Toward COP 15

Japan's Initiative on Climate Change

Ministry of Foreign Affairs of Japan

May, 2009 Version 3

Today's Agenda

1. The current state of climate change

2. Issues to tackle

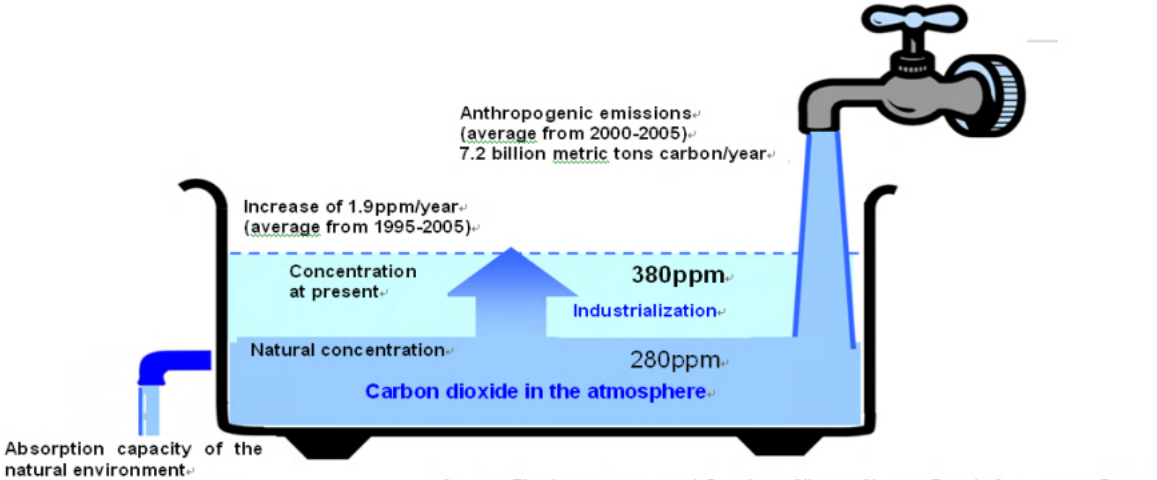
3. Towards a low-carbon society

1. The current state of climate change

A dried-up swamp from lack of rainwater in the Sahara region

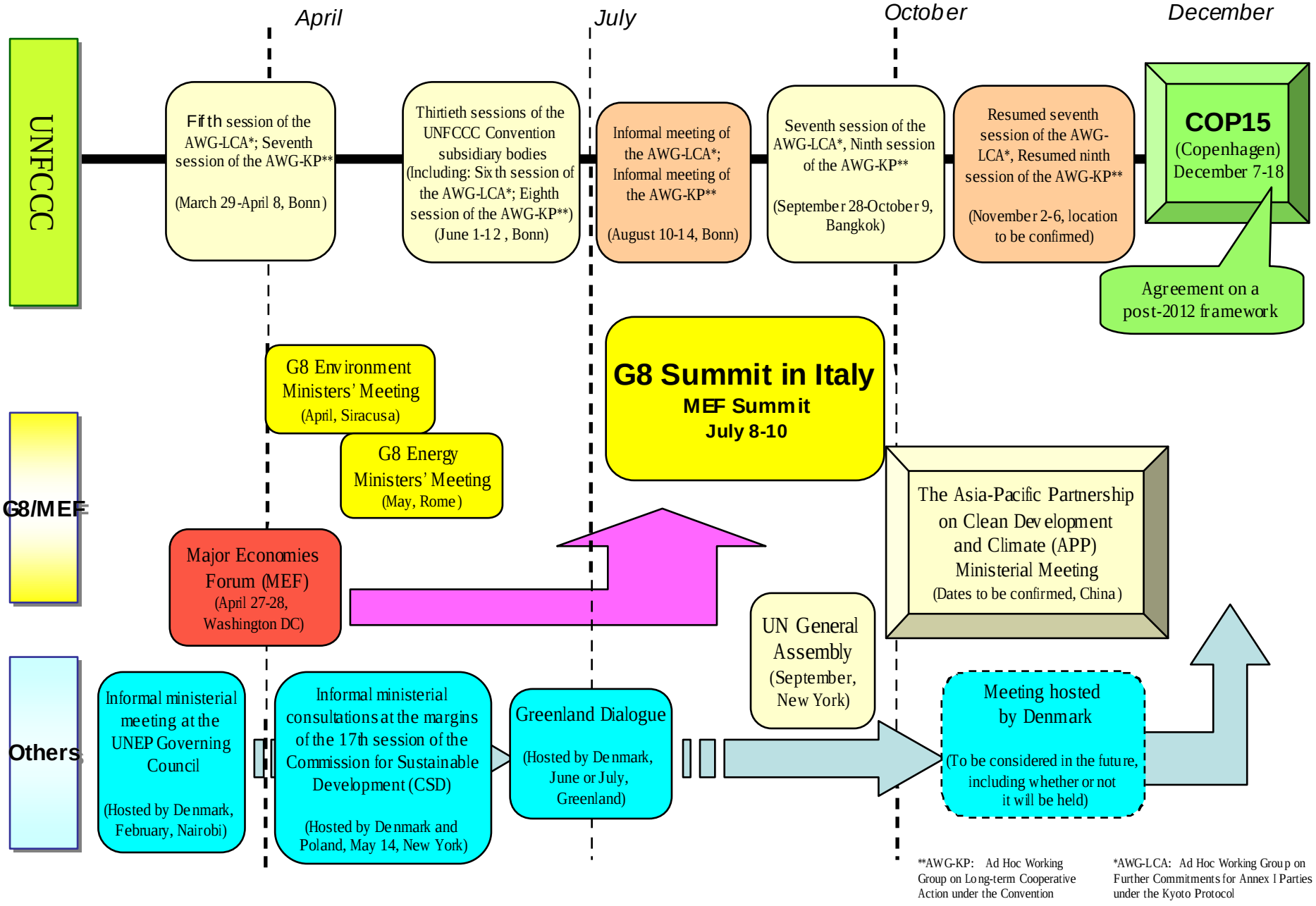
Sea level rise at the Funafuti atoll (Funafuti, capital of Tuvalu)

Danger of increasing infectious diseases



Source: The Intergovernmental Panel on Climate Change Fourth Assessment Report (2007)
Compiled by the National Institute for Environmental Studies and the Ministry of the Environment of Japan

Major Diplomatic Events Related to Climate Change (2009)



**AWG-KP: Ad Hoc Working Group on Long-term Cooperative Action under the Convention

*AWG-LCA: Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol

2. Issues to tackle

(1) International Framework beyond 2012

Establishing a new framework for the international community

(2) International Environmental Cooperation

Assistance for developing countries' efforts

(3) Innovation

Development & dissemination of environmental technologies

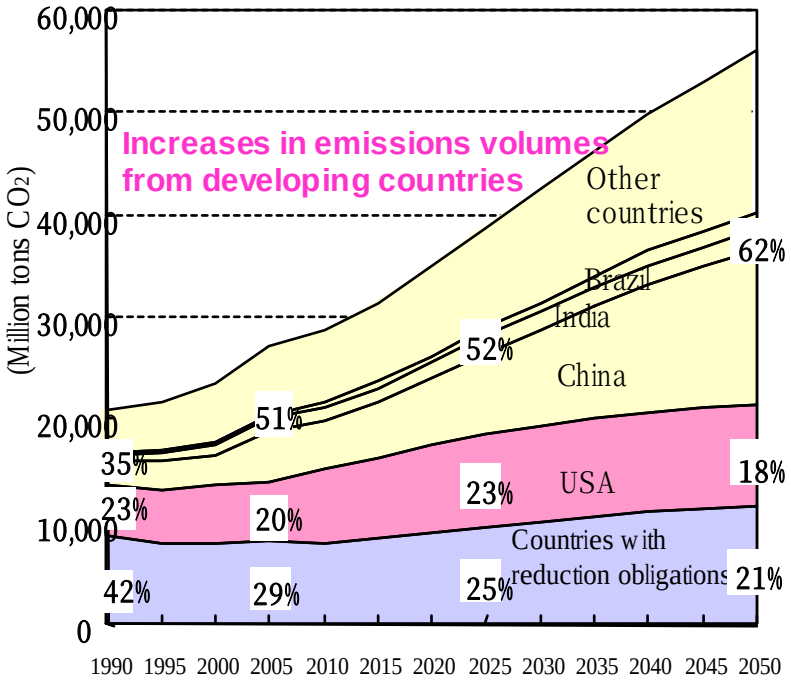
Japan is leading the efforts of the international community based on the "Cool Earth 50" and "Cool Earth Promotion Programme," as a comprehensive prescription unique to Japan

(1) The Post-2012 Framework

Total emissions from all countries with reduction obligations under the Kyoto Protocol amount to no more than 30% of global emissions.

It is necessary to have a framework for fair and effective GHG reductions in which all major economies participate in a responsible manner.

Projected global CO_2 emissions from fuel combustion



Source: Research Institute of Innovative Technology for the Earth (RITE)

Japan's initiatives

- Agree among the G8 countries to seek to share with all countries and adopt the vision of achieving at least 50% reduction of global greenhouse gas emissions by 2050
- Promote the efforts of both developed and developing countries
- Provide climate change-related assistance to developing countries that are aiming to achieve both emissions reductions and economic growth (Cool Earth Partnership)
- Announce its mid-term emissions reductions target by June 2009

Participation of All Major Economies Is Necessary

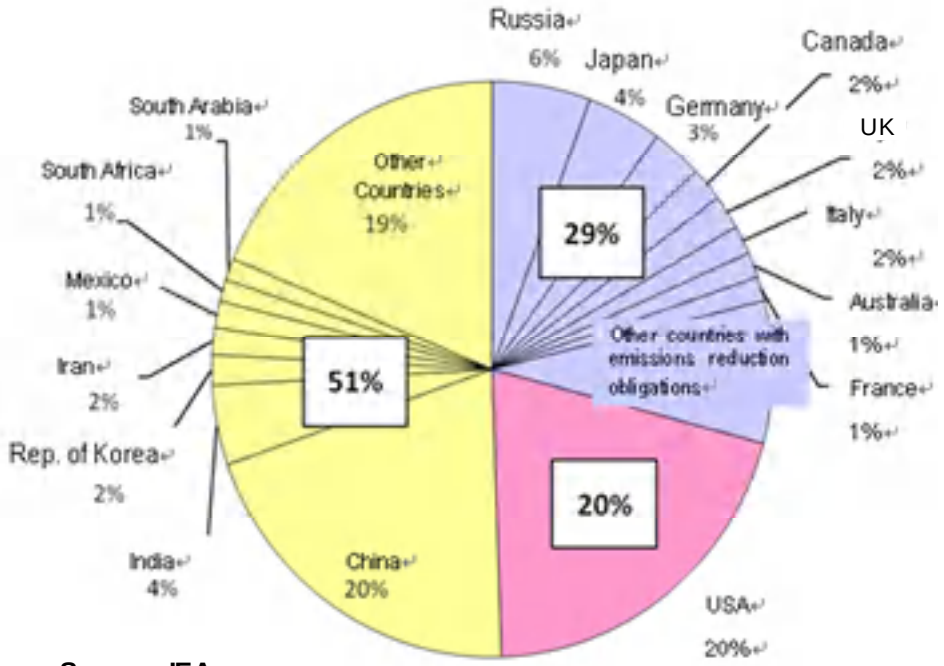
Reference #2

- The proportion of CO2 emissions from countries with emissions reduction obligations under the Kyoto Protocol to the global emissions is roughly 30%. (Reduction rates of major countries: Japan: -6%; EU: -8%; Russia: +/-0%)

- USA, China, and India as major emitters do not have emissions reduction obligations.

→ A fair and effective framework with participation of all major economies is necessary.

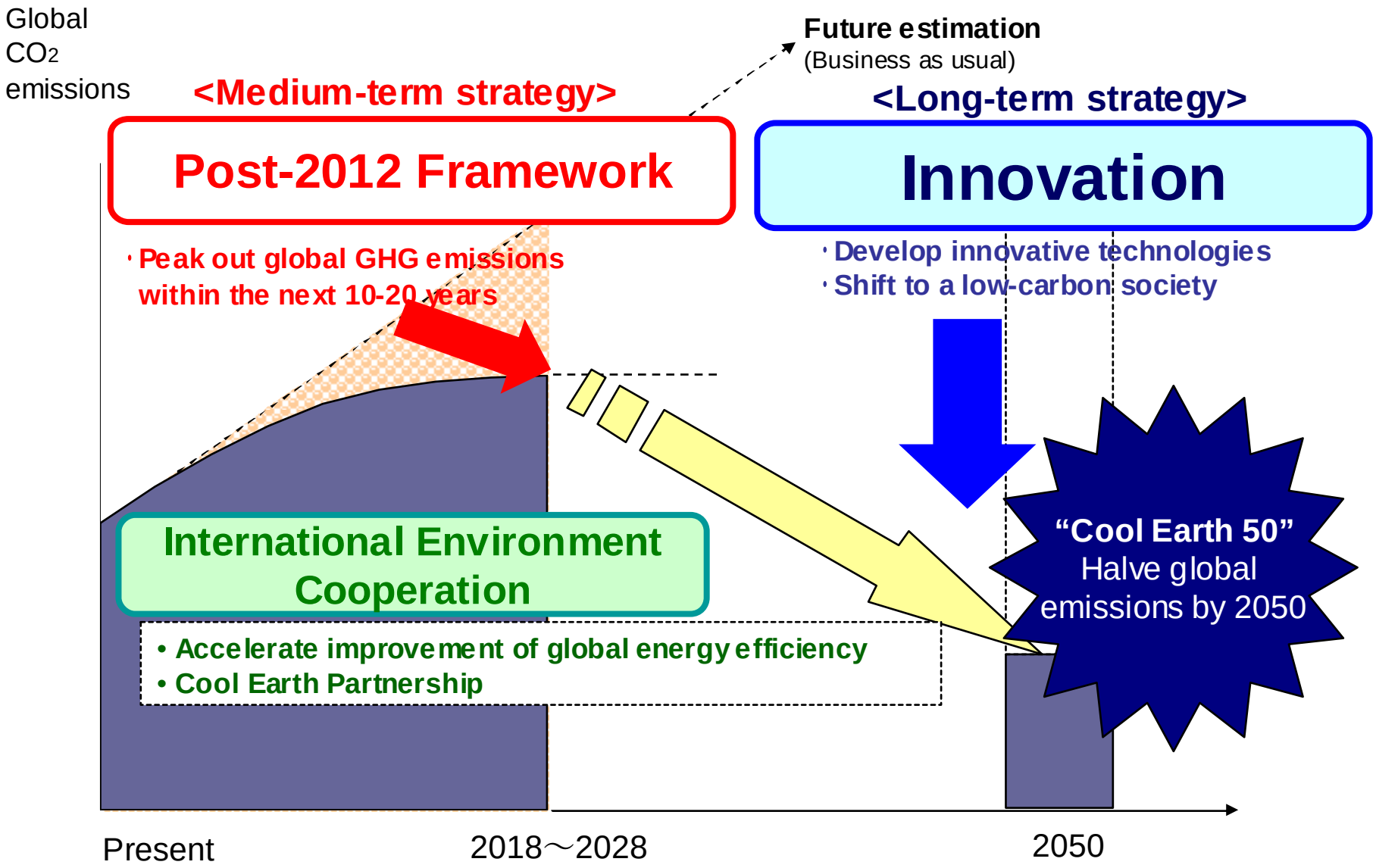
Global CO2 emission from fuel combustion (2006) [%]



Source: IEA

Halving global emissions by 2050

Reference #3

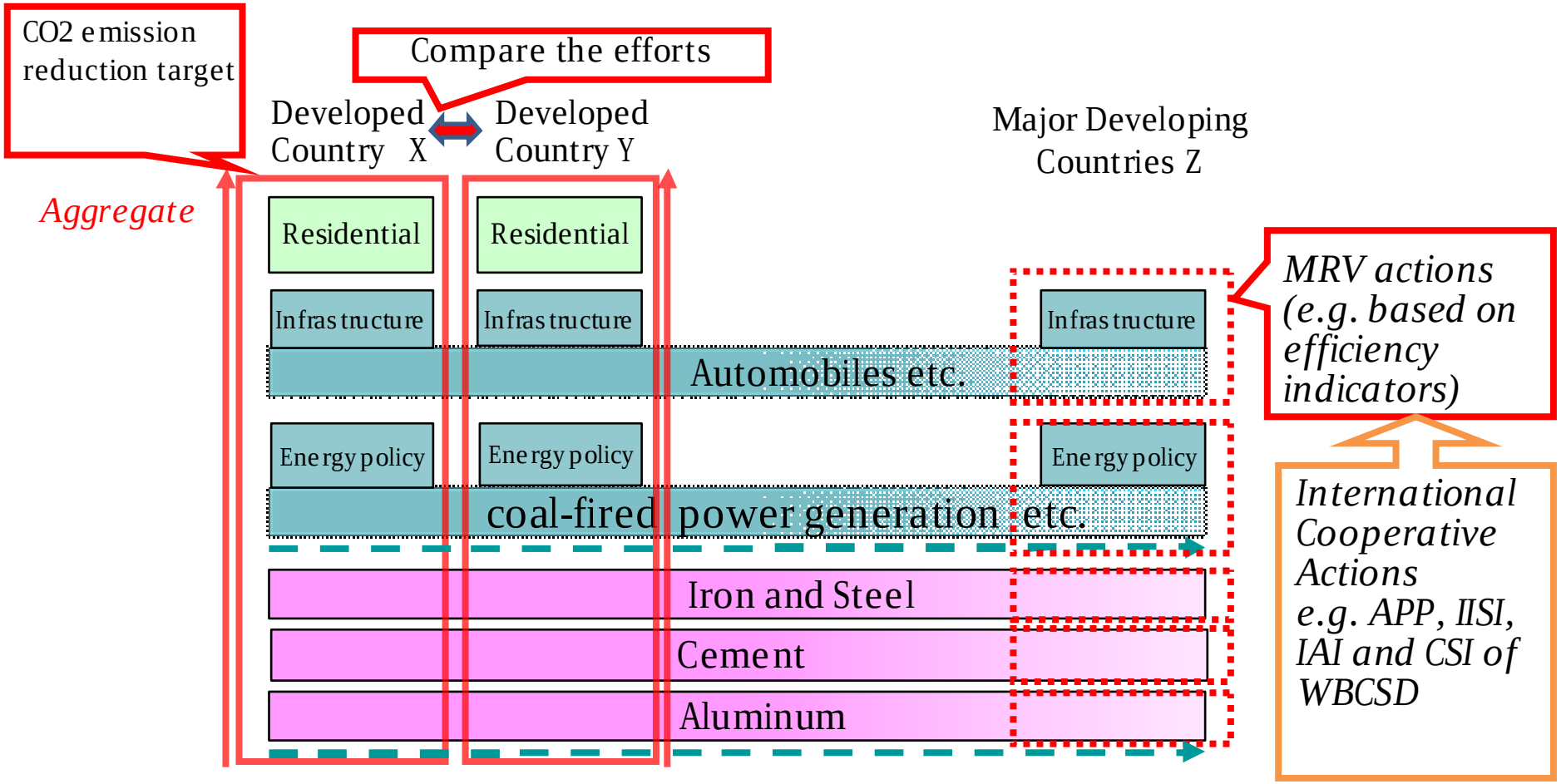


Sectoral Approaches for post-2012 framework

Reference #4

Through analyzing reduction potentials and setting indicators, Sectoral Approaches

- helps to compare the developed countries' targets
- helps to set MRV mitigation actions (intensity targets) of major developing countries
- accelerates global emissions reduction by supporting developing countries through transfer of technologies and practices



(2) International Environmental Cooperation

Assistance for developing countries' efforts to address climate change issues

Adaptation measures
Address the adverse impacts of climate change

Clean energy
Assistance for access

Mitigation measures
GHG reductions

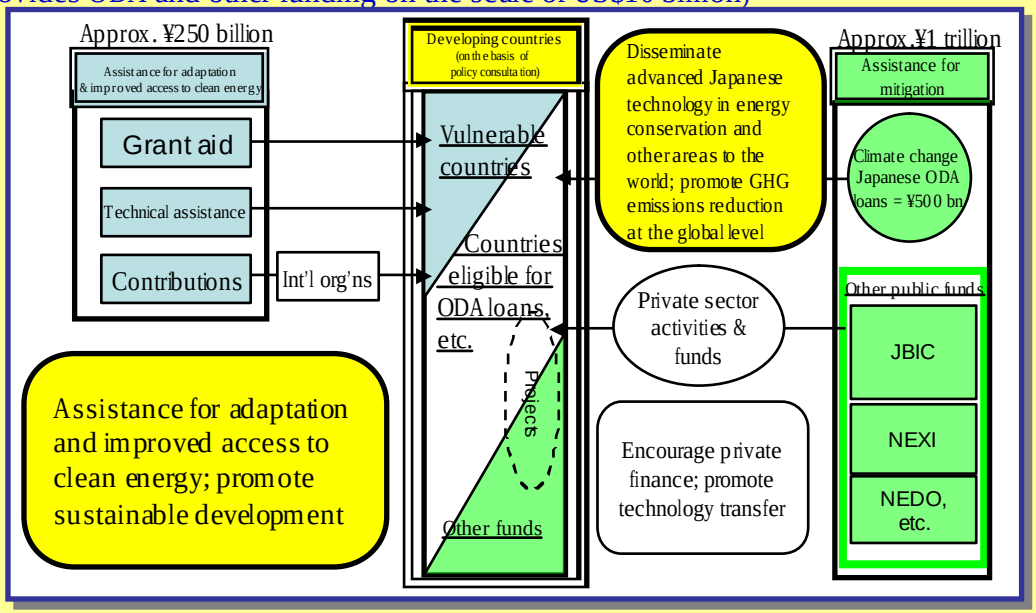
Climate Investment Funds (CIF)

A multilateral fund established through the leadership of Japan along with the UK and the US (a fund of approx. US$6 billion in total; Japan has announced contributions of US$1.2 billion)

Strategic Climate Fund (SCF)	Clean Technology Fund (CTF)

Cool Earth Partnership

● Assist developing countries making efforts to reduce GHG emissions and achieve economic growth in a compatible way (from 2008 over the following five years, Japan provides ODA and other funding on the scale of US$10 billion)

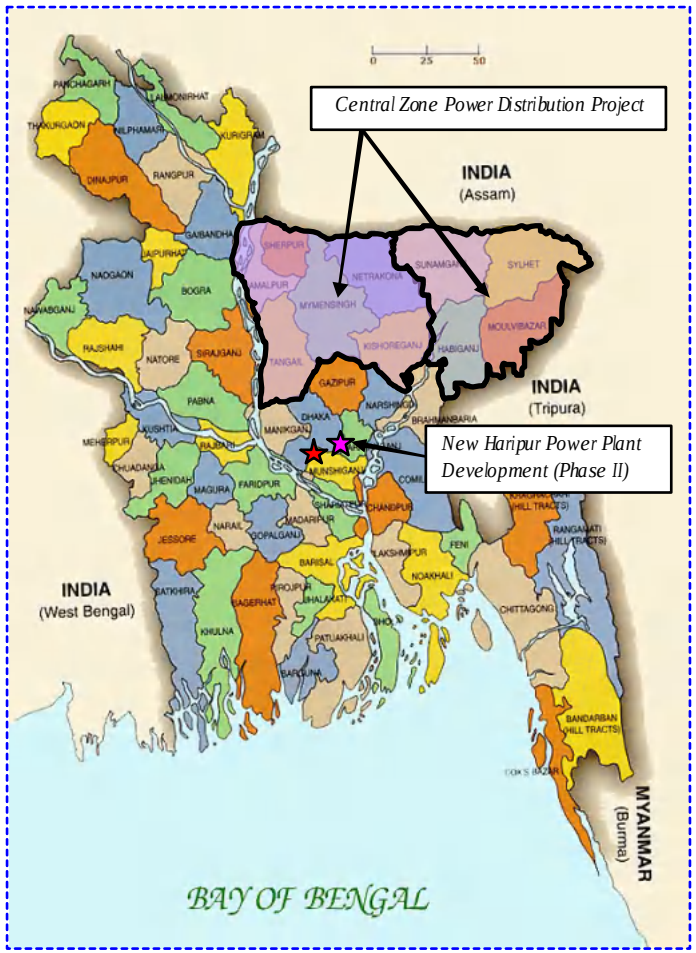


Cool Earth Partnership

Climate Change Japanese ODA Loans ("Cool Earth Loans") (1)

Reference #5

Bangladesh: New Haripur Power Plant Development Project & Central Zone Power Distribution Project



(1) New Haripur Power Plant Development Project (Phase II)

(¥22.21 billion)

Intended location for New Haripur Power Plant Development

Project Overview

In this project, a high-efficiency combined cycle thermal power plant (360MW) that reduces CO_2 emissions will be constructed in the city of Narayangonj on the outskirts of Dhaka and technical support will be provided. The increase in the electric generating capacity and the enhanced efficiency of the operation and maintenance of the plant will contribute to the stable supply of electricity and dramatic reductions in CO_2 emissions compared to conventional power generating facilities can also be expected.

(2) Central Zone Power Distribution Project

(¥9.715 billion)

Electrical grid in Bangladesh

Project Overview

In this project, electrical grids will be newly constructed and repaired in the Central Zone (the Greater Mymensingh District and the Greater Sylhet region). In addition, support will be provided to develop the organizational foundation of the public corporation executing this new power distribution. Reductions in distribution losses will result in less CO_2 emissions.

Cool Earth Partnership

Climate Change Japanese ODA Loans ("Cool Earth Loans") (2)

Indonesia: Climate Change Program Loan

Reference #6

Policy objectives in Indonesia

¥30.768 billion

Forestry sector

(1) A pilot project will be launched as one of the first under a new market mechanism to prevent deforestation (Reduced Emissions from Deforestation and Degradation in Developing Countries [REDD]).
(2) The CO_2 absorption capacity of the forestry sector will be increased by ensuring the sound management of plantation forests, including preventive measures for forest fires and peat land rehabilitation.

Industrial, domestic (household), & business sectors

(1) Energy efficiency will be improved by 12-18% by 2025.
(2) Relevant laws and regulations will be developed in order to facilitate improvements in energy efficiency.
(3)The creation of data on energy consumption will be improved. In addition, for the main industrial sectors (iron/steel, cement, etc.), a roadmap towards CO_2 emissions reductions will be created and rules for CO_2 emissions reductions will be established, including targets for each sector.

Other sectors

Policies and systems regarding the agricultural sector, national land use plan, the co-benefit approach and climate early warning system, etc. will be created or improved.

Energy sector

(1) The capacity of geothermal power facilities in 2025 will be increased to 9,500MW (projected to reduce GHG emissions by approximately 60 million tons annually).
(2) In order to raise the portion of the total energy supply derived from renewables (excluding geothermal) to at least 10% by 2025, related laws will be formulated and the investment climate will be developed so as to foster private investment.
(3) Through the introduction of renewable energies and energy-conservation measures, CO_2 emissions from the energy sector will be reduced by 17% compared to a scenario in which such measures were not taken.

Water resources sector

The following measures will be undertaken in order to conduct optimal watershed management adapted to the impacts of climate change:

(1) Formulate plans for integrated water resources management
(2) Coordinate stakeholders and establish a committee on water, etc. to form the core for formulating a strategy for the construction of facilities

Cool Earth Partnership

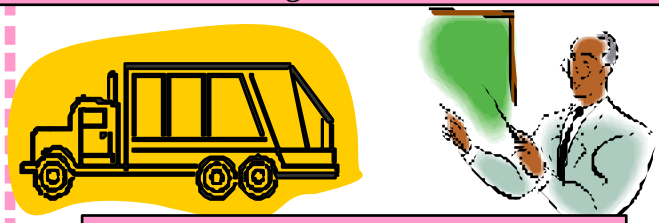
Environment Program Grant Aid

Reference #7

Bangladesh: "The Programme for Improvement of Solid Waste Management in Dhaka City toward a Low Carbon Society in Bangladesh"

Development of Human Resources

Environmental education for sanitation department workers (drivers, etc.)
(Instruction on reducing GHGs and awareness raising)



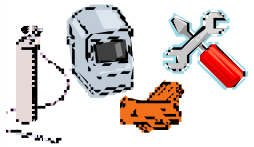
Environmental education; technical instruction on operation and maintenance; institutional building

Capacity Development of Dhaka City

Provision of waste collection vehicles

Low-carbon type waste collection vehicles→
CO_2 reductions

Maintenance



ovision of tools & equipment
for maintenance facilities

Formulation of CNG promotion plan

Waste Collection Vehicles

current state

Image (Natural gas vehicle)

(3) Innovation

Compatibility between economic growth and GHG emission reductions → **Developing & disseminating energy-conserving and other leading-edge & innovative environmental technologies will be key**

Japan: Highest level of energy-saving technology in the world

Japan's level of energy efficiency is three times the global average

Japan: 0.24 kg/Average level internationally: 0.75 kg

CO_2 emissions volume per unit of GDP (2005) [$kgCO_2$/US$, converted at basic exchange rate for 2000]

◆Plug-in hybrid cars

CO_2 emissions volume is 1/2 to 1/4 that of gasoline-powered cars

◆High-temperature superconducting (HTS) cables

Improved electric power transmission efficiency

◆Solar power generation

Clean & non-exhaustible

Cutting CO_2 by 30% through innovative steel manufacture processes

Reference #8

■Approximately 6% of total global CO_2 emissions are emissions from the steel sector (2005) *according to IEA calculations

- Development of innovative steel manufacturing technology using hydrogen as a reducing agent, as a partial substitute for coke
- Technology for separation/capture generated from blast furnace

→

- CO_2 emissions can be cut by approximately 30% through a combination of these two technologies

Reducing CO_2 emissions from coal thermal power plants to zero

Reference #9

■ Approximately 26% of total global CO_2 emissions are emissions from coal thermal power plants (2005) *According to IEA calculations

High-efficiency coal thermal power

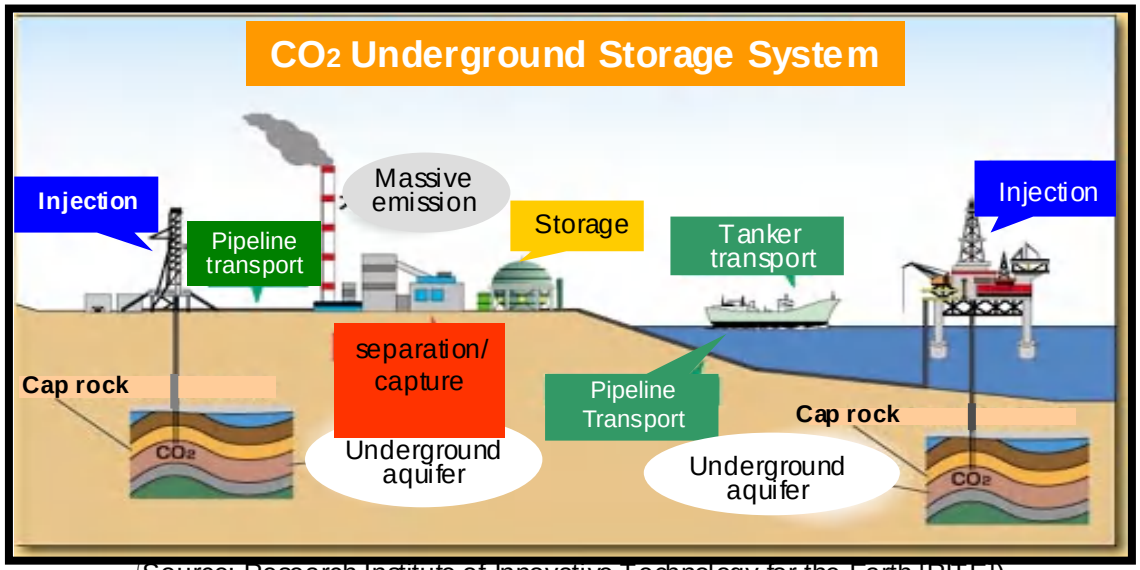
- Raise generation efficiency from current 42% to 65%
- Possible to cut CO_2 emissions approx. 40% from current levels

+

CO_2 recapture/ CO_2 sequestration

- Realize by 2020
- Realize zero emissions by combination with high-efficiency coal thermal power generation

Tachibana Bay coal thermal power plant, Japan's largest



(Source: Research Institute of Innovative Technology for the Earth [RITE])

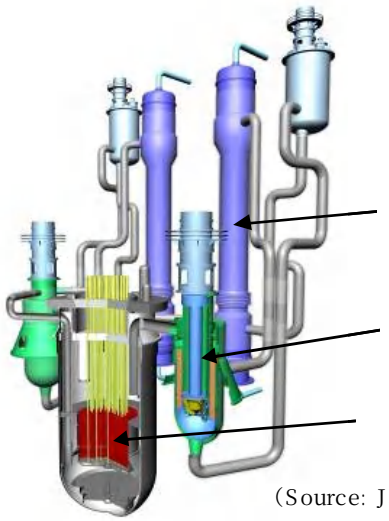
Technology development for advanced nuclear power generation

Reference #10

- Nuclear power generation emits no CO_2 during the generation process
- It ensures the 3Ss (safety, security and safeguards)

● Fast reactor

Practical strategic research study design example

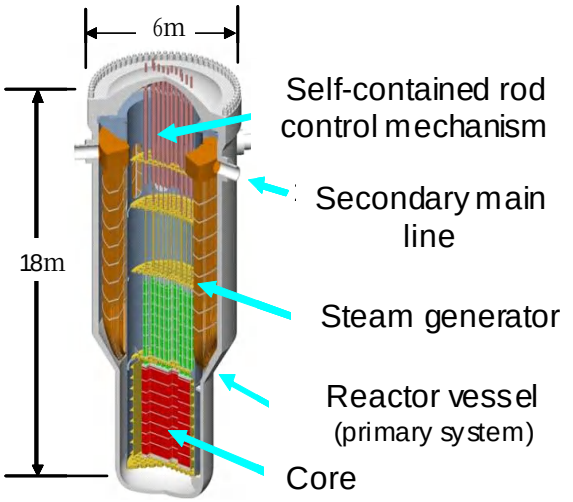


(Source: Japan Atomic Energy Agency)

● Develop fast reactor that raises the use efficiency of uranium resources drastically and dramatically decreases radioactive waste

● Medium/small-sized reactor

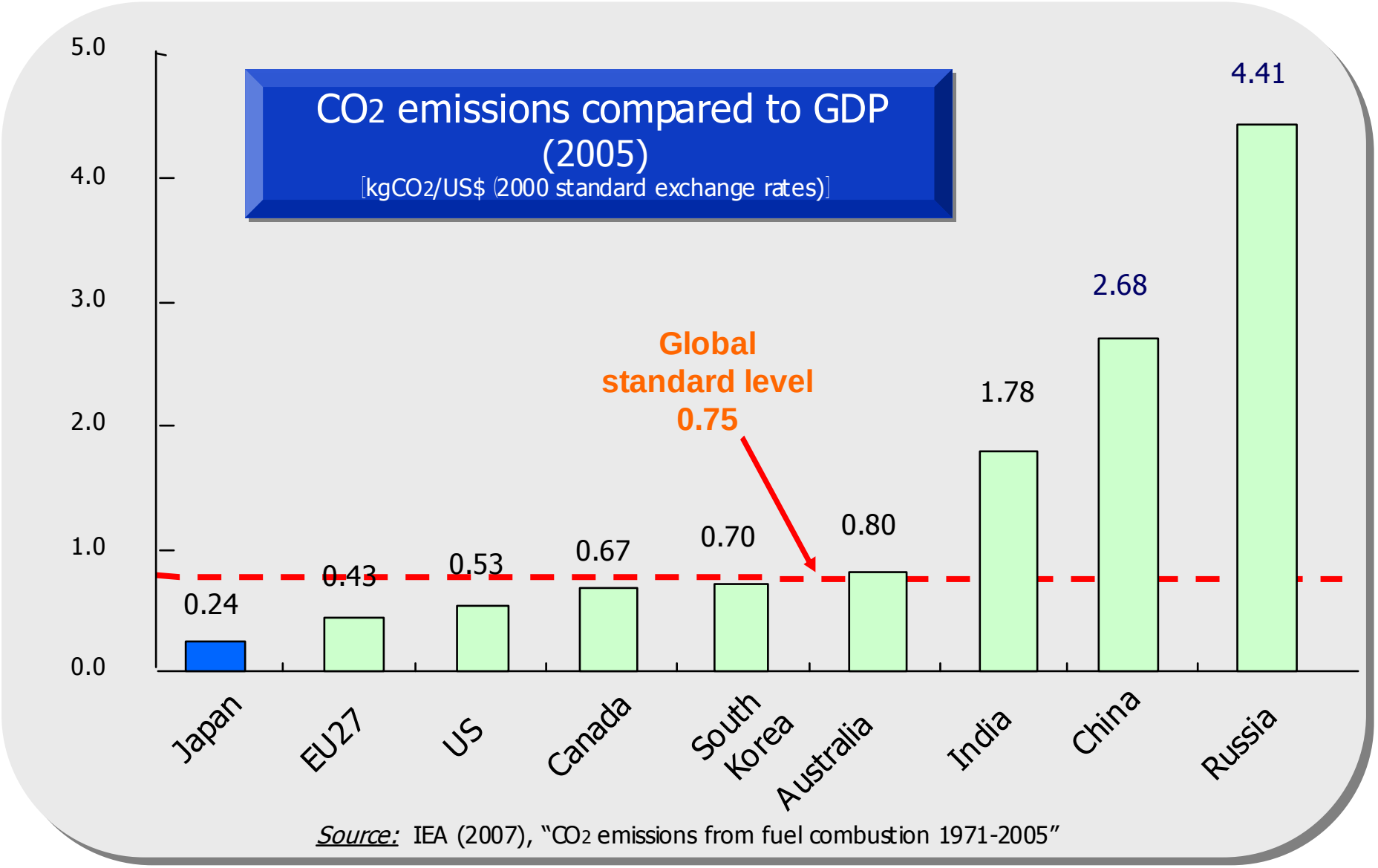
Ex., 350MWe-IMR



● Develop compact medium/small-sized reactor appropriate for energy demand in developing countries, island states, etc.

Expanding advanced technologies to reduce global emissions

Reference #11



Source: IEA (2007), "CO_2 emissions from fuel combustion 1971-2005"

Major CO_2 reductions through next-generation vehicle technologies

Reference #12

■ **Approximately 17% of global total CO_2 emissions are emissions from vehicles (2005)**

*According to IEA calculations

● Hybrid vehicle and electric vehicle

Hybrid vehicle combining electricity and internal combustion engine (gasoline)

Electric vehicles that run only by electricity

● Fuel-cell vehicle

Fuel-cell vehicle using hydrogen as its fuel

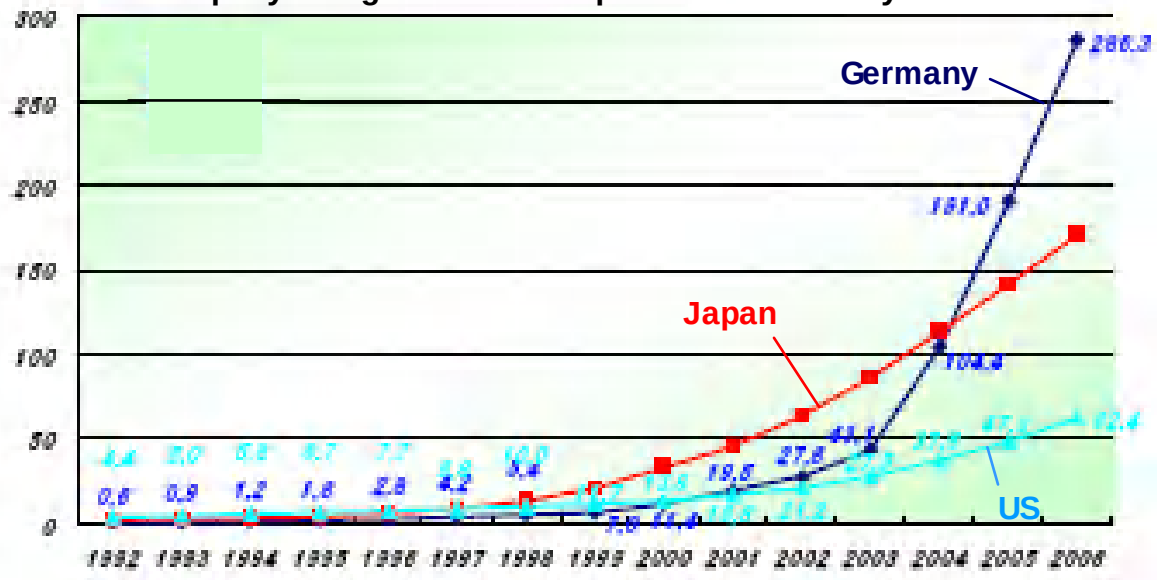
- CO_2 emissions to reach 1/2-1/4 those of gasoline vehicles
- Battery volume to be increased 7-fold from current levels

- CO_2 emissions to reach 1/3 of those of gasoline vehicles

Greatly raising the efficiency of solar power generation

Reference #13

The rapidly rising level of solar panels cumulatively introduced



Large-scale solar panel installation on plant roof

Note1:Source: Trends in Photovoltaic Applications / IEA/ PVPS (as of 2006)

Note2:IEA PVPS participating countries: Australia, Austria, Canada, Switzerland, Denmark, Germany, Spain, France, UK, Israel, Italy, Japan, Republic of Korea, Mexico, the Netherlands, Norway, Sweden, US, Portugal

(*Source:* Ministry of Economy, Trade and Industry of Japan)

- We will dramatically raise the generation efficiency from its current 15-20% to over 40%
- We will reduce the current cost of solar power generation (46 yen/kWh) to the same level as thermal generation (7 yen/kWh)

3. Towards a low-carbon society

“mass production, mass consumption, mass disposal” society

20th century

Clothing styles that facilitate energy conservation

Promote “Cool Biz” clothing styles as business attire suited to the hot & humid Japanese summer

Dissemination of innovative technologies and existing advanced technologies

Promotion of the 3Rs

Energy-saving home appliances

Switching from incandescent bulbs to fluorescent bulbs which use much less energy

21st century

low-carbon, sound material-cycle society

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

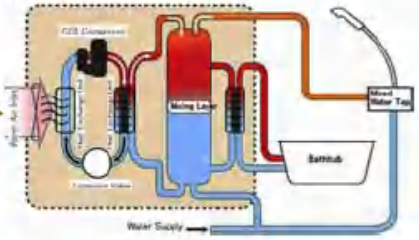
- Engaging in eco-life
- Appliances and vehicles pre-equipped with environmental impact display system

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]

Source: Ministry of the Environment

Reference #15

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

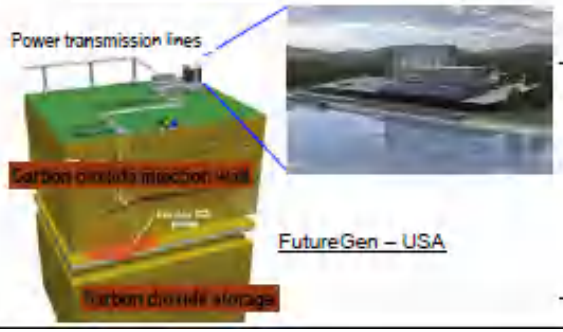
Solid Polymer Fuel Cell (Polymer Electrolyte Fuel Cell) Configuration

Zero Emissions

A society making high use of CO2-free energy resources

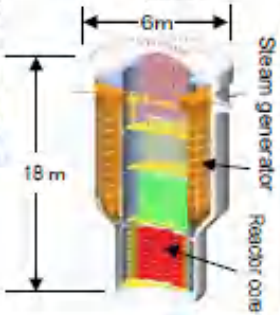
- Innovative zero-emissions coal-fired power generation → Zero-emissions coal-fired power generation, which currently accounts for nearly 30% of the global emissions
- Next generation light water reactors, small and medium reactors, high temperature gas-cooled reactors, and fast breeder reactor (FBR)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

Zero-emissions Coal-fired Power Generation Plant



FutureGen – USA

Small and Medium Reactor

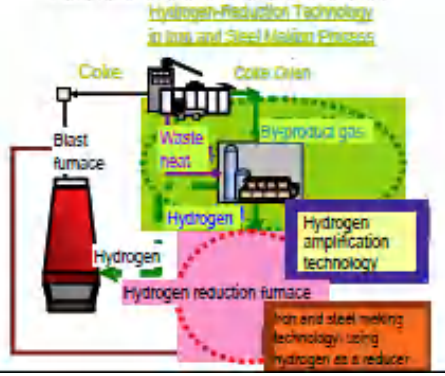


Ultra High Energy Efficiency Technology

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%.



Source: Ministry of the Environment