Japan’s Environment Policy

- Challenges and Strategy -

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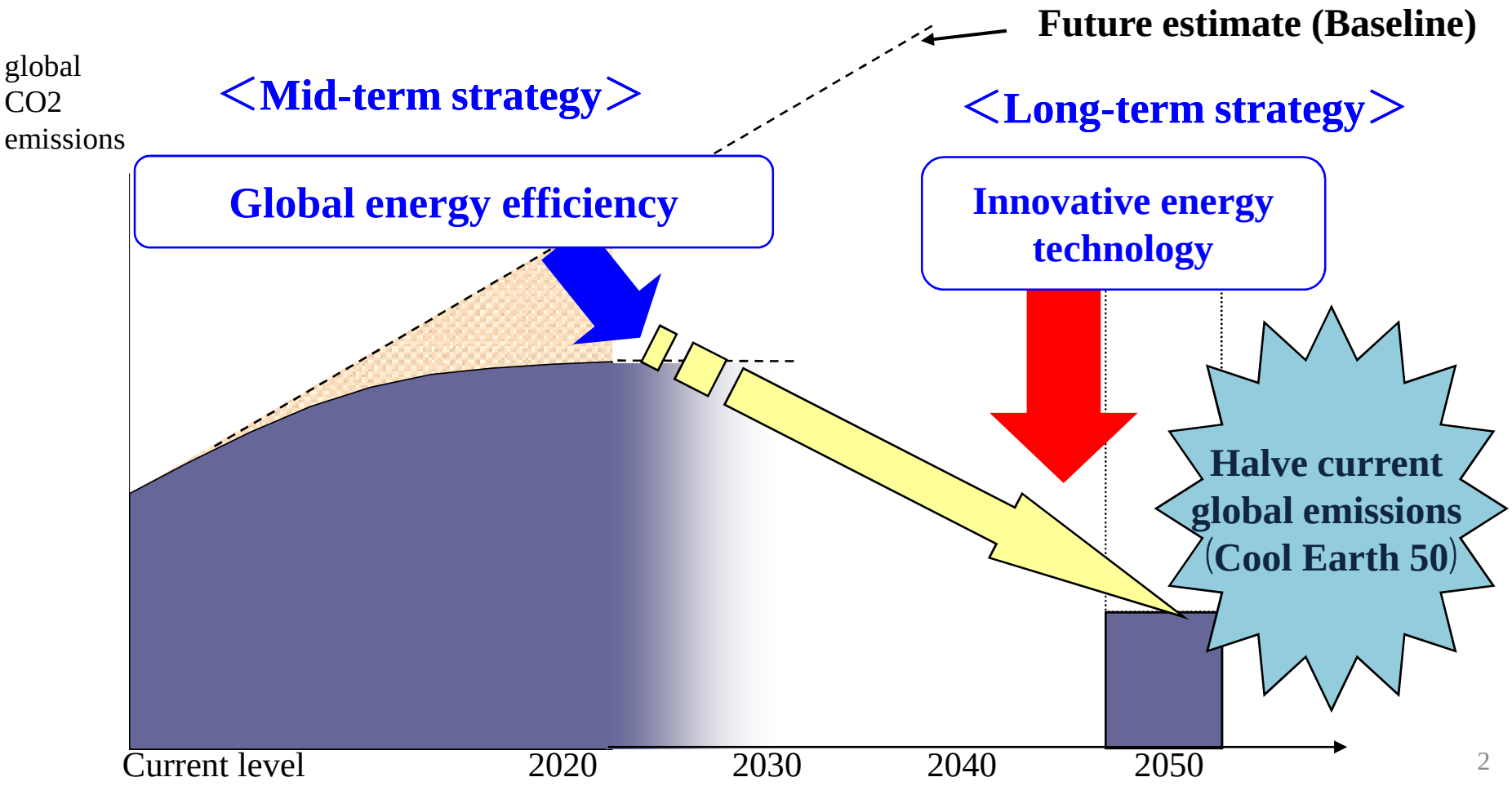
Strategy for 3Es

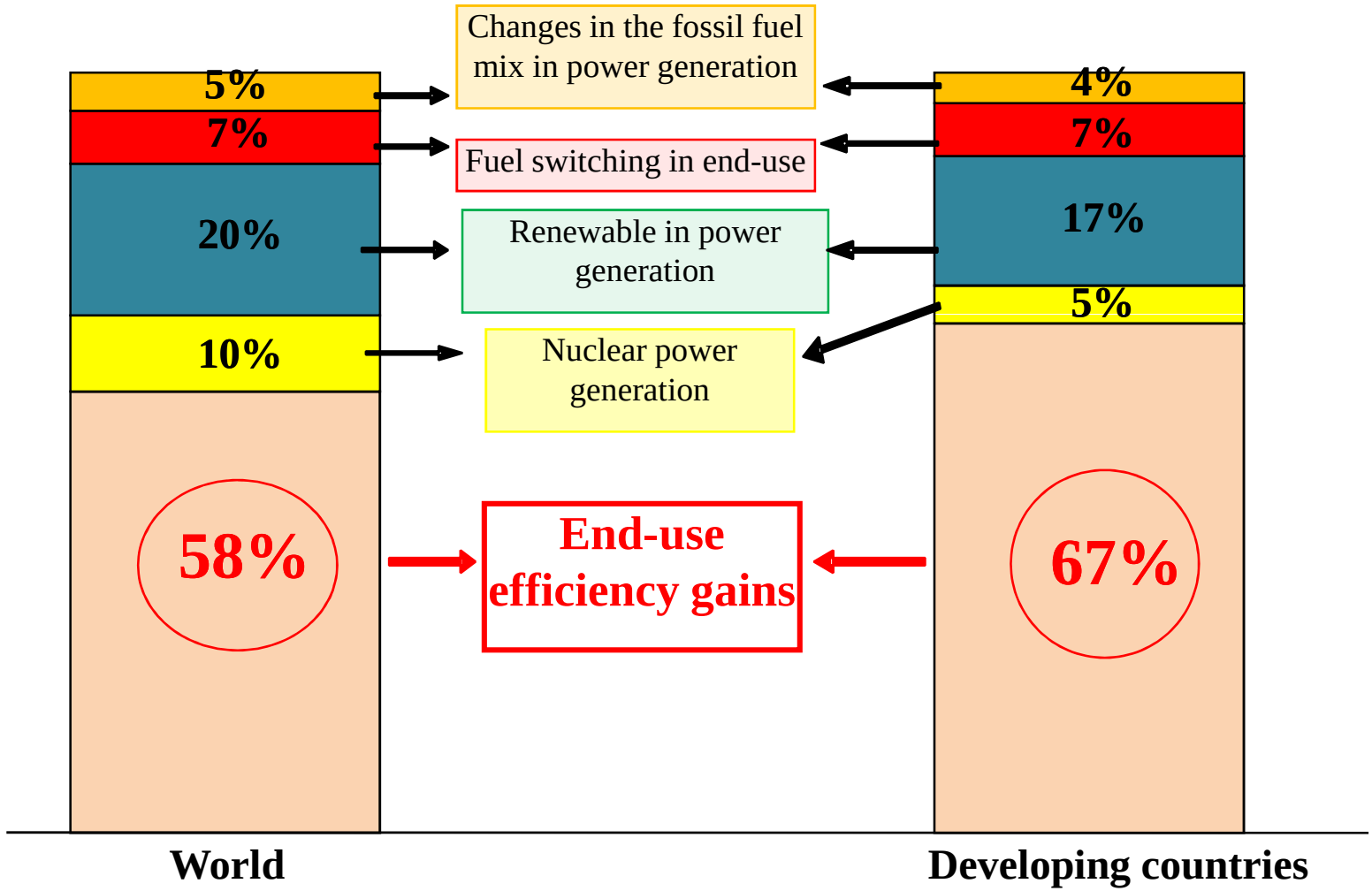
- 3Es = Energy security, Environmental protection, Economic growth
- Short and Mid-term : disseminating existing energy efficiency technology.
- Long-term: innovative energy technology can be developed and disseminated



Mid-term strategy : Energy efficiency

How does Energy Efficiency Work?

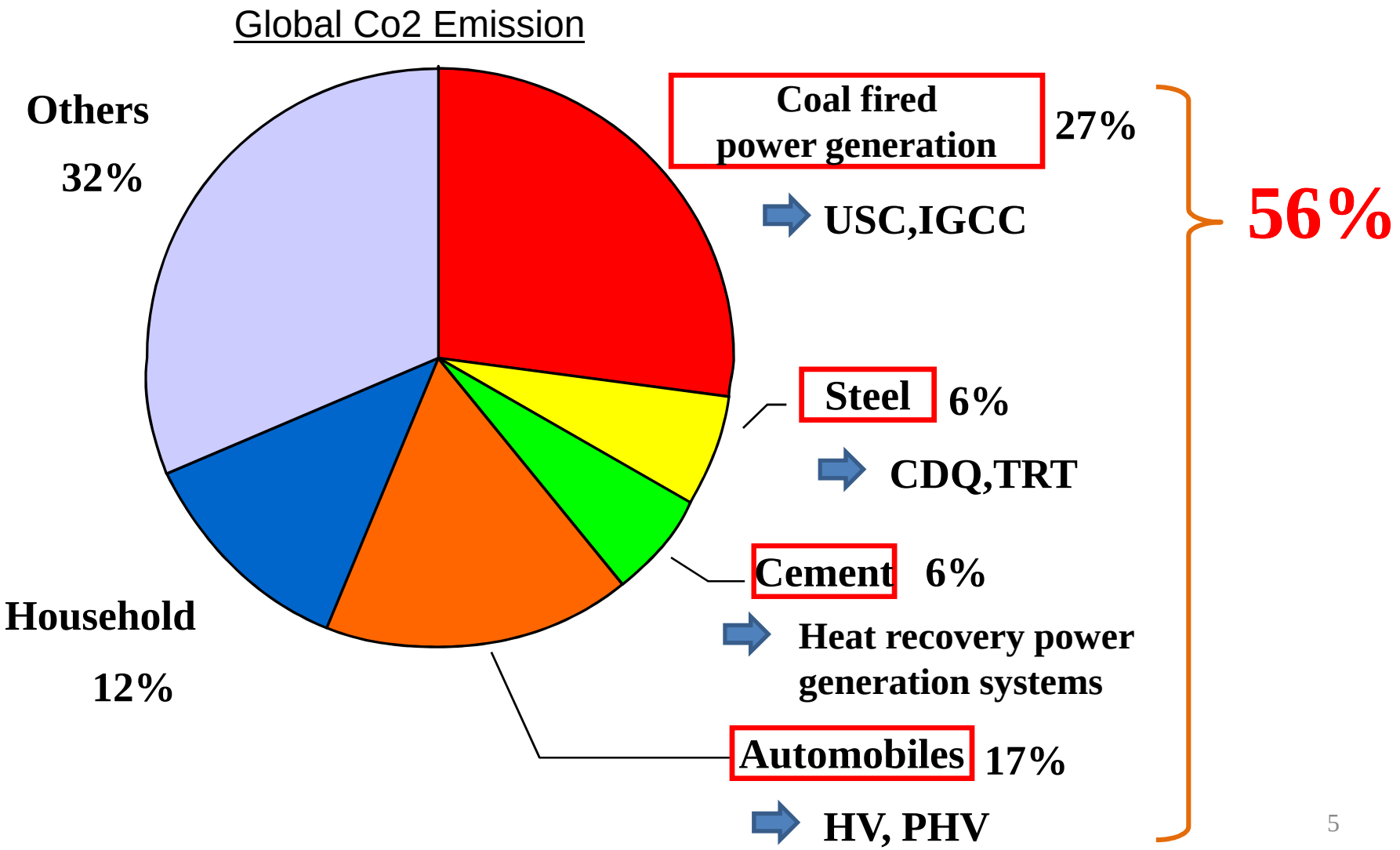
Potential of CO2 reduction in 2030 from 2004



Source: IEA

The Global Potential of CO2 Emissions Reductions

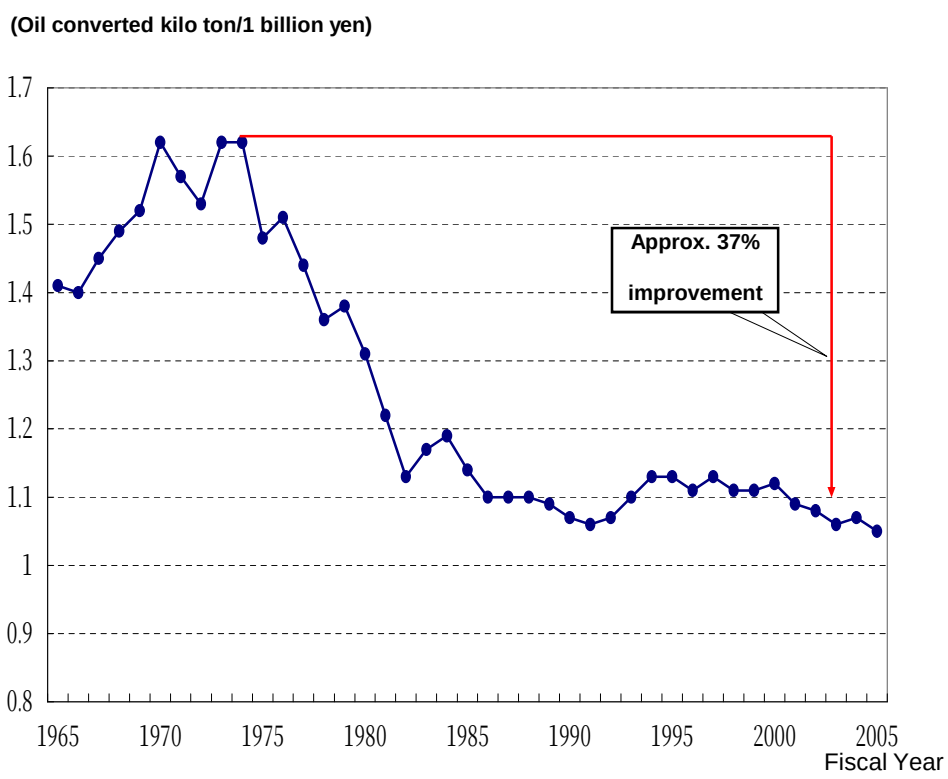
・Only four areas(coal, steel, cement, automobile) emit 56% of global CO2 emission



Energy Conservation Efforts of Japan after Oil Crises

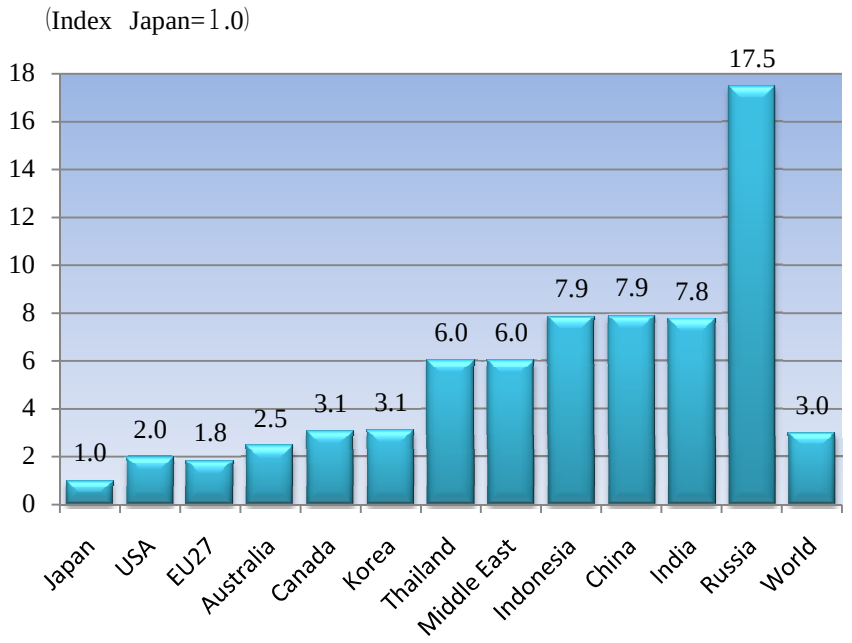
○ Japan improved the energy efficiency by 37% in last 30 years after the oil crises in the 1970s as a result of active activities made by both public and private sectors.
○ Japanese primary energy consumption per GDP is the lowest in the world owing to various energy conservation measures taken for the respective sectors.

Energy use per real GDP of Japan



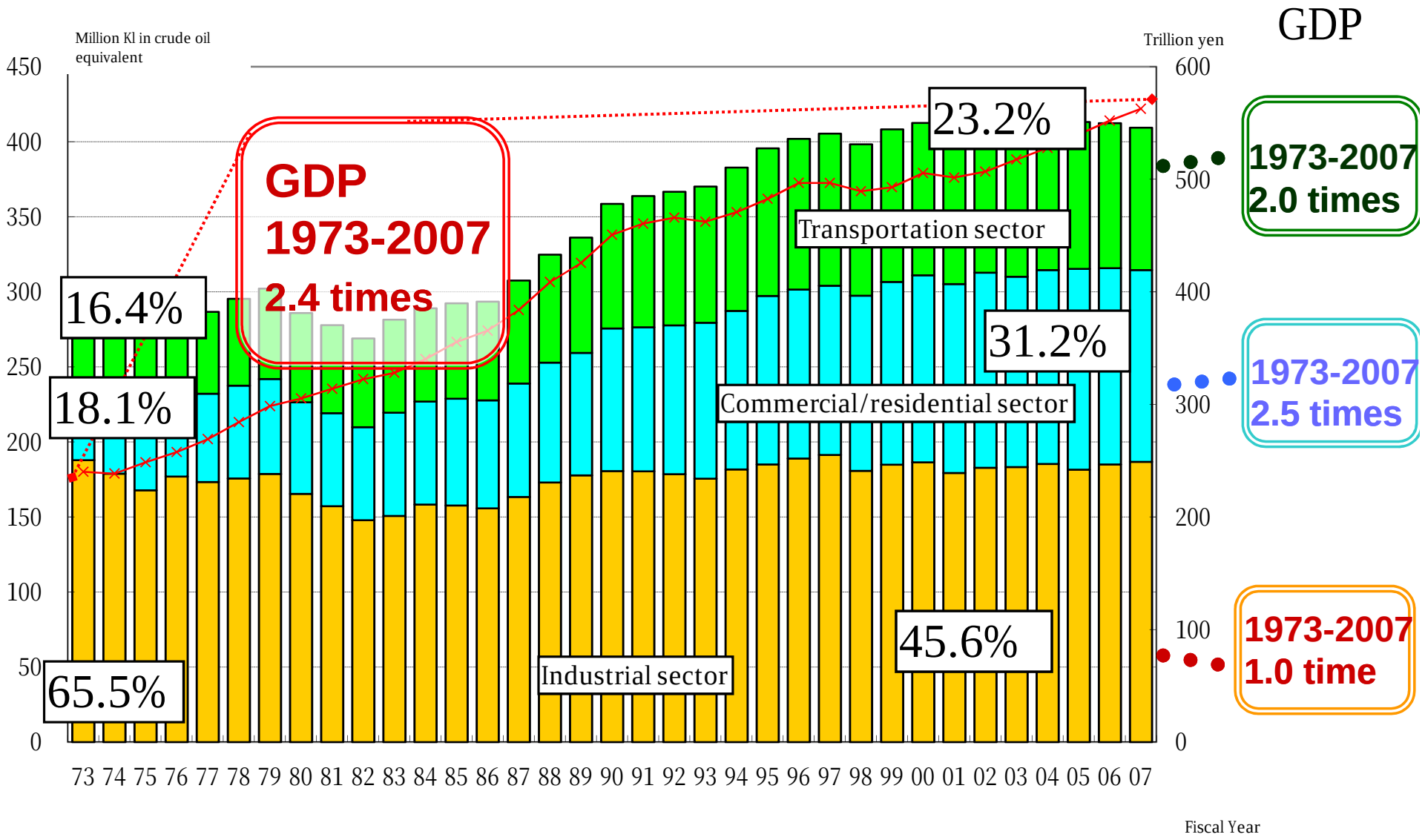
(Source) "Total Energy Statistics" by ANRE

Primary energy supply per GDP unit of each country (2007)



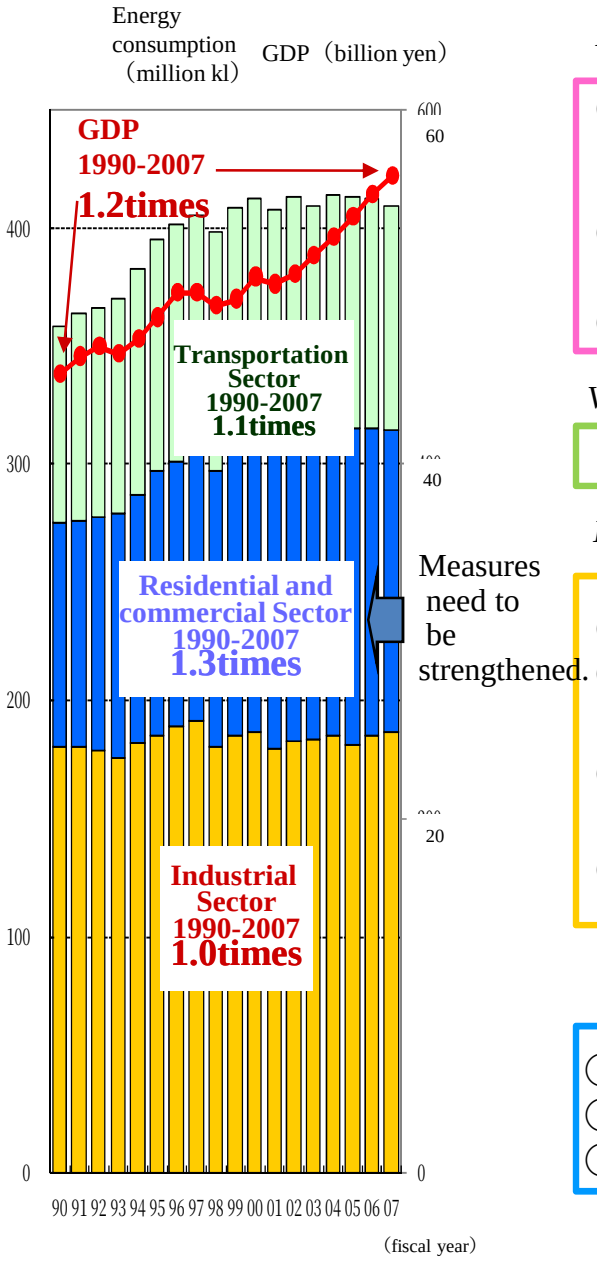
* Calculated according to IEA Energy Balances of OECD/Non-OECD Countries(2008edition)
Index of each country making Japan 1, based on the value dividing primary energy consumption by GDP.

Transition of Final Energy Consumption



(Source) Total Energy Statistics, Annual Report on National Economy.
(Note) It must be noted that the values after 1990 were calculated differently from those of the years before that, because the calculation method for totaling the total energy statistics was changed in that year.

Overview of Japan's energy efficiency policy



Measures need to be strengthened.

Regulation

◯Energy management obligation by Energy Conservation Law (Factories,Carrier,Consignor)

→ Factories : Introduce energy management by an unit of a company (in 2008)

◯ Enhancement of energy efficiency of buildings by Energy Conservation Law

→ Strengthen regulation (in 2008)

◯Top Runner Program

Voluntary action

◯Promotion of Nippon Keidanren's Voluntary Action Plan

Incentive

◯Promotion of high fuel economy vehicles(clean energy vehicles)

◯Subsidies for promoting energy efficient facilities (high-efficient building , high-performance industrial furnace etc.)

◯Energy-saving labeling, Forum for Promoting energy efficient home electric appliances, etc.

◯Tax incentive for energy efficient reform of residence , Low-interest loan

Cross Sectoral approach

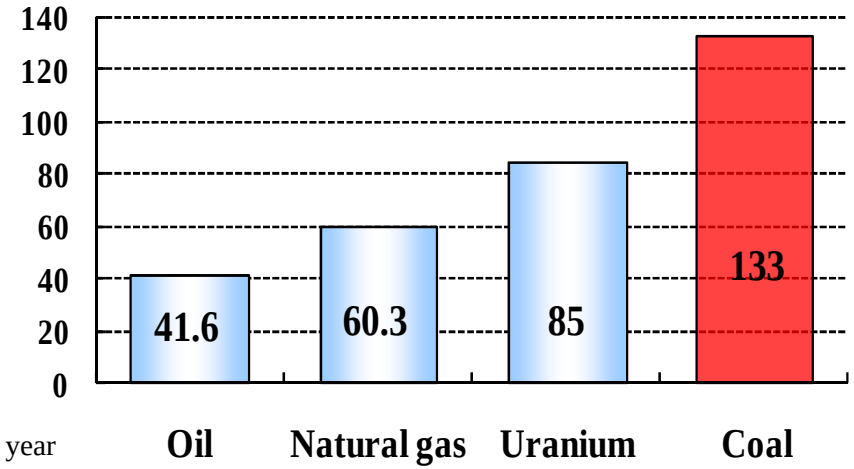
◯Providing information and promotion of national movement

◯Promotion of energy efficiency technological development

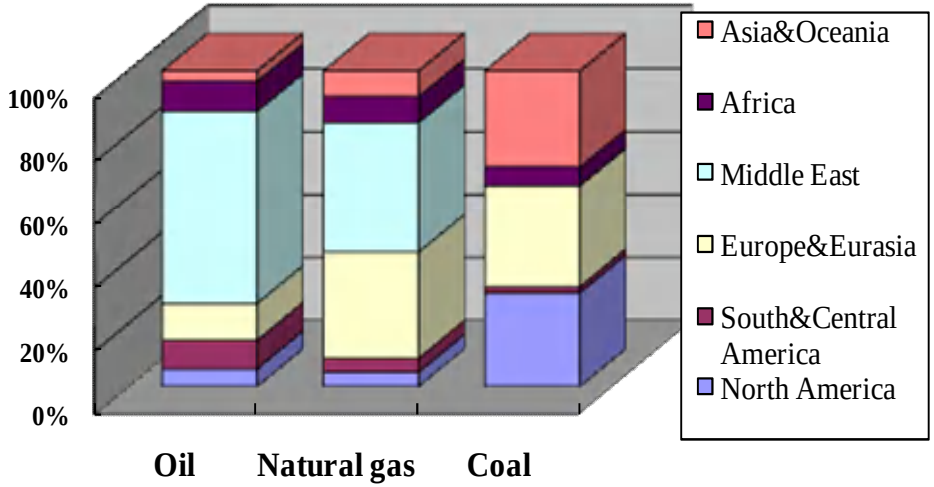
◯Promoting international cooperation

Coal – Clean Coal Technologies

Reserve-production Ratio of Major Resources



Distribution of Proved Reserves



Source: BP Statistics 2008　OECD/NEA,IAEA「URANIUM2006」

Clean Coal Technologies for Power Plants

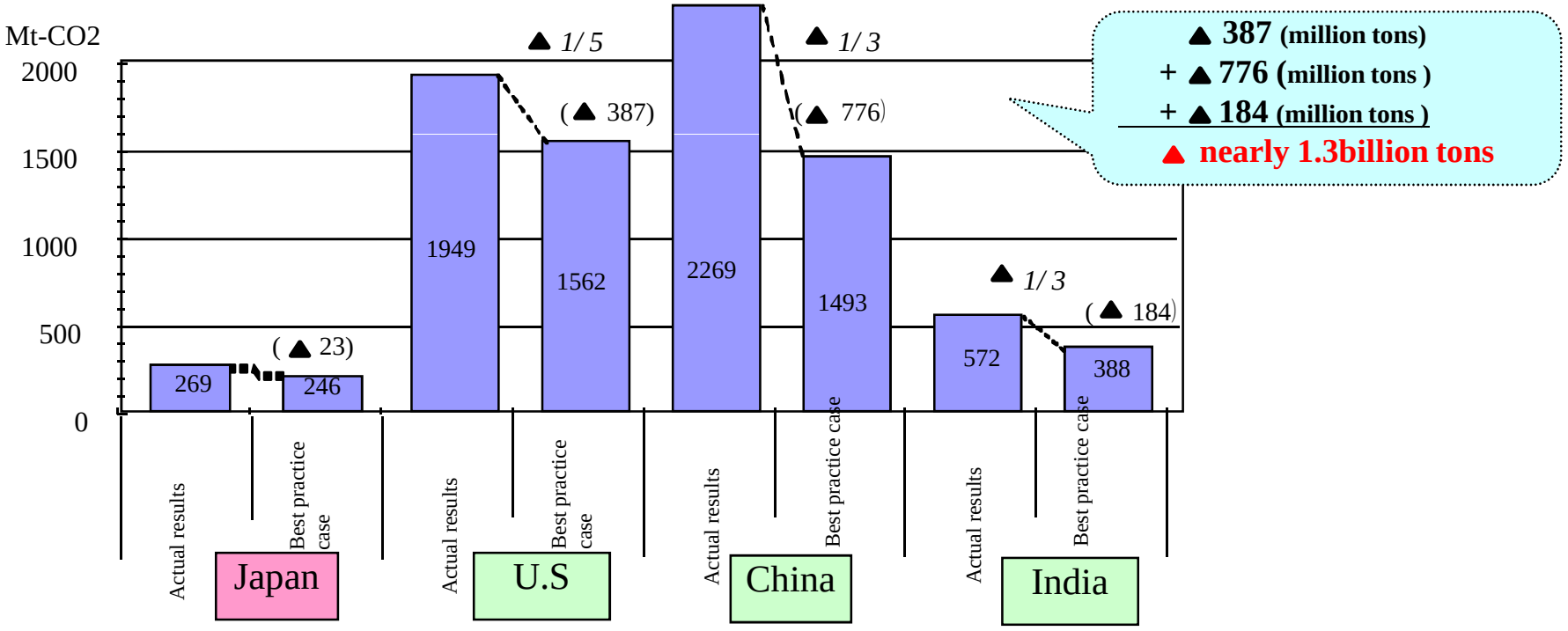
	USC	IGCC	IGFC
Transmission End Efficiency Target	41%	46 ~ 48%	55%
Current Stage	Existing	Demonstration Test (250MW)	Operation Test

How does Clean Coal Technologies work?

The CO2 emissions reduction potential would be nearly 1.3 billion tons if coal fired power plants in the U.S, China and India apply similar efficiency standards of the newest in Japan.

CO2 emissions from coal fired power plants (2004)

- Results vs. Japanese example of best practice (the highest efficiency on a commercial basis) -



Best practice case: Trial calculations of CO2 emissions in the case applied Japanese best practice (the highest efficiency of power plant on commercial base)

The data source of "Actual results": IEA "World Energy Outlook 2006"

International Cooperation for the Promotion of Clean Coal Technology（CCT）

Japan has been carrying out
－ International development & deployment of CCT
－ Policy dialogues & seminars

《Main Recent Events》

【Bilateral】

(1) China
- ●Diagnosis of facilities, re-modeling & staff training
- ●Cooperation on CCS－EOR (Carbon dioxide Capture and Storage and Enhanced Oil Recovery)
- ●Model projects of utilizing coal mine methane gas

(2) India
- ●Model projects for coal preparation systems

(3) Indonesia
- ●Coal policy dialogue & seminar

(4) EU, Poland
- ●Japan-EU CCS Workshop (Planned)
- ●Japan-Poland policy dialogue & seminar (Planned)

【Multilateral】

(1) APEC (Expert Group on Clean Fossil Energy Meeting)
- ●Seminars & information exchange on CCT

(2) ERIA (Economic Research Institute for ASEAN and East Asia)
- ●Research on CCT

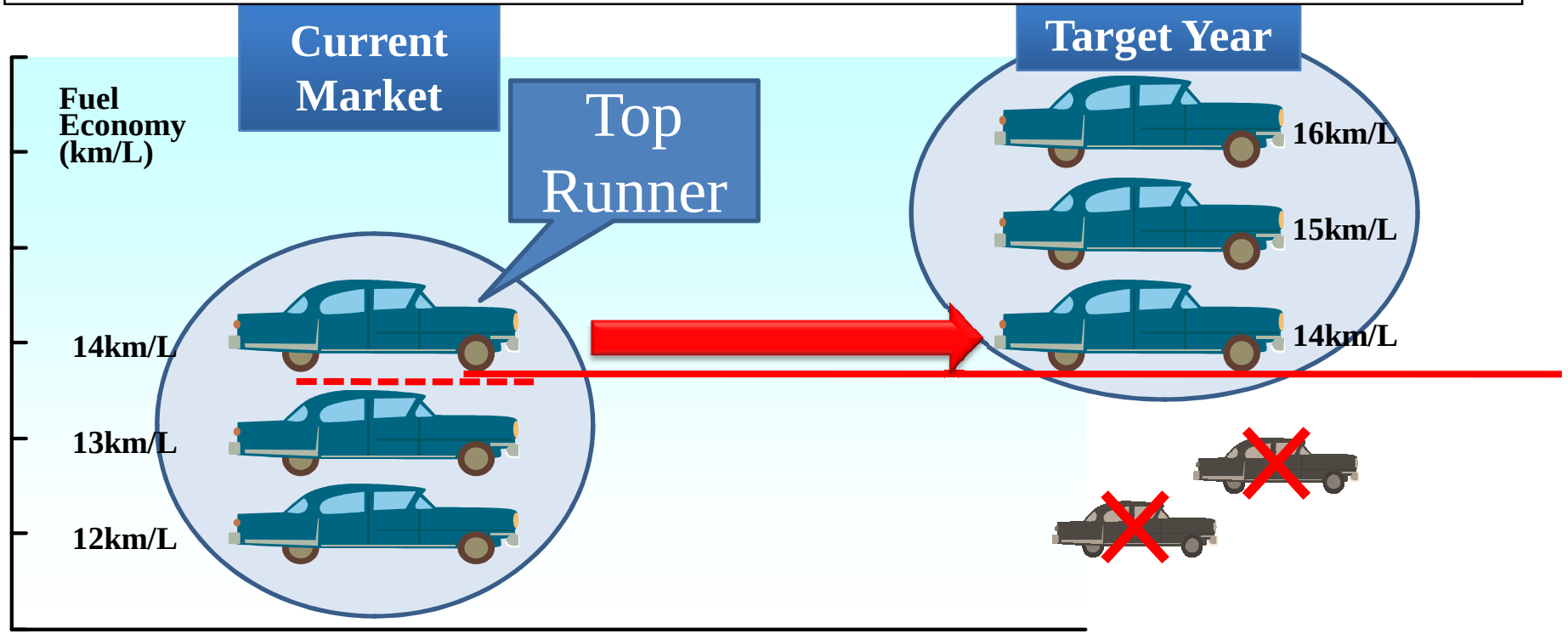
(3)APP（Asia-Pacific Partnership on Clean Development & Climate: Power Generation & Transmission Task Force)
- ●Peer review activities on the efficiency of aged coal-fired power plants

(4)MEF（Major Economies Forum on Energy &Climate)
- ●Drafting the Technology Action Plan of the “High Efficiency and Low Emissions Coal Technology ”

Top Runner Program

・Top Runner regulation obliges manufacturers to develop more energy efficient products than the current top runner in the market.

・For appliances, the Top Runner Program is effective and made remarkable results in Japan.

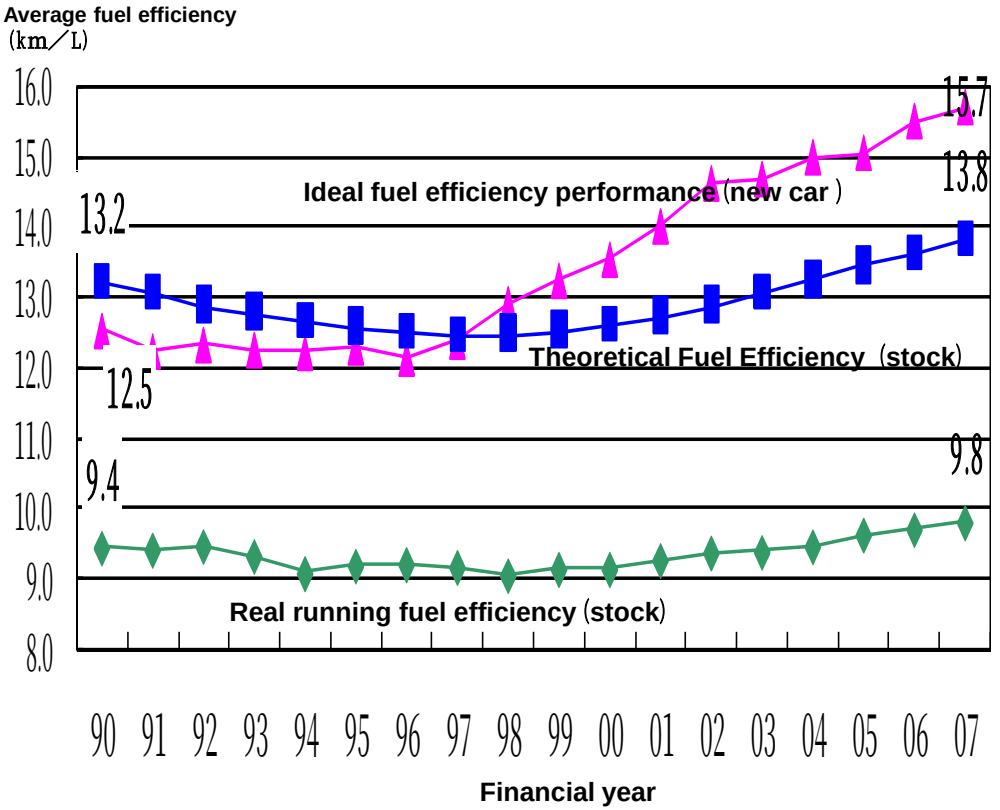


Equipment	Improvement of energy efficiency
TV sets	25.7% (1997→2003)
Air conditioners	67.8% (1997→2004)
Gasoline-powered cars	22.8% (1995→2005)

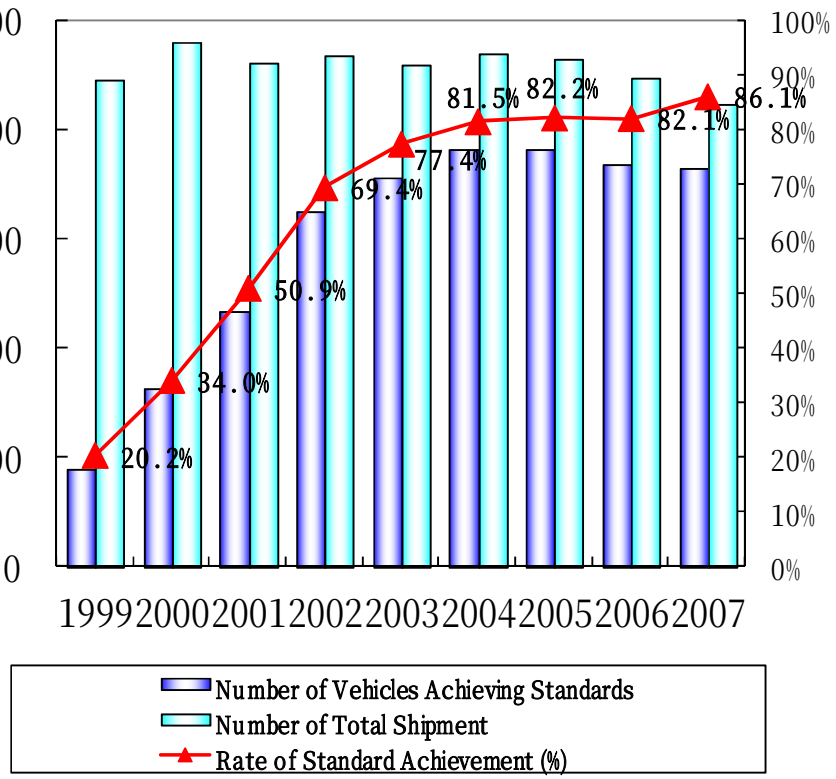
Effect of fuel efficiency improvement

- Fuel efficiency in FY 2005 has improved by approximately 22.8% compared with FY 1995, regarded as a positive effect by the successful combination of Top Runner Program and Green Taxation Plan, etc. since the FY 1999 program inception.
- Almost 80% of vehicles shipped have already achieved the current fuel efficiency standards at the end of FY 2004.
- Japan developed the revised fuel efficiency standards for vehicles in July, 2007. The target fiscal year is 2015, and the standards aim for 23.5% improvement of fuel efficiency in comparison with that in FY2004.

Transition of fuel efficiency performance of passenger car



Gasoline Passenger Vehicles' Standard Achievement (FY 2010 standard) based on number of shipment



Long-term strategy：Enhancement of innovative technology RD&D

Long-term strategy -Innovative Energy Technology-

Japan formulated "Cool Earth - Innovative Energy Technology Program" in March 2008 to address substantial reduction in the long-term through innovative energy technology RD&D.

- ✓ Committee has been set under METI Minister with experts from industry, academia, public research institutions.
- ✓ Identified 21 key energy technologies to be focused on with high priority.
- ✓ Formulated technology roadmaps for all of them, which give RD&D direction and milestones on performance with timelines.
- ✓ Strengthen international cooperation to accelerate innovative technology RD&D.

21 Key Innovative Energy Technologies

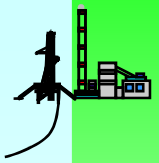
Efficiency improvement ***Low carbonization***

Supply side

Power Generation

2. Efficient coal-fired power plant

3. CCS



4.Innovative solar power

5. Advanced nuclear power

1. Efficient LNG-fired power plants

6. Superconducting power transmission

Demand side

Transport

7. ITS

8. FCV

9. PHEV/EV

10. Biofuel

Industry

11. Innovative materials/ manufacturing process

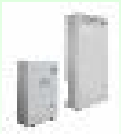
12. Steel making process with Hydrogen

Residences/ Buildings

13. Efficient houses/buildings

14. Efficient lighting

15. Fuel Cell for residential use



Cross sectoral

16. Efficient Heat pumps

17. Efficient IT devices/networks

18. HEMS/BEMS/Regional EMS

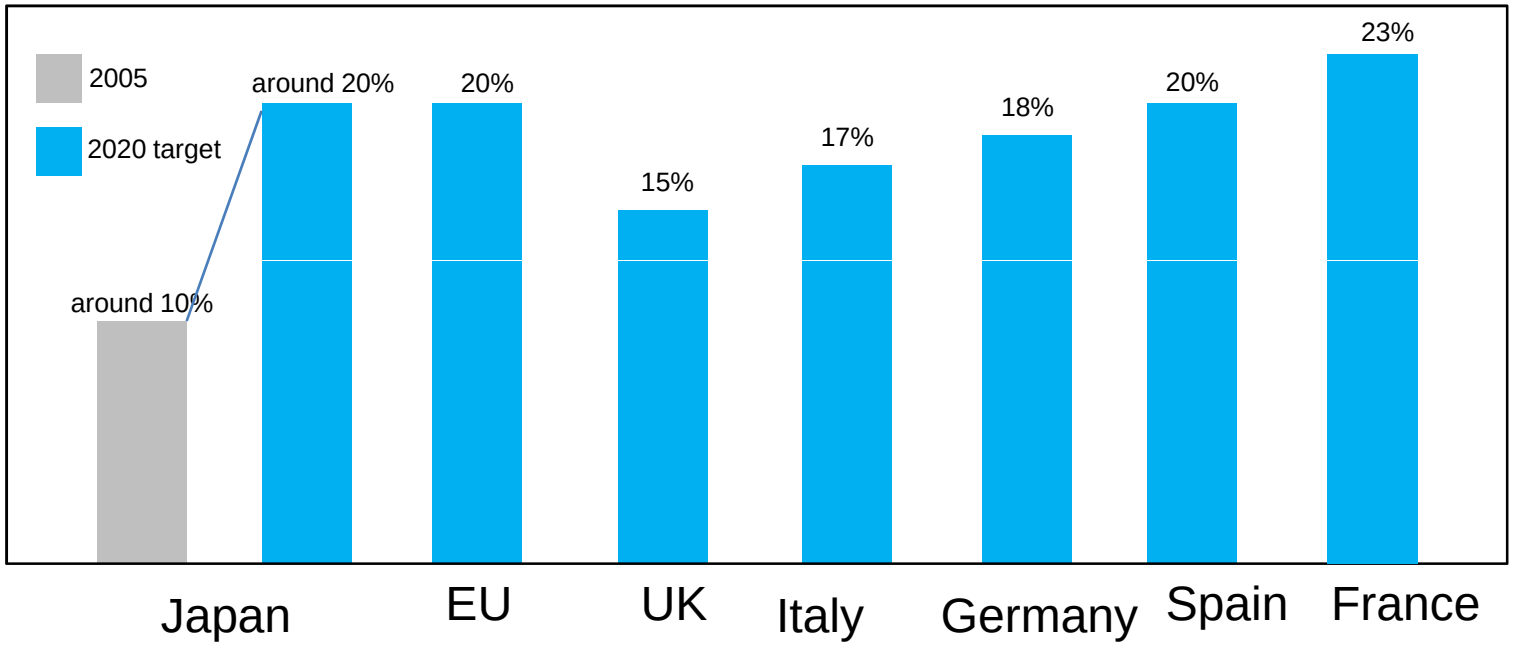
19. Power storage

20. Power electronics

21. Hydrogen production/storage/ transport

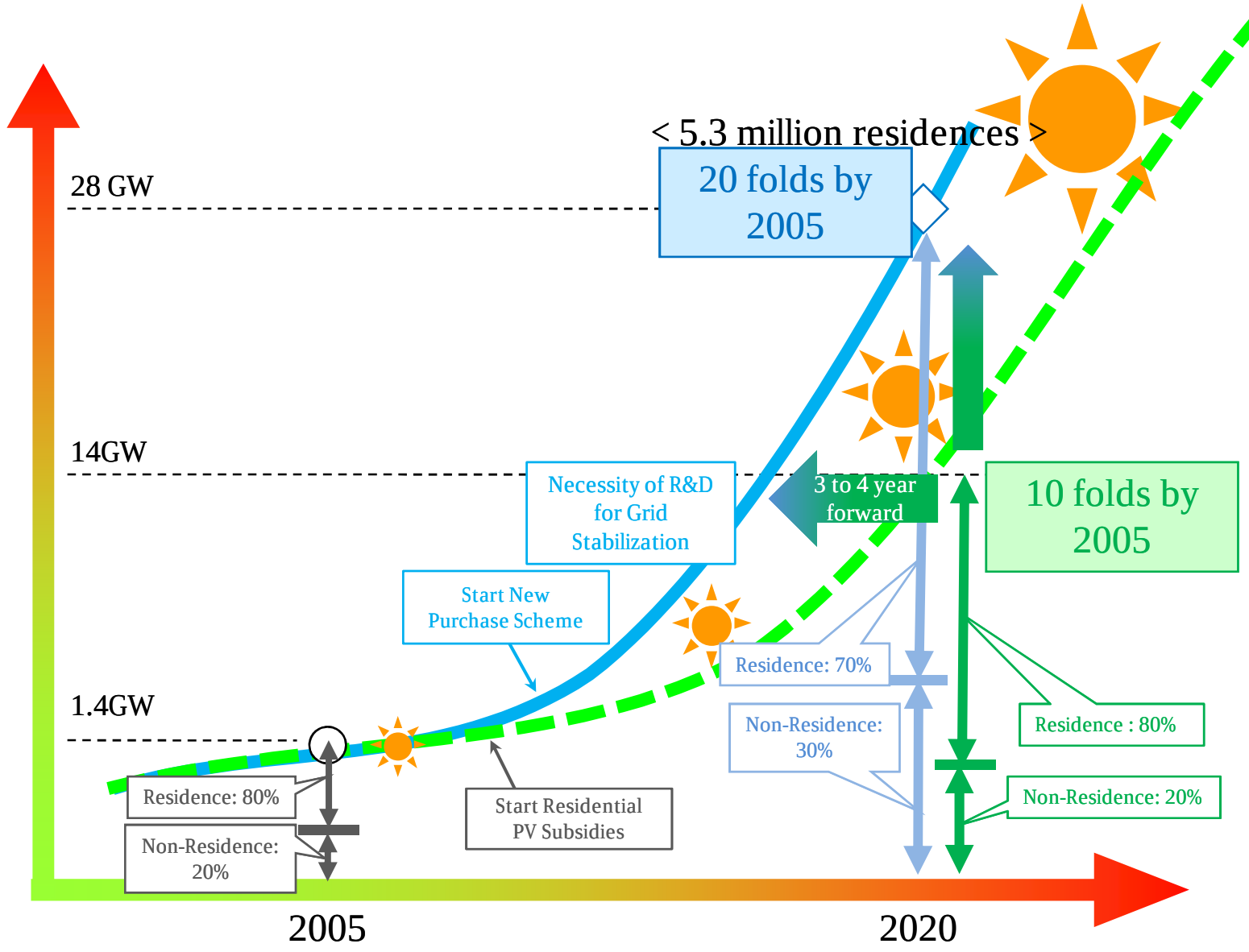
3. CCS (restated)

Renewable Energy Deployment Target compared to Final Energy Consumption



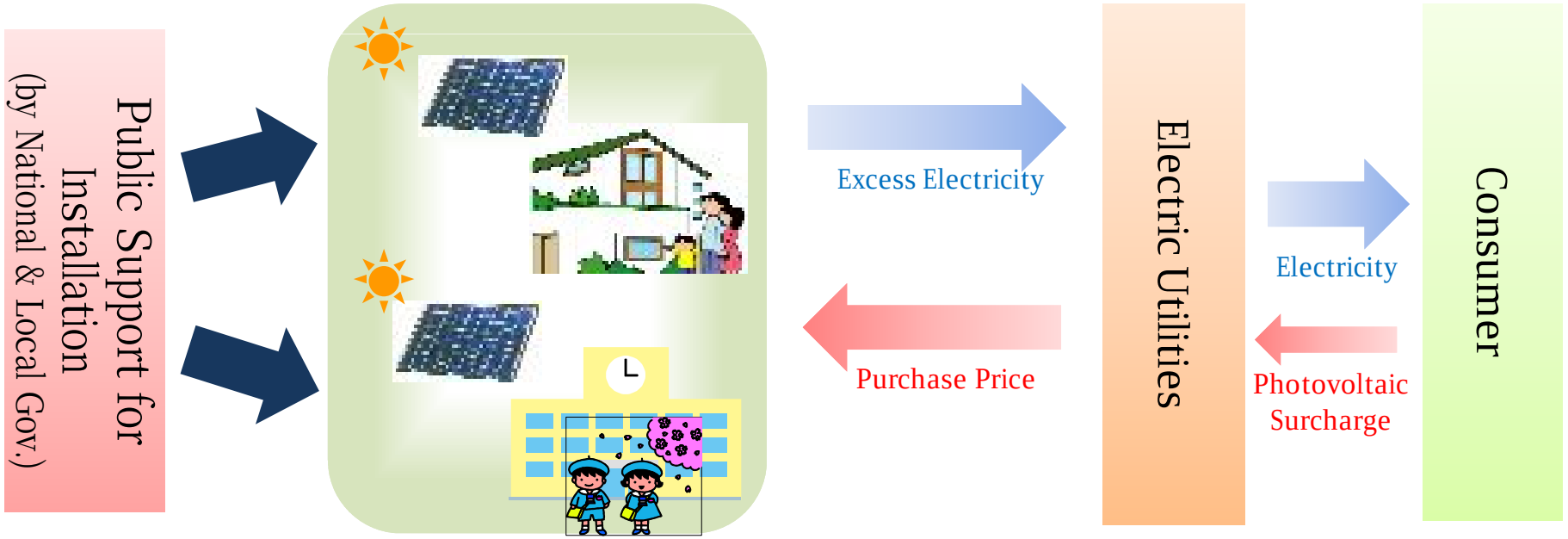
*) Including heat supply from heat pumps as prescribed at EU Directive

PV Deployment Scenario (test calculation)



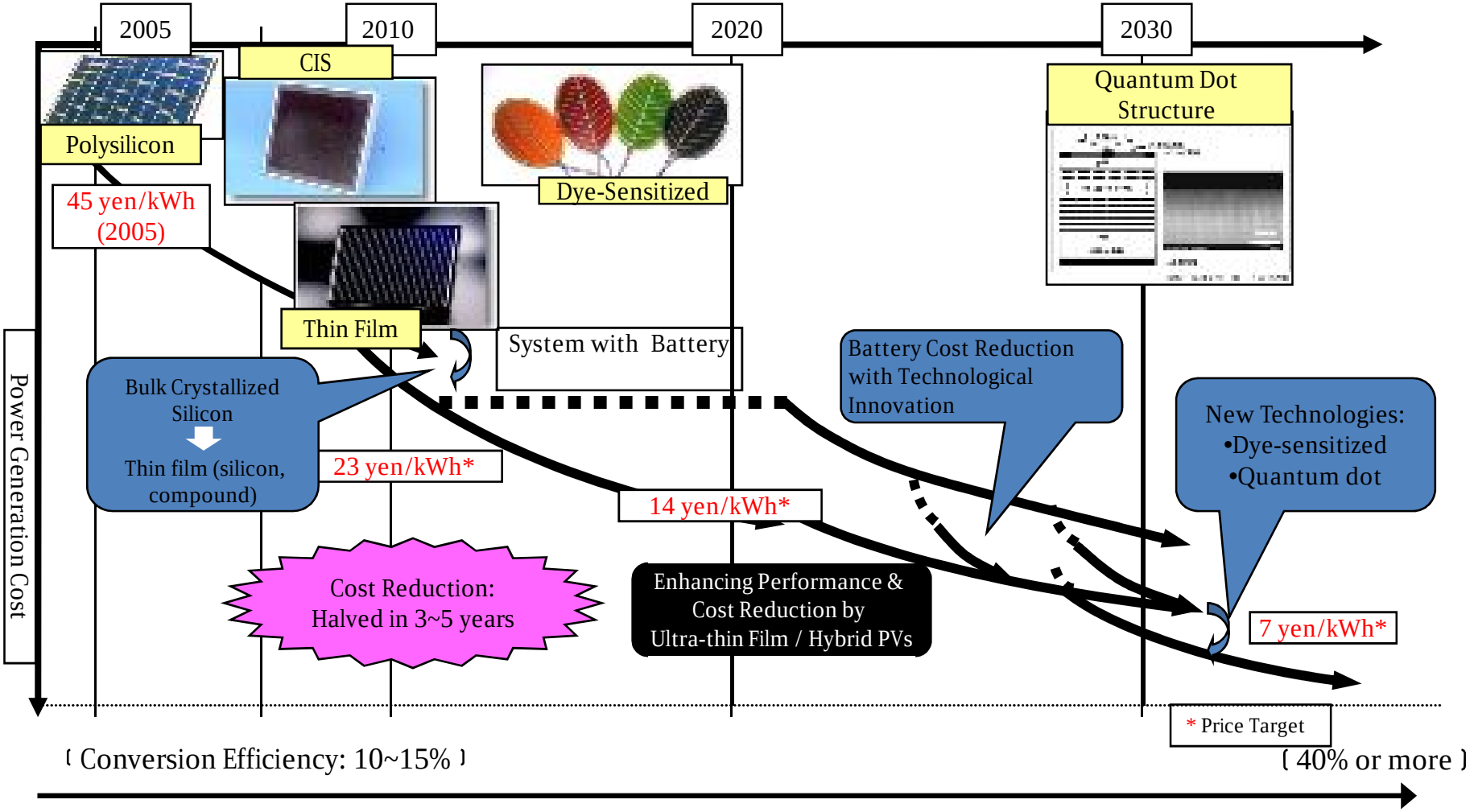
New Purchase Scheme for PV Electricity

- Target: EXCESS Electricity from PVs (excludes facilities for electric utilities)
- Price: 48yen/kWh (residential sector), 24yen/kWh (non-residential sector)
  Starting price will be decreased year by year
- Terms of Purchase: For 10years
- Start from: November 1st, 2009



< Installers: Electric Consumers >

Photovoltaic: Vision for Cost Reduction

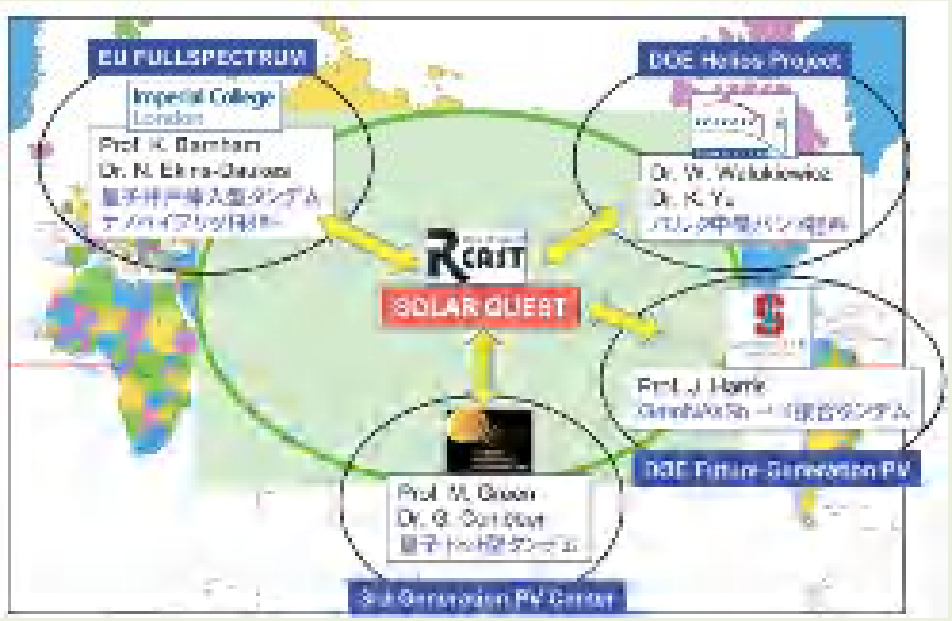


Equivalent to Nuclear Energy in 2030

Photovoltaic: Establishment of Center of Excellence for Innovative Solar Cell

Budget: 2 billion yen annual

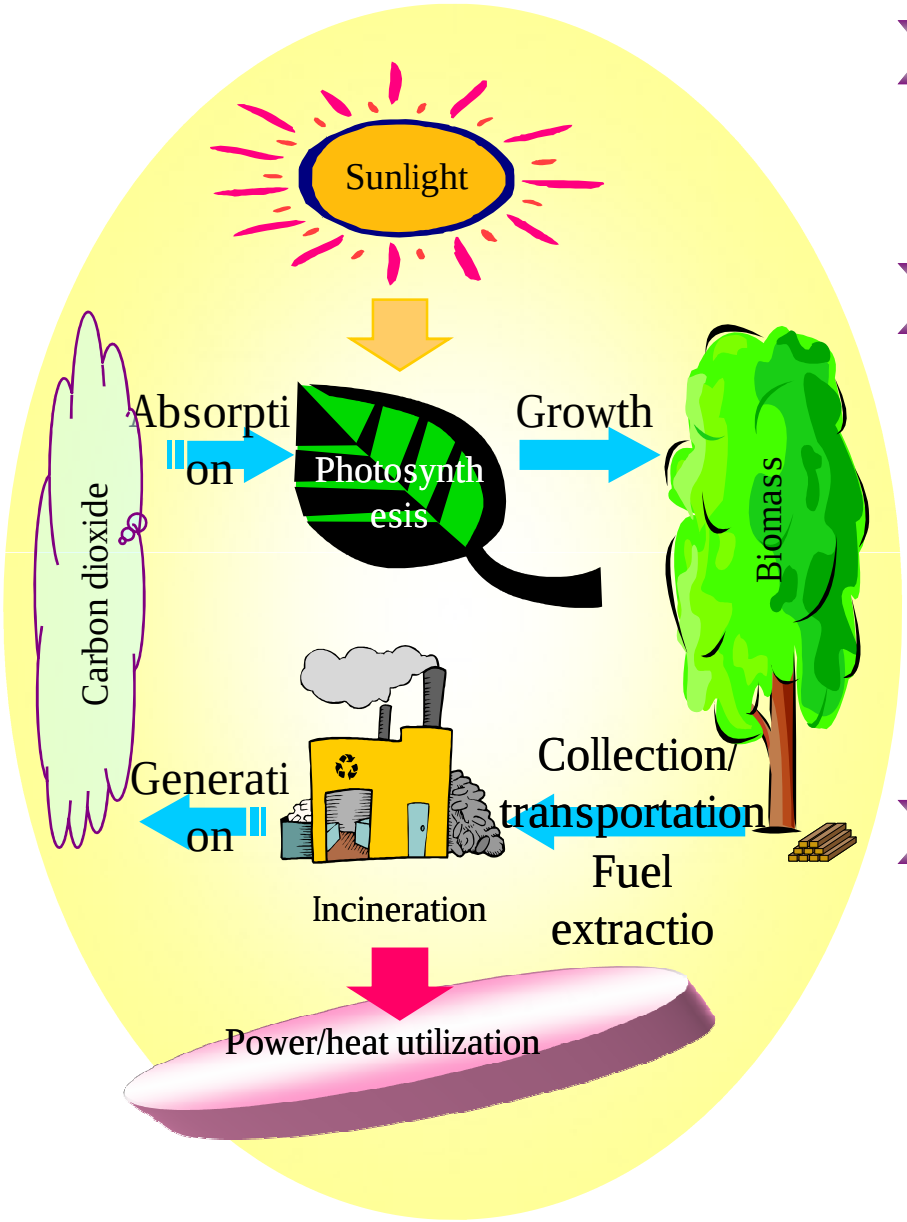
Research Center for Advanced Science and Technology, University of Tokyo (RCAST)



Nickname:
SOLAR QUEST

- Development of Quantum Dot Superlattice Solar Cells (theoretical conversion efficiency >60%)
- Participation Companies : Toyota Technological Institute, SHARP, ENEOS, etc.
- International collaboration with world-leading institute abroad (including institutes under DOE.)

What is Biomass Energy?



What is biomass?

Organic matter from animals and plants, except for fossil resources, that is usable as energy source

Significance as energy

(1) Biomass is carbon-neutral renewable energy, and additional CO_2 will not be emitted if the balance of discharge of CO_2 is considered through fixed CO_2 use, by fostering biomass at the same time with utilization.

(2) Diversification of energy sources can be promoted by newly using biomass, which has never been used.

Problems to conquer

(1) Its generation distribution is wide and thin, and the energy density per capacity is low, resulting in a great load for resource collection and transportation.

(2) Facilities tend to be of small scale and dispersed, and it is difficult to enhance efficiency and reduce cost through scale merit.

Example of Facilities Using Biomass

Wooden biomass power generating facility (direct incineration)
– Itoigawa city, Niigata prefecture

[Company that established the facility]
Summit Myojo Power Co.
[Biomass]
Construction waste materials, such as sawdust, thinned wood
128,000 t / year
[Total project cost]
6,912 million yen
[Outline]
High-efficiency power generation through high-efficiency combustion of chip-form fuel, using a circulating fluidized bed boiler, is planned.
Electricity generated is planned to be sold to factories and electricity retailers.

Large power-generation boiler (Circulating fluidized bed boiler)

Power generation efficiency of 35% or above

Biomass fuel of 70% or above (high multi-fuel combustion rate)

Electric power
50,000kW

Factories and electricity retailers

Incineration ash, used for cement

Power generation plant with no waste

Recent Development of introducing Biofuels

Major Challenges

(1) Stability of Supply

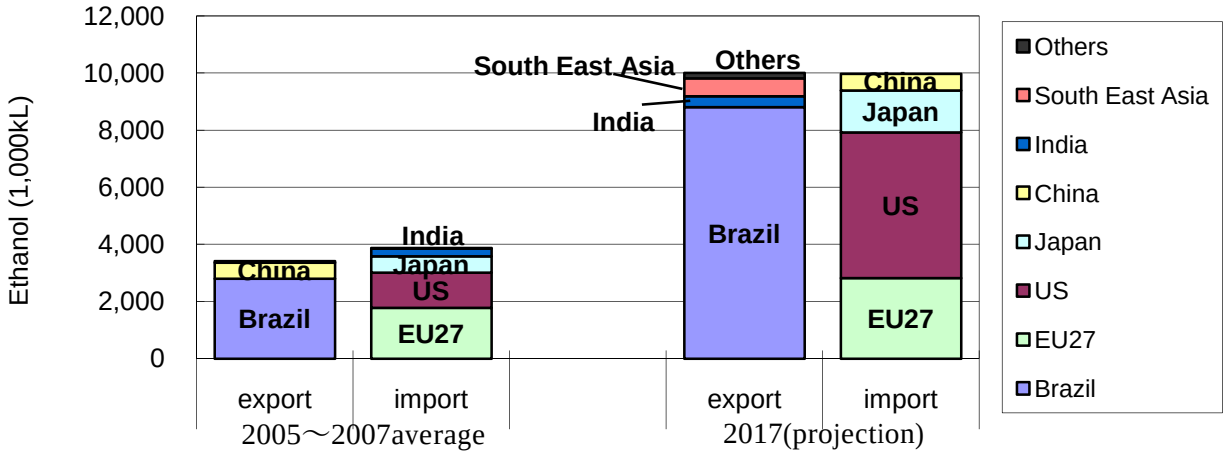
- Japan depends on Brazil for bioethanol. Japan : Only 3% is self-sufficiency ratio for bioethanol.

(2) Competition with Food

- Grain and other food prices have risen fast over recent years as overseas demand for biofuels has increased rapidly. Biofuels are feared to compete with food.

(3) Economic efficiency

- Stability of prices over a long term are important for gasoline, bioethanol and other fuels.



Source：OECD-FAO Agricultural Outlook 2008-2017

Solutions

Strive to innovate technologies for next-generation biofuels to overcome these challenges.

Fuel Cell: World First Commercialization (Residential)

ENE·FARM

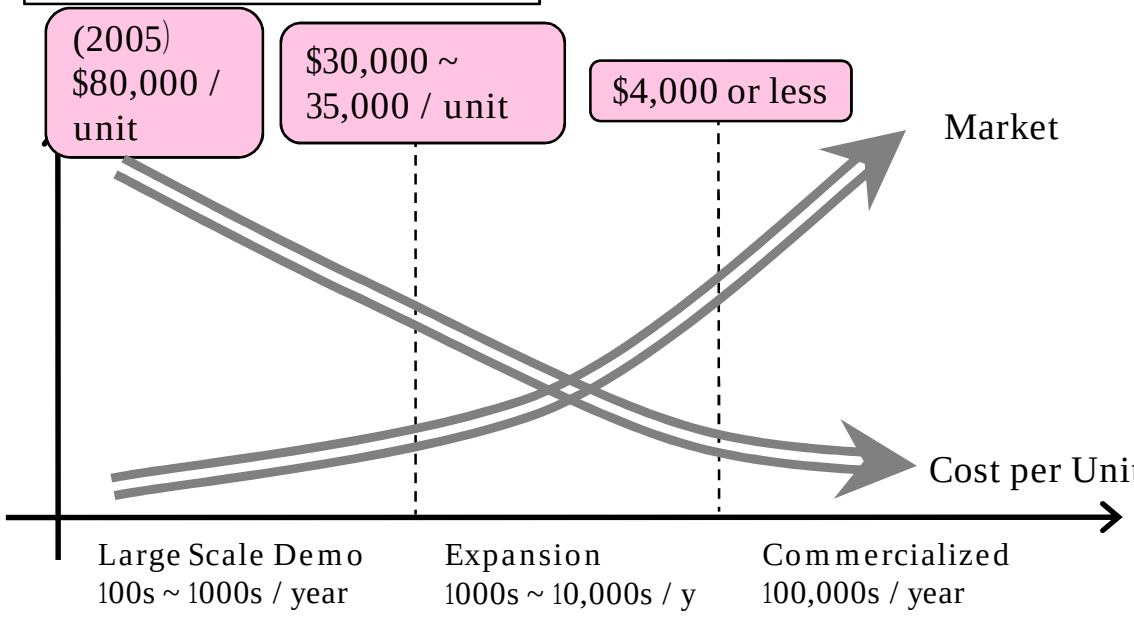
FY2009 on Sale

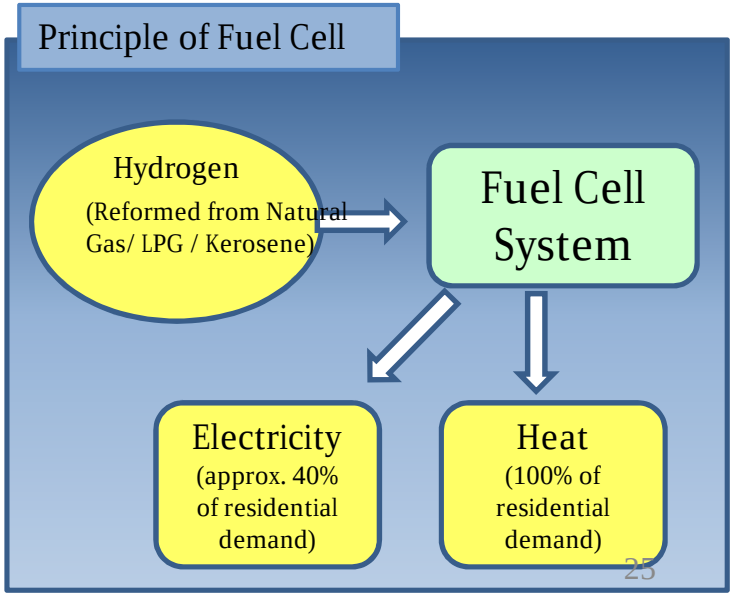
Starting Price: approx. US$30,000

Strong Incentives

Subsidy : US$14,000 / unit (maximum)

Vision for Cost Reduction





Fuel Cell: Automobile

Honda FCX Clarity

Toyota FCHV-adv

Range: Over 600km per one fueling

Demonstration: 65 Vehicles Registered

(including 5 buses and 7 hydrogen ICVs)

Fuel Cell: Challenges

1. Materials

Hydrogen embrittlement of metals

➡ Research at “HYDROGENIUS” project

HYDROGENIUS

2. Hydrogen Storage

Advanced fundamental research for hydrogen storage materials

3. Efficiency Improvement

PEFC (polymer)	33~37%	(HHV/LHV)
SOFC (ceramic)	40~44%	(HHV/LHV)

*efficiency for electrical power generation

4. Infrastructure

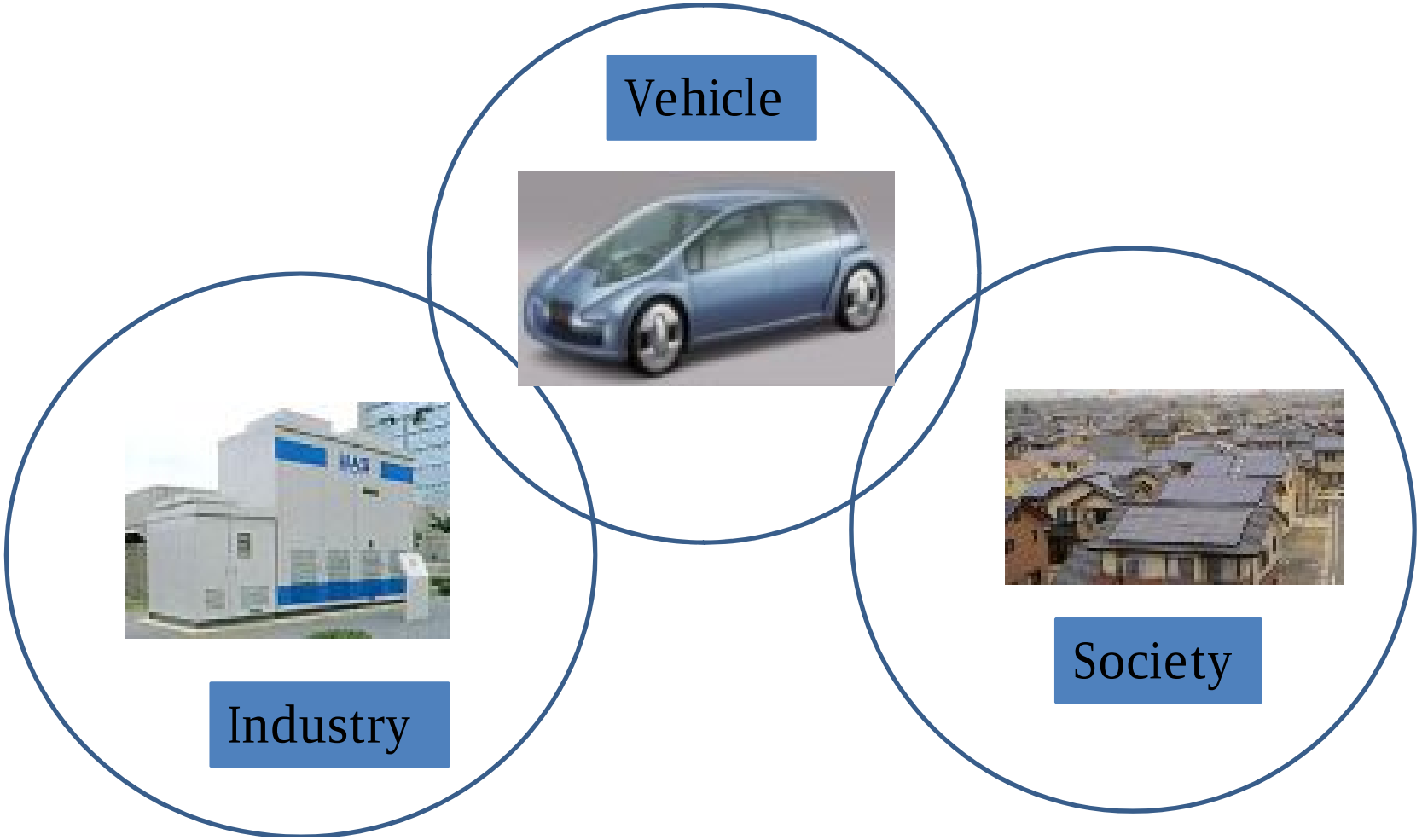
Deployment of hydrogen fueling stations

Reduction of the construction cost, Safety regulations, etc.

Battery: Key Technology for the Future

Battery is not a Renewable Energy… Battery does not produce Energy…

BUT, Battery is the most fundamental Technology for the Future World



Battery:
Vision for Technological Development

Target for EV Battery

	The Present	2010	2015	2020	2030
Capacity	1	1	1.5	3	7 times
Cost	1	½	1/7	1/10	1/10 times

⇨ Same Range as Gasoline Cars per Charge (500km)

R&D for Innovative Battery

- FY2009 ~ FY2015 project
- Budget: 3 billion yen annual
- R&D of Basic Technologies for Innovative Battery
- Establishment of Center of Excellence

International Cooperation in Energy Conservation and Renewable Energy

Support to Develop Institutional Framework

- Acceptance of trainees
  - Creation of laws and systems (tax systems, subsidy programs and others) to promote energy conservation
  - Introduction of energy-saving and other associated technologies, and methods for management of energy conservation
- Dispatch of experts
  - Long-term dispatch of experts to prepare energy conservation plans (formulation of energy-conservation targets, action plans and others) and develop energy conservation institutions such as law system.
  - Short-term dispatch of experts for energy conservation diagnoses of factories

Scene of training

Energy conservation and Renewable energy model projects

- Demonstrate the effectiveness of Japan's practical energy efficient technologies with actual models and others in the countries where such technologies have not come into wide use yet
- Disseminate proven energy-saving and alternative-energy technologies on a business basis
- The greatest challenge facing us is to promote wide use after completion of projects.

Coke dry quenching equipment (CDQ)

Multilateral Frameworks

- IEA, APEC, APP, EAS, IPEEC, IRENA etc.

Promotion of the Japanese Smart Energy Technologies

Japanese Business Alliance for Smart Energy - Worldwide

Mr. F. Mitarai,
Chairman of JASE-W

Purpose

Contribution on Greenhouse Effect through Promotion of Energy Conservation Technology over the World

Activities

－ Publication of Smart Energy Products & Technologies and its distribution to the World.

※HP ： http://www.jase-w.eccj.or.jp/technologies/index.html

－Globalizing Japan's eco-friendly businesses through the government – private joint activities.

－Deep discussion on specific business fields

① Heat Pump / Inverter Working Group
② Energy Saving Solution Working Group
③ Solar Power Working Group

Establishment： October 30th, 2008
Chairman ： Mr. F Mitarai, Chairman of Japanese Business Federation
Main Members : 57 Companies, 19 Observers, 11 Governmental Organizations