# Effective Action on Global Warming Prevention

## by the Electrical and Electronics Industries

### Our Initiatives for Creating a Low-Carbon Society

Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

The Japan Electrical Manufacturers' Association, / Japan Electronics and Information Technology Industries Association, / Japan Business Machine and Information System Industries Association, Communications and Information Network Association of Japan, / Association for Electric Home Appliances, / The Japan Refrigeration and Air Conditioning Industry Association, Japan Electric Lamp Manufacturers Association, / Japan Luminaires Association,

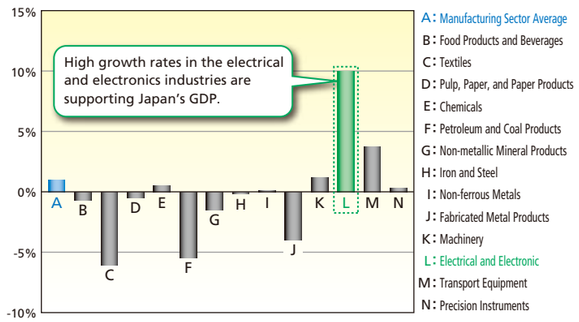
# 1 Global Warming Prevention for Sustainable Development

## Achieving Economic Growth and Environmental Conservation

### The Electrical and Electronics Industries Are Supporting Japan's Growth

We in the electrical and electronics industries produce products that sustain activities in areas as diverse as industry, business, households, transportation, and power generation. Through technological innovation and globalized businesses, we are building our potential for growth and contributing to Japan's economic expansion.
We play a major part in both the economy and in employment. In the manufacturing area, our industries compose approximately 17% (48.6 trillion yen) of Japan's 286 trillion yen industrial production and employ 17% (1.21 million people) of the total number of workers.

Average GDP Growth by Industrial Sector (1996-2005)



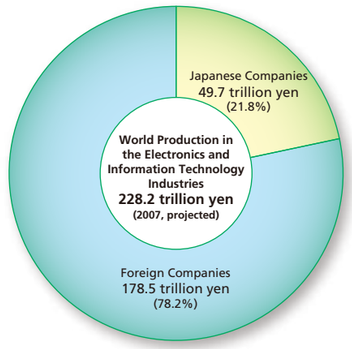

Source: Cabinet Office, "Gross Domestic Product Classified by Economic Activities"

### Japan's World-leading Electronics and Information Technology Industries

Global electronics and information technology markets have been growing rapidly.
Japanese companies hold approximately 22% of these markets, with output of 50 trillion yen.
Japanese companies command major shares in digital home appliances such as photographic and video equipment*1 (86%), televisions (39%), and DVDs and VTRs (41%).
Japanese companies also hold large shares in electronic components (43%), display devices (25%), semiconductors (21%), and other electronic component and device areas.

*1: 'Photographic and video equipment' includes digital cameras, and video cameras.

Share of World Production of Japanese Companies in the Electronics and Information Technology Industries

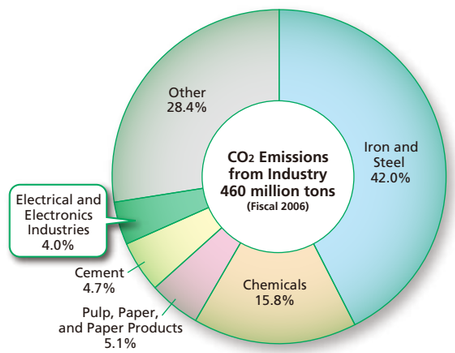



Source: Japan Electronics and Information Technologies Industries Association, "2008 Production Forecasts for the Global Electronics and Information Technology Industries." (December 2007)

### $CO_2$ Emissions from Electrical and Electronics Industries in Japan's Industrial Sector

We are working to achieve sustainable development and are actively pursuing measures to prevent global warming while maintaining growth.
In fiscal 2006, the electrical and electronics industries were responsible for only 4% of Japan's industrial $CO_2$ emissions.

$CO_2$ Emissions from Japanese Industry




Source: Results and Future Issues Pertaining to the Fiscal 2007 Follow-up to the Voluntary Action Plan on the Environment

## Approaches to Global Warming Prevention

### Making Contributions at All Stages of the Product Lifecycle

In addition to our efforts to reduce $CO_2$ emissions in product manufacturing, we are also working to reduce emissions from power generation by promoting the adoption of nuclear energy, improving the efficiency of thermal power generation, and expanding the use of renewable energy.
We are also working to encourage the use of energy efficient products to help reduce $CO_2$ emissions caused by product use. Through efforts such as these, we are to addressing global warming in both energy supply and demand, and bringing us closer to a low-carbon society.

**Effective Action on Global Warming Prevention**

**Improving Production Efficiency and Promoting Energy Conservation**
- Production process innovations
- Improving Energy Efficiency

$CO_2$ Emission Reductions at the Manufacturing Stage

**Development and Promotion of High-efficiency, Energy-saving Equipment**

**Energy-saving Devices**
- Semi-conductor devices
- Liquid crystal panels
- Electronic components

**Energy Demand**
Promoting Green IT and the use of energy efficient products
- Household, business, and industrial equipment
- IT equipment and solutions

**Energy Supply**
Supporting high-efficiency supplies of electricity
- Nuclear power generation / Combined thermal power generation
- Renewable energy equipment

**Improving efficiency of distribution**
- Modal shifts
- Adoption of fuel-efficient vehicles
- Improving transportation efficiency

**Energy-saving measures for offices**
- Higher efficiency air conditioning and lighting
- Better energy consumption measurement and management

**Contributing to public efforts**
- Energy-saving Appliances Popularization Forum
- Environmental Household Account book

**Creation of a Low-carbon Society**

Households / Commercial

Contributing to reductions of $CO_2$ emissions from product use

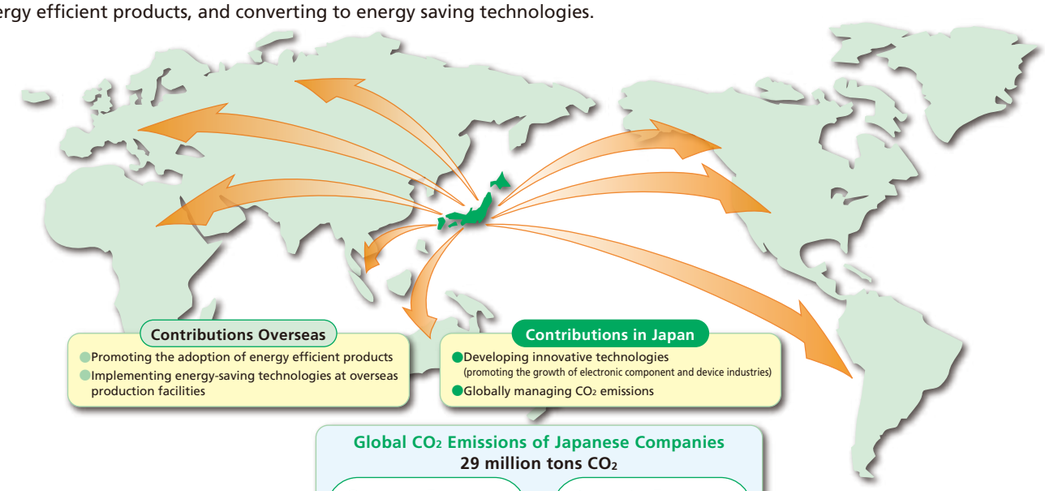
Industry / Transportation

Contributing to reductions of $CO_2$ emissions from power generation

**Supply for Low Carbon Energy**

### Contributing to Technological Innovation Around the World

Through technological innovation, we are working to reduce the $CO_2$ emissions of our global base by promoting the adoption of energy efficient products, and converting to energy saving technologies.



**Contributions Overseas**
- Promoting the adoption of energy efficient products
- Implementing energy-saving technologies at overseas production facilities

**Contributions in Japan**
- Developing innovative technologies (promoting the growth of electronic component and device industries)
- Globally managing $CO_2$ emissions

**Global $CO_2$ Emissions of Japanese Companies**
**29 million tons $CO_2$**

Overseas Emissions 10.5 million tons $CO_2$ + Domestic Emissions 18.46 million tons $CO_2$

50 primary companies (2006)

Source: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

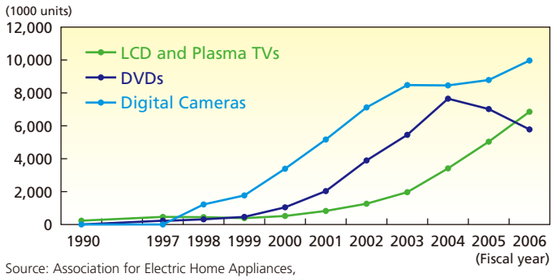
# 2 Reducing $CO_2$ Emissions from Manufact uring Through Technological Innovation

## Progress of the Voluntary Action Plan on Global Warming Prevention

### Improving Production Capacity to Respond to Increases in Demand

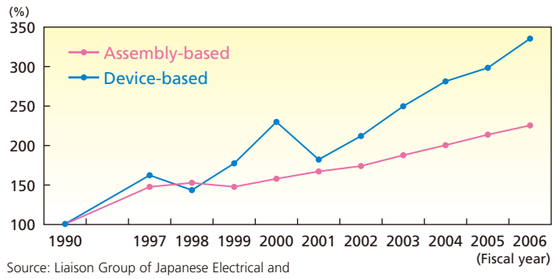
In recent years, the demand for digital home appliances, IT equipment, and mobile phones has rapidly expanded. Assembly-based manufacturing facilities are being constructed overseas, in order to meet this strong demand. At the same time, domestic production capacities are being increased in facilities producing electronic components and devices, for which precision processing is crucial.

Domestic Shipments of Digital Home Appliances




Source: Association for Electric Home Appliances, "Electric Home Appliance Industry Handbook 2007."

Growth of Value of Actual Production*2 by Area in the Electrical and Electronics Industries (compared to fiscal 1990)

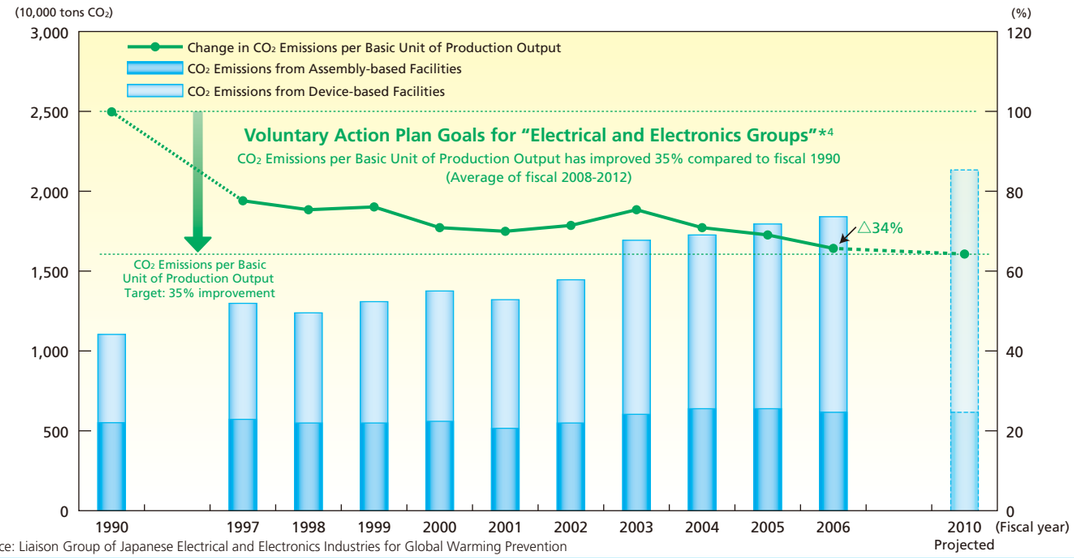



Source: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

### Voluntary Action Plan on Global Warming Prevention

In 1997, we began the Voluntary Action Plan on Global Warming Prevention and since then, we have worked toward greater energy efficiency in our manufacturing activities through our common goal of "improving $CO_2$ Emissions per Basic Unit of Production Output". As we augment our domestic production capacities, $CO_2$ emissions have grown. However, significant gains have been made in $CO_2$ emissions per basic unit of production output, which has led us to set more ambitious targets since fiscal 2007, and expand our efforts to include office areas, as well as at headquarter facilities.

$CO_2$ Emissions per Basic Unit of Production Output*3 in the Electrical and Electronics Industries (compared to fiscal 1990) and $CO_2$ Emissions by facilities




Source: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

*2: Value of Actual Production: Nominal production corrected with the Corporate Price Goods Index (Electrical Machinery and Equipment) from the Bank of Japan.

*3: $CO_2$ Emissions per Basic Unit of Production Output = $\frac{CO_2 \text{ Emissions}}{\text{Value of Actual Production}}$

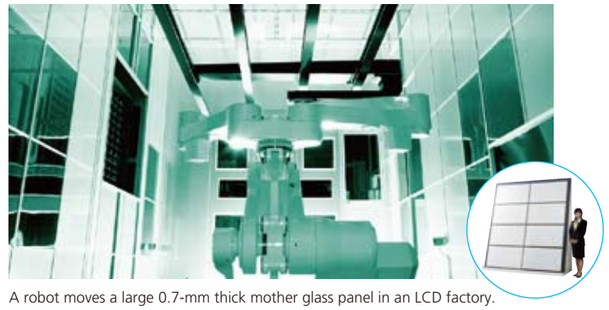
*4: "Electrical and Electronics Groups": Japan Electronics and Information Technology Industries Association (JEITA), The Japan Electrical Manufacturers' Association (JEMA), Communications and Information Network Association of Japan (CIAJ), Japan Business Machine and Information System Industries Association (JBMIA)

## Promoting Energy Efficient Manufacturing

### Innovating Production Processes

As wafer sizes increase in semiconductor manufacturing, and mother glass panels become larger in LCD and plasma display production, the production efficiency of domestic makers of electronic components and devices has drastically increased through the use of innovative production processes. This has also resulted in significant improvements in $CO_2$ Emissions per Basic Unit of Production Output. For example, domestic LCD panel factories reduced their $CO_2$ emissions per manufacturing area by 50% by fiscal 2006 (compared to fiscal 1998).

A 300mm-wafer compatible semiconductor plant.



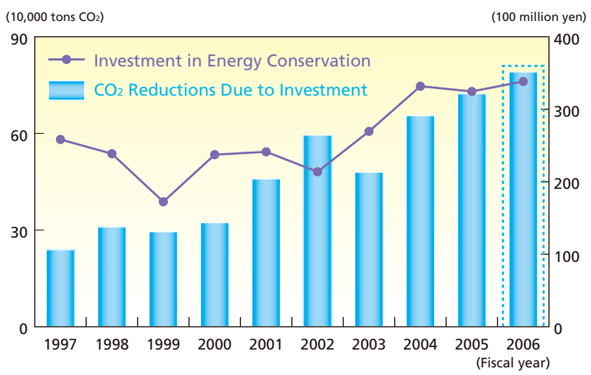
A robot moves a large 0.7-mm thick mother glass panel in an LCD factory.

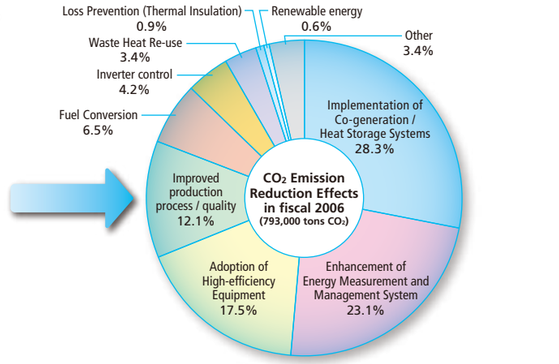
Source: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

### Improving Energy Efficiency

Since 1997, we have annually invested over 20 billion yen to save energy in our factories. This has resulted in cumulative $CO_2$ emission reductions of approximately 5 million tons for the 10 years from fiscal 1997.

$CO_2$ Emission Reduction Effects of Energy Conservation Investment by the Electrical and Electronics Industries




In semi-conductor factories, humidification methods were changed in the clean rooms, and zone air conditioning systems were implemented, which enhance the air purity only in wafer transfer areas.
($CO_2$ emission reductions of 4,100 tons per year.)

In LCD manufacturing plants, co-generation systems have been installed to use LNG (liquid natural gas), which is clean energy, to generate electricity on-site.
($CO_2$ emission reductions of 76,000 tons per year.)

Source: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

# 3 Creating Products and Services to Build a Low-Carbon Society

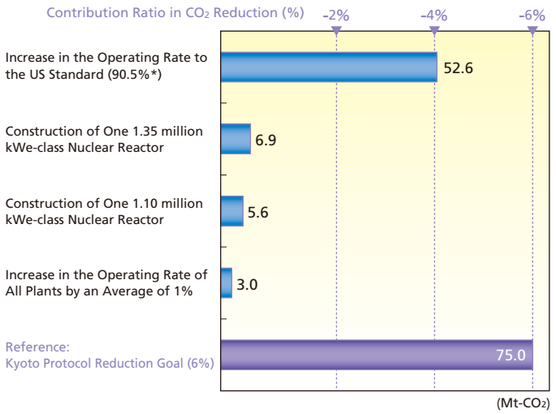
## Energy Supply: Efforts to Support Efficient Generation of Electricity

### Promoting Nuclear Power Generation and Increasing the Efficiency of Thermal Power Generation

Nuclear power is very suitable for a large-scale, stable supply of electricity, and does not emit any $CO_2$ to generate power. For these reasons, nuclear power generation is gaining renewed attention internationally as a way of addressing concerns about both energy security and global warming. In Japan, expanded facilities and improved operating rates have resulted in major $CO_2$ reductions. Japan's electrical and electronics industries provide highly reliable equipment to meet the requirements for the nuclear power industry in the world. We are also working in thermal power generation, which supplies more than 70% of the world's electricity, by offering combined-cycle electricity generation systems*5 that boast world-class generating efficiencies.

*5: Combined-cycle electricity generation systems use both gas and steam turbines to generate power.

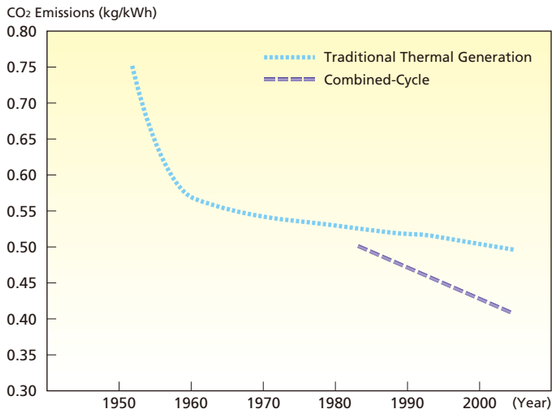
$CO_2$ Emission Reduction Effects from Increases in Nuclear Power Plants and Higher Operating Rates




* Average value from 2000-2004 (Japan's average operating rate is 72.8%)

Source: Calculation by The Japan Electrical Manufacturers' Association

$CO_2$ Emissions Reduction of Traditional Thermal Power Generation and Combined-Cycle Generation



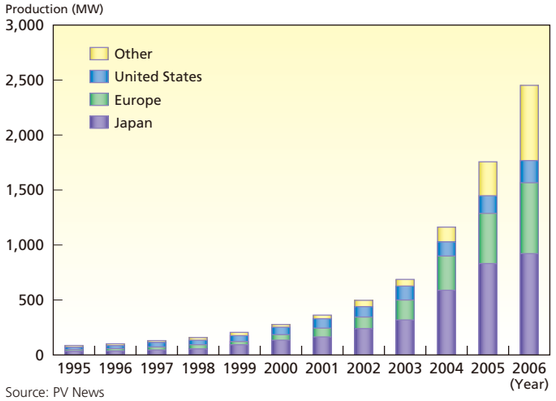

Note: Figures are for $CO_2$ emissions when converted to natural gas.

Source: MHI Technical Review Vol.45 (2008)

### Expanding the Use of Renewable Energy

New renewable energy technologies, such as wind and photovoltaic power generation are coming into greater use, especially in Japan, North America, and Europe. Japan's electrical and electronics industries have been a part of this change, by promoting the mass production of PV cells. With lower costs and higher efficiencies, we have captured a 40% share of production. Furthermore, we are conducting proof-of-concept trials across the country, in preparation for the use of stationary fuel cells in future household co-generation systems.

Global Production of PV cells




Source: PV News

Nishi-Harima Branch Office, Hyogo Prefecture, Japan

Buena Vista Wind Farm in California, USA

Stationary Fuel Cell Units

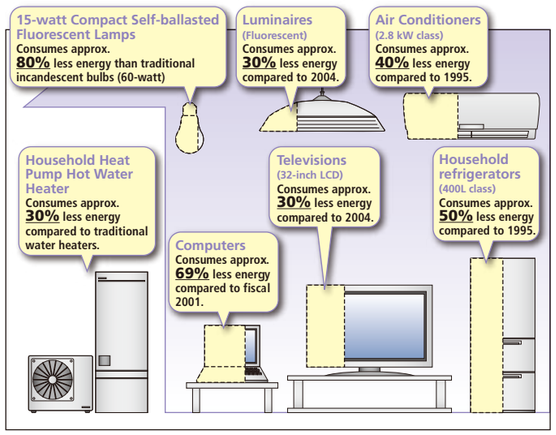
## Energy Demand: Promoting Energy-saving Appliances and Green IT

### Developing and Promoting the Adoption of Energy-saving Appliances

We have been working to improve our products' energy-saving capabilities and to develop new technologies, which led to many of our appliances and office machines achieving "Top Runner" standards*6 under the Energy Conservation Law. We also set industry goals for the reduction of standby power consumption, which has successfully led to the reduction of standby power consumption for the main types of consumer electronics to less than 1 W. The $CO_2$ reduction effect from the gain is up to 26 million tons (based on government calculations - The effect of Top runner into commercial and residential sector). In October 2007, we established the "Energy-saving Appliances Popularization Forum" to call for the greater replacement of energy-saving appliances and more energy-conscious use of home appliances.

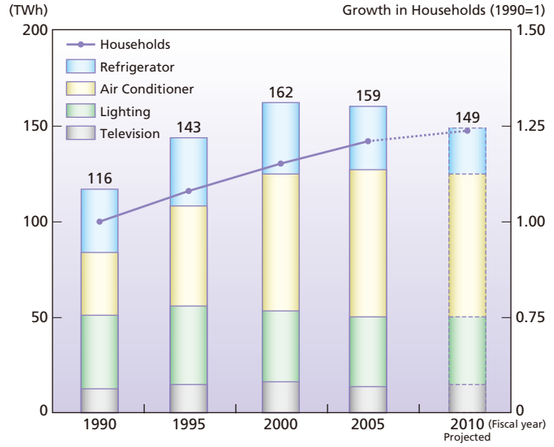
*6: Top-Runner Standard: The standard mandates improvement of energy consumption of home appliances and automobiles beyond products currently on the market.

Energy Efficiency Improvement of Main Types of Home Appliances




Sources: Computers: Energy Conservation Center; Other: Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

Household Growth and Total Power Consumption of Main Home Appliances in Japan

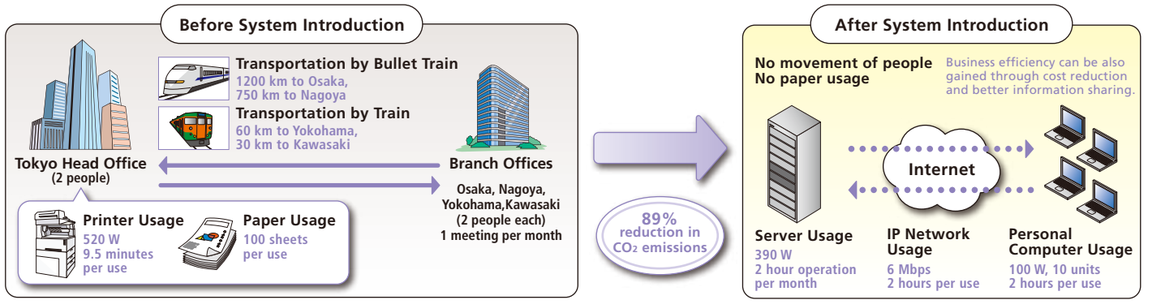



Source: National Institute of Population and Social Security Research, "Household Projections for Japan (National Statistics)"; Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

### "Energy Conservation for IT" and "Energy Conservation Through IT"

With the development of the information society, the amount of IT equipment in use, such as personal computers and servers, is increasing drastically. Japan's IT industries are working to reduce the energy consumption of IT equipment, data centers, and network infrastructure, and to provide IT to develop energy-saving systems and services. In February 2008, we established the "Green IT Promotion Council" to foster close collaborations between government, industry, and academia in technological innovation and to promote efforts to reduce the environmental impact of IT.

Example of Energy Conservation Through IT, Teleconferencing System

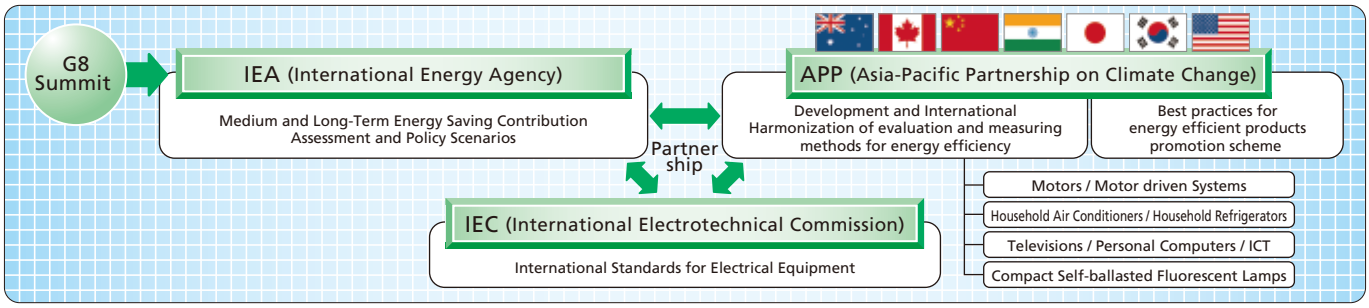



Source: NEC

# International Co-operation to Reduce Greenhouse Gases

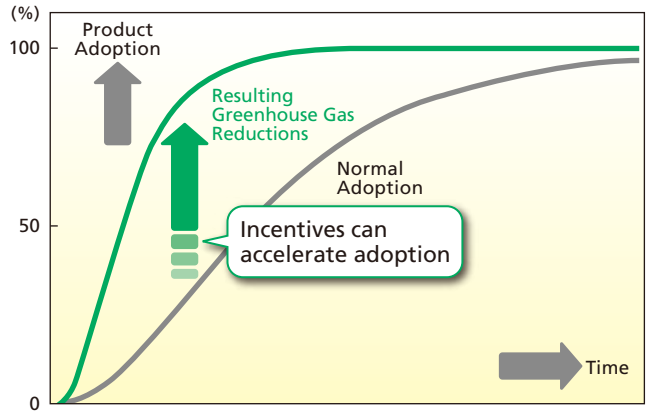
## Methods for Evaluating Energy Efficient Products

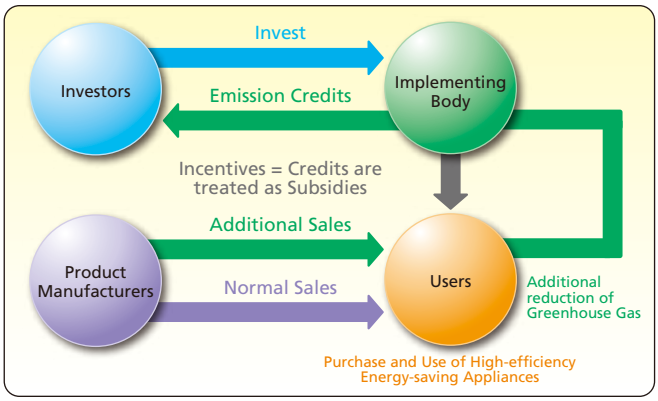
To promote the global adoption of energy efficient products, Japan and many other countries have proposed evaluation and measuring methods for energy efficiency in international markets.




## Product CDM (Clean Development Mechanism) Methods

To promote the use of energy efficient products in developing countries, we are developing incentives based on greenhouse gas emission credits.




## International Partnerships to Reduce Greenhouse Gases

In the semiconductor and LCD areas, the electrical and electronics industries in a large number of countries have partnered to create common environmental targets, and reduce the use of alternate freons (PFCs, etc.).

**World Semiconductor Council (WSC): Semiconductor industries in Japan, Europe, the US, South Korea, and Chinese Taipei** (participation by China expected beginning in 2011)
Reduction of total output of PFCs to 10% below 1995 levels by 2010.

**World LCD Industry Cooperation Committee (WLICC): LCD display device industries in Japan, South Korea, and Chinese Taipei.**
Reduction of total output of PFCs to less than 0.82 MMTCE (million metric tons of carbon equivalent) by 2010.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As of June, 2008 (3,000)