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# Human Development Report 2007/2008

**Fighting climate change:  
Human solidarity in a divided world**

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**Japan – Country Study**

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# Human Development Report 2007 – mitigation country studies

## Japan – Country Study

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## **Executive Summary**

Japan has not as of February 2007 set any concrete long-term targets (beyond Kyoto 2008-2012) for greenhouse gas emissions (GHG) reductions, nor announced a long-term strategy for climate change mitigation. There are several promising research initiatives, but climate change policy is, at present, very much focused on meeting the country's Kyoto Protocol commitment to reduce GHG emissions by 6% (2008-2012) from the 1990 level.

Actual emissions as of end of 2005 (preliminary figures) had, however, risen by 8.1% from 1990, thus leaving a gap to bridge of more than 14%. Major emissions increases have occurred in commercial/retail, housing, and transportation sectors, while the industrial sector has reduced emissions by some 3% since 1990.

A voluntary cap-and-trade scheme (CO<sub>2</sub> emissions only) operated by the Ministry of the Environment started operations in 2006, and when the second annual round commences in April, 2007, 89 corporations will be participating in this initiative. It is positioned as a testing bed for possible future emissions trading schemes, but there is no clear policy commitment to introduce a full-fledged scheme.

Research by the National Institute for Environmental Studies (NIES) explores scenarios for a Low Carbon Society 2050, and this research is expected to provide a foundation for future legislation and roadmaps toward the de-carbonization of society. In February 2007, this project released an interim report suggesting that a 70% reduction of GHG emissions (as compared to the 1990 level) is both technologically and economically feasible; the cost would be no more than approximately 1% of GDP in 2050, the report suggests.

Nippon Keidanren (Japan Business Federation) requires its member corporations in seven key industries, accounting for more than 90% of industrial emissions, to reduce emissions by 2010 to the 1990 level. This appears to be achievable for most industries, but Keidanren has not announced any further, more progressive or long-term reduction targets.

Japan has been very successful in promoting energy efficient technologies, and the "Top Runner Program" encouraging best-in-market approaches to energy efficiency now covers 21 product categories. Also, Japanese clean energy technology transfers to other Asian nations is actively being promoted through NEDO – the New Energy and Technology Development Organization. Further, in the "Asia-Pacific Partnership for Clean Development and Climate" initiated in 2005 by six nations including Japan and the US, a technology and market-oriented approach to clean development appears to align well with Japan's approach to mitigation. However, there are no commitments to emissions reductions linked directly to these initiatives.

The Japanese Government's "Kyoto Target Achievement Plan adopted in April 2005 is at present (February 2007) under revision, and major new policy initiatives are expected in the latter half of 2007, but a key issue will be how/whether the Japanese Government can persuade industry, represented by Nippon Keidanren, to further action.

## 1. GHG Emission Trends in Japan:

### Carbon emissions in Japan – 8.1% above 1990 (2005 figures)

Preliminary figures released by the Japanese Ministry of the Environment in October 2006, indicate that greenhouse gas emissions (GHG emissions) in Japan in 2005 were approximately 8.1% above the level in 1990, the reference year for the Kyoto Protocol. (The final report on 2005 GHG emissions is due in April 2007). Total emissions were 1.364 billion metric tons CO<sub>2</sub>e as compared with 1.261 billion tons for 1990. Under the Kyoto Protocol, Japan has committed to reducing GHG emissions by 6% from the 1990 level in the 2008-2012 period. This commitment by Japan to reduce GHG emissions by 6% is structured in the following way:

0.6% - Actual domestic GHG reductions	}	6% reduction compared to 1990 level
3.8% - Forest sink		
1.6% - Kyoto Mechanism (purchase of certified emissions reductions)		

Since emissions, as mentioned above, have risen by some 8.1% as of end of 2005, it is now estimated that Japan needs to reduce domestic emissions by a total of 8.7% between 2008-2012:

0.6% - Actual domestic GHG reductions commitment (as above)
8.1% - Increase of emissions as of end of 2005
<hr/>
8.7% - Required actual domestic emissions reductions between 2008-2012

Source<sup>i</sup>

There is a significant difference in the emissions performance of key sectors in Japan. Table 1 provides an overview of CO<sub>2</sub> emissions trends in all major sectors (this overview focuses only on so-called “energy-derived CO<sub>2</sub> emissions,” which make up some 80% of total emissions:

**Table 1: 2005 CO<sub>2</sub> emissions (Japan), preliminary figures**

Sector	1990	% Change in 2005	Status in 2005
Total	1,059	+0.8%	1206 (+13.9% from 1990)
Industrial	482	+0.2%	466 (-3.2% from 1990)
(factory operations, etc.)			
Transportation	217	-1.8%	257 (+18.1% from 1990)
(vehicles, shipping, etc.)			
Commercial/Retail	164	+3.1%	234 (+42.2% from 1990)
(retail, service sectors, office buildings, etc.)			
Housing	127	+4.5%	175 (+37.4% from 1990)
(private homes, etc.)			
Energy	67.9	-0.6%	74.4 (+9.7% from 1990)

(Power stations, etc.)			
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Unit: million Mt CO<sub>2</sub>

Source<sup>ii</sup>

Through energy efficiency improvements in the industrial sector, an emissions reduction of 3.2% has been achieved. In transportation, housing, and commercial/retail sectors, however, there has been an increase of CO<sub>2</sub> emissions of 18.1-42.2%.

Emissions in the transportation sector have risen 18.1% since 1990, but started decreasing for the first time in 2005 due to improved fuel efficiency, consumer preference for smaller cars, and shorter annual driving distances (a slight decrease in driving distances started in 2004).

Emissions in the commercial/retail sector have increased dramatically (42.2%) mainly due to increased total floor space (35% above 1990).

In the housing sector, the increase of 37.4% can largely be attributed to an increase of 21% in the total number of housing units between 1990-2005. A case study below provides some more detail on the rise in emissions in the two latter sectors.<sup>iii</sup>

## 2. Carbon target setting – focus still on Kyoto targets

Japan has not as of early 2007 set any GHG emissions reduction targets beyond 2012. There are no publicly stated long-term targets, although discussions are underway in the Ministry of the Environment on a 2050 target of 50% reductions (this is not yet a public or official target). Japan does not have any publicly expressed schemes or imminent legislation for carbon budgeting, only a voluntary cap-and-trade initiative as described below.

It seems that the Japanese government, and industry alike, are focusing almost entirely on how to meet Kyoto Targets for 2008-2012. After the Kyoto Protocol came into effect in February 2005, the Japanese government in April 2005 released a “Kyoto Protocol Target Achievement Plan.” The pillars of this Achievement Plan are explained below.

In June 2006, the Ministry for the Environment established a committee facilitated by the National Institute for Environmental Studies (NIES) to explore a national long-term environmental vision, but as of early 2007, no concrete targets or actions for long-term climate change mitigation have been made public. NIES, since 2004, has worked with a group of some 60 scientists on creating scenarios for a Low Carbon Society 2050 (see below: 5-1).

### **3. Long-term Emissions Trends**

Repeated inquiries to the Ministry of the Environment and the leader of the Low Carbon Society Project 2050 at the National Institute for Environmental Studies (NIES) revealed that Japan does not have any official long-term projections for GHG emissions. The author of this report was told by both sources that a projection of Japan's energy supply and demand for 2030, released by The Ministry of Economy, Trade and Industry (METI) in 2005, contains data that are the closest one would get to an official government estimate. The below cases and corresponding graphs are taken from this 2030 energy supply and demand projection. Four cases (scenarios) with several sub-cases are used as the basis for projections of energy supply and demand and the related CO<sub>2</sub> emissions<sup>iv</sup>:

#### **(1) Reference Case**

This is the business as usual case – no major technological breakthroughs, major new political frameworks nor demographic surprises.

#### **(2) Energy Technology Progress Case**

This case presupposes that new energy technologies will make significant progress and will be utilized to a wide extent. Two sub-cases have been analyzed – the “energy conservation progress case” and the “new energy progress case.”

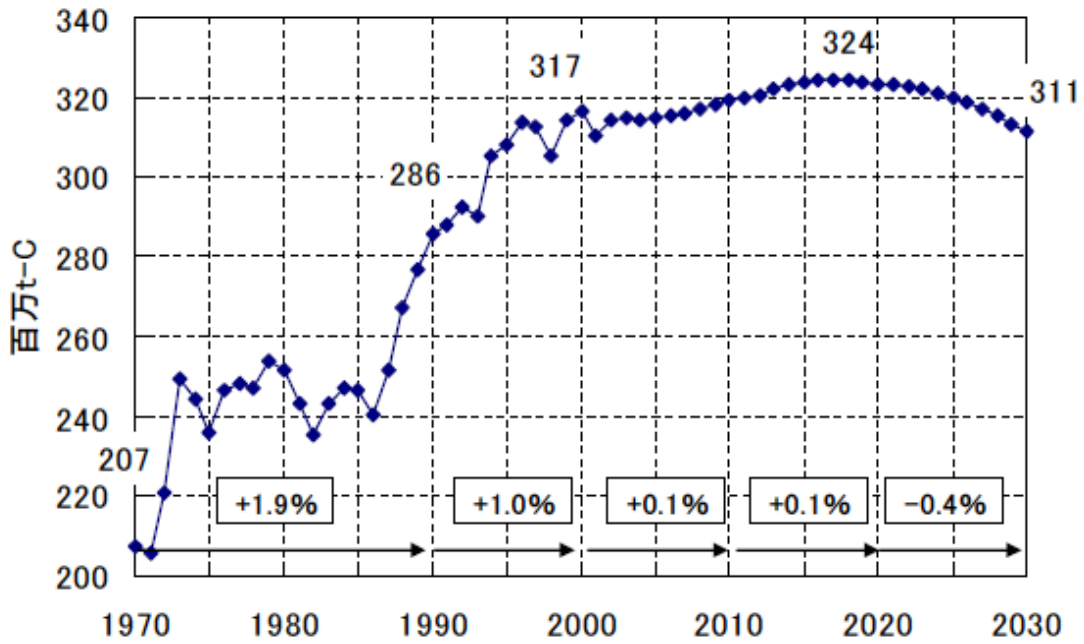
#### **(3) Nuclear Case**

This case presupposes that nuclear energy supply will increase. Again, there are two sub-cases - a “high nuclear case” that reckons with 16 new nuclear power plants in operation by 2030, and a “low nuclear case” based on the assumption of 7 new plants in operation.

#### **(4) External Macro Factor Case**

Here, major macro factors such as global growth in the economy and the price of oil are used as a basis to analyze four different potential sub-cases – a “high growth case” with economic growth of 1.6% in 2030, a “low growth case” reckoning with 0.4% growth, a “high oil price case” with an oil price of USD 35/barrel in 2030 and a “low oil price case” with a supposed oil price of USD 15/barrel.

Graph 1: Projected CO<sub>2</sub> emissions under the Reference Case (million Mt-C)

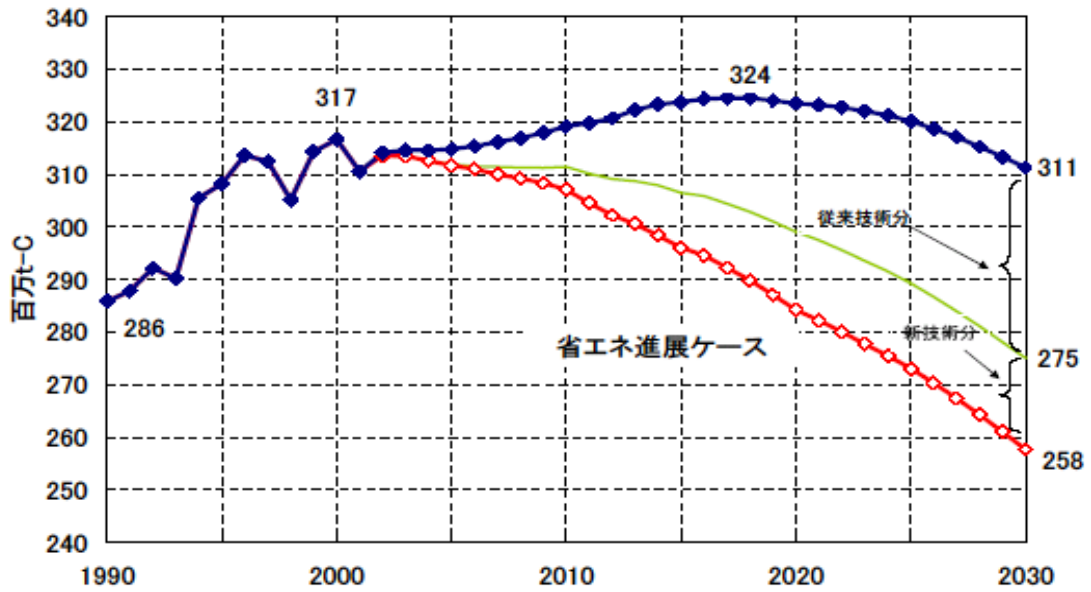


Source of graphs 1 through 4: “2030 Energy Supply and Demand Projection”,  
 Ministry of Economy, Trade and Industry, 2005<sup>v</sup>

Due to a decrease in the population starting in 2006 and expected to accelerate, it is projected that CO<sub>2</sub> emissions (in the graphs represented as carbon, not CO<sub>2</sub>) will peak before 2020, increasing by a total of 8.7% by 2030 (as compared to 1990). This projection seems, to the author of this report, to be overly optimistic, with actual emissions (CO<sub>2e</sub>) having risen by 8.1% as of end of 2005.

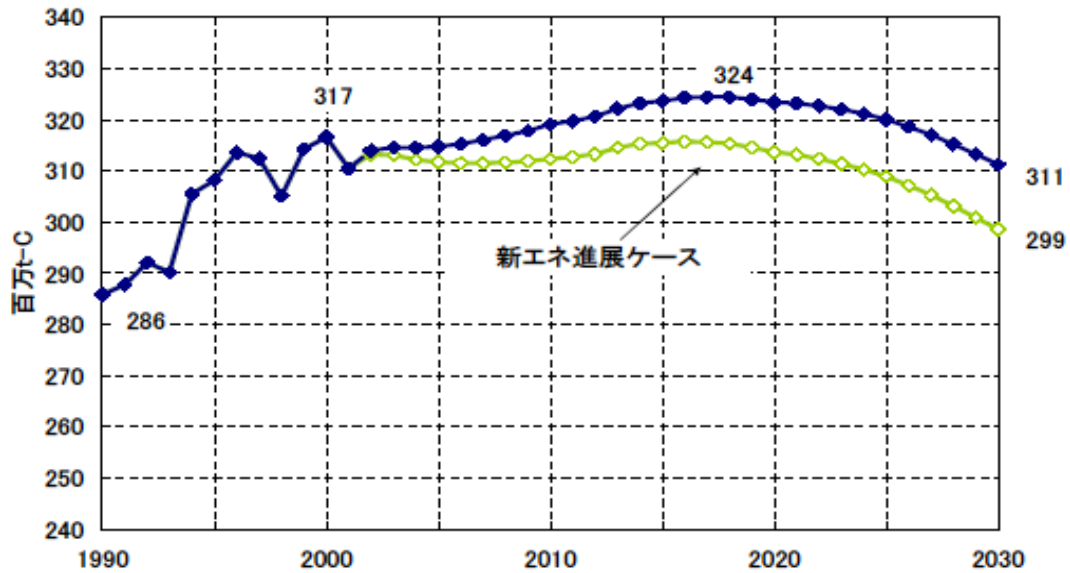


Graph 2: Projected CO<sub>2</sub> emissions under the Energy Conservation Progress Case  
(million Mt-C)



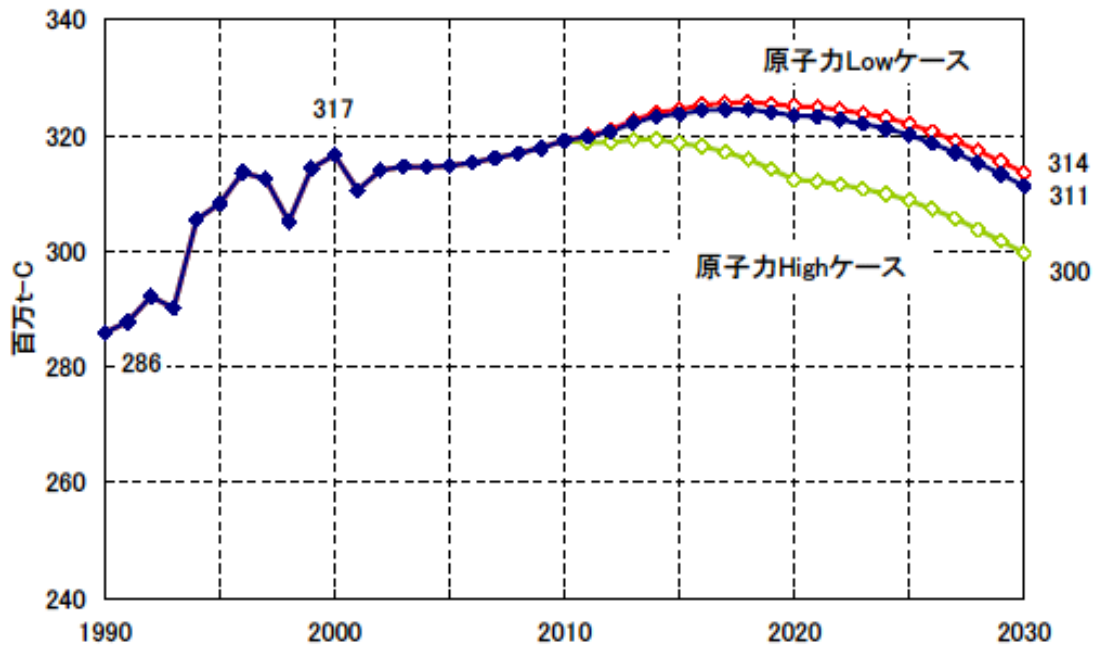
The top curve indicates the reference case. The second curve presupposes the maximum application of present energy conservation technologies and projects a 3.8% decrease of CO<sub>2</sub> by 2030. The third curve (lowest curve) further incorporates new technological developments in energy conservation and reckons with a potential reduction of 9.8%

Graph 3: Projected CO<sub>2</sub> emissions under the New Energy Progress Case  
(million Mt-C)



This case estimates a share of renewable energy of 10% in Japan in 2030 and projects that this would allow for the increase of CO<sub>2</sub> emissions (as compared to 1990) to be limited to 4.5% by 2030.

Graph 4: Projected CO<sub>2</sub> emissions under the Nuclear Case (million Mt-C)



Source of graphs 1 through 4<sup>vi</sup>

This case indicates that a “low nuclear case” in which 7 new nuclear power plants are in operation by 2030, would lead to an increase of CO<sub>2</sub> emissions of 9.8% whereas a “high nuclear case” with 16 new plants would help limit the increase to plus 4.9% by 2030.

Further, the macro cases working with high and low economic growth, and high and low oil prices produce another four graphs, in which only the low growth scenario (of 0.4% growth in GDP in 2030) produces a reduction in CO<sub>2</sub> emissions – some 1.7% by 2030.

#### 4. Government initiatives

##### 4-1 Kyoto Protocol Target Achievement Plan (2005)

The Kyoto Protocol Achievement Plan released by the Japanese Government in April 2005, spells out targets for all sectors as described in Table 1. Table 2 compares these targets with actual emissions in 2005.

**Table 2: Sector specific reduction targets and status in 2005**

Sector	2010 Target (%)	Status in 2005
Industrial	-8.6%	-3.2%
(factory operations, etc.)		
Transportation	+15.4%	+18.1%
(vehicles, shipping, etc.)		
Commercial/retail	+15%	+42.2%
(retail, service sectors, Office buildings, etc.)		

Housing	+6%	+37.4%
(private homes, etc.)		
Energy	-16.1%	+9.7%
(Power stations, etc.)		

Targets as compared to

1990 level of emissions

Source<sup>vii</sup>

It is important, however, to note that these targets in the Achievement Plan are described as “orientational/indicative targets”, and that they are not backed up by any obligatory measures or potential sanctions. The Kyoto Protocol Achievement Plan includes a lengthy description of measures to be taken both by key sectors/stakeholders and by the government, but there is no over-arching policy instrument to ensure the actual implementation of such measures by key players in society.

On July 7<sup>th</sup>, 2006, the Ministry of the Environment released a 243-page progress report on the Achievement Plan. Here it is pointed out that it will be necessary both to strengthen present measures and introduce new, additional policy tools to meet Japan’s Kyoto Target. The progress report does not in any great detail describe comprehensive or over-arching policy tools (such as an EU-like cap-and-trade system or environmental taxation), but points to thirteen major areas in which a strengthening of present measures could possibly have significant impact (defined as a reduction potential of more than 10 million tons of CO<sub>2</sub> per area by 2010). The thirteen areas are:

- (1) Realization and further strengthening of [Keidanren’s] Voluntary Environmental Action Plan (see below).

Reduction potential: 42.4 million tons CO<sub>2</sub> by 2010.

- (2) Improvement of energy efficiency in buildings. An accelerated plan for energy

efficiency improvement could yield a reduction of 25.5 million tons CO<sub>2</sub> by 2010.

- (3) Further promotion of BEMS (Building Energy Management Systems) and HEMS (Home Energy Management Systems).

Reduction potential: 11.2 million tons CO<sub>2</sub> by 2010.

- (4) Improvement of energy efficiency in houses. An accelerated plan for energy efficiency improvement could yield a reduction of 8.5 million tons CO<sub>2</sub> by 2010.

- (5) Further promoting nuclear power (and increasing operational efficiency of nuclear power plants) and other measures to lower CO<sub>2</sub> emissions in electricity production.

Reduction potential: 17 million tons by 2010.

- (6) Promotion of new energy sources (in particular solar and biomass).

Reduction potential: 46.9 million tons CO<sub>2</sub> by 2010.

- (7) Promotion of co-generation equipment and the use of fuel cells.

Reduction potential: 11.4 million tons CO<sub>2</sub> by 2010.

- (8) Further acceleration of top-runner program [see below] for the improvement of vehicle fuel efficiency. Through the natural replacement of inefficient vehicles with more efficient vehicles and through further technological and policy measures to continue fuel efficiency improvements, a reduction of 21.13 million tons CO<sub>2</sub> is possible by 2010.

- (9) Further acceleration and broader introduction of top-runner approach to electric appliances. Through the natural replacement of electrical appliances as well as the introduction of the top-runner approach to a wider range of appliances, including microwave ovens, rice cookers, gas-based grill devices, etc.) a reduction of 29.01 million tons CO<sub>2</sub> is possible by 2010.

- (10) Systematic promotion of new materials in industry, in particular non-freon aerosols, non-freon polystyrene, SF<sub>6</sub>-free magnesium alloys, etc.

Reduction potential: 43.6 million tons CO<sub>2</sub> by 2010.

- (11) The recovery of HFCs used as coolant in automobiles and other devices (in accordance with existing legislation).

Reduction potential: 12.38 million tons CO<sub>2</sub> by 2010.

- (12) Replanting and better maintenance of forests/forestry.

Reduction potential: 47.67 million tons CO<sub>2</sub> by 2010.

Note: The calculation is made on the assumption that if forestry trends as of 2005 continue until 2010, Japan will not be able to meet its forest sink target of 3.8% (see above).

The CO<sub>2</sub> reduction potential is measured against a BAU scenario from 2005-2010.

- (13) Purchase of 100 million tons CERs (certified emissions reductions) between 2006-2013 under the Kyoto Mechanism.

Note: this is to meet the target for reduction target of 1.6% through the Kyoto mechanism (see 1. above)

Source<sup>viii</sup>

The Achievement Plan is under continuous revision as of early 2007, and a first draft report on potential additional measures is expected in March, 2007. It is expected that additional budget measures will be proposed by summer 2007 and finalized around December 2007, following the Japanese budget cycle. Talks with officials from both the Ministry of Environment and the Ministry of Economy, Trade and Industry in January 2007, however, indicate that as of early 2007, “nothing has been decided.” It is not clear what specific measures will be taken to close the significant gap existing between Japan’s Kyoto Target and actual emissions (as indicated above, the gap reached 14.1% as of end of 2005).

#### **4-2 Japan’s Voluntary Emissions Trading Scheme (JVETS)**

One promising, new initiative promoted by the Ministry of the Environment is JVETS – Japan’s Voluntary Emissions Trading Scheme. Operated by the Climate Change Policy Division of the Ministry, and initially funded with approximately 3 billion yen for its first year of operations, the scheme commenced in 2005, and is the first experiment of the “cap-and-trade” type of emissions trading in Japan.

Corporations volunteering to participate in JVETS commit to emissions reductions (annual basis/ CO<sub>2</sub> only) and are allocated emissions allowances (JPAs) by the Ministry. (The emissions baseline is calculated from average actual emissions over the past three years). Corporations may receive subsidies within the scheme to help fund investment in energy efficiency improvements or other equipment to meet reduction targets (Subsidy rate is up 1/3 of installation costs, max. 200 million yen per site).

The first operational round started in April 2006 and concludes in March 2007. Within this period, participating corporations may freely trade the allocated emissions allowances amongst themselves. If a reduction target cannot be met, corporations are allowed to use either JPAs purchased from other participating corporations or so-called jCERs (certified emissions reductions under the JVETS scheme) to meet targets. If such additional measures are not taken, the corporation may have to return subsidies received .

Despite being entirely voluntary of nature, the first round (2006-2007) had 31 corporate participants, the second (2007-2008) will have 58. (Of these 89 corporations, 31% are from the Food and Beverage Sector, 20% from the Building Sector, 13% from the Textile sector, 10% from the Paper and Pulp Sector, 8% from the Metals Sector, and 8% from the Ceramics Sector).<sup>ix</sup>

It is unclear as of present whether this voluntary scheme will develop into an obligatory scheme, but with the second round running until March 2008, it seems unlikely that a full-scale cap-and-trade scheme can be realized in the near future. Also, critics of the scheme, point to it more as an easy way for corporations to get government subsidies for equipment to improve energy efficiency, than a real “cap-and-trade” scheme.

### 4-3 Team Minus 6

In 2005, the Japanese Ministry of the Environment initiated an awareness campaign, dubbed “Team Minus 6,” involving businesses and citizens in an effort to meet the nation’s Kyoto target. An annual budget of some 3 billion yen has been allocated to this initiative, which is operated by the second largest advertising agency, Hakuhodo. “Six Actions” have been defined through which businesses and citizens can help reduce CO<sub>2</sub> emissions:

- Act 1: Reduce by adjusting air conditioner temperature
- Act2: Reduce through careful water usage
- Act3: Reduce through the way you use your car
- Act4: Reduce by choosing products carefully
- Act5: Reduce through the way you shop and by producing less waste
- Act6: Reduce through the way you use electricity

The Team Minus 6 campaign in 2005 launched “cool biz” – a communications initiative encouraging corporations to go “tie-less” in June-September, thus raising the indoor air conditioner temperature to 28°C. Later, a “warm biz” initiative was launched encouraging the use of sweaters and lower office temperatures (20 °C) in the winter season. Corporations who join the Team Minus 6 campaign can use the logo and tag-lines for communication and marketing purposes.

This initiative has been a success in engaging both citizens and corporations in a national effort to combat climate change, and as of early 2007, almost 10,000 corporations and more than 1 million citizens had registered as “participants” in the campaign on the dedicated web-site ([www.team-6.jp](http://www.team-6.jp)). Gauging from corporate environmental websites, the Team Minus 6 campaign certainly seems to have galvanized continuous efforts to reduce emissions from office operations.

According to the Environment Ministry’s homepage, the first year of “Cool Biz” (Summer 2005), resulted in an estimated emissions reduction of 0.46 million MtCO<sub>2</sub>, while the “Warm Biz” campaign of Winter 2005-2006 is to have caused an estimated emissions reduction of 1.41 million Mt CO<sub>2</sub>. In total, this would correspond to some 0.15% of total CO<sub>2</sub> emissions in Japan in 2005 (1.87 million MtCO<sub>2</sub>/1.206 billion Mt CO<sub>2</sub>). This is, however, only an estimate, and it is unclear whether the initiative in the medium term will result in significant emissions reductions, or, in the long term, cause major lifestyle shifts in the Japanese population.

Source<sup>xi</sup>

#### **4-4 Local government initiatives – Tokyo Metropolitan Government**

It is not possible in this short report to give an extensive overview of different mitigation measures taken by local governments (mainly prefectures and major cities) across Japan. It is worth, though, to point to the progressive policies of the Tokyo Metropolitan Government. With some 12 million inhabitants in Metropolitan Tokyo, and with the Metropolitan Government's role as a pace-setter in local government policy in Japan, the new initiatives being introduced here may have significant national impact over the coming years.

In 2002, the Metropolitan Government initiated a mitigation strategy called “Stop Global Warming from Tokyo” This is now running in its third stage (overview of Metropolitan Governments' Approach:<sup>xii</sup>

The four pillars of the third stage are:

- 1 Reinforcement of CO2 Emissions Reduction Program
- 2 Establishment of Energy Environment Planning Program
- 3 Reinforcement of Tokyo Metropolitan Government (TMG) Green Building Program
- 4 Establishment of TMG Labeling System for Energy Saving (for electrical appliances).

The aim of this program is not only to help alleviate global climate change, but also to provide counter-measures to the heat island phenomenon, which has become more pronounced in recent years in Tokyo.

In accordance with the first two pillars of this third stage, the Metropolitan Government in March 2005 issued an environmental directive requiring large emitters in the Metropolitan Area to submit a five-year plan for CO2 emissions reductions. The directive covers some 1000 major emitters in the area. On the Metropolitan Government's homepage, corporations are evaluated depending on how correctly and punctually they have submitted this five-year plan – evaluations run from AA (27% of corporations), A+ (27%), A (45%) to B (0.5%) and C (1.0%). Further, the Metropolitan Government also in March 2005, established the “Tokyo Global Warming Mitigation Promotion Network” which provides information, support, support for energy conservation, and a registry/introductory service for businesses actively working to reduce GHG emissions. Source<sup>xiii</sup>

### **5. Industry initiatives**

#### **5-1 Nippon Keidanren – Voluntary Action Plan**

The backbone of Japanese industry's climate change mitigation measures is the “Voluntary Action Plan” first established by Nippon Keidanren, Japan Business Federation, in 1997 - the year of the Kyoto Conference. Seven major industry associations (electronics, steel and metals, oil and gas, mining, trade, construction, and chemicals)



work with their individual corporate members to meet targets set in the Voluntary Action Plan. Industrial emissions from these seven industry groups account for 90% of total industrial emissions in Japan.<sup>xiv</sup>

The overall target set in 1997 was to reduce emissions in 2010 to the 1990 level. Targets set in the voluntary action plan, thus, do not relate directly to the Kyoto Protocol, nor are there any sanctions for corporations who fail to meet targets. As of early 2007, this target (1990 level emissions) was achieved, or estimated to be achievable, in most industries, and in total, as indicated in Table 1, emissions from the industrial sector were some 3.2% below 1990 level by end of 2005 (preliminary figures).

One major problem with this voluntary plan is that corporations are free to set targets either as absolute reduction targets or as efficiency targets relative to sales or energy usage. As a result of this, there is no uniformity in target setting, with some industries setting multiple targets, some focusing on reduction targets relative to sales, some relative to energy usage, and some committing to absolute emissions reductions.

In March 2005, the Central Environment Council, under the auspices of the Ministry of the Environment, recommended that the Japanese government should urge Nippon Keidanren to work with the Council and the Ministry of the Environment to ensure that the targets set in the Voluntary Action Plan are met, and to strive for further emissions reductions where possible. On the basis of this recommendation, a “follow-up” process commenced with seven industry working groups set up by Nippon Keidanren. In December 2006, these working groups reported to the Central Environment Council on achievements and further potential reduction measures were discussed. This process has not yet reached its conclusion as of February 2007.

As described in Table 2, the Japanese Government in the Kyoto Protocol Achievement Plan released in April 2005, encourages an 8.6% reduction of CO<sub>2</sub> by 2010 (as compared to 1990) from the industrial sector. It is unclear how the gap between Nippon Keidanren’s zero target (or from the actual reduction level on 3.2% by 2005) to the Government’s 8.6% reduction requirement is to be bridged. Nippon Keidanren has not made any public announcements that its members are willing to go beyond the goal of keeping 2010 emissions at 1990 levels.

Source<sup>xv</sup>

## **6. Scientists’ Initiatives**

### **6-1 Japan Low Carbon Society 2050**

In 2004, a 5-year project operated by the National Institute of Environmental Studies, (NIES) funded by the Ministry of the Environment, commenced with the goal to “establish a methodology to evaluate middle to long term environmental policy toward Low Carbon Society in Japan – Japan Low Carbon Society Scenarios toward 2050.”<sup>xvi</sup>

This project focuses on 1) long-scenario development, 2) long-term GHG reduction target setting, 3) assessment of environmental options considering future socio-economic

conditions in a) urban systems, b) technology (IT) society, and c) transportation system. It is the hope both of the project management team and of the Ministry of the Environment that this project will create the foundation for Japan's long-term policy framework and target setting with regards to climate change mitigation.

Some 60 scientists are involved in exploring scenarios for 2050 and several international workshops have been held. As part of this project, a joint Japan-UK research project entitled "Developing visions for a Low Carbon Society (LCS) through sustainable development" was established with a first workshop in Japan in 2006 and a second planned for June 2007 in the UK. The Low Carbon Society research project has produced several booklets which are available on the NIES website ([http://2050.nies.go.jp/project\\_e.html](http://2050.nies.go.jp/project_e.html)).

It is to be expected that the findings from this research project will be incorporated into planning for a long-term (2050) environmental vision for Japan described in 2. above. The project workshops have also involved scientists from other European countries as well as North and South American and Asian participants. With NIES' extensive Asian network, it is likely that this Low Carbon Society research may have some impact on future mitigation strategies in countries in South-East Asia.

On February 15<sup>th</sup>, 2007, an interim report of this research project was released, indicating that a 70% reduction in greenhouse gases by 2050 (as compared to 1990) would be possible at a cost of around 1% of estimated GDP. The report describes two different potential scenarios for Japanese society in 2050 (Scenario A is an urban-centered society focused on efficiency and compactness. Scenario B is a decentralized society in which a more relaxed lifestyle is encouraged and many urbanites have returned to their more rural hometowns) and insists that in both potential future worlds, it will be possible through early and innovative investment in technology to achieve a 70% reduction of GHG emissions. This report may very well become the basis for future government deliberations on the policies required to achieve a low carbon society, but is unclear at present whether the political will can be found, or the willingness of industry to cooperate can be realized, to actually implement such a long-term, drastic reductions strategy. Source<sup>xvii</sup>

### **6-2 Scientists' Declaration from February 2<sup>nd</sup>, 2007**

On the day of the first launch of IPCC's fourth assessment report in Paris, February 2<sup>nd</sup> 2007, a group of 15 leading scientists in Japan, including eight IPCC authors (four of them lead authors) published a letter addressed to "the citizens of Japan." In this letter, the scientists quote the IPCC findings and urge all individuals of the nation, in whatever their capacity, to take action on climate change mitigation. The scientists also urge the Japanese Government to set long-term mitigation/emissions reduction target as soon as possible.

It is a relatively new approach for Japanese scientists to make this kind of public appeal, but it remains to be seen whether such an initiative has any measurable impact on decision-making in policy or business, or on the actions of Japanese citizens.

## **7. Japan in the international context**

### **7-1 The Kyoto Initiative**

In 1997, the year of the Kyoto Conference, the Japanese Foreign Ministry launched a “Kyoto Initiative” aiming at building climate change mitigation measures into the nations ODA (official development assistance) program. Three pillars of this Initiative are (quoted from the Ministry’s homepage):

#### 1) Cooperation in capacity building

In order to strengthen developing countries' self-help efforts regarding ODA projects in the global-warming-related fields, Japan will, over the five-year period beginning from the FY 1998, give training to 3000 persons in developing countries in the following fields:

- (a) Air pollution (plus projects that relate directly to anti-global warming)
- (b) Waste disposal
- (c) Energy-saving technologies
- (d) Forest conservation and forestation

#### (2) ODA loans with the most concessional terms (0.75 percent as an annual interest rate, 40 year as a repayment period)

- (a) Energy saving technologies
- (b) New and renewable energy sources
- (c) Forest conservation and forestation

#### (3) Effective use and transfer of Japanese technology and know-how

Source<sup>xviii</sup>

### **7-2 Asia-Pacific Partnership on Clean Development and Climate**

Japan, the US, Australia, China, India and South Korea in July 2005 launched the “Asia-Pacific Partnership on Clean Development and Climate.”<sup>xix</sup> This partnership is described as “complementary” to the Kyoto Protocol and aims to co-develop and diffuse clean technologies for the region. An overview of the Partnership describes the purpose as follows: “The Partnership will be consistent with and contribute to Partners’ efforts under the UNFCCC and will complement, but not replace, the Kyoto Protocol.”<sup>xx</sup> The inaugural ministerial meeting was held in January 2006, in Sydney, but the Partnership has not made any commitments to reduce absolute GHG emissions.

Together the six nations account for more than 50% of global CO<sub>2</sub> emissions, and

produce about 65 percent of the world's coal, 48 percent of the world's steel, 37 percent of world's aluminium, and 61 percent of the world's cement. (Source: Asia-Pacific Partnership homepage). Eight task forces have been set up: Aluminium, Buildings and Appliances, Cement, Cleaner Use of Fossil Energy, Coal Mining, Power Generation and Transmission, Renewable Energy and Distributed Generation, Steel. It is still unclear exactly how Japan will act in this partnership, but it is to be expected that Japanese technology and major technology companies will play a key role.

Source<sup>xxi</sup>

### **7-3 Technology Transfer – NEDO**

A key player in Japan's strategy for the transfer of cleaner technology to Asian countries is NEDO – the New Energy and Industrial Technology Development Organization. NEDO was established by the Japanese government in 1980 to develop alternatives to oil-based energy sources. Later, the activities were expanded to include also environmental technology research and development, and the promotion of new energy and energy conservation technology.

It is through NEDO that the Japanese government will purchase the certified emissions reductions required to meet its Kyoto Target (plans are to purchase 100 millions tons of CERs in the first Kyoto Period). Further, NEDO is also important because of its extensive network and collaboration on new energy technologies in Asian countries. NEDO is a key vehicle for technology transfer from Japan and as of early 2005 had been involved in some 35 “International Model Projects” in seven Asian nations – China, India, Thailand, Indonesia, Vietnam, Malaysia and Myanmar (Burma). The activities of NEDO may be seen as characteristic of Japan's technology-driven and business oriented approach to energy efficiency and climate change mitigation. It is also quite likely that NEDO will come to play a key role in the Asia-Pacific Partnership on Clean Development and Climate (see above 6-3).

Source<sup>xxii</sup>

## **8. Conclusions: How will Japan act accelerate the shift toward a low-carbon society**

### **8-1 Will there be an overarching policy approach?**

The key question when addressing Japan's mitigation policy framework is surely whether or not, in the near future, we will see a more comprehensive, over-arching policy-based initiative from the Japanese government. In the medium term, the Low Carbon Society research undertaken at the government funded National Institute for Environmental Studies (NIES, see 5-1 above), may become the cornerstone of an integrated, long-term Japan strategy toward decarbonization of the economy. But, in the short term, we may expect some major movements from the Japanese government in the latter half of 2007 to achieve the nation's Kyoto Target. With “Kyoto” being a “global environmental brand” and Japan's national pride and interest resting solidly on the country's achievement of its Kyoto Target, it is almost certain that new, more aggressive measures will be introduced

to take effect from Fiscal 2008 (from April 2008 in Japan). How this process will unfold, in particular how the Government will persuade the Nippon Keidanren to accept further reduction measures, remains to be seen.

The G8 summit is to be held in Japan in the summer of 2008. It is highly likely that the Japanese government will focus on climate change issues in the summit agenda, and also possible that some public, long-term mitigation goals may be announced before the summit. In 2007, however, key ministries will be working busily on what additional measures to implement to ensure the fulfillment of Kyoto Protocol commitments.

## **8-2 Japan's Energy Strategy**

Japan's national energy strategy continues to be focused on further energy savings (stricter regulations, particularly in the transportation and housing sectors), and the expansion of nuclear energy as key contributors to lowering CO<sub>2</sub> emissions. The national target for new energy sources (other than hydro-power), is a mere 1.35% for 2010 (set under the auspices of the Ministry of Economy, Trade and Industry).

The "Framework for Nuclear Energy Policy" adopted in October 2005 by the Japanese Government, positions nuclear energy as the key technology for climate change mitigation, energy security and environmental protection (Source: Framework for Nuclear Energy Policy, Oct. 11, 2005). The Framework specifically states that Nuclear Power should make up between 30-40% of the nation's electricity production in the year 2030.<sup>xxiii</sup>

## **8-3 Focus on Technological Innovation and Asian Collaboration**

Undoubtedly, as seen above, there will continue to be a strong focus on and continued innovation in energy efficient, "clean" technologies. A market-driven approach in which the Japanese Government supports technology transfers to other Asian (and African) countries through major Japanese technology companies is to be expected. This collaborative approach has been successful in Asia and is expected to lead to further business alliances between Japanese and Asian corporations.

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### **Case Study: Commercial and Housing Sectors Emissions Trends and Countermeasures**

The two sectors that have seen the largest increase in CO<sub>2</sub> emissions since 1990 are the commercial sector and the housing sector. The commercial sector includes wholesale and retail stores, restaurants, hotels, hospitals, schools, theaters and cinemas, as well as office buildings. CO<sub>2</sub> emissions in the commercial sector have risen by an estimated 42.2% (end of 2005, preliminary figures) since 1990. CO<sub>2</sub> emissions from this sector added up to slightly less than 20% of total CO<sub>2</sub> emissions in 2005.

The housing sector covers private housing, and here emissions have gone up by some 37.4%. CO<sub>2</sub> emissions from this sector added up to slightly less than 15% of total CO<sub>2</sub>

emissions in 2005. Below is a short analysis of the reason for this major increase in emissions and an overview of some of the countermeasures being taken at present.

### Commercial Sector

Office buildings and wholesale/retail stores make up approximately 20% each of commercial sector emissions. For both of these subcategories, it is a large increase in floor space that has contributed to the significant rise in emissions, while the relative emissions per square meter has actually declined. For office buildings, the total floor space had increased by 45% as of end of 2004 (from 1990), for wholesale/retail stores the figure was +43.2%.

Also in other of the subcategories of the commercial sector, it has generally been a very large increase in floor space, which has caused emissions to rise. The single largest increase in total emissions has been from 24-hour convenience stores, which have sprouted up all over Japan since the late 1980s. Emissions in this sector have increased by some 200% - from 880,800 MtCO<sub>2</sub> in 1990 to 2,615,100 MtCO<sub>2</sub> in 2004).

**Table 3: Commercial Sector – change in CO<sub>2</sub> emissions and total floor space 1990-2004**

	CO <sub>2</sub> emissions 1990-2004	Total floor space (sqm) 1990-2004
Office buildings	+45.3%	+45.0%
Wholesale & Retail stores	+41.8%	+43.2%
Hotels	+45.2%	+22.6%
Theaters/cinemas	+80.7%	+45.6%
Schools	+19.6%	+13.8%
Hospitals	+15.3%	+55.3%
Restaurants	+33.7%	+28.0%

Source<sup>xxiv</sup>

In the “Kyoto Protocol Target Achievement Plan” launched in April 2005 (see 2. above), the goal for the commercial sectors was set at a 15.0% increase of CO<sub>2</sub> emissions by 2010 (at the time, emissions figures from 2002 showed an increase of 36.7%). As emissions figures from 2005 indicate (+42.2% from 1990), the measures taken in promoting energy efficiency in the sector have had very little effect on total emissions. Although a large majority of newly established facilities and buildings in the commercial sector live up to recent, strict energy conservation standards, the greater issue is how to ensure that the overall energy efficiency of all facilities/building, including old stock, is drastically improved.

In 2006, new measures were introduced as part of the “Law for the Promotion of Investment for Reform of the Energy Supply-Demand Structure” aiming to speed up the

shift to new, more energy efficient equipment. The law stipulates that companies investing in new energy facilities/equipment may receive a 7% tax exemption and /or favorable depreciation rates if applying for this before March 2008. Measures taken by the Tokyo Metropolitan Government (as described above) also aim to reduce emissions from the commercial sector, but in both cases, it seem highly unlikely that present measures will be enough to significantly lower emissions in the sector.

Sources<sup>xxv, xxvi, xxvii</sup>

### Housing

In the housing sector, it appears that two main factors have contributed to the 37.4% increase in CO<sub>2</sub> emissions since 1990; one is a 21% increase in the number of housing units, the second is the use of a larger number of domestic appliances and lighting.

Although the top-runner program (see above) has resulted in significantly more energy efficient appliances (refrigerators were 55% more efficient in 2006 than in 1998, air conditioners 42% more than in 1997, and TV-sets 31% more than in 1997), many families now have larger refrigerators, more TV-sets (+30% from 1990-2004) as well as more of other appliances, and use more lighting. As a result, the top-runner program has been excellent on the product level, but has not yet helped produce actual emissions reductions in Japanese households. Total emissions from lighting and domestic appliances (excl. refrigerators, air conditioners and water heaters) have gone up by as much as 53.3% from 1990-2004.

In the “Kyoto Protocol Target Achievement Plan” launched in April 2005 (see above), the goal for the housing sector was set at a 6.0% increase of CO<sub>2</sub> emissions by 2010 (at the time, emissions figures from 2002 showed an increase of 28.8%). Stricter standards for energy efficiency in new houses and a consumer oriented campaign, driven by industry and generally supported by the Ministry of the Environment and the Ministry of Economy, Trade and Industry, to encourage the purchase of new, more energy efficient appliances are some of the measures taken to drive emissions lower in the housing sector. However, since new housing adds only very little to the total floor space in any given year (2% in 2005), the real task is how to take effective measures to make existing homes more energy efficient. Unfortunately, in Japan there is no “flagship legislation” in this area (as with the promotion of solar and wind energy in, for example, Germany, driven by strong price incentives), and it seems highly unlikely that the goal set in the 2005 “Achievement Plan” (+6.0% by 2010) will be achievable. Without broad legislation and large-scale, incentive-based schemes that encourage the general Japanese house owner to install new energy systems or to improve insulation or windows, etc., in order to significantly lower energy consumption, the housing sector may very well end up with the largest gap between 1990 and 2008-2012 emissions.

Sources<sup>xxviii, xxix, xxx</sup>

As mentioned above, the 2005 “Kyoto Protocol Achievement Plan” is under revision in

the first half of 2007, and new, stronger measures can be expected in both the commercial and the housing sector, although, as of February 2007, it is not clear exactly what is to be expected or, in particular, how the huge gap in these two sectors could possibly be bridged in just a few years time.

**Box : The Japanese “Top-Runner Program” for Improved Energy Efficiency**

After the second oil crisis, Japan in 1979 enacted the "Law concerning the Rational Use of Energy" (generally known as the “Energy Conservation Law”). Following the Kyoto Conference in 1997, the law was greatly revised and updated in 1998. A key part of the revision was the introduction of the so-called “Top-Runner Standard” to encourage higher energy efficiency in key consumer products. The law is continuously being revised, with more product categories being included and ever stricter standards introduced. As of the latest revision in September 2006, a total of 21 product categories are subject to the Top Runner Standard (such as passenger vehicles (gas, LP & diesel), commercial vehicles, air conditioners, TV-sets, refrigerators, freezers, microwave ovens, fluorescent lighting, electric toilet seats, copying machines, vending machines, etc.).

The Top Runner Standard sets energy efficiency targets in relation to the best performing products already on the market. Under the auspices of the Ministry of Economy, Trade and Industry (METI), corporations are given a certain number of years to reach “top-runner” performance in relevant product categories. Targets are periodically adjusted upwardly. The ongoing initiative to enforce this standard is called the Top Runner Program, described in more detail by the Energy Conservation Center, Japan, in the following manner:

“The Top Runner Program uses, as a base value, the value of the product with the highest energy consumption efficiency on the market at the time of the standard establishment process and sets standard values by considering potential technological improvements added as efficiency improvements. Naturally, target standard values are extremely high. For achievement evaluation, manufacturers can achieve target values by exceeding target values by weighted average values using shipment volume.”

Source<sup>xxxi</sup>

Through this program, significant improvements have been made in the energy efficiency of key consumer products on the market. The below table gives an overview for some of the major product categories:



**Table: Energy efficiency improvement in Japanese consumer products as a result of the Top Runner Program**

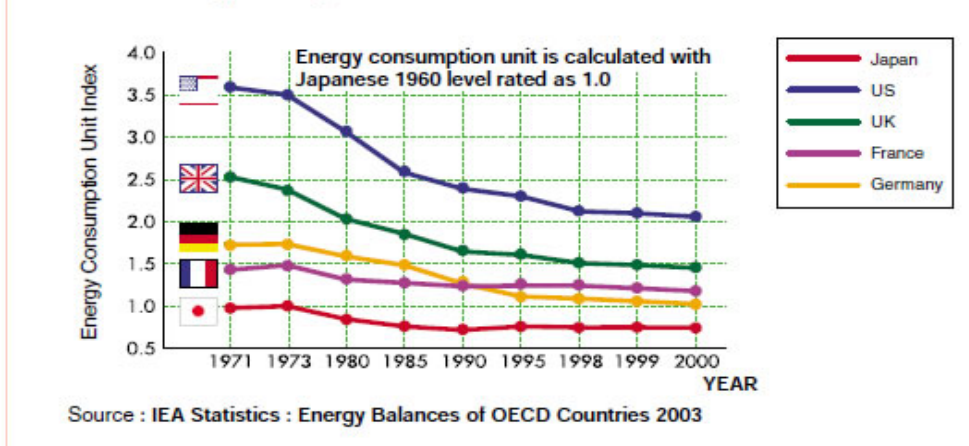
Product category	Energy efficiency improvement (result)	Energy efficiency improvement (initial expectation)
TV sets	25.7% (FY 1997 – FY 2003)	16.4%
VCRs	73.6% (FY 1997 – FY 2003)	58.7%
Air conditioners *	67.8% (FY 1997 – 2004 freezing year)	66.1%
Electric refrigerators	55.2% (FY 1998 – FY 2004)	30.5%
Electric freezers	29.6% (FY 1998 – FY 2004)	22.9%
Gasoline passenger vehicles *	22.0% (FY 1995 – FY 2004)	23.0% (FY 1995 – FY 2010)

\* An indicator of energy consumption efficiency is COP for air conditioners and fuel efficiency (km/L) for passenger vehicles; therefore, their reduction effects for energy consumption are expressed in an inverse manner.

Source<sup>xxxii</sup>

As can be seen from the above table, in all products categories actual results have exceeded initial expectations. Gasoline passenger vehicles are on track to reach the 2010 target (above table covers figures until 2004). As a whole, initiatives such as the Top Runner Program have been instrumental in helping Japan achieve and maintain the highest energy efficiency of leading industrialized nations.

Figure: Transition of Energy Consumption in Selected Industrialized Countries



The top-runner program can be called characteristic of the Japanese approach to climate change mitigation. Regulatory initiatives focus strongly on how to trigger technological innovation and are most often based on cooperation with corporations, using peer pressure and the market mechanism (competitiveness) to promote less polluting technologies.

#### Endnotes

- i Oct. 17 2006 report on Preliminary Emissions Figures for 2005, Ministry of the Environment, Japan
- ii Oct. 17 2006 report on Preliminary Emissions Figures for 2005, Ministry of the Environment, Japan
- iii “Preliminary Figures on Greenhouse Gas Emissions, 2005) Ministry of the Environment, November 2006).
- iv “2030 Energy Supply and Demand Projection”, Ministry of Economy, Trade and Industry, 2005
- v “2030 Energy Supply and Demand Projection”, Ministry of Economy, Trade and Industry, 2005
- vi “2030 Energy Supply and Demand Projection”, Ministry of Economy, Trade and Industry, 2005
- vii Kyoto Protocol Target Achievement Plan, Cabinet Office, Japan  
April 28, 2005
- viii Progress report on the Kyoto Protocol Target Achievement Plan, Ministry of the Environment, July 7<sup>th</sup>, 2006 (Japanese only)
- ix Japan’s Voluntary Emissions Trading Scheme (JVETS), Yasushi Ninomiya, 17<sup>th</sup> January 2007, CARB Seminar, California – presentation material.
- x Japan’s Voluntary Emissions Trading Scheme (JVETS), Yasushi Ninomiya,  
17<sup>th</sup> January 2007, CARB Seminar, California – presentation material.
- xi [www.team-6.jp](http://www.team-6.jp)
- xii [http://www2.kankyo.metro.tokyo.jp/sgw/English/index\\_en.htm](http://www2.kankyo.metro.tokyo.jp/sgw/English/index_en.htm)

- 
- xiii <http://www.tokyo-ondanka-net.jp/index.html>(only Japanese).
- xiv Follow-up on the Voluntary Action Plan, METI, Dec. 21, 2006 (Japanese only).
- xv Follow-up on the Voluntary Action Plan, METI, Dec. 21, 2006 (Japanese only).
- xvi NIES (National Institute for Environmental Studies) homepage  
[http://2050.nies.go.jp/project\\_e.html](http://2050.nies.go.jp/project_e.html)
- xvii : “2050 Japan Low Carbon Society Scenarios”, 2050 Japan Low Carbon Society Project Team, February 2007.
- xviii [http://globalwarming.mofa.go.jp/policy/environment/warm/kyoto\\_init/kyoto\\_full.html](http://globalwarming.mofa.go.jp/policy/environment/warm/kyoto_init/kyoto_full.html)
- xix <http://www.asiapacificpartnership.org>
- xx <http://www.asiapacificpartnership.org/About.htm>
- xxi <http://www.asiapacificpartnership.org>
- xxii <http://www.nedo.go.jp/english/>
- xxiii [http://aec.jst.go.jp/jicst/NC/tyoki/taikou/kettei/eng\\_ver.pdf](http://aec.jst.go.jp/jicst/NC/tyoki/taikou/kettei/eng_ver.pdf)
- xxiv : Ministry of the Environment/Ministry of Economy, Trade and Industry,  
“Analysis of main factors in our country’s GHG emissions trends” (Japanese only), Nov. 2006
- xxv Ministry of the Environment/Ministry of Economy, Trade and Industry,  
“Analysis of main factors in our country’s GHG emissions trends”  
(Japanese only), November 2006
- xxvi Ministry of Economy, Trade and Industry, “Toward Achieving the Kyoto Protocol Targets” (Japanese only), February 2007
- xxvii Kyoto Protocol Achievement Plan, April 2005
- xxviii Ministry of the Environment/Ministry of Economy, Trade and Industry,  
“Analysis of main factors in our country’s GHG emissions trends” (Japanese only),  
November 2006
- xxix Ministry of Economy, Trade and Industry, “Toward Achieving the Kyoto Protocol Targets” (Japanese only), February 2007
- xxx Kyoto Protocol Achievement Plan, April 2005
- xxxi Energy Conservation Center, Japan:  
[http://www.eccj.or.jp/top\\_runner/index.html](http://www.eccj.or.jp/top_runner/index.html)
- xxxii : Energy Conservation Center, Japan:  
[http://www.eccj.or.jp/top\\_runner/index.html](http://www.eccj.or.jp/top_runner/index.html)