ACE:「Actions for Cool Earth」

Proactive Diplomatic Strategy for Countering Global Warming

November 2013

Ministry of Foreign Affairs
Ministry of Economy, Trade and Industry
Ministry of the Environment
JAPAN

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Innovation

Summary of New Low Carbon Technology Plan

Decided by the Council for Science and Technology Policy on September 13th, 2013

- In January 2013, Prime Minister Abe issued the following instruction: “Establish proactive diplomatic strategy against global warming in order to contribute to the world with Japan’s technologies.”
- Japan is to contribute toward addressing global issues such as global warming and energy scarcity by steadily developing and diffusing innovative technologies. The aims are to reduce the world’s greenhouse gas emissions by half by 2050 (80% reduction for developed countries) and to contribute to overcoming environmental and energy issues hindering the economic growth of developing countries.
- The revision of the present strategy detailed the following:
  (1) Identification of innovative technologies that require development both over the short-to-medium and medium-to-long term. (2) Strengthening of policies for promoting technology development, and (3) Measures required for global expansion and diffusion of innovative technologies, in order to expedite steady development and diffusion of innovative technologies.

(1) Identification of Innovative Technologies

A total of 37 technologies were identified as “innovative technologies”. It is important to globally expand the technologies through technology development according to the needs of target countries, product optimization, and combination of various technologies.

Technologies for Short/Medium-term Development (To Be Developed by ~2030)

○Production • Supply sector

- High-efficiency coal-fired power generation, high-efficiency natural gas-fired power generation, wind power generation, solar energy, geothermal power generation, ocean energy, nuclear power, etc.

○Consumption • Demand sector

- Next-generation automobiles, innovative structural materials, innovative devices, energy management, energy efficient houses/buildings, etc.

○Distribution • Supply/Demand Integration sector

- Fuel cells, high-performance electricity storage, heat storage and insulation technologies, etc.

Technologies for Medium/Long-term Development (To Be Put into Practical Use after ~2030)

- CO_2 Capture and Storage (CCS), artificial photosynthesis, biomass utilization, Hydrogen production/transport/storage, etc.

(2) Strengthening of Policies for Promoting Technology Development

Promotion of Investment in R&D Cultivation of Innovative Technology Seeds

Improve investment environment for the private sector through utilization and promotion of R&D tax systems. Develop high-risk high-return technologies under the leadership of the government.

(3) Measures Required for Global Expansion and Diffusion of Innovative Technologies

Promotion of the Joint Crediting Mechanism

Promote the development of projects through cooperation among relevant ministries, agencies and organizations including JICA and JBIC.
*JICA: Japan International Cooperation Agency
*JBIC: Japan Bank for International Cooperation

Promotion of Utilizing International Standardization

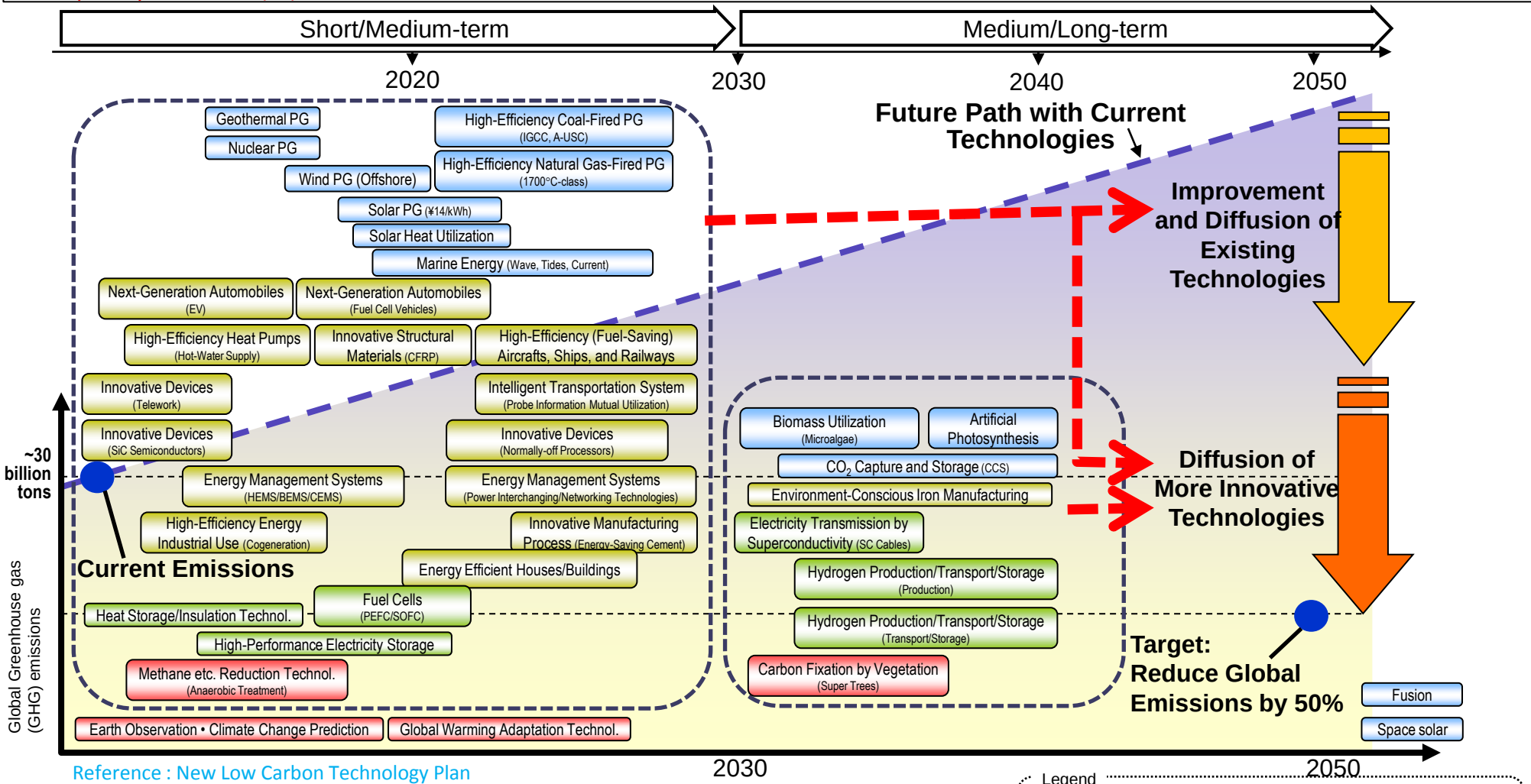
Assist establishment of systems for energy-saving measures, renewable energy application, HRD, etc., in emerging countries.

Strategic Utilization of Public Funds

Utilize public financing to promote global expansion of high-efficiency thermal and nuclear power generation, low-carbon society, etc.

Global Contribution of Japan's Environmental and Energy Technologies

- Japan will continue to develop advanced environmental and energy technologies in the short/medium-term to medium/long-term, and will contribute to halving global greenhouse gas emissions by 2050 through global diffusion of such technologies.
- Steadily implement the revised Low Carbon Technology Plan as well as globally cooperate to develop and diffuse the technologies to cover approximately 80% of the reduction needed to halve global GHG emissions by 2050.
- Aim to invest USD110 billion of both public and private finance over five years on the premise of achieving national and regional primary balance surplus by Fiscal Year (FY) 2020.



Reference : New Low Carbon Technology Plan

*1 The horizontal position of environmental and energy technologies indicates approximate time of practical diffusion based on the roadmap of each technology.
*2 "Future path with current technologies" indicates approximate transition of global GHG emissions assuming no change in efficiencies for existing technologies (e.g., generating efficiency of coal-fired generation)
*3 The downward arrows for "Improvement and diffusion of existing technologies" and "Diffusion of innovative technologies" indicate both contributions are required to reduce global GHG emissions; they do not specify the amount of reduction by each contribution.

Legend
- Production • Supply
- Consumption • Demand
- Distribution • S/D Integration
- Other Technologies

*1 Center of bars indicates approximate time of practical diffusion.
*2 Parentheses show technology examples. Refer to the full text for details.

Low carbon technology innovation aimed at developing countries

❖Japan has advanced low-carbon technoloy which is highly needed in developing countries. It is an essential element for advancing proactive diplomatic strategies to address global warming, including the Joint Crediting Mechanism (JCM)
On the other hand, environmental regulations and systems, culture and customs, resource and energy constraints could prevent diffusion of these technologies in developing country markets

It is essential to make Japanese low-carbon technologies suitable for developing country needs

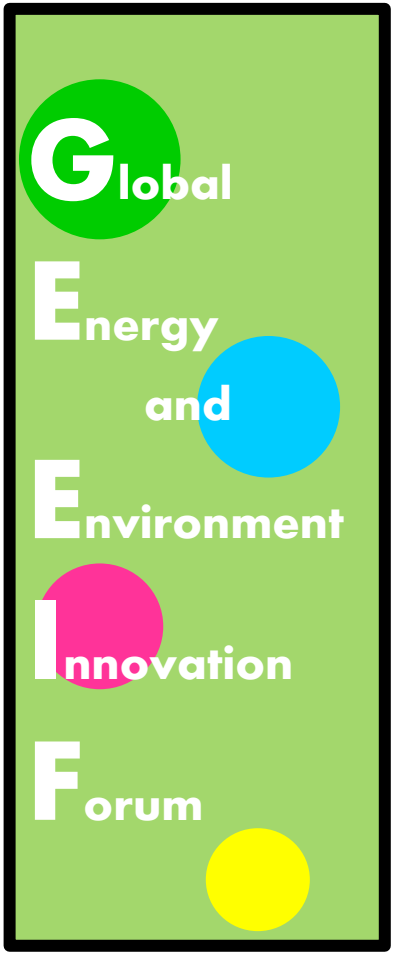
- Convert world-leading low-carbon technologies into technologies which meet the real needs of developing countries, and realize low-carbon societies through diffusion
- Further strengthen the global competitiveness of domestic enterprises through innovation created in the course of development of technology

Examples of developing country needs towards Japanese low-carbon technology

Building field	Infrastructure field	Consumer products field	Energy field
➢ CO2 reduction technologies for buildings that suit the climate characteristics of the region ➢ CO2 reduction technologies in offices and homes, such as lighting	➢ Technologies related to the public transportation system ➢ Low-carbon technologies for road traffic ➢ Water infrastructure-related technologies	➢ Drastic CO2 reduction technologies for energy-intensive demand side applications such as commercial air conditioners and refrigerators	➢ Low-carbon technologies that suit the renewable-energy and climate characteristics etc., of the region ➢ Independent- and distributed-type low-carbon energy system

Global Energy and Environment Innovation Forum (GEEIF)

Japan will host annual global conference, the Global Energy and Environment Innovation Forum, which world-leading researchers, business persons, and policy makers meet and discuss to solve the problem of global warming through accelerated innovation in energy and environment sector.



1. Objectives

World-leading researchers, business persons, and policy makers meet and discuss every year,

- How to promote Innovation in the area of Energy and Environment Technologies
- How to apply these technologies to address Climate Change
- How to enhance the cooperation among Academia, Business, and Government

2. Organization

Host : NEDO, New Energy and Industrial Technology Development Organization
(Japanese public research and development management organization)
Co-Host : The Government of Japan

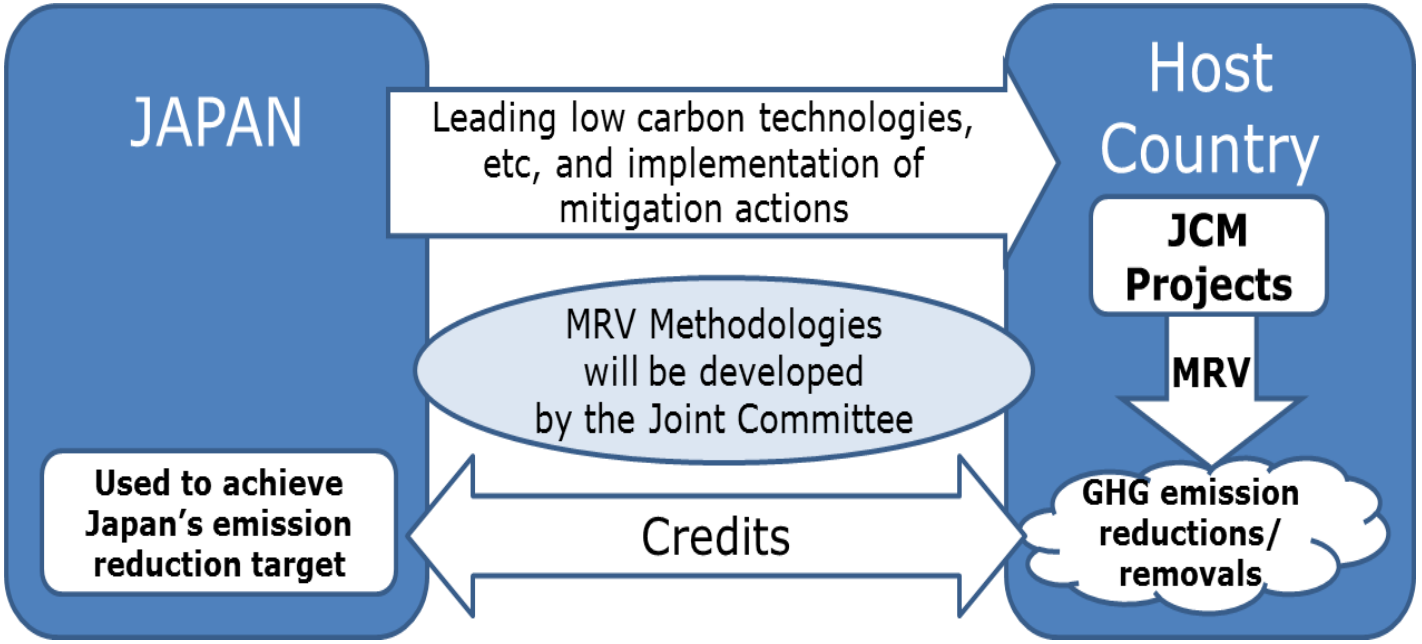
3. Date/Venue

Date : October 7th, 2014 : Opening Reception
October 8th, 2014 : Plenary Session, Concurrent Session
Venue : Tokyo, Japan

Application

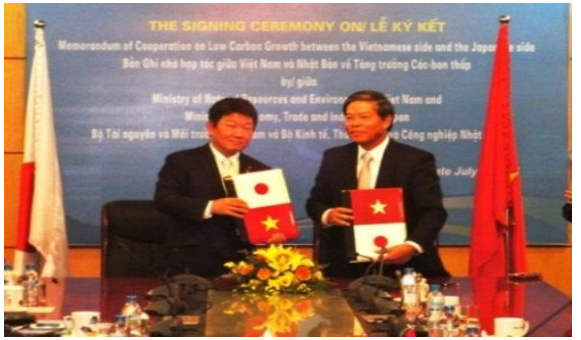
Basic Concept of the JCM

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions to GHG emission reductions or removals from Japan in a quantitative manner, by applying measurement, reporting and verification (MRV) methodologies, and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals, complementing the CDM.
- Japan has signed the bilateral document for the JCM with 8 countries (Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR and Indonesia.)



[The Second East Asia Low Carbon Growth Partnership Dialogue] May 18, 2013 (Tokyo)
Mr. Kishida, Minister for Foreign Affairs, introduces the JCM to the ministers of the East Asia Summit countries

[Signing with Maldives] June 29, 2013 (Okinawa)
Mr. Ishihara, Minister of the Environment and Dr. Shakeela, Minister of Environment and Energy

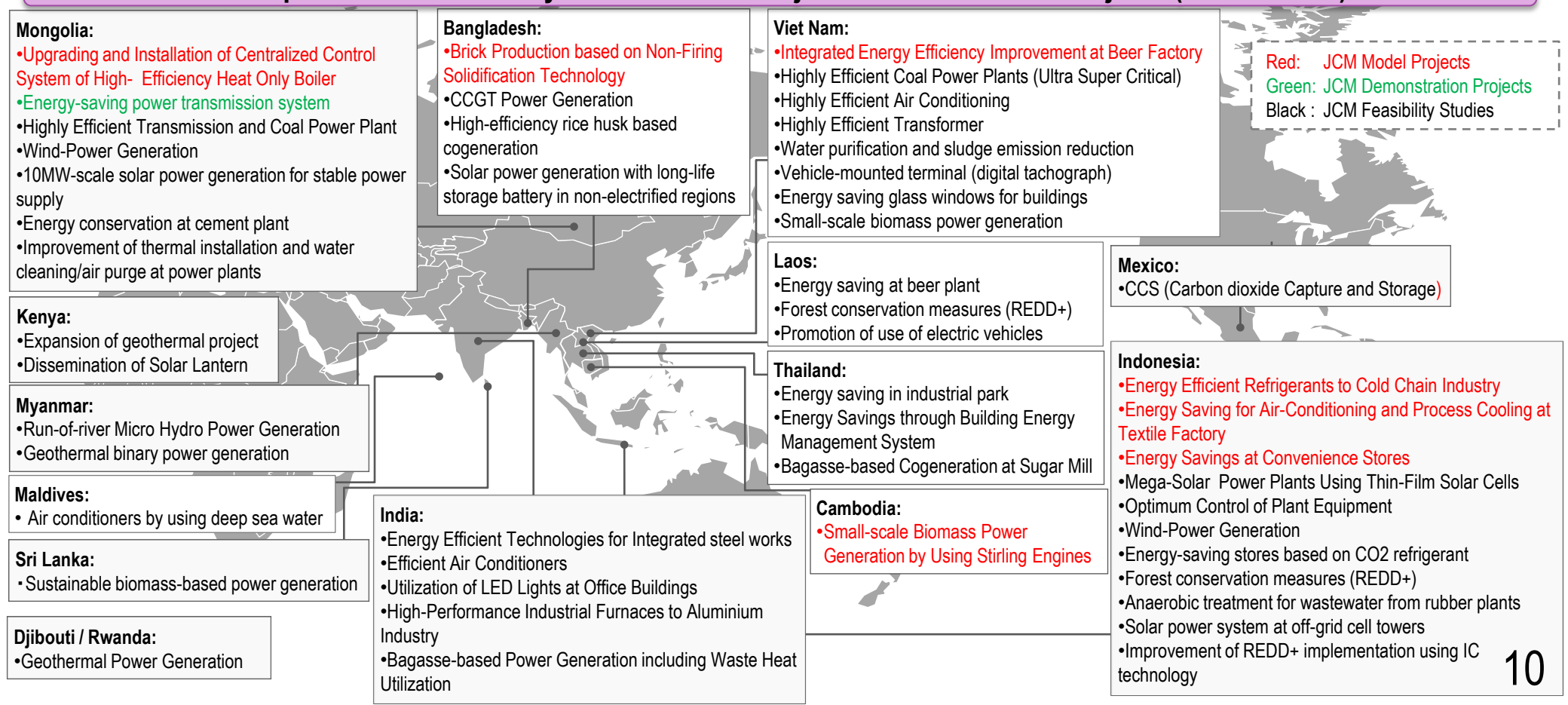


[Signing with Viet Nam] July 2, 2013 (Hanoi)
Mr. Motegi , Minister of Economy, Trade and Industry and Mr. Quang, Minister of Natural Resources and Environment

Approaches for promoting JCM project formulation

- Implementation of JCM Demonstration Projects and Financing Program for JCM Model Projects
- Establishment of the JCM Special Financing Scheme (JSF) in collaboration with JBIC and NEXI
- Establishment of a fund to assist emission reduction projects which cooperate with projects assisted by JICA, etc.
- Assistance to cities and islands as a whole
- Utilization of the consultative meetings of relevant ministries, agencies, and organizations.

Example of JCM Feasibility Studies/Model Projects /Demonstration Projects (2010 to 2013)



Mongolia:
- Upgrading and Installation of Centralized Control System of High- Efficiency Heat Only Boiler
- Energy-saving power transmission system
- Highly Efficient Transmission and Coal Power Plant
- Wind-Power Generation
- 10MW-scale solar power generation for stable power supply
- Energy conservation at cement plant
- Improvement of thermal installation and water cleaning/air purge at power plants

Bangladesh:
- Brick Production based on Non-Firing Solidification Technology
- CCGT Power Generation
- High-efficiency rice husk based cogeneration
- Solar power generation with long-life storage battery in non-electrified regions

Viet Nam:
- Integrated Energy Efficiency Improvement at Beer Factory
- Highly Efficient Coal Power Plants (Ultra Super Critical)
- Highly Efficient Air Conditioning
- Highly Efficient Transformer
- Water purification and sludge emission reduction
- Vehicle-mounted terminal (digital tachograph)
- Energy saving glass windows for buildings
- Small-scale biomass power generation

Red: JCM Model Projects
Green: JCM Demonstration Projects
Black : JCM Feasibility Studies

Laos:
- Energy saving at beer plant
- Forest conservation measures (REDD+)
- Promotion of use of electric vehicles

Mexico:
- CCS (Carbon dioxide Capture and Storage)

Kenya:
- Expansion of geothermal project
- Dissemination of Solar Lantern

Thailand:
- Energy saving in industrial park
- Energy Savings through Building Energy Management System
- Bagasse-based Cogeneration at Sugar Mill

Myanmar:
- Run-of-river Micro Hydro Power Generation
- Geothermal binary power generation

Maldives:
- Air conditioners by using deep sea water

Sri Lanka:
- Sustainable biomass-based power generation

Djibouti / Rwanda:
- Geothermal Power Generation

India:
- Energy Efficient Technologies for Integrated steel works
- Efficient Air Conditioners
- Utilization of LED Lights at Office Buildings
- High-Performance Industrial Furnaces to Aluminium Industry
- Bagasse-based Power Generation including Waste Heat Utilization

Cambodia:
- Small-scale Biomass Power Generation by Using Stirling Engines

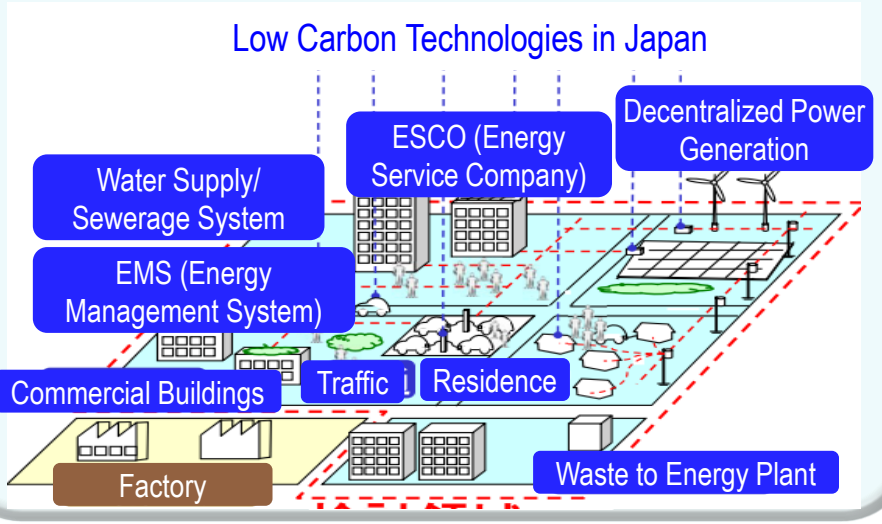
Indonesia:
- Energy Efficient Refrigerants to Cold Chain Industry
- Energy Saving for Air-Conditioning and Process Cooling at Textile Factory
- Energy Savings at Convenience Stores
- Mega-Solar Power Plants Using Thin-Film Solar Cells
- Optimum Control of Plant Equipment
- Wind-Power Generation
- Energy-saving stores based on CO2 refrigerant
- Forest conservation measures (REDD+)
- Anaerobic treatment for wastewater from rubber plants
- Solar power system at off-grid cell towers
- Improvement of REDD+ implementation using IC technology

Financial Support Program for the International Deployment of Low-Carbon Technologies ～Achieving "Leapfrog" Development in Developing Countries～

Japan helps developing countries in Asia Pacific region "Leapfrog" toward Low-Carbon Societies by Japanese advanced low-carbon technologies .

Basic Concept

- Creation of " Low Carbon Societies" by de-carbonizing social infrastructure (water supply and sewerage, waste to energy plant, etc.) in developing countries.
- Large-scale deployment of Japanese advanced low-carbon technologies
- Transfer technologies, know-how and social systems as a package



Approach

★ **Deploying Japan's advanced low-carbon technologies in Asia-Pacific region, in cooperation with development assistance agencies including JICA.**

★ **Establishing the "Joint Crediting Mechanism (JCM)" which provides win-win solution for developing countries and Japan.**

[Support for Initial Costs]

—New Financial support for "Leapfrog" development

[Support for establishing the JCM Framework / Creating the JCM projects]

—Promoting JCM Feasibility Studies and Capacity Building

Contribution towards establishing foundations for promoting “most advanced technologies”

- Promote international standardization, such as proposing new international standards* for evaluating the level of energy efficiency on advanced technologies (e.g., LED lighting apparatuses and solar shading windows)

  (*) Based on Japanese proposal, international standards were developed on: i) calculating methods for CO2 emissions in the steel manufacturing processes and ii) evaluation methods for the level of energy efficiency for inverter air conditioners.

- Support developing countries to develop national standards and to establish regulations consistent with appropriate international standards to evaluate the level of energy efficiency.
  (e.g., Project for supporting ASEAN Member States to adopt appropriate standards/regulations for the inverter air conditioners)

Example-1: CO2 emission from steel manufacturing

- ISO 14404 is the standard for calculating the amount of energy consumption and CO2 emissions from the steel manufacturing processes (Proposed by Japan)
- Any world steel manufacturers can use this standard. This standard would contribute to the reduction of CO2 emissions.

Example-2: Energy saving from home electric appliances

- Collaborate with Asian countries,
  - to develop testing methods to evaluate the ability of energy efficiency appropriately for home electric appliances (e.g., air conditioners, refrigerators) which adjust to the climate and the life style of Asia.
  - to develop standards and to establish the regulations for evaluating energy saving ability, i.e. LED lighting apparatuses, with a view to developing a new international standard in the future.

Supporting development of low-carbon planning in developing countries

An early shift towards low-carbon societies in developing countries is essential in order to achieve a 50% reduction in global emissions by 2050.

Provide Japanese technology, experience and know-how. Support the building of low-carbon societies which suit the circumstances of developing countries (planning / legislation, etc.), and make self-reliant low-carbon planning possible in developing countries

- Realize global reductions in greenhouse gas emissions
- Expand the market for environmental and energy technologies for which Japan takes the lead

Share such development processes as voluntary action and initiatives and plans to achieve Kyoto-Protocol targets

Deployment of Japanese environmental and energy technologies

Propagation of know-how to develop a low-carbon roadmap

Support the building of low-carbon societies in developing countries
1) Strengthening of ability to form low-carbon plans
2) Technology transfer
3) Human resource development
→ The gateway to sustainable development

* Air pollution improvement, sanitation improvement, electrification rate improvement, energy self-sufficiency rate improvement, increase of employment

Emission reduction effect + Co-benefit effect

Lead to a positive spiral of low-carbon action by industry, government, universities and the private sector in Japan and in developing countries

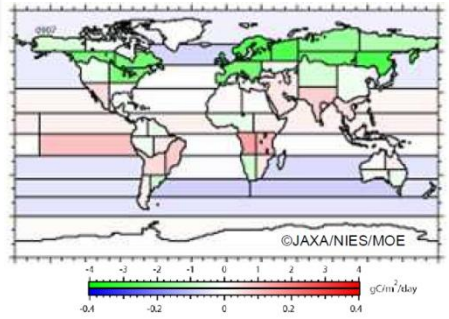
Low Carbon Asia Research Network (LoCARNet), etc.

Monitoring of the effects of the introduction of low GHG and low-carbon technology with satellite observation

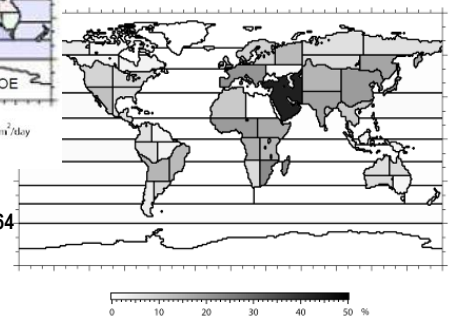
The role of a new state-of-the-art GHG observing satellite “GOSAT"

1. Utilize CO2 concentration data from satellite observation to make quantitative estimates of the CO2 concentration balance for the entire globe
2. Verify the useability of satellite CO2 concentration data

Development of the " GOSAT-2", aiming for launch in FY 2017



1. Absorption/emission in 64 regions across the globe, estimated with output from the observation network on the ground and the from "IBUKI" (left)

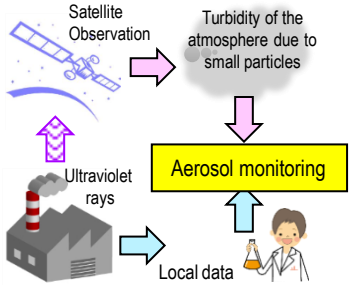


2. Averaged annual reduction in the uncertainty of assumed CO2 balance (%) in 64 regions across the globe, by combining observation data gathered by "IBUKI" with ground-based observation data (right)

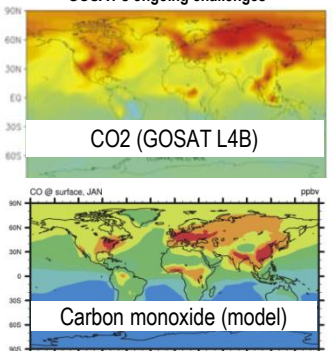
The advantage of "GOSAT-2"

1. Perform comprehensive measurement of black carbon (BC) in addition to CO2, etc.
2. Analyze the energy-oriented CO2 emission and its reduction potential, by country
3. Analyze CO2 emissions by major cities or large point sources
4. Verify the CO2 emission reduction effects achieved through introduction of low-carbon systems using data from “GOSAT-2” Utilize this technology in the future to promote the shift to low-carbon societies in other Asian countries under JCM.

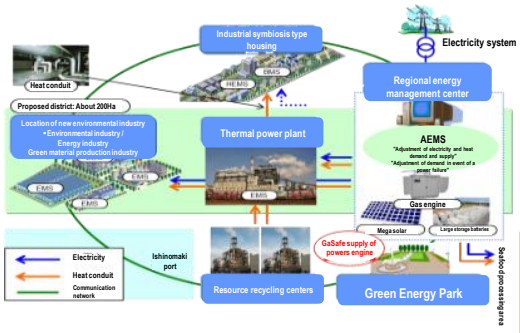
1. Air pollution reduction, aerosols, etc.
-New challenges for GOSAT's successor-

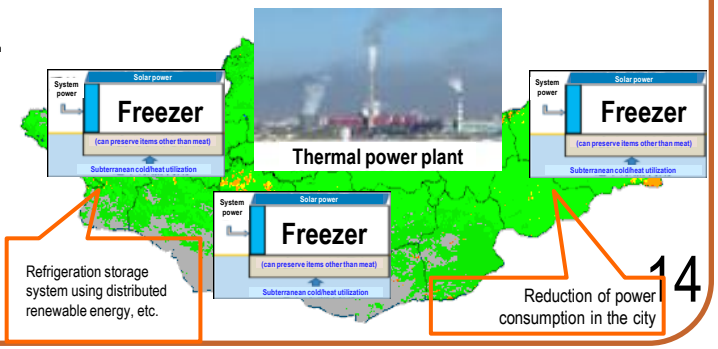


2. and 3. Low-carbon society building
-GOSAT's ongoing challenges-



4. Industrial symbiosis-type regional energy network system (Left: Example in Indonesia)
Balancing the use of distributed renewable energy and sustainable grazing (Right: Example in Mongolia)





Promotion of CO2 technology assessment

In the environmental technology field, fusion with technologies from other fields is taking place, and it is difficult for research institutions and industries to get a birds-eye view of these trends.

* For example, in the case of superconducting power transmission, evaluation from a variety of standpoints, such as CO2 reducing effects, environmental effects, feasibility, cost, receptiveness of the public, is required.

The government will conduct verification of the effects of low-carbon technology and technology assessment (evaluation of the utility and environmental impact of the technology), appropriately grasp technological needs, and provide information to research institutions and industry.

- **Stimulate the development and diffusion of next-generation technology and promote further reduction in GHG emissions as well as new economic growth**

Partnership

Assistance to Developing Countries in the field of Climate Change

Mobilizing ODA, OOF and private finance, Japan will provide total 1,600 billion yen (approx. 16 billion dollars) for mitigation and adaptation measures in developing countries over 3 years from 2013 to 2015. Among them, public finance amounts to 1,300 billion yen (approx. 13 billion dollars).*

ODA	• Concessional loan, Grant aid, Technical assistance etc.
OOF(other public finance)	• Public finance in JBIC co-financing etc.
Private Finance	• Private finance mobilized by the utilization of JBIC and NEXI etc.

Main Features

➢ Expansion of assistance in the field of disaster prevention and adaptation

- Utilizing new schemes such as stand-by loan for disaster recovery (Stand-By Emergency Credit for Urgent Recovery (SECURE)) and preferential terms for concessional loan
- Leading assistance to developing countries by multilateral cooperation toward the 3rd UN World Conference on Disaster Prevention

➢ Consideration for vulnerable countries

- Implementing well-thought assistance to developing countries vulnerable to the effects of climate change such as small island states, focusing on disaster prevention by using various schemes

➢ Public-Private partnership

- Scaling-up of private finance substantially by utilizing public financial instruments, and thus, encouraging private sectors to participate in the climate change projects

➢ Promotion of the diffusion of low carbon technologies

- Establishing a win-win relations between Japan and developing countries through overseas expansion of low carbon technologies and infrastructures in which Japan has strong competitiveness

*The assumed exchange rate is 98 yen to the dollar.

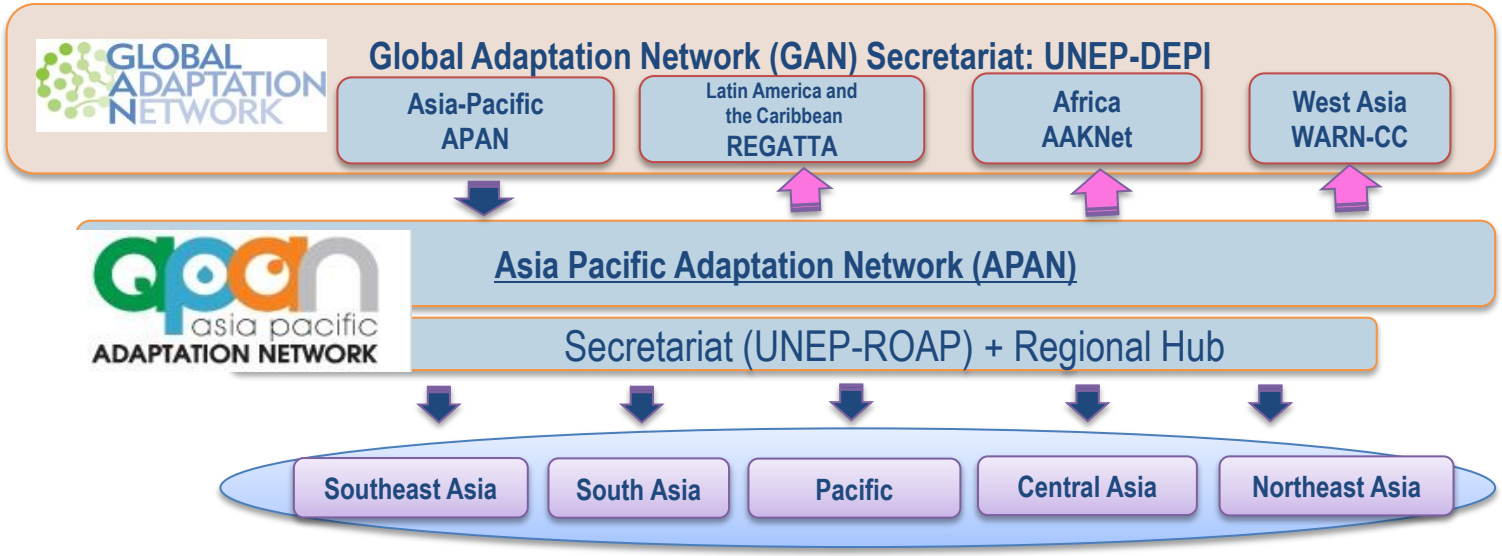
Knowledge sharing networks for strengthening adaptive capacity

[GAN: Global Adaptation Network]

- A global network for adaptation proposed by UNEP.
- Supports to make vulnerable communities, ecosystems and economies more resilient against climate change, through knowledge sharing on adaptation.
- Scheduled for official launch at COP19 in November 2013.

[APAN: Asia-Pacific Adaptation Network]

- Established in 2009, ahead of the rest of the world.
- Supports adaptation actions in developing countries, through sharing information and knowledge on adaptation within the region.
- Since its foundation, Japan has supported information sharing on the web, capacity-building training in developed countries and dialogue between scientists and policy-makers.



Establishment of Future Framework beyond 2020

- The international negotiation has been launched started to adopt "a legal framework applicable to all Parties" by 2015, which comes into effect from 2020.
- Japan finds it necessary to offer concrete proposals and lead the negotiation for the establishment of a fair and effective future framework applicable to all Parties.

Negotiation Schedule

2013	・Discussion in the ADP
2014	・Leader's Summit is to be hosted by the UNSG in September ・Elements for a draft negotiating text are to be considered at the COP20 in December
2015	・A negotiating text should be available before May ・A legal document of a new framework is to be adopted at COP21 in December

Global CO_2 emission from fuel combustion (year 2010) and Kyoto Protocol