# Japan's Efforts to Realize a Low Carbon Society

**(Current Situation of Japan)**

- **Japan has achieved the world's highest level of energy efficiency in steel and cement production (for example, EU, China, United States, and Russia uses 1 to 1.25 times more energy to produce one ton of steel compared to Japan - as of FY 2003.)**
- **Nuclear energy is a core power source accounting for about one-third of total electricity generation.**
- **Compared to other major industrialized nations, public transport has a distinctively high share. (Japan: 46.7%, UK: 13.1%, Germany: 20.7%, France: 16.1%, US: 22.4%)**
- **The accumulative sales of Toyota hybrid automobiles in Japan and overseas was about 1 million units by April 2007 .**
- **Since 1999, Japan has been the largest producer of solar cells in the world.**
- **Japanese high-end air conditioners are at the world's highest level of energy efficiency.**
- **The introduction of the Cool Biz and Warm Biz campaigns realized a 2.55 million ton reduction of carbon dioxide (Winter 2005 and Summer 2006).**

# Examples of Japan's Policies and Measures

## Top Runner Program based on the Law concerning the Rational Use of Energy

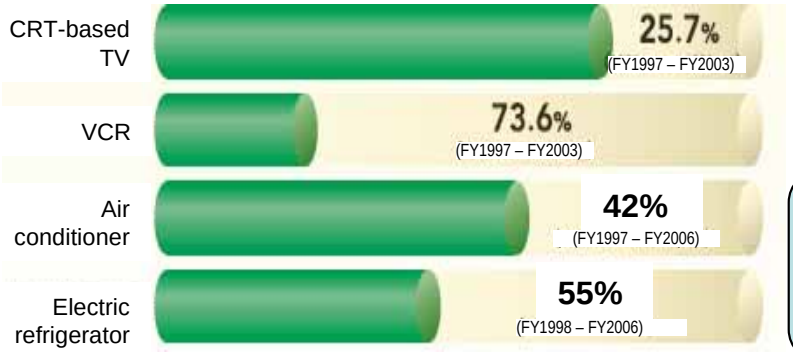
### Program Outline

・Based on the Law concerning the Rational Use of Energy, energy saving standards for home appliances and automobiles are determined by the Top Runner Method (see Note). the standards are imposed upon manufactures. For the manufacturers that do not meet the standards, measures including advice, announcement, orders, and fines (less than 1 million yen) are taken.

**Note: Top Runner Method**

**This concept calls for products to have better performance than the best product currently on the market.**

Efficiency Improvement of Home Appliances




## Mandatory Greenhouse Gas Accounting and Reporting System

### System Outline

・Based on the Law Concerning the Promotion of the Measures to Cope with Global Warming, This system requires large emitters to report their GHG emissions to the government. The government then enables the public to access the gathered data.

**The Public / Businesses**

<Accounting by>
・Business
・Business Type
・Prefecture

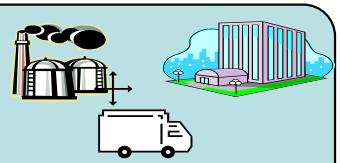
**Accounting/Announcement**

**Government**

**Reporting**

Note: Disclosed when requested

・Targeted businesses are those that emit more than the fixed volume of greenhouse gases
・Targeted sectors are industrial, business (including the public sector), and transportation sectors
・Calculation shall be done for the six gases for each business establishment (each company for the transportation sector)



## Initiatives taken by Government Agencies

### National/Prefectural/Municipal Action Plans

・Based on the Law Concerning the Promotion of the Measures to Cope with Global Warming, the national government, prefectures, and municipalities have taken the initiative and established a plan to reduce greenhouse gas emissions during their clerical works and projects.

Double Glass

Solar Panel

### Global Warming Prevention Measures Regional Promotion Plan

・Based on the Law Concerning the Promotion of the Measures to Cope with Global Warming, local public authorities have established deliberate and comprehensive measures to reduce greenhouse gas emissions according to the region's natural and social conditions.

## Raising Public Awareness

### Team Minus 6%

・A large scale national campaign for the prevention of global warming started in April 2005 to realize the "6%" reduction in greenhouse gas emissions based on the Kyoto Protocol. The Team Leader is the Prime Minister and the sub-leader is the Minister of the Environment.

・Individuals are invited to participate in daily global warming prevention activities such as "COOL BIZ," "WARM BIZ," and "Hello! Environmental Technology."

COOLBIZ WARMBIZ

### (National / Prefectural) Japan Center for Climate Change Actions Voluntary Advisors for Global Warming Prevention Activities

(1) National Center: Established by the Minister of the Environment based on the Law Concerning the Promotion of the Measures to Cope with Global Warming with the aim to raise public awareness regarding anti-global warming measures.
(2) Prefectural Centers: Established by the Prefectural Governors based on the Law Concerning the Promotion of the Measures to Cope with Global Warming.
(3) Advisors: Based on the Law Concerning the Promotion of the Measures to Cope with Global Warming and with the trust of the Prefectural Governor, persons who are knowledgeable of global warming prevention measures and have considerable experience in publicity and educational campaigns educate and advise the public.

# Image of a Low Carbon Society in the Near-future

## A Low Carbon approach to Land-use / Nature / Transportation

### Living in harmony with Nature

<Coexisting with Forests>
- More effective use of carbon sink from forests
- Timber production and bio-energy supply

Wood Chip Burning Boiler

<Knowing Nature>
- Learning and participating in Nature Conservation

### Low Carbon Transportation System

- Advanced road traffic system, promoting Eco-drive
- Use of highly efficient railways, airplanes, and ships
- Promotion of low-carbon fuels such as bio fuel and hydrogen
- Diffusion of high-efficiency fuel cell vehicles and electric vehicles

### Low Carbon Community Development

- Appropriate population densities (compact cities), shortening of commuting distances, and increased use of public transportation
- Local production for local consumption, rejuvenate primary industry through regional branding

**Promoting Local Production For Local Consumption**

**~ Aiming toward creating a "face-to-face" relation between consumers and producers ~**


Agricultural Production Bureau,
Ministry of Agriculture, Forestry, and Fisheries

## A Low Carbon Industry and Business

### Low Carbon Office

- Promoting Buildings Energy Management Systems
- Energy efficient buildings
- IT progress (promoting paperless)
- Further promoting recycling

### Low Carbon Production System

- High efficiency boilers
- Cascade use of surplus energy generated at factories and its reuse by other entities
- Effective use of carbon capture and storage

### Utilization of Low Carbon Energy

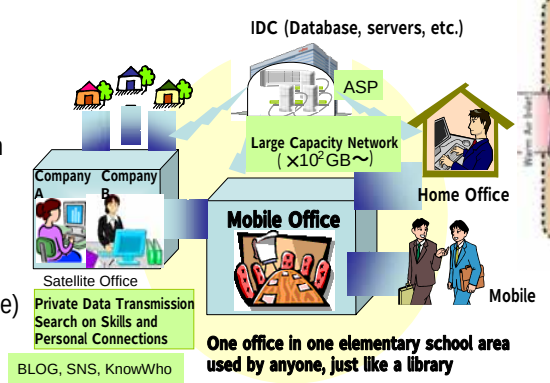
- Use of residual bio-fuels
- Solar water heaters
- Solar power generation
- Fuel switching to natural gas fuel
- Promotion of nuclear power generation
- Cleaner use of coal

### Development of Low Carbon Businesses

<Image for New Industry Development>
- Eco-business education
- Greater international competitiveness through development of low carbon technologies
- Strategic transfer of environmentally sound technologies to developing nations

<Working Styles>
- Promotion of SOHO (Small Office/Home Office)

[Example of SOHO]




## A Low Carbon Residence and Household

### Awareness Raising = Lifestyle Change

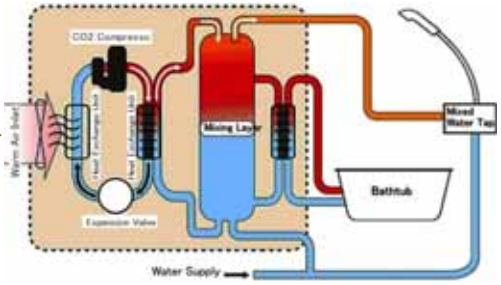
- Engaging in eco-life
- Appliances and vehicles pre-equipped with environmental impact display system

### Utilizing Solar Energy

- Solar power generation
- Solar water heaters
- Greening of rooftops

### Widespread Diffusion of Energy Efficient Devices and Well Insulated Homes

- High efficiency lighting
  [filament light bulbs→ fluorescent lamps, HID lamps, LED, etc.]
- Well insulated homes
- Ultra- efficient air conditioners
- Reduction of standby power consumption
- Effective water heating with heat pump
- Fuel cell cogeneration




[Heat pump system]

# Image of a Low Carbon Society in 2050

## A Solar Society

A society making high use of the solar energy

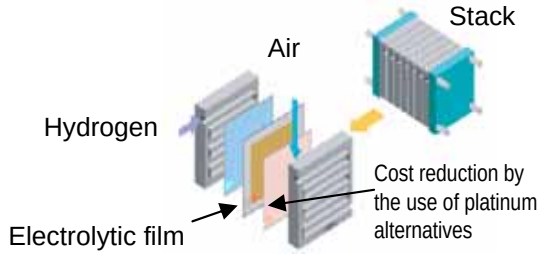
- Low-cost and high-efficiency solar cells by using new materials → A significant improvement in power generation efficiency from the current 15 – 20% to over 40%, as well as its cost reduction to the level of thermal power generation
- Thin-film solar cells → Flexible solar cells with no restriction of installation places
- Low-cost rechargeable batteries with increased capacity
- Hydrogen generation from the solar energy by photocatalysts

Thin-film silicon solar cells

## A Hydrogen Society

A society making high use of hydrogen

- The wide use of polymer electrolyte fuel cell automobiles → The wide use of fuel cell vehicles to realize zero emissions in the automobile sector, which currently accounts for nearly 20% of the global emissions
- Efficient hydrogen storage technology → By improving hydrogen storage capacity from the current 3kg to 7kg, the mileage of fuel cell vehicles rises to nearly 700km, the level of the conventional cars.
- Fuel cells to satisfy household energy demands



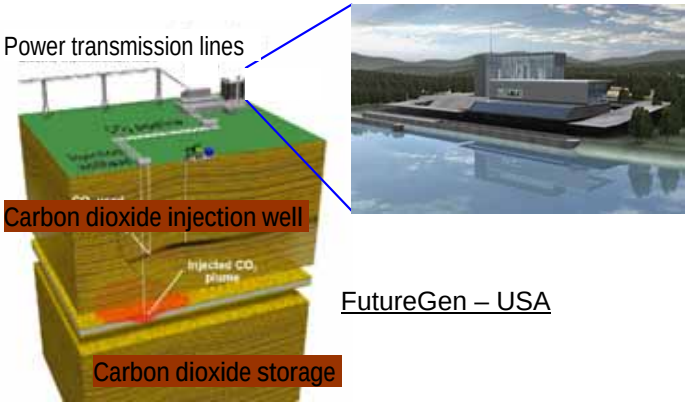

Solid Polymer Fuel Cell (Polymer Electrolyte Fuel Cell) Configuration

## Zero Emissions

A society making high use of CO2-free energy resources

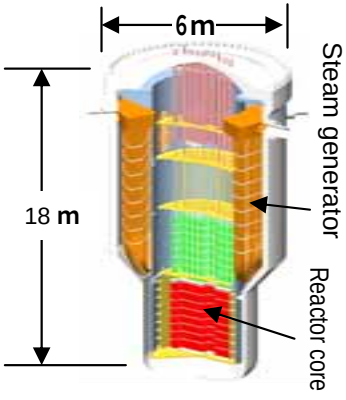
- Innovative zero-emissions coal-fired power generation → Zero-emissions coal-fired power generation, which currently accounts for nearly 30% of the global emissions
- Next generation light water reactors, small and medium reactors, high temperature gas-cooled reactors, and fast breeder reactor (FBR) cycles → A significant increase of zero-emissions nuclear power generation

Zero-emissions Coal-fired Power Generation Plant




FutureGen – USA

Small and Medium Reactor




## Ultra High Energy Efficiency Technology

A society realizing extremely efficient production processes ; having low-carbon-emitting production systems ; and making ultra-high efficient use of energy at homes and offices

- Iron and steel making technology to partially substitute hydrogen for coke as a reducer
- Cascade use of waste heat energy, and production technology to fully utilize the by-products of other industries as raw materials
- Next generation energy-saving devices including high-efficiency semiconductors.
- Superconducting power transmission without powerloss
- Ultra high energy efficiency heat pumps exploiting waste energy

→ The IEA estimates, in its 2050 reduction scenario, that the global diffusion of high energy efficiency technology reduces the global emissions by 25%.

Hydrogen-Reduction Technology in Iron and Steel Making Process