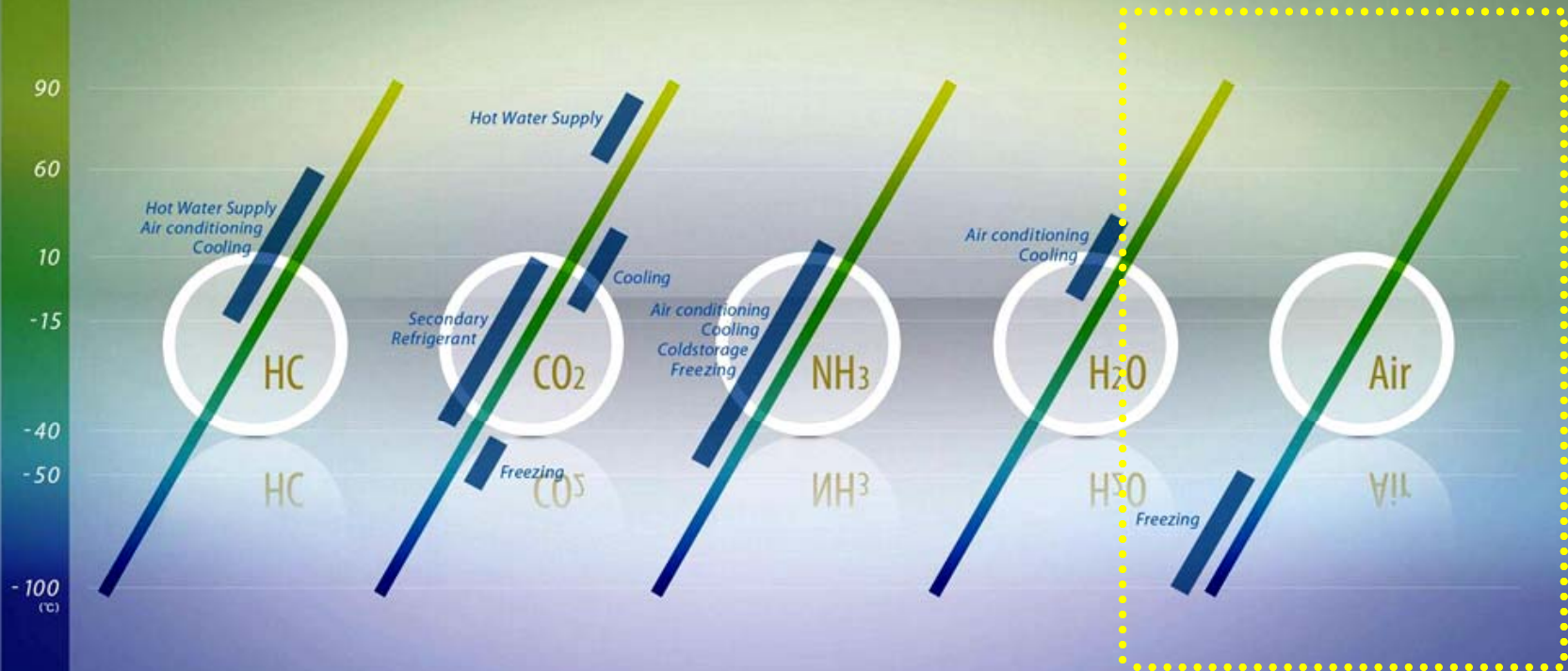


## Beijing TV Station by NIKKEN SEKKEI



8-3: View of building from northeast. The building's steel superstructure creates a three-dimensional stacking composition.  
北東側外観。鉄骨のスーパーストラクチャーによって立体的に積層させた構成としている。  
074 | 075

# "Natural Five" Refrigerants and Product Solutions

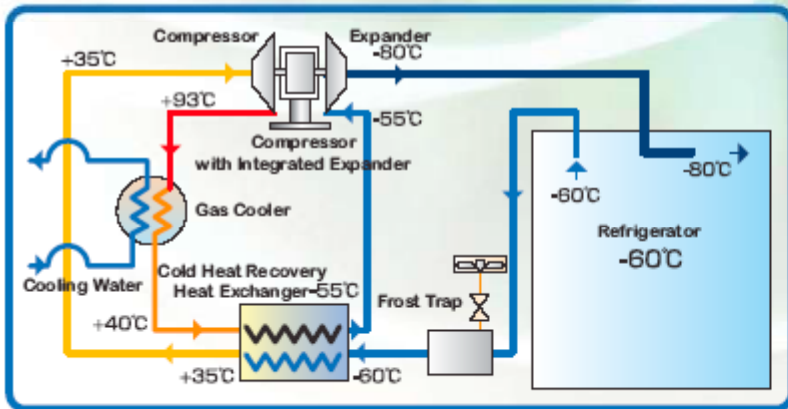


# Installation in Japan



This system is expected  
as a equipment that freezing  
keeps  $-50 \sim -100^{\circ}\text{C}$

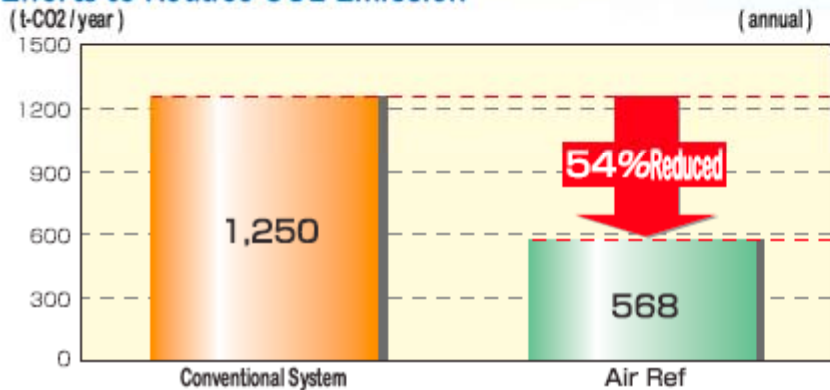
# 54% Reduction of CO2 Emission



**Target:** Ultra cold refrigerator for tunas and bonitos, rapid freezer, frost-破碎 etc.

- Using [Air] as the ultimate natural refrigerant, [Air Ref] is safe and eco-/people-friendly.
- Due to the turbo compressor with integrated expander, high COP can be achieved, saving energy by 50% comparing the conventional types.
- Due to its low operating pressure, exempt from legal regulations.
- Directly cooling the air, Air Ref does not require a fan coil unit or piping for refrigerant in the storage.
- Dehumidifying agent reduces frosting in the storage. Defrosting is not required.

## Efforts to Reduce CO2 Emission



## Case Study

2,000 ton Refrigerator  
Interior Temperature : -60°C

### Power Consumption

< Conventional System >  
R22 2 Stage Compression Refrigerator

**281 kW**

< Air Ref >

**128 kW**

# New Ammonia Refrigerant Freezer Developed by Mayekawa under the support of Technology development schemes of solution to global warming the MOE, Japan

*Fluorocarbons are strong greenhouse gases and should be replaced*

- Previous disadvantages of Ammonia refrigerant were overcome.
  - (1) Poor performance below  $-30^{\circ}\text{C}$ .
  - (2) Toxic and odorous, dangerous to use in the situations where there may be contact with people.
- The energy efficiency of the indirect cooling method was greatly improved by combining the use of CO<sub>2</sub> refrigerant.  
Electric Power consumption was reduced 20% for 15 years use period.
- High safety has been also achieved by reducing the amount of NH<sub>3</sub> refrigerant to approximately one sixth compared with original one.



# MBDC Cradle to Cradle Certification

(<http://www.mbdc.com/>)



- A multi-attribute eco-label that assesses a product's safety to humans and the environment and design for future life cycles.
- **Purposes:** To provides guidelines to help businesses implement the Cradle to Cradle framework
  - Focuses on using safe materials that can be disassembled and recycled as technical nutrients or composted as biological nutrients.
  - Materials and manufacturing practices of each product are assessed in five categories: Material Health, Material Reutilization, Renewable Energy Use, Water Stewardship, and Social Responsibility.
- **Criteria:** Products or materials from any industry sold to consumers or other businesses are eligible for certification. Certification criteria are the same for all product types.
- **Products covered:** <http://c2c.mbdc.com/c2c/list.php>
- Certification program offers four levels of product certification: **Basic, Silver, Gold, Platinum.**
- In order to be certified at a certain level, a product must meet the minimum criteria for that level in all five criteria categories: **Material Health, Material Reutilization, Renewable Energy Use, Water Stewardship, and Social Responsibility.**
- Cradle to Cradle services and certification are registered in the US, European Union, and Japan and are pending in several other countries.
- MBDC works with a Science Advisory Group to stay on top of best practices and cutting-edge scientific research and a Technical Advisory Group to improve program operations.

# EPEAT (Electronic Product Environmental Assessment Tool) (<http://www.epeat.net/>)



- One of the projects of Green Electronics Council
  - Green Electronics Council is a programme of the International Sustainable Development Foundation (non-profit corporation)
- Purposes: To help purchasers evaluate, compare and select electronic products based on their environmental attributes.
- Products covered: Desktop and laptop computers, thin clients, workstations and computer monitors that meet 23 required environmental performance criteria
- 95% of US federal ICT purchasing must meet EPEAT
- Criteria: Environmental criteria contained in IEEE 1680. Depending on % of 28 optional criteria that they meet above 23 baseline criteria, EPEAT registered products are rated Gold, Silver or Bronze
  - EPEAT Criteria: <http://www.epeat.net/Criteria.aspx>
    - EPEAT system and the environmental criteria for computers and monitors were originally developed in a 2-year multi-stakeholder process facilitated by the Zero Waste Alliance on a grant from the US EPA.
    - With the international registry expansion, EPEAT now makes it easy for purchasers in 41 countries around the world to choose greener electronics
  - IT purchasers in the US, Canada, Europe, China, Japan, Singapore, Taiwan, Australia, New Zealand, Brazil and Mexico can now evaluate, compare and select products available to them locally, based on the products' environmental performance in their country/region.



**GOLD**

Meets all 23 required criteria plus at least 75% of the optional criteria



**SILVER**

Meets all 23 required criteria plus at least 50% of the optional criteria



**BRONZE**

Meets all 23 required criteria

# Topten (<http://www.topten.info/>)



- **A web portal featuring up-to-date and targeted information easily available for European consumers**
- **Purposes:**
  - Guide consumers to the most energy efficient appliances and cars in Europe
  - To make efficient products the normal and best choice for consumers, retailers and manufacturers
- **Products covered: Cars, home electrical appliances, lamps, office equipments, consumer electronics and building components**
- **Criteria:**
  - **Cars: Best automobiles with combustion engines regarding their environmental soundness available in European countries**
  - **Other products: Most energy efficient in the respective categories in Europe**
- **Topten Pro section to help public procurers and other professional buyers to make use of the Topten approach:**
  - Provide clear guidance on what criteria buyers should include in tendering in order to buy the most efficient products on the market.
  - All the products on topten.info comply with these criteria.
  - Direct assistance provided by ICLEI Europe.
- **Launched in 2000 in Switzerland, 12 other national Topten sites established, and 4 countries currently building up their own national Topten sites. Each Topten website provides a selection of best appliances from the energy point of view. Thanks to its growth, it can now consolidate its political impact by establishing “Best of Europe”.**
- **Partners: Euro-Topten, Intelligent Energy Europe (IEE), WWF European Policy Office (EPO), Brussels, ICLEI**



# How to bring natural refrigerants 'Faster to Market'?

## Answer to this question.

- (1) Green Procurement by Green-Purchasing law
- (2) Ecodesign Regulation
- (3) Environmental Tax
- (4) Dissemination of information by Ecoproducts exhibition
- (5) Promote Eco-Innovation further
- (6) Certification of refrigerator using natural refrigerants