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AD HOC WORKING GROUP ON FURTHER COMMITMENTS FOR ANNEX I PARTIES UNDER THE KYOTO PROTOCOL
Third session
Bonn, 14–18 May 2007

Item 3 of the provisional agenda
Analysis of mitigation potentials and ranges of emission reduction objectives of Annex I Parties

Information and views on the mitigation potential at the disposal of Annex I Parties

Submissions from Parties

1. The Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol, at its second session, invited Parties to submit to the secretariat, by 23 February 2007, information and views on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties, appropriate in different national circumstances, taking into account their environmental, economic and social consequences, their sectoral dimensions, and the international context in which they are deployed (FCCC/KP/AWG/2006/4, para. 22).

2. The secretariat has received eight such submissions. In accordance with the procedure for miscellaneous documents, the submissions are reproduced[*] in the language in which they were received and without formal editing.

[*] These submissions have been electronically imported in order to make them available on electronic systems, including the World Wide Web. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

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[*] This submission is supported by Bosnia and Herzegovina, Croatia, Serbia, and The former Yugoslav Republic of Macedonia.

PAPER NO. 1: GERMANY ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES

This submission is supported by Bosnia and Herzegovina, Serbia, Former Yugoslav Republic of Macedonia and Croatia

Subject: **Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol:**
Information on mitigation potentials at the disposal of Annex I Parties, taking into account efficiency, costs and benefits within an international context, that can facilitate the round table discussion during the Third Session of the Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol

The European Union is encouraged by the progress made during the second session of the Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG) in Nairobi. The European Union welcomes the AWG's decision on the work programme for the completion of its mandate (Document FCCC/KP/AWG/2006/L.4) and looks forward to the third session of the AWG. In particular it welcomes this opportunity to give additional information and views on the mitigation potential at the disposal of Annex I parties. In this context, the European Union believes that the discussions should continue to be informed by the latest findings of the IPCC, in particular the Fourth Assessment Report and welcomes the AWG's request to the Secretariat to ensure adequate interaction with experts working on the report.

General remarks

Over the last 100 years global temperature has risen by about 0.74 degrees Celsius. The recent contribution of Working Group I to the IPCC's Fourth Assessment Report projects temperature increases over this century of between 1.8 – 4 degrees Celsius. Thus, all IPCC scenarios show that it is very likely that the global mean temperature increase will exceed the EU limit of 2°C above pre-industrialized levels by the end of this century if no further action to limit greenhouse gas emissions is undertaken. Therefore the EU believes that there is an urgent need for joint global efforts to reduce GHG emissions in all major economies – including deeper reductions by all developed countries. This will require global greenhouse gas emissions to peak within the next 10 to 15 years, followed by substantial global emission reductions of up to 50% by 2050 compared to 1990.

Accordingly, the EU reiterates that developed countries should continue to take the lead by committing to collectively reducing their emissions of greenhouse gases in the order of 30% by 2020 compared to 1990 with a view to collectively reducing their emissions by 60 to 80% by 2050 compared to 1990.

In this context, the EU is willing to commit to a reduction of 30% of greenhouse gas emissions by 2020 compared to 1990 as its contribution to a global and comprehensive agreement for the period beyond 2012, provided that other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries adequately contribute according to their responsibilities and respective capabilities.

The EU is committed to transforming Europe into a highly energy efficient and low greenhouse-gas-emitting economy and makes a firm independent commitment to achieve at least a 20% reduction of greenhouse gas emissions by 2020 compared to 1990 until a global and comprehensive post-2012 agreement is concluded, and without prejudice to its position in international negotiations.

For a comprehensive post-2012 agreement to be consistent with the 2°C objective, it should build upon and broaden the Kyoto Protocol architecture, and provide a fair and flexible framework for the widest possible participation, in line with the principle of common but differentiated responsibilities and respective capabilities.

There is an increasing body of scientific, technical and socioeconomic evidence that shows that it is technically feasible to meet such a 2 degree target by ambitious strategies to transform our currently unsustainable economies into low carbon economies on the basis of current and emerging technologies and at moderate overall cost in the order of a few percent of global GDP. The Stern review estimates that the costs of not acting would be much higher, 5 to 20% of global GDP. In addition, climate mitigation will also produce co-benefits in terms of reduced air pollution, enhanced energy security and industrial innovation.

Findings of a range of studies indicate that if a broad package of mitigation options, including land use, land use change and forestry is deployed on a global scale and in a cost-effective way, costs can be significantly reduced and the effectiveness of mitigation policies enhanced. Moreover, they point to the importance of early action to avoid both the need for very steep reductions later on and increased transition costs due to the lock-in to carbon intensive capital investments.

However, the developed countries that presently have commitments inscribed in Annex B and have ratified the Kyoto Protocol will not be able to combat climate change effectively on their own. These countries accounted for only about 30% of global emissions in the year 2000. Today's 27 Member States of the European Union accounted for 14% of global emissions in 2000. This share is expected to decrease substantially over the coming decades. It is in this context, that the EU is looking into all its mitigation potentials and is already implementing significant mitigation policies. Attaining all mitigation options in all sectors can only be realised as a contribution to a fair and flexible international effort.

Mitigation potentials

There is significant technical potential for decreasing greenhouse gas emissions. In the near to medium term, one of the most important sources of greenhouse gas emission reductions can be found in energy efficiency and energy demand measures.

Historically, energy intensity has improved by 1.4 % p.a. in the OECD over the last 30 years with higher rates around 1980 and more recently in the Economies in Transition. Recent assessments for the Climate Change and Energy package proposed by the European Commission estimate that there remains substantial potential within the EU to improve energy efficiency of final energy demand (i.e. 2.3% p.a. up to 2020). For instance, the building, road transport and appliances sector demonstrates large technical and economic potential to improve energy intensity.

Deploying low carbon energy production technologies is another important source of greenhouse gas reductions. No single technology can deliver on all necessary reductions and their deployment will also depend on specific national circumstances. Full deployment and diffusion of current technologies enable reductions to be achieved more quickly.

Renewable energy has been expanding considerably in the EU over the last decade with growth rates particularly high for wind energy (30% p.a.) and solar energy (15% p.a.). With a share of only 6% of total EU energy needs, potential growth for renewable energy remains very large in the EU. The EU endorsed a target of a 20 % share of renewable energies in overall EU energy consumption by 2020. In this context, the use of biomass offers an important potential for reducing the greenhouse gas emissions in the power and transport sectors, but realising this potential is dependent on development of new

combustion technologies and second generation biofuels in order to use this potential in a sustainable way.

The reduction potential of non-CO2 gases also remains considerable. For instance the reduction potential in the waste management sector is well known but also other sources such as large point sources in industry and agriculture need further consideration. In addition, there are still important sectors that are not yet subject to effective emission reduction policies, such as international bunker fuels. Mitigation potentials of these sectors should therefore be analysed by the AWG.

With a view to the substantial emission reductions that are required to halve global emissions by 2050 the necessary transformation towards low carbon economies will also be faster and much less costly if new and emerging technologies are brought to markets as soon as possible. Efforts to mitigate greenhouse gas emissions should therefore not only concentrate on options that are market ready now, but also include those that are strategically important for achieving our long term vision of limiting global temperature increase to 2°C. More investments in R&D and demonstration of low carbon technologies are required over the next few decades to help them to the market. Finally, it is important to look at all long term investment and to study not just the direct costs but the emissions budget of investments over their whole life cycle to take account of the future responsibility for greenhouse gas emissions.

There is for instance already now an interest emerging technologies such as in carbon capture and environmentally safe sequestration. Deployment of this technology will require a regulatory framework that ensures investment certainty and takes into account all environmental, technical and legal aspects. The EU is developing a policy and regulatory framework with a view to enabling the use of this technology within the EU and in principle full deployment of this technology by 2020 is possible. The analysis of the AWG should build on the IPCC Special Report on CCS and consider costs and risks when looking into potentials of this technology.

The potential of hydrogen will be important for reducing emissions for instance in the transport sector. Research and Development need continued encouragement to ensure full scale deployment in medium to long term.

Costs and Benefits

To assess the relative effectiveness of different mitigation options, the analysis of technical potentials has to be complemented by a look at the economic costs of various options. Cost estimates to reduce CO2 emissions need to include both costs and benefits. Furthermore economic, social and environmental consequences of reduction efforts have to be taken into consideration, e.g., since aggregate and sectoral economic impacts depend on the extent of global participation. The EU believes, nevertheless, that the economic costs of deepened action will be less than the cost of inaction.

By 2030, world GDP is projected to be almost double that of 2005. The impact assessment underlying recent EU climate policy decisions shows that ambitious global action on climate change is fully compatible with sustaining global growth. This would reduce global GDP growth by only 0.14 % per year up to 2020, a fraction of the expected annual GDP growth rate of 2.8 %. This is an insurance premium to pay, and would significantly reduce the risk of irreversible damages resulting from climate change.

Attaining ambitious reductions potentials will also generate other co-benefits through improved energy security, improved energy competitiveness, job creation and reduced local health impacts. For example, reducing CO2 emissions from energy use in the EU by around 20% would generate annual health

benefits of up to € 48 bn. These are typically benefits that are not taken into account when assessing emission reduction costs.

Experience in EU member states also shows, that climate policies can lead to substantial benefits in terms of employment opportunities, investment and leadership on world markets for sustainable energy technologies. In Germany for instance, around 170.000 new jobs have been created by recent investments into renewable energy. Even if these benefits are often difficult to fully quantify economically, the AWG should take those co-benefits into account more systematically when considering the effectiveness of mitigation options. The work of the OECD on the benefits of climate change policies could provide for useful expert input.

Implementation barriers and context of action

The market potential for mitigation options is smaller than the economic potentials due to various barriers. These include the fact that firms and consumers do not take all life-cycle costs and external impacts into account. This would require all costs, including external ones, to be internalised in prices or accounted for by information and regulation. In some cases, perverse incentive structures need to be removed for implementing economic potentials.

In some sectors there are structural barriers to full deployment, in particular in relation to the transport sector. For example existing networks for access to fuel are based on use of currently available fuel sources. A move to the use of alternative fuels to power vehicles could require the development of a new delivery infrastructure or significant alteration to the old systems. Maximising the full potential of renewables could be enhanced by further consideration of smart electricity systems that would, for example be able to integrate effectively and efficiently electricity from a range of generation options, such as wind turbines and provide for storage capacity.

In addition, there are barriers related to the distribution of the impacts of mitigation measures. While climate policies may come at moderate costs or even be beneficial to the economy overall, the costs may be concentrated in a few sectors or companies and create social and competitiveness problems and thus require a fair and flexible international cooperation to be successfully implemented.

Moreover, in an interlinked global economy with growing international trade, ambitious standards, for instance for efficient and safe electrical appliances, should be promoted through trade.

The analytical work of the AWG should identify the barriers to realising technical and economic potentials and ways to overcome those barriers, e.g. through good practices from experiences of countries or innovative approaches. In addressing the challenge to implement the most cost-effective approaches to reduce emission, it is necessary to work together to exploit synergies (e.g. with air pollution policy). The EU is looking forward to contribute to further analytical work of the AWG towards this end.

An important question for the AWG to consider would also be how the international context could facilitate the further development, deployment and diffusion of existing and emerging low carbon technologies and the full implementation and enhancement of energy efficiency and energy demand measures.

The potential for internal reductions will often depend on this context. For instance the reduction potential of envisaged emission cuts in the EU emission trading system depends in part also on the price evolution and the future prospects of the global carbon market. For a range of the reduction options the economic cost will depend on the full scale deployment of these potentials on a global scale.

In order to realise the full mitigation potential of some sectors, we need a legal framework that includes the further development of a comprehensive global carbon market, of international bunker fuels and of land use, land use change and forestry sector. The EU is therefore keen on looking into institutional options, including international mechanisms for cooperation and options for specific sectors to enable the AWG to analyse the respective potentials in the most meaningful way.

PAPER NO. 2: ICELAND

Subject: Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol: Information and views from Parties on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties, appropriate in different national circumstances, taking into account their environmental, economic and social consequences, their sectoral dimensions, and the international context in which they are deployed.

The Icelandic Government, on 13 February 2007, adopted a new Climate Change Strategy for Iceland, which includes a long-term vision to the year 2050, five main areas of emphasis of Iceland's response to climate change, analysis of mitigation potentials in seven sectors, and proposals for action to be taken within these sectors. The Strategy is only available in the Icelandic language for the moment, but an English translation will be made available.

Iceland would like to present key elements of the new Climate Change Strategy, including mitigation potential in key sectors and their international context, in the context of the AWG. Iceland is ready to make a short presentation at the AWG session in May 2007 or at other AWG sessions in 2007. Further written information will be made available to the UNFCCC in the coming weeks.

PAPER NO. 3: JAPAN

Japan's submission on information and views on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies

Japan welcomes the opportunity to submit its information and views on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies to contribute to progress of the work under the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG).

1. GENERAL REMARKS

It is Japan's view that AWG work should be a valuable contribution in achieving stabilization of greenhouse gas concentrations in the atmosphere set by Article 2 of the Convention as its ultimate objective. For realization of this objective, it is necessary to make the level of emissions equal to that of absorptions and to balance the global carbon circulation. To this end, global emissions need to be reduced to a level less than half of the current emissions at an early stage, and all countries are required under an enlightened sense of solidarity to take effective mitigation measures in accordance with their respective capabilities. It is indispensable that all major emitting countries put forth their efforts in mitigation, while Annex I countries concluding the Kyoto Protocol taking the lead in the mitigation efforts. Discussions on mitigation potentials and mitigation measures of Annex□countries should be conducted in a manner that eventually leads to global emission reduction.

The Kyoto Protocol is a significant first step but has the following problems. It is insufficient for the realization of the ultimate objective of the Convention.

① The Kyoto Protocol's commitment takers represent only about 30% of the global GHG emissions, and the effect of the fulfillment of their commitments is expected to have only 2% impact in terms of global GHG emission reduction in 2010.
② There is no mechanism in the Protocol to promote sector-wide technology transfer, not project-based technology transfer, to developing countries.
③ The Protocol sets numerical amount of total emission reduction for each Annex□country to be reduced from the level of the specific base year. This is not necessarily fair and equitable targets that reflect reduction potential of the respective country (preceding efforts for energy-saving are not appropriately reflected.).

Taking the above mentioned into consideration, the work of AWG should be done in an integrated manner with discussions on subsequent climate framework and the review process of the Protocol under its Article 9. Selection of objectively reasonable base year, reviews of condition on entering into force of amendments to Annex B, the current system of the joint commitments or so-called "bubble", and the Kyoto mechanisms, emphasis on encouraging and facilitating the achievement of reduction targets rather than penalizing, assessment by energy intensity that is consistent with the environment as well as the economy, and extension of the commitment period; these are some examples of issues to be discussed in an integrated manner. Japan is strongly committed to engage actively in the historic task to reach an agreement on new and long-term framework.

2. SUMMARY OF INFORMATION AND VIEWS

Japan's past joint efforts by public and private sectors have created the most energy efficient economy in the world. Clean and energy efficient technologies that Japan has developed in this course have not only improved Japan's energy efficiency but also made a significant contribution to the global

emission reductions through various kinds of international cooperation. These experiences provide useful information on mitigation potential, effectiveness, efficiency, costs and benefits of policies, measures and technologies as well as the following important suggestions in terms of necessary elements that make subsequent climate framework more effective. (Details can be referred to in the Annex.)

- The top runner program making use of market competition has made a great contribution to the effective diffusion of existing highest-level technologies as well as to the enhancement of technology developments. Also, as seen in the steel production, heightening the added value of products, though it increases energy consumption in the industry, makes certain contribution to energy conservation in society as a whole.
- In the processes of research and development (R & D), commercialization and diffusion of expensive clean energy technologies, proper assistance by the government at each stage is important.
- Identification of energy saving and clean technologies is also essential to providing direct incentives to introduce those technologies.
- R & D efforts for energy saving technologies and innovative emission reduction technologies should be continued. It is also especially important that those R & D efforts for innovative technologies that can create significant reduction potentials should be made with a long-term perspective.
- As for reduction potentials, accurate calculation by sector and country is critically needed. For this purpose, making use of diffusion ratio for specific energy-saving technology is a useful methodology. In other words, it is important to establish the leading mitigation technologies for each country and sector, and to make a regular monitoring of improvements.
- The Asia-Pacific Partnership on Clean Development and Climate (APP) is an effective bottom-up approach for the realization of emission reduction in the fields with large potential.
- For realization of an international cooperation framework for long-lasting and effective global emission reduction, following points need to be considered.

  ① From the viewpoint of equity, attention and appreciation should be drawn to preceding efforts for energy-saving in each country's activities.
  ② Irrespective of any changes in the situation of the world economy and the national economies, a real progress in GHG emissions reduction matters. Therefore, it is also necessary to measure such reduction with the level of energy efficiency (intensity). Energy intensity is a useful indicator for the realization of sustainable and maximum emission reductions while considering sectoral international competitiveness.
  ③ From the viewpoint of equity, levels of reduction in the required commitment in the subsequent framework should be set in a way not to bring about substantial differences in required reduction efforts among commitment takers. The most cost-effective emission reduction with limited resources is possible through putting those resources into sectors where reduction potential is large and therefore reduction cost is low, taking into consideration relative comparison on the sectoral energy efficiency levels.
  ④ Sectoral approach is necessary to address global emission increase caused by cross-country transfer of emission source.

Japan is of the view that above mentioned points should be considered in the work of AWG based on the reliable and objective data. To begin the consideration, common understandings on the concept about mitigation potential, effectiveness, efficiency, and costs and benefits are required. Therefore, building such understandings should be given priority at the coming AWG session in May, and energy specialists need to participate in order to calculate reduction potentials of major sectors.

Japan has a history of emission reduction efforts longer than thirty years, even before the Kyoto Protocol. Even though these consistent efforts have made it the most energy efficient country in the world, Japan reiterates its full commitment to the promotion of emission reduction through further

improvement of its energy efficiency, and to the further strengthening of its efforts in diffusing and developing technologies as well as in enhancing international cooperation.

However, efforts of Japan and other like-minded countries alone can not possibly achieve the ultimate objective of the Convention in its Article 2. In order to take sustainable and effective actions, it is necessary to identify mitigation potentials of sectors and regions where marginal abatement costs are low. We should consider their mitigation measures, and to put resources intensively into such measures to cope with global warming. The work of AWG should focus on effective policy measures based mainly on development, diffusion and transfer of clean and efficient technologies and pathways towards realization of such measures with major emitting countries' participation.

INFORMATION AND VIEWS
(Japan)

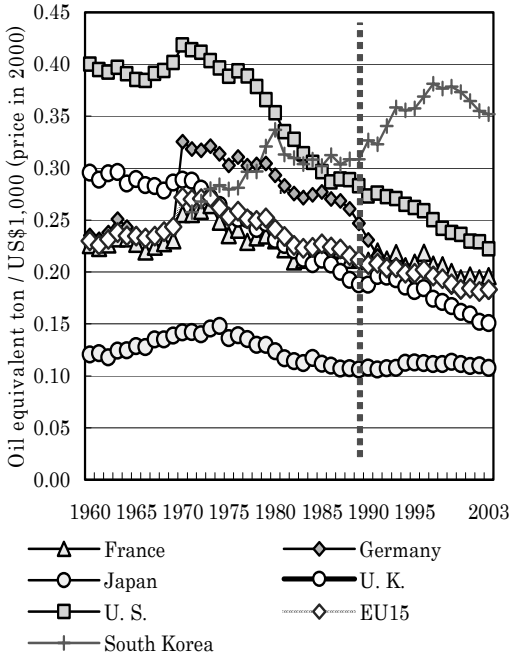
(1) Changes in Energy Efficiency

Japan, which has almost no indigenous energy resources, has steadily promoted the improvement of efficiency of energy consumption since the oil crises under its basic policy to ensure stable supply of energy and adapt to the environment. Through such efforts, Japan has achieved the world's top-level energy efficiency.

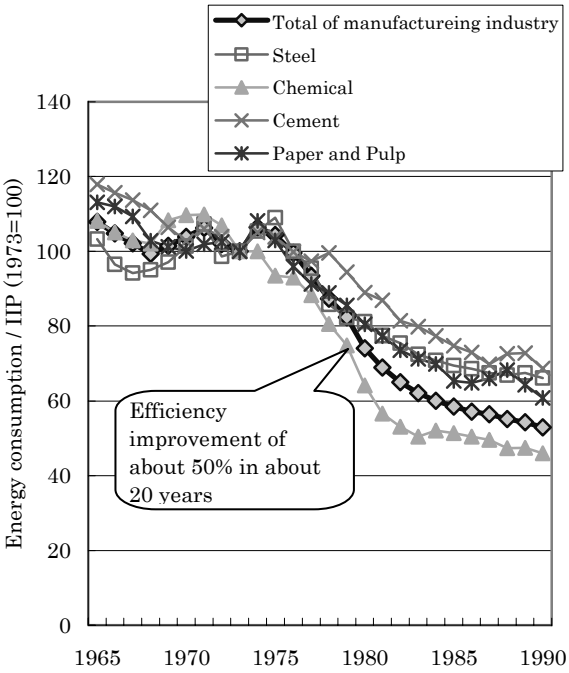
[History of Improvement of Energy Efficiency in Japan]

- Japan's economy achieved high growth of more than 10% a year on average from 1960 to 1970. However, the steep rise in oil prices due to the two oil crises in 1973 and 1979 had a great impact on the resource-poor Japanese economy.
- In the wake of the oil crises, Japan's overall energy efficiency (energy consumption per GDP) has been improved by 37% during the past thirty years since 1973, and the manufacturing industry served as the engine of this process in the case of Japan.
- As the share of the manufacturing industry is large in the Japanese economy, measures in this industry are important. Japanese industries drastically improved their energy consumption intensities since the oil crises to 1990 through investments in energy conservation (the energy consumption intensity in the manufacturing industry improved by about 50% in about 20 years from fiscal 1973 through fiscal 1990).
- To evaluate past emission reduction efforts such as those of Japanese industries since 1970s, the level (intensity) of energy efficiency rather than the range of improvement from one point in the past should be appreciated.
- However, as the whole country's energy consumption per GDP is largely affected by geographical conditions such as weathers, etc. and industrial structures in respective countries, there are practical limitations in comparing energy efficiency of each country in terms of energy consumption per GDP. For this reason, it is necessary to figure out energy consumption efficiency in each industrial sector by using energy consumption per production etc., and then to make evaluations in consideration of respective economic structures.

Changes in energy consumption intensities (Oil equivalent ton/US$1,000 (price in 2000))



Changes in energy consumption intensities in the manufacturing industry (Energy consumption/IIP)

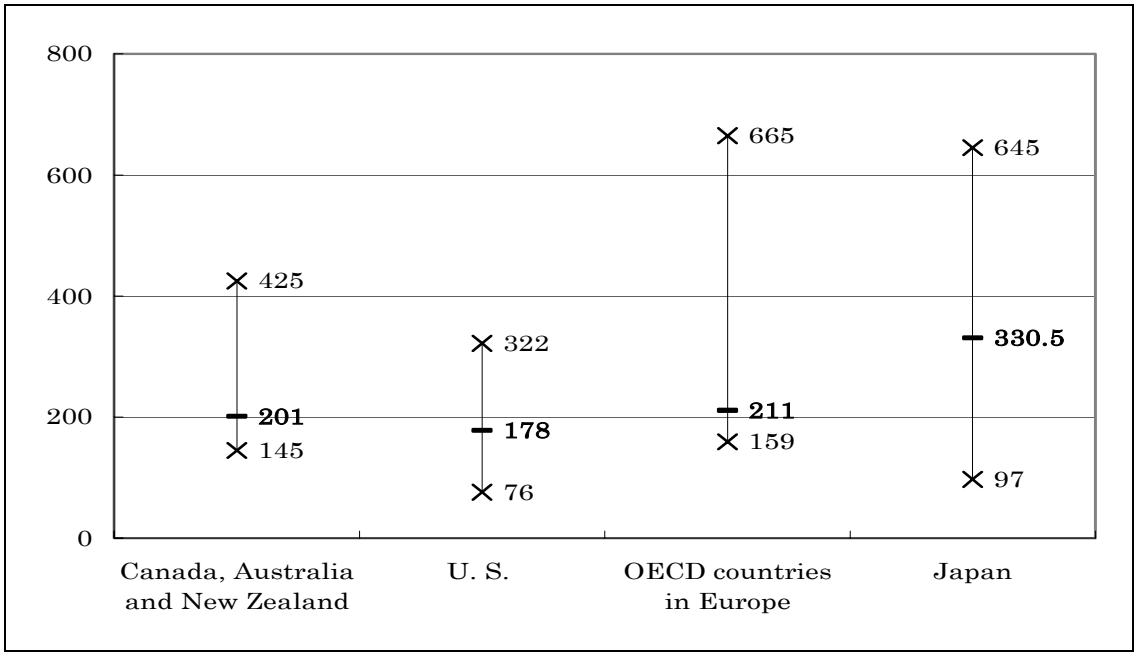


[Basic Approach to Energy Policy]

- Against the background of achievement of such a drastic improvement of energy efficiency, there was a philosophy in responsive measures to ensure stable supply of energy and adapt to the environment.
- Reflecting such policy, Japan is implementing measures to cope with global warming with the "compatibility between the environment and economy" as its basic approach. Aiming at creating an environment-friendly country that leads the world, Japan promotes technological innovation and fosters the participation of and cooperation between the central government, local public bodies, businesses and the people.

[Difference in Marginal Abatement Cost]

- Japan has achieved the world's top level energy efficiency. As a result, the cost of Japan to further improve efficiency is the highest level. However, to lead further emission reduction, Japan will strengthen its efforts to further improve efficiency.
- According to IPCC's third assessment report, Japan's marginal abatement cost (median value of nine models: 330.5) for the first commitment period is 1.6-1.9 times as high as that of other advanced countries (median value of nine models: 178-211).
- The next framework must set the levels of commitments in a way of not causing a large difference in the efforts of respective countries to reduce their emissions from the viewpoint of equity. For this purpose, it is important to consider energy efficiency levels, etc. in breakdown by sector of each country. To take the most effective reduction measures with limited resources, moreover, resources must be inputted where the potential of reduction is large and the reduction cost is low.



[Source: IPCC's third assessment report]

(2) Japan's Efforts with Government and Private Sectors in One

The activities promoted by the government and private sectors in cooperation with each other span a fairly broad spectrum such as voluntary action of the industrial sector, diffusion of wide use of conventional technologies by capitalizing on market competition, government's direct support of technologies, promotion of investments in clean technologies, etc. In this section, suggestions are made concerning the potential of reduction and the like by analyzing Japan's efforts and results thereof.

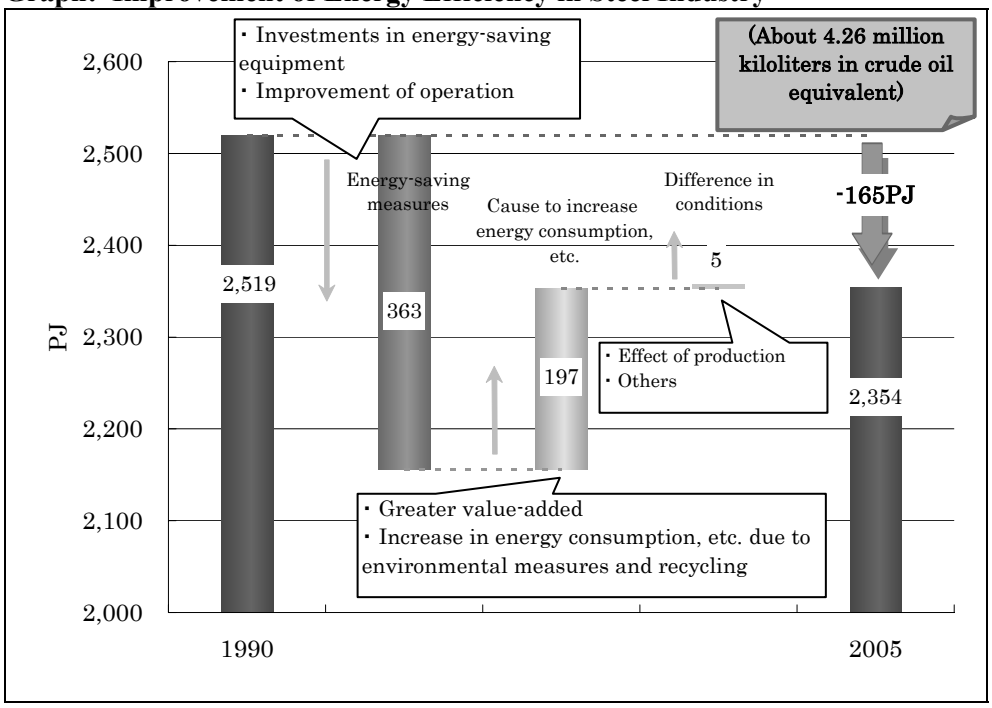
[Pledge and Review by Industrial Sector]

- In Japan, industrial world with the energy conversion sector (power generation sector) and the manufacturing industry as the central figures developed the Nippon Keidanren Voluntary Action Plan on the Environment, and continue to make voluntary actions to reduce CO_2 emissions. The industries that have participated in these actions cover about 44% of Japan's overall CO_2 emissions and about 83% of the industrial sector's overall CO_2 emissions.
- This action plan is aimed at reducing CO_2 emissions in fiscal 2010 to the level of 1990 as the base year. CO_2 emissions increased by 3.7% from the base year and peaked in 1997 , then started decreasing thereafter, and the action plan has achieved its target for six years in a row since fiscal 2000.
- In setting the targets, individual industries are required to pledge their respective targets to achieve the target of the industrial community as a whole.
- The progress of the action plan is reported to an advisory council, and the efforts to achieve the targets are reviewed by the government and the experts of academic community. The effects of such efforts are checked as appropriate.
- For Japanese industries that have maintained the world's top level energy efficiency, further improvement of energy intensities through energy conservation not only reduces CO_2 emissions but also strengthens the international competitiveness of Japanese industries. The production of high-quality products and environment-friendly activities of such companies have realized sustainable development.

Steel Industry

- The effects of measures taken by industrial sector during this period cannot be evaluated by the reduction in CO_2 emissions alone. According to the example of efforts made by Japan's steel industry, energy consumption could be successfully reduced by 165PJ (about 4.26 million kiloliters in crude oil equivalent) from the fiscal 1990 level in fiscal 2005.
- However, to achieve this reduction, the steel industry carried out energy-saving measures that are equivalent to 363PJ such as investments in energy-saving equipment, improvement of operation, etc. On the other hand, 197PJ were the cause of increasing energy because of greater value-added to improve the functions of steel materials as well as environmental measures and recycling, and as a result, the difference is the amount of energy saved.
- Improvement in quality of steel materials increases energy consumption in the manufacturing process, but it contributes to mitigate emissions equivalent to about 7.6 million tons of CO2 in society as a whole through the improvement of fuel efficiency of automobiles, extension of service life of steel materials, etc.

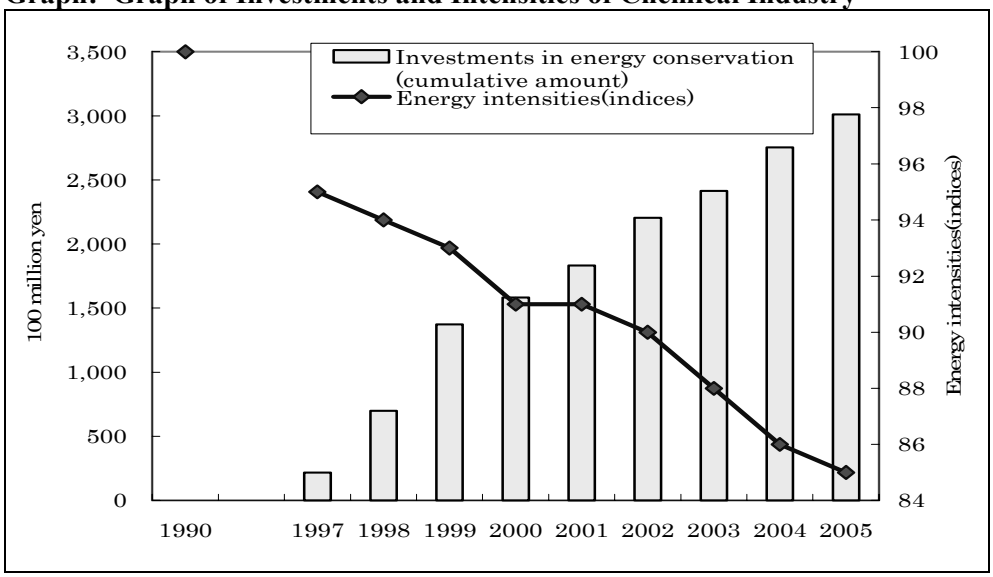
Graph: Improvement of Energy Efficiency in Steel Industry



Chemical Industry

- Japan's chemical industry has promoted the improvement of energy efficiency through active investments in energy conservation. In fiscal 2005, the cumulative amount of investments in energy conservation since fiscal 1997 reached about 300 billion yen, and the intensity was improved by 15% from the fiscal 1990 level.
- Data of the chemical industry suggest that the promotion of investment in energy conservation such as installation of highly efficient equipment leads to steady improvement of intensities.

Graph: Graph of Investments and Intensities of Chemical Industry



Source: Compiled by the Japan Chemical Industry Association (JCIA)

1.

[Policy to Promote Energy Conservation--Top Runner Program]

- Japan introduced the so-called top runner program in 1998. The top runner program is a policy to improve the energy efficiency of the market as a whole by using the value of the product with the highest energy consumption efficiency on the market at the time of the standard establishment process as a base value and setting standard values by considering potential technological improvements added as efficiency improvements. As of September 2006, 21 items are covered by the program. The scope of the applicable appliances is expected to be expanded and the standards of respective appliances are expected to be reviewed in the future.
- The top runner program has succeeded in efficiently promoting wide use of existing best available technology by capitalizing on market force. Moreover, technology development is promoted through competition among companies by setting high standard values in proportion to the prospects of technology progress. Setting such achievable targets creates fair markets, and the win-win relations to allow environmental protection and economic growth to go hand in hand are created.
- In reality, energy efficiency is now increased to levels much higher than the estimates at the time of setting the standards for applicable appliances and automobiles. Among the efforts by sector, as for the products whose markets are formed for home electric appliances, automobiles, etc. and energy efficiency can be compared with each other, it is effective to set efficiency standards for each product, and promote wide use and development of technology through competition among companies.

Table: Efficiency Improvement by Top Runner Program

Product category	Improvement of energy consumption efficiency (results)	Improvement of energy consumption efficiency (initial estimates)
TV set	25.7% (fiscal 1997 to 2003)	16.4%
VCRsr	73.6% (fiscal 1997 to 2003)	58.7%
Air-conditioners *	67.8% (fiscal 1997 to 2004 freezing year)	66.1%
Electric refrigerators	55.2% (fiscal 1998 to 2004)	30.5%
Electric freezers	29.6% (fiscal 1998 to 2004)	22.9%
Gasoline passenger vehicles *	22.0% (fiscal 1995 to 2004)	22.8% (fiscal 1995 to 2010)

* An indicator of energy consumption efficiency is COP for air conditioners and fuel efficiency (kilometers per liter) for passenger vehicles, it should be noted that the effect of reduction in energy consumption is an inverse number.

[Measures for Promotion of Energy Investments]

- To promote capital investments that contribute to improvement of energy efficiency, Japan has been providing incentives since 1992 by means of tax relief.
- Japan has been promoting clean investments in a wide range, including individuals and small-to-medium and large companies, in 69 items of high-efficiency equipment such as lights, air-conditioners and other equipment for business use, biomass utilization equipment, hybrid automobiles, etc.
- Reflecting technology progress, in fiscal 2006, Japan revised the applicable facilities with priority given to other sectors including offices and other business facilities such as light-emitting diode lighting systems, high-efficiency air-conditioning equipment, etc.
- The direct incentives for identification and introduction of specific clean technologies under this system effectively guide the investment behaviors of individuals and businesses. They function as a means of promoting efficiency improvement in other sectors including offices and other business facilities and residential sectors where energy consumption is rapidly increasing.

Outline of System Revision in Fiscal 2006
Special depreciation of 30% of acquisition price (small-to-medium companies, etc. are allowed to select a 7% tax credit of acquisition price instead)]

<New Equipment>
Equipment for business use:
[lighting system] light-emitting diode (LED) lighting systems
[Air-conditioning] high-efficiency air-conditioning equipment (multi and central system)
[Heat insulation] highly heat insulative window glass
[Others] Top runner transformer
New energy equipment: woody biomass power generation equipment, bioethanol production equipment, etc.
<Continuously applied equipment>

○ high-efficiency industrial furnace ○ cogeneration equipment ○ hybrid car

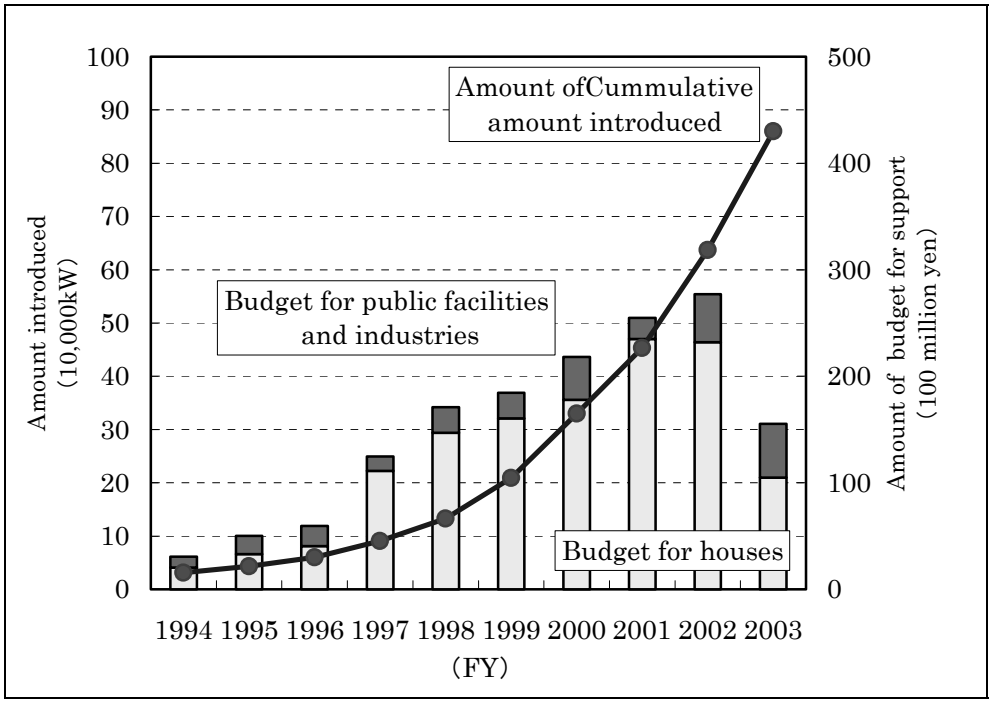
○ photovoltaic power generation equipment ○ fuel cell equipment ○ waste power generation equipment, etc.

[Status and Measures in Civilian and Transport Sectors]

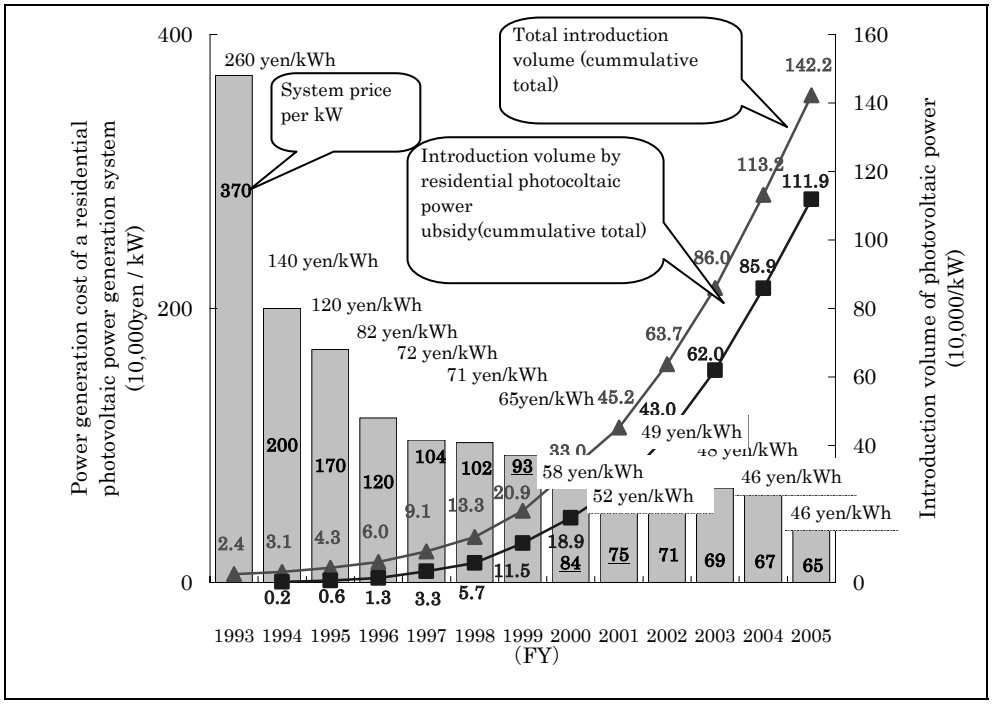
- As seen in trends in the recent years, emissions in civilian and transport sectors have considerably increased since 1990, and those emissions in fiscal 2005 have increased by 40.1% and by 18.1% respectively.
- In civilian sector, expanded floor areas contributed to the increase in CO_2 emissions in the business subsector. In the residential subsector, on the other hand, an increase in the number of households and an increase in energy consumption per household due to an increase in the number of home electric appliances, upsizing of these appliances, etc. owned are major causes. The effect of reduction became manifest in proportion to the replacement purchases of home electric appliances whose energy efficiency is improved by the top runner program.
- CO_2 emissions in the transport sector were on an upward trend in the 1990s due to an increase in the number of passenger cars owned for private use. However, as the theoretical fuel efficiency of passenger cars has been improved since the mid-1990s under the top runner program and the mileage per vehicle has decreased after fiscal 1990, the emissions in the transport sector turned to a downward trend in and after fiscal 2001 and are now approximating to the target value (2.5 million tons in fiscal 2010) of Kyoto Protocol Target Achievement Plan.

[Technology Support by Government--Photovoltaic Power Generation]

- As part of the policy to promote new energy, Japan has addressed the development of photovoltaic power generation since the late 1970s. The private sector's technology development was given rise by the development funds that were invested by the government in the early stage of risky research and development.
- In the stage to promote wide use, the government subsidized the introduction of photovoltaic power generation equipment, and the cost was successfully reduced by economies of scale in production.
- As a result of such support by the government, the cumulative amount of Japan's photovoltaic power generation systems installation accounted for about 40% of the worldwide share as of the end of 2005. The amount of CO_2 emissions reduced by photovoltaic power generation systems accounted to about 600,000 CO_2 tons in 2004, which is twice as much as the amount in 2002.



Source: The Institute of Energy Economics, Japan (2005), and materials for the 18th basic lecture on energy.
Source: Prepared by materials (budget) of the Agency of Natural Resources and Energy, the Ministry of Economy, Trade and Industry.
Note: The budget for technology development, etc. is excluded. The budget for public facilities and industries represents the field test projects of NEDO.



(3) Efforts to Achieve Drastic Reduction in Emissions in Future

With the efforts made by the government and private sectors in one, Japan has achieved the world's top-level energy efficiency, and continued the efforts to introduce nuclear power generation and develop clean energy technologies such as photovoltaic power generation, etc. Under the basic concept of "economic growth compatible with environment protection," Japan is determined to further strengthen these efforts in the future.

To achieve the ultimate objective of Article 2 of the Convention, in particular, Japan has to promote the development of innovative technologies that lead to drastic reduction in CO_2 emissions, while ensuring technological neutrality without arbitrarily selecting technologies, in addition to the enforcement of the efforts to improve efficiency and proliferation of such efforts in the world. Several efforts now under way to introduce nuclear power generation, and develop and introduce innovative technologies that have a great potential of reduction in CO_2 emissions are described below.

[Efforts for Further Improvement of Efficiency]

As mentioned above, Japan has improved its energy efficiency (energy consumption per GDP) by 37% in the past thirty years since 1973, and achieved the world's top level energy efficiency. However, Japan intends to try to further improve efficiency in order to cope with global warming issues. In May 2006, Japan developed its New National Energy Strategy, under which Japan is undertaking various measures to further improve energy efficiency (energy consumption per GDP) by at least 30% by 2030 from the 2003 level.

[Utilization of Nuclear Power Generation With No CO_2 Emissions]

- Nuclear power generation as an energy source that is superior in stable supply and does not emit any CO_2 during operation is a promising means that contributes to the establishment of energy security and measures against global warming, and Japan has long actively promoted the introduction of nuclear power generation on the condition of ensuring nuclear non-proliferation, nuclear safety and nuclear security.
- In Japan, nine nuclear power plants are slated to start commercial operation by fiscal 2015, and Japan plans to increase the installed capacity of nuclear power generation to about 60 million kW. In and after 2030, Japan aims to increase the ratio of nuclear power generation to total power generation to 30-40% or more.
- While ensuring safety and other major prerequisites, the use and promotion of nuclear power generation technology that does not emit any CO_2 is important to drastically reduce CO_2 emissions on a global scale.

[Development of Technology Related to Fuel Cells]

- Fuel cells are an important technology that is expected to drastically reduce CO_2 emissions in the transport and civilian sectors through the spread of fuel-cell-powered electric vehicles, stand-alone fuel cells, etc. To introduce fuel cells as early as possible, Japan has put its energies into demonstration tests and technology development that is aimed at performance improvement and cost reduction.
- To realize the scenario to start full-scale introduction of fuel cells in 2020, the government has strengthened the research and development by drastically increasing government budget from 11.9 billion yen in fiscal 2001 to 35.4 billion yen in fiscal 2005.
- With the government-funded development, Japan aims to achieve the target of introduction in 2020, i.e., five million fuel-cell powered electric vehicles and 10 million kW of stand-alone fuel cells.

[Promotion of Shift to Next-Generation Transport Energy]

- Japan's transport sector that relies almost 100% on oil is very vulnerable in the energy demand and supply structure, and is now faced with a challenge to shift from the structure that relies only on oil to drastically reduce its CO_2 emissions.
- As for specific efforts, Japan will create an environment towards fuel diversification through such means as proper revision of fuel efficiency standards and improvement of infrastructure for supplying fuels of biomass origin in order to encourage introduction and diffusion of fuel efficiency improvement technologies such as hybrid and other technologies. .
- With such activities, Japan aims to reduce the oil dependence of the transport sector to about 80% in 2030.

[Development of Technology Related to Carbon Capture and Storage (CCS)]

- CCS is one of the important technologies that are expected to drastically reduce CO_2 emissions in the future. Among others, it will become possible for the areas where CO_2 emissions of fossil fuel origin are expected to increase due to rapid economic growth to make sustainable economic growth compatible with reduction in CO_2 emissions through the introduction of CCS technology, with proper considerations given to the geographical features and economic rationalities in the area.
- Japan continues the government-led research aiming at drastic reduction of the cost to capture CO_2, development of innovative technology, safety assessment, etc., and appropriated a budget of 5.6 billion yen (in fiscal 2006) for commercialization targeted for 2015. The amount that can be captured and stored underground in Japan is said to be about 5.2 billion CO2 tons according to a trial calculation (but this calculation does not include any business costs etc.). Moreover, Japan provides various kinds of government support for business deployment overseas.

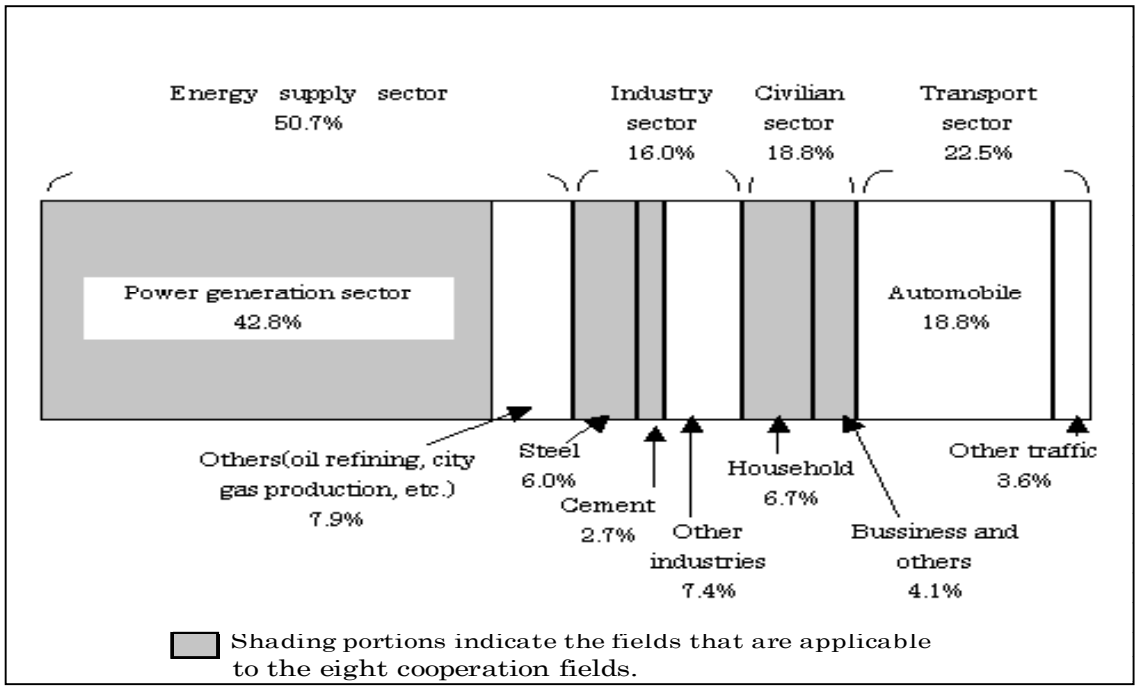
(4) Contribution to Global Emissions Reduction

Japan has promoted thorough improvement of energy efficiency and development of clean and innovative technologies through the efforts mentioned above. Japan's technologies have been transferred and widely used overseas through various activities, thus contributing to global emissions reduction. In this section, materials and information related to cooperation activities overseas are provided.

[Bottom-Up Approach by Cooperation between Government and Private Sectors--APP]

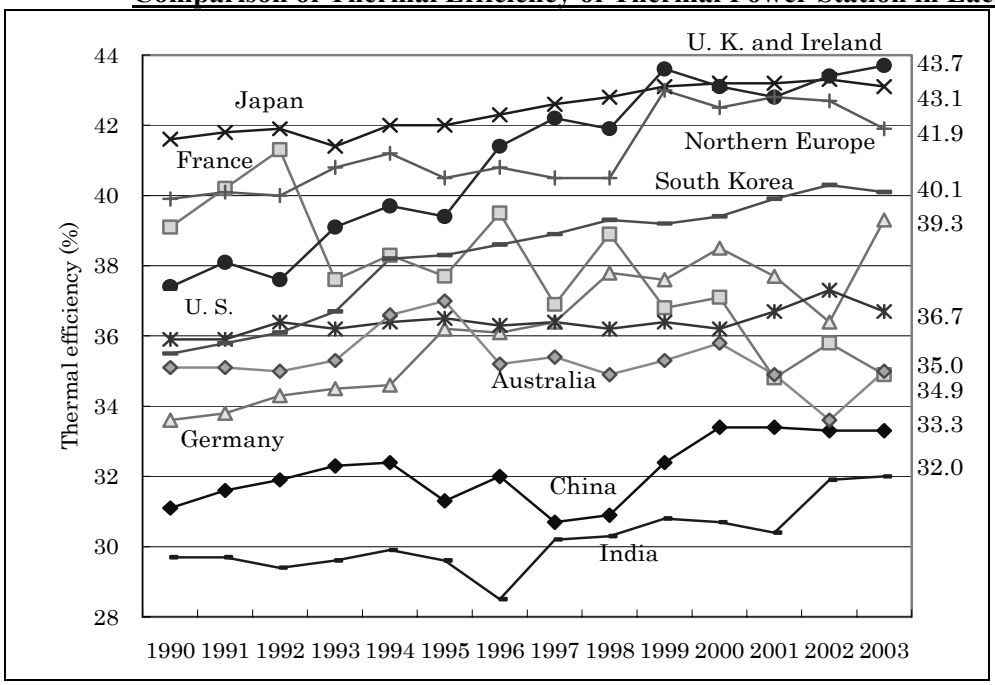
- The Asia-Pacific Partnership on Clean Development and Climate (APP) joined by Japan, Australia, China, India, South Korea and the U.S. is an effort of cooperation between the government and private sectors to supplement the Kyoto Protocol. These six countries account for about half of CO_2 emissions in the world, and the potential of reduction by their energy-saving cooperation, etc. is very large. The ratio of contribution of the cooperation fields to the energy consumption and CO_2 emissions of the six countries is as much as about 60%.
- The characteristic of this partnership is the sector-by-sector bottom-up approach, in which the private companies that actually possess clean and efficient technologies cooperate in the development, spread and transfer of such technologies and the government supports such activities. Japan aims to contribute to global-scale reduction in greenhouse gas emissions by transferring and diffusing of not only the most advanced equipment and technology but also the energy-saving technologies, know-how, etc., which Japan has developed to date.
- For example, Japan's electricity industry has achieved the world's top level thermal efficiency of thermal power stations through the introduction of the most advanced equipment and technology. To maintain such high efficiency over a long period of time, the industry has developed various methodologies and know-how of operation, maintenance and management. Sharing them with the engineers of participating countries makes it possible for Japan to contribute to global-scale reduction in greenhouse gas emissions.
- As experts of the eight fields gather by each field, identify efficient technologies and discuss the problems of and measures for spread and transfer of such technologies, efficient measures for

reduction can be promoted. Specifically speaking, energy efficiency is benchmarked by sector (comparison and analysis of best practice), the potential of reduction in each sector as a whole is clarified, and the efficiency improvement technology to be transferred is specified.



Note: CO2 emissions mentioned above represents CO2 emissions of fuel origin only and do not include CO2 emissions of process origin. The amount of CO2 emissions from cement becomes twice as much if CO2 emissions of process origin are included.

Comparison of Thermal Efficiency of Thermal Power Station in Each Country

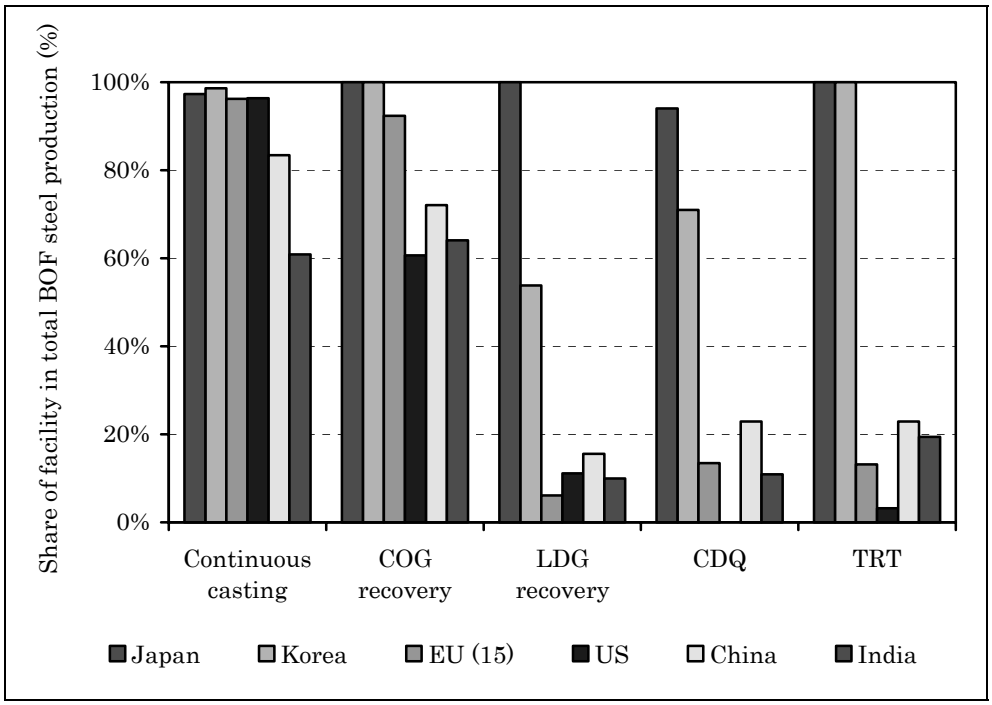


Source: UPDATED COMPARISON OF POWER EFFICIENCY ON GRID LEVEL 2005 (ECOFYS)

Table: 8 Fields (Task Force)
Cleaner use of fossil energy
Renewable energy and distributed generation
Power generation and transmission
Steel
Aluminum
Cement
Coal mining
Building and appliances

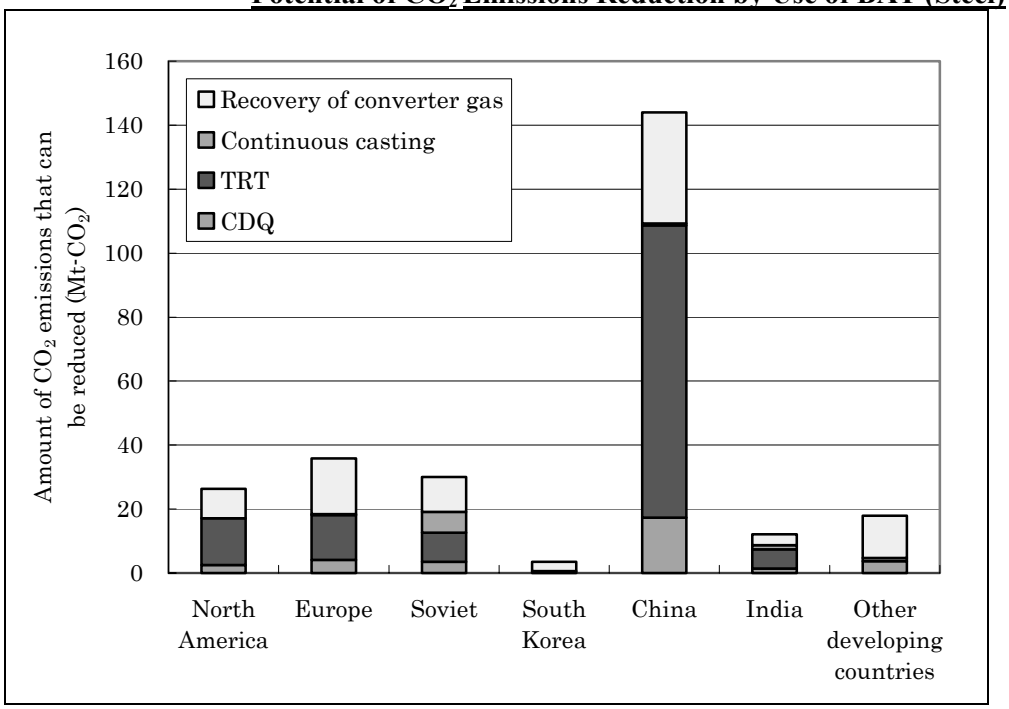
[Diffusion of Clean Technology]

- To know the potential of reduction, the methodology to calculate it based on the percentage of introduction of specific clean technology is effective. Specifying the technologies, of which the introduction is delayed in heavy energy consuming industries, etc. but are highly effective to improve energy efficiency, and coping with the problems involved in the introduction of such technologies can steadily and effectively reduce emissions. International cooperation such as APP is intended to address effective reduction with this methodology.
- According to past estimates by research institutes, etc., if best available technologies (BAT) such as coke dry quenching (CDQ), top-pressure recovery turbine (TRT), exhaust heat recovery, continuous casting, etc. are introduced in the steel industry of other countries at the diffusion rate as high as Japan, about 300 million tons of CO_2 emissions can be reduced a year in the world.
- In the electric power industry, power generation plant and equipment are expected to be renewed all over the world. It is possible to contribute to the global reduction in greenhouse gas emissions by transferring highly efficient BAT like those boasted by Japan at the time of such renewal, and the potential of reduction by such technology is also high. If the efficiency of coal-fired, oil-fired and gas-fired power generation in other countries is increased by BAT to the level as high as Japan (basic case), CO_2 emissions in the world can be reduced by 1.7 billion tons. As a reference case, CO_2 emissions can be reduced by 1.2 billion tons in the case where the efficiency of the power plants constructed in and after 1980 is increased only by improvement of maintenance.



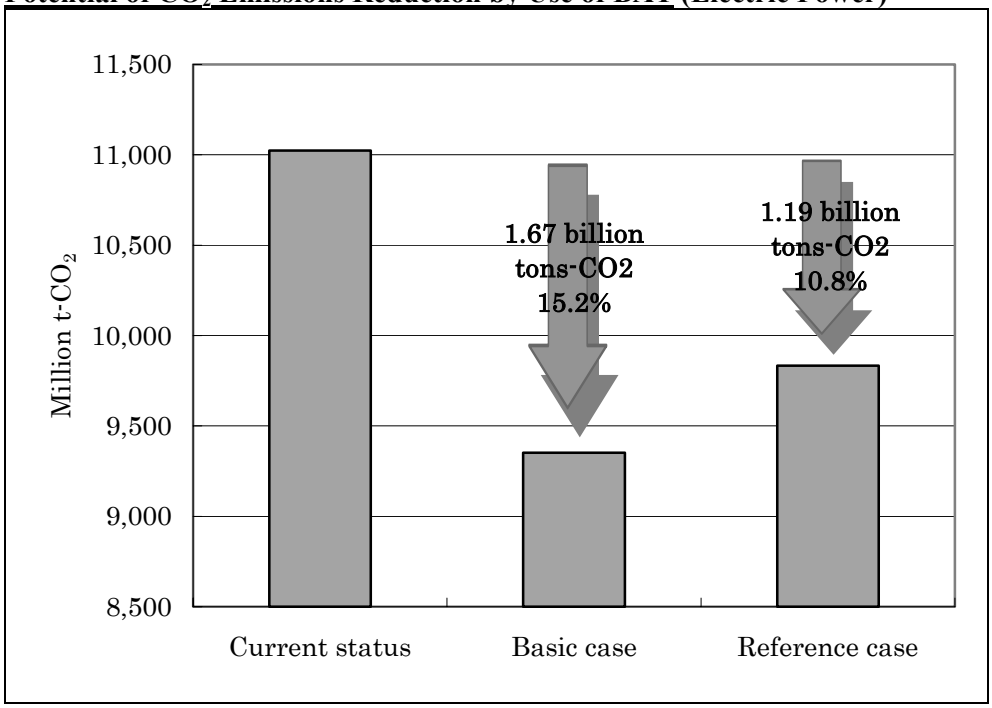
Source: Estimates by RITE from data of reports from IISI, NEDO, etc.

Potential of CO_2 Emissions Reduction by Use of BAT (Steel)



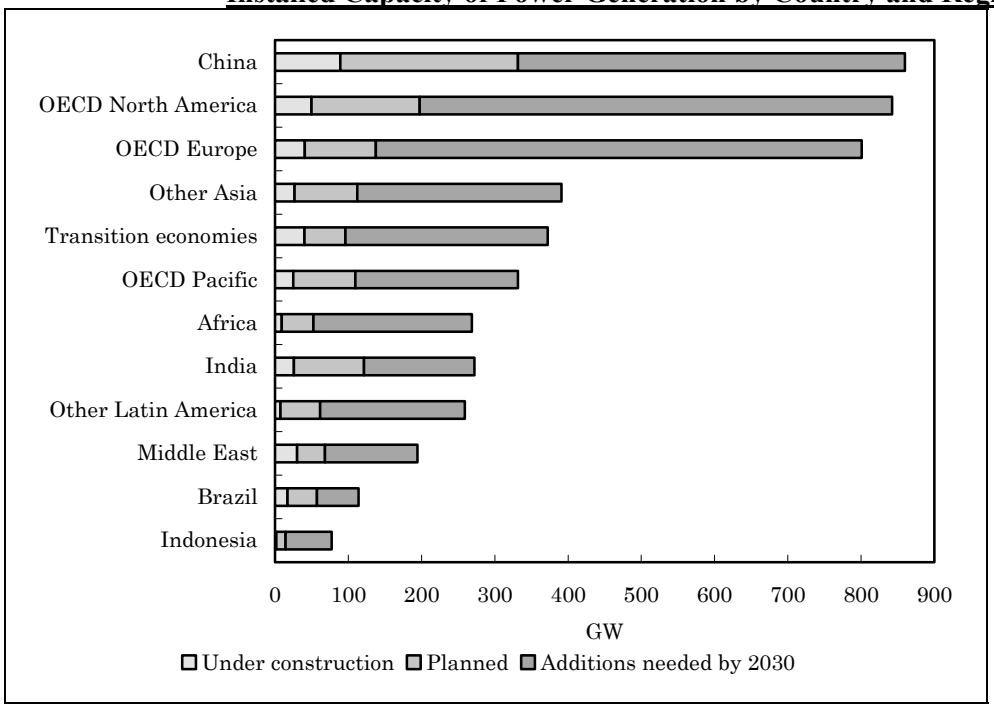
Source: Energy-Saving Intensity, FY 2000 survey report by NEDO "Survey on Energy-Saving Technology In Japan," March 2001, contracted out to Japan Consulting Institute. Production volume: IISI data in 2004. Prospects for increase in GDP: OECD, World Energy Outlook 2004. Present diffusion rate: IISI data and hearings from experts.

Potential of CO_2 Emissions Reduction by Use of BAT (Electric Power)



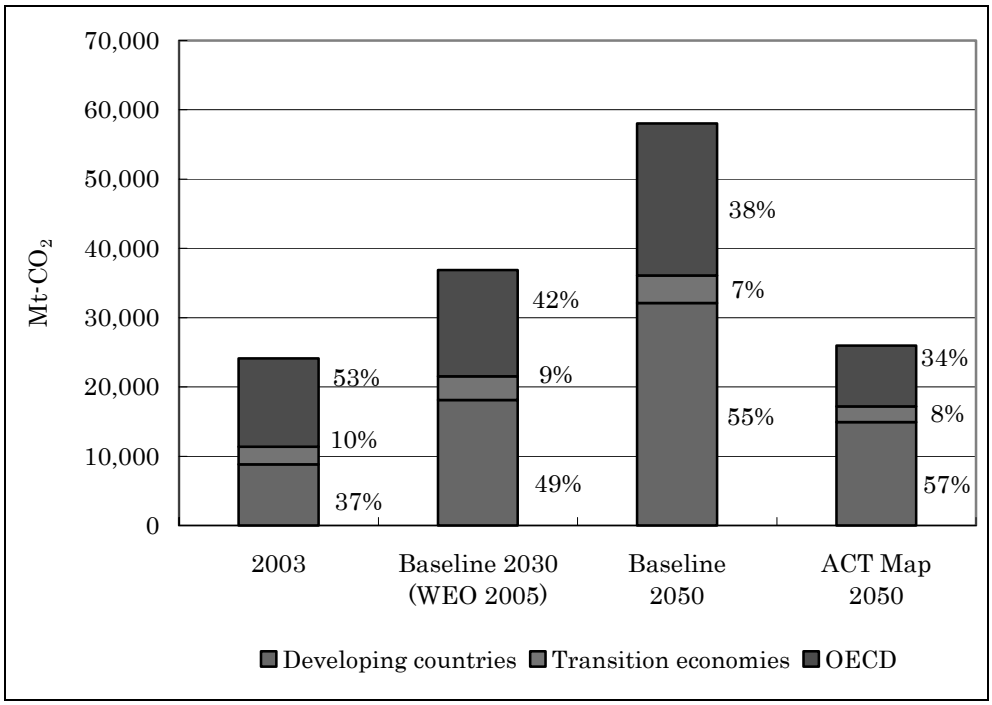
Sources: IEA, Energy Balances of OECD Countries and Non-OECD Countries World Energy Outlook 2004

Installed Capacity of Power Generation by Country and Region



[Trends and Analyses of Emissions on Global Scale]

- According to IEA's analyses, the worldwide CO_2 emission in 2050 is expected to increase by 137% (from the 2003 level) under the business as usual (BAU) scenario. Of these emissions, advanced countries (OECD countries) account for 27%. The emissions of developing countries are expected to exceed that of advanced countries during the period from 2020 to 2030. To achieve the ultimate objective of Article 2 of the Convention, early efforts by countries, including major emitting countries, are absolutely necessary.
- A large increase in emissions is expected in the future. To implement sustainable measures in such circumstances, the development and diffusion of clean technology is an urgent matter. According to ETP (Energy Technology Perspective) worked out by IEA, if the technology of US$25 per CO_2t or lower is widely diffused in the world, it is possible to retard the increase in CO_2 emissions from fuel combustion in the world up to 6% from the 2003 level in 2050. Under the more ambitious technology assumptions of the TECH Plus scenario, where technology is further progressed, it is said to be possible to reduce such CO_2 emissions by 16%.
- To realize this potential of reduction, it is effective to promote the transfer and diffusion of energy-saving technology by sector across international boundaries. Japan's clean and highly efficient technology can contribute to global emissions reduction. For global emissions reduction, it is necessary for the government and private sectors to participate and make efforts in one in a competitive environment where high levels of energy efficiency and clean technology should be properly reflected.
- At the time of review of the potential of emissions reduction and specific measures for reduction on a global scale, it is necessary to proceed with detailed analyses by industrial sector. It is important to make the full use of the results of the work to formulate the energy efficiency indicator now being examined by IEA and to extract best practices as well as the results of efforts made by sector under the APP.


70,000
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Mt-CO2
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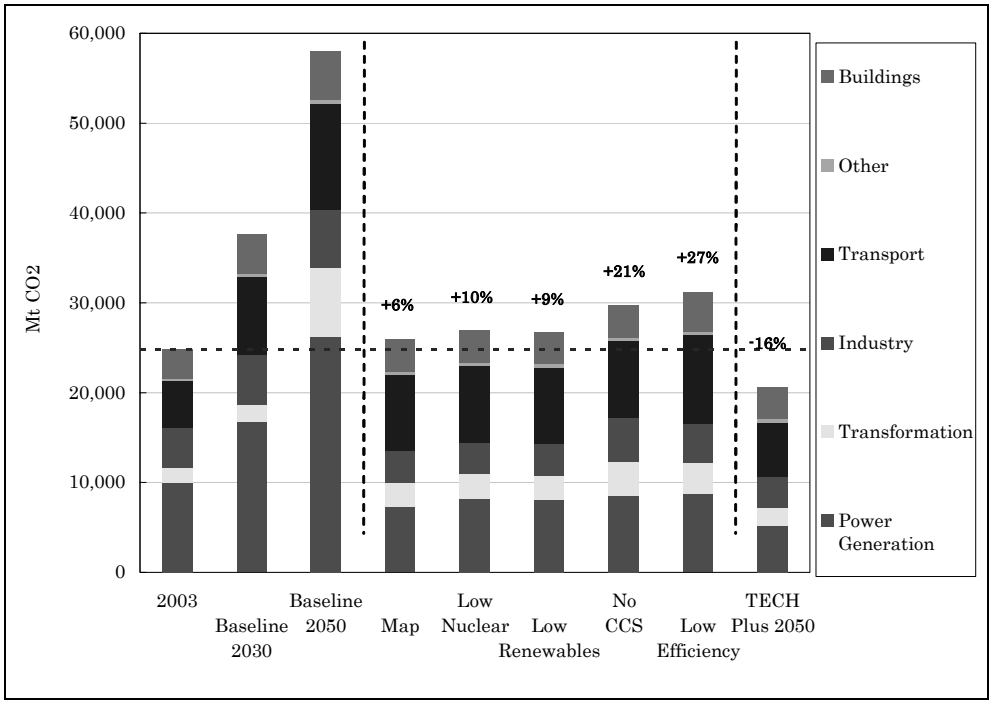
2003
Baseline 2030 (WEO 2005)
Baseline 2050
ACT Map 2050
Developing countries
Transition economies
OECD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Mt CO2
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+21%
+27%
-16%
Buildings
Other
Transport
Industry
Transformation
Power Generation
2003
Baseline 2030
Baseline 2050
Map
Low Nuclear
Low Renewables
No CCS
Low Efficiency
TECH Plus 2050

PAPER NO. 4: NEW ZEALAND

AD HOC WORKING GROUP ON FURTHER COMMITMENTS FOR ANNEX I PARTIES UNDER THE KYOTO PROTOCOL

Initial information and views from New Zealand relevant to consideration of the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties, appropriate in different national circumstances, taking into account their environmental, economic and social consequences, their sectoral dimensions, and the international context in which they are deployed

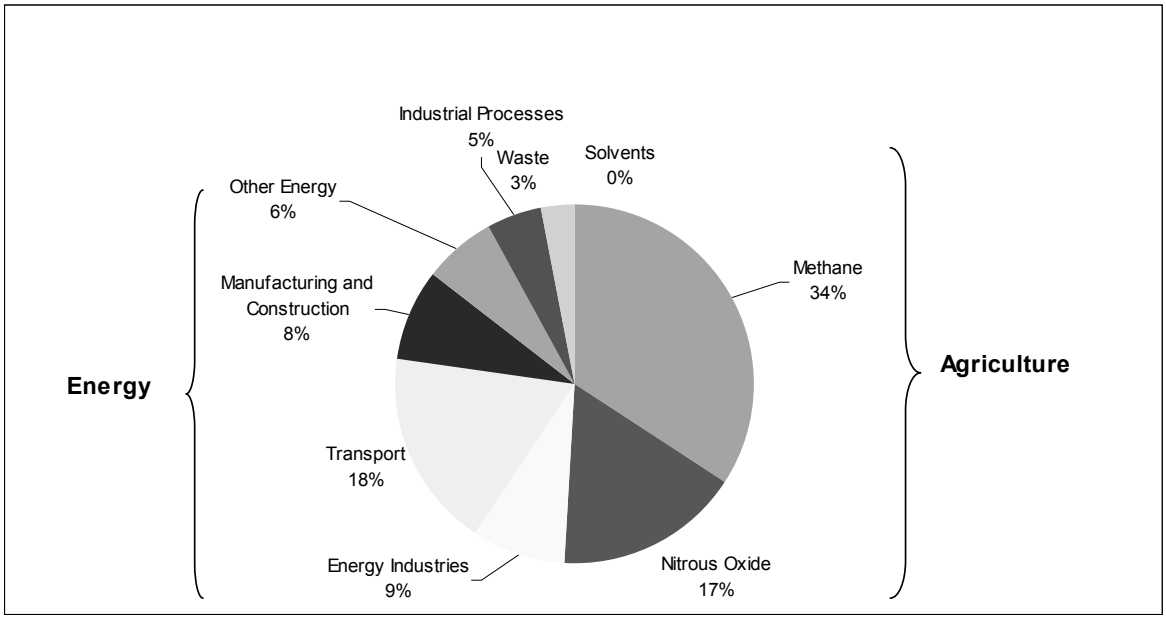
This report is in two parts. The first covers New Zealand's national circumstances, including information on key sectors, while the second highlights the relevant aspects of the international context.

New Zealand's national circumstances

Current New Zealand emissions profile[1]

Figure 1 and Table 1 present details of New Zealand's greenhouse gas emissions. Figure 2 provides a broader picture of New Zealand's greenhouse gas emissions and sinks removals from LULUCF.

Figure 1: New Zealand Greenhouse Gas Emissions for the Year 2000[2]



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[1] Although New Zealand's most recent emissions data is from 2004, data from 2000 has been used for this report as it allows direct comparison with the latest available global data, also from 2000.

[2] Data Sources: New Zealand figures: Inventory submission 2006 and New Zealand's Fourth National Communication (recalculated 2000 figures). Annex 1 and Global figures: Climate Analysis Indicators Tool (CAIT) Version 4.0. (Washington, DC: World Resources Institute, 2006).

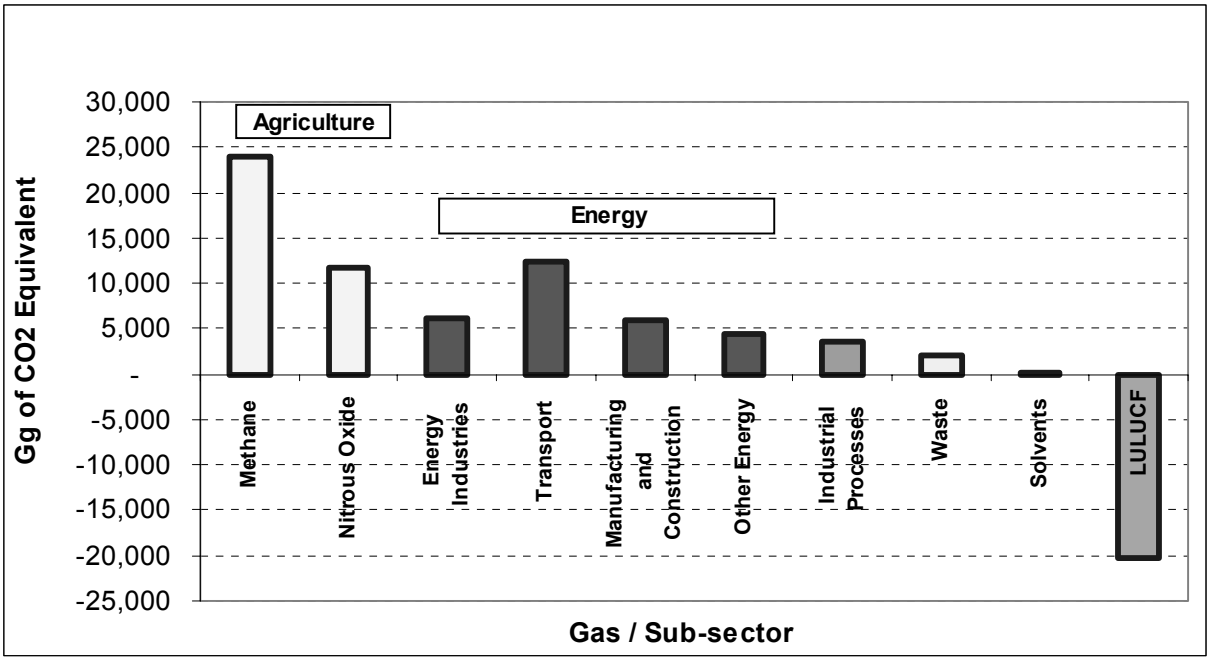
New Zealand greenhouse gas emissions represent around 0.2 per cent of global emissions. The key climate change-relevant aspects of New Zealand's economy include a high proportion of electricity generated from renewable sources, a high proportion of greenhouse gas emissions from agriculture, the export of food, significant forest carbon sinks, and an export driven economy that relies on maritime and air transportation. Given this structure of our economy, New Zealand is already relatively carbon efficient. Further efforts to reduce New Zealand's net greenhouse gas emissions will need to take account of this context

Table 1: New Zealand greenhouse gas emissions by sector, sub-sector or gas and comparisons with Annex 1 and Global Totals for the year 2000[1]

Sector	**Gas / Sub-sector**	**Gg of CO2 Equivalent**	**% of NZ's Total Emissions**	**NZ as % of Annex 1 Total**	**NZ as % of Global Total**
Energy	Energy Industries	6,063	8.6%	0.1%	0.1%
	Transport	12,487	17.8%	0.4%	0.3%
	Manufacturing and Construction	5,965	8.5%	0.3%	0.1%
	Other Energy (including electricity production)	4,431	6.3%	0.2%	0.1%
	Sub-Total Energy	*28,946*	*41.2%*	*0.2%*	*0.1%*
Agriculture	Methane	23,985	34.1%	3.7%	0.9%
	Nitrous Oxide	11,667	16.6%	1.5%	0.4%
	Sub-Total Agriculture	*35,652*	*50.7%*	*2.5%*	*0.6%*
Industrial Processes		*3, 588*	5.1%	*0.6%*	0.3%
Waste		2,081	3.0%	0.4%	0.1%
Solvents		47	0.1%	0.0%	0.0%
LULUCF[3]		- 20,216		7.4%	-0.3%
Total Emissions		**70,315**		**0.4%**	**0.2%**
Total with LULUCF		**50,099**		**0.3%**	**0.1%**

[3] LULUCF: Land Use, Land Use Change & Forestry

Figure 2: New Zealand Greenhouse Gas Emissions/Sinks for the Year 2000[1]



New Zealand domestic policies and initiatives

New Zealand is progressing work on its domestic climate change and energy-related policies and initiatives. This includes discussion on what policy measures would be preferred in New Zealand to reduce our emissions up to 2012 and beyond to protect and enhance our forest carbon sinks, and a draft New Zealand energy strategy looking out to 2050.

Underlying the development of New Zealand's policy is an acknowledgement that climate change is a long-term strategic issue that requires enduring policies and initiatives, and an expectation that the cost of carbon will increasingly be built into economic decisions internationally.

Despite the uncertainty about the international arrangements for post-2012, a number of climate change and energy policies and initiatives will proceed in New Zealand. The Government has announced a major thrust towards the environmental sustainability of our economy. However, representing only around 0.2 per cent of global emissions, New Zealand cannot make a significant impact through its own mitigation efforts alone. New Zealanders want to know that any future contribution by New Zealand to international efforts is part of a concerted global response that will be effective in tackling climate change.

In this regard, New Zealand is prepared to take on further international commitments after 2012, in the context of the broadest international agreement which will set the world on a track to meet the UN Framework Convention on Climate Change's (UNFCCC) ultimate stabilisation objective[4].

[4] "to achieve… stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

More analysis and discussion is required within New Zealand, drawing on our experiences in preparing for the first commitment period, before we are in a position to specify how we might be prepared to contribute to international arrangements.

Sectoral Dimensions

Energy

New Zealand is largely an importer of oil and oil products. The country is currently self-sufficient in electricity and gas, and is a net exporter of coal.

New Zealand's electricity generation from renewable sources is around 70%, with hydroelectric power contributing around 60% of annual generation.

Significant elements of energy sector policy are currently under review and consultation in New Zealand, including the draft New Zealand Energy Strategy (NZES) and the draft New Zealand Energy Efficiency and Conservation Strategy (NZEECS). The NZES has a strong focus on greenhouse gas emissions limitation. Establishment and implementation of energy related climate change policies will influence to what extent actual emissions are reduced below the base case levels.

Transport

New Zealand's transport system is influenced by the distribution of its small population (~4 million people) over New Zealand's two main islands, geographically similar in size to Japan or the United Kingdom. New Zealand's remoteness from many of its trading partners requires extensive use of shipping and air transport, including for meeting customer demand for fresh out of season products. As with most countries, transport in New Zealand is energy intensive with a reliance on fossil fuels.

Areas of focus for New Zealand policy development in this sector include the use of bio-fuels both in the near and the longer term (including 2nd generation technologies using woody biomass), measures to improve the fuel economy of the New Zealand road fleet and increased investment in public transport. The recently released draft NZES and draft NZEECS identify the scope of transport policy activity.

Agriculture

Agriculture dominates land use and economic output in New Zealand, accounting for over 45 percent of total land use. The agriculture sector is New Zealand's largest export earner and New Zealand is the largest single-country exporter of dairy products and sheep meat.

Most New Zealand agriculture is based on pasture systems with animals grazed outdoors year-round. With 66,000 economically sustainable farms, agriculture is the backbone of the New Zealand economy, comprising 65 percent of merchandise exports by value. Government support to agriculture is the lowest in the OECD, with no price or production subsidies.

New Zealand is an energy efficient producer of pastoral agricultural food products that are exported and consumed throughout the world. Agricultural productivity and greenhouse gas intensity of production continue to improve.

Almost 50% of New Zealand's greenhouse gas emissions come from non-carbon dioxide emissions from complex biological processes (enteric fermentation in ruminant animals) and nitrous oxide from pastoral agriculture. Effective solutions are not currently available for the bulk of those emissions.

Given the proportion of emissions from this source it is a significant issue for New Zealand; however other countries, developed and developing alike, also face these challenges. New Zealand is a world leader in research in this area and we have signalled our interest in increased international cooperation on pastoral agriculture emissions. For example, the difficulty of accurate and reliable estimation of greenhouse gas emissions from agriculture is an obstacle to effective measures to reduce emissions, and further research is needed on techniques of estimation.

The extent of the realisable abatement potential in the agriculture sector will vary markedly depending on the particular characteristics of the agricultural system. However, barring major technological breakthroughs the potential is likely to be relatively small.

Present New Zealand policy therefore has a focus on research into abatement technologies. Outcomes over the next 10 to 20 years will be driven by: the abatement technologies that emerge from research, their effectiveness, the feasibility of their application at the farm level, and the long term underlying growth in the sector.

Forest carbon sinks

Indigenous forests occupy ~23% of land use in New Zealand and store large quantities of carbon. Indigenous forest on public land (83% of total indigenous forest) cannot be harvested, and on private land only if sustainably harvested.

New Zealand also has a commercial planted forest resource – comprising ~7% of land use - managed on a sustainable clear-fell basis. These resources also act as significant carbon reservoirs and sinks in New Zealand. In the early 1990s there was a significant expansion in commercial planted forests. More recently however, plantings of commercial forests have declined to historic lows, for reasons including competition with other land uses such as agriculture and exchange rate movements. The international market situation for forestry products has also proved challenging due to low log prices. Such prices have been partly driven by increases in the supply of unsustainably harvested and illegally logged timber. This timber undermines the economic incentive for planting forests in New Zealand.

Forestry is a valuable tool for offsetting emissions and has co-benefits of erosion control and maintaining and improving water quality and biodiversity in some locations. Forestry can offset significant amounts of carbon and store it for long periods of time in root mass, above ground biomass and when harvested and processed into wood products. Forests also play a role in adaptation, for example reducing flood peaks and controlling erosion rates.

In recognition of the important roles played by forests, New Zealand has recently introduced the Permanent Forest Sinks Initiative (PFSI). The PFSI creates incentives for landowners to permanently establish forests. In turn, forest owners are able to sell carbon credits that are generated. The PFSI addresses climate change and also provides other environmental and economic co-benefits.

LULUCF / Sustainable land management

It is important to consider the dynamic utilisation and sustainable management of land when considering issues related to Land Use, Land-Use Change and Forestry (LULUCF). The rules for LULUCF need to be such that they do not discourage action to reduce LULUCF emissions and indeed allow for the full potential of this sector to contribute to the overall objective of the UNFCCC.

International rules for LULUCF need to take account of national circumstances to allow for ease of domestic implementation.

Waste

Significant reductions have occurred in this sector driven by technological development and the regulation of emission standards for landfill gas.

Industrial Processes

Industrial development is not expected to be a significant contributor to future emissions in New Zealand. This reflects New Zealand's natural advantage and specialisation in biological-based industries and the general trend to an increasingly service-based, knowledge economy.

International context

Setting the work of the AWG in the broader international context is essential for the effective and efficient consideration of issues. In order to achieve the UNFCCC's ultimate objective, significant emission reductions will be required by countries that do not currently have emission reduction commitments under the Kyoto Protocol. Therefore, the ultimate consideration of further commitments by Annex I Parties to the Kyoto Protocol will only make sense when set in this wider context.

One aspect of this relates to international competitiveness. The cost of mitigation measures will be borne by business. It will be important to reassure business sectors that they will not face threats to their international competitiveness through the taking on of costs not shared by their competitors in other countries. In particular, where mitigation technologies do not exist (eg for ruminant methane emissions) or are currently prohibitively expensive, it will be important to take into account national circumstances to ensure fair and equitable treatment between business sectors.

Issues relating to relative production efficiency are also important. A level playing field is needed to allow production to occur in the place where it is most efficient to do so. For example, New Zealand's agricultural products compete with some highly protected markets, some of which face carbon prices in their economies and some that do not. It is important to avoid perverse arrangements that could see New Zealand's highly efficient production reduced and "leaked" to other less efficient systems.

PAPER NO. 5: NORWAY

Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol.

Norway welcomes the opportunity to submit information and views "on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties, appropriate in different national circumstances, taking into account their environmental, economic and social consequences, their sectoral dimensions, and the international context in which they are deployed" (FCCC/KP/AWG/2006/4, paragraph 17(a) (i)).

General remarks

Human induced emissions of greenhouse gases are causing climate change leading to a range of negative effects. Meeting the ultimate objective of the Convention requires an urgent global response to control and reduce emissions of greenhouse gases. Based on available scientific information, the Norwegian government has concluded that in order to stabilize concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, the global mean temperature increase should be kept below 2 °C compared to pre-industrial levels. This implies reductions in global emissions of greenhouse gases in the order of 50 percent compared to 1990 by the middle of this century. Negotiations on further commitments should be guided by this goal or a similar shared vision.

The total emissions of greenhouse gases from the countries which presently have emission limitation commitments under the Kyoto Protocol represent about 30 percent of the global emissions, and the relative share is decreasing. Annex I Parties have a responsibility to take a lead in reducing greenhouse gas emissions. To limit the temperature increase to 2 °C, these Parties must undertake emission cuts in the order of 20 to 30 percent in the period 2020-2030. However, strengthening the commitments for Annex B Parties alone will provide only a modest and clearly insufficient step towards the ultimate objective of the Convention.

Curbing greenhouse gas emissions require a wide array of policies and measures. Some may have more potential than others. Norway has leaned heavily towards using economic instruments in its climate policy. Historically taxes have been favoured. These have yielded considerable results, both to reduce emissions of CO2 as well as of HFC/PFCs. An emissions trading scheme was introduced from 1 January 2005. This initial system is presently being revised and will be extended to include more sources from 1 January 2008. Taxes and emissions trading will be important policies also in the future. Other policies include direct regulations and agreements with industry. The Government is also promoting improved energy efficiency and use of renewable energy such as wind and biomass. (Almost 100 percent of Norway's electricity production is presently based on hydro power.) For a comprehensive documentation of Norway's policies and measures, reference is made to Norway's Fourth National Communication and The Report on Demonstrable Progress.

Technical possibilities to reduce Norwegian emissions

The Norwegian Commission on Low Emissions was appointed by the government in March 2005 to prepare scenarios describing how Norway can reduce its emissions of greenhouse gases by 50-80 percent by 2050. The Commission presented its final report in October 2006.

The Commission has projected emissions growth in a reference scenario without measures. The greenhouse gas emissions in the reference path in 2050 are about 70 Mt CO2 equivalents, compared to about 50 Mt in 1990, i.e. an emission growth of 40 percent. About three quarters of the projected emissions in this scenario are distributed fairly evenly between electricity production, the process industry and transportation. The remaining emissions will come mainly from gas and oil activity, heating, agriculture, and waste disposal.

The Commission has identified 15 measures that together will ensure the necessary reduction in Norwegian emissions in a long-term perspective. The measures are mainly directed at specific and major emissions sources. In addition, the Commission considers two basic measures as prerequisites for the realization of the other measures: A long-lasting climate awareness campaign with dissemination of accurate and relevant facts about the climate problem and what can be done, and investment in the development of climate-friendly technologies through long-term and stable support for an identified technology package.

Examples of identified technologies are:

- Transportation: Phasing in of low- and zero-emission vehicles, phasing in of CO2-neutral fuels, reduction of transportation demands, and development and phasing in of low-emission ships.

- Heating: Increased energy efficiency in buildings e.g. through stricter building codes, transition to CO2-neutral heating through increased use of biomass, more effective use of solar heat, heat pumps, etc.

- Oil and gas activities: Electrification of the continental shelf and more facilities located on land. (Location on land will facilitate use of carbon capture and storage.)

- Electricity production: Expansion of renewable energy through construction of wind and small hydro-electric power stations, and implementation of carbon capture and storage from gas-fired and coal-fired power plants.

The Commission's calculations show that the national costs need not be exorbitant, given that the measures are implemented when the need for renovation arises and as long as climate-friendly solutions are chosen systematically in new investments.

The report of the Commission has been submitted to a public hearing, after which the Government will decide on implementation of the proposals, including timing. Some of the proposed measures are already being implemented: A three-year climate change awareness campaign has been launched, and the first changes in the taxation of cars and fuels have been introduced to stimulate transition to more climate friendly transport.

The Government has furthermore launched an inter-ministerial process to quantify reduction potentials in all sectors with a view to work out action plans for the various sectors. This work is expected to be reported to the Parliament by mid-2007.

Carbon Capture and Storage

A main task in most countries is to decarbonise the energy and transport sectors. In the short and medium term, this can only partly be achieved through renewables. Fossil fuel resources, in particular coal, are vast and seem to remain a main option for energy use for the next decades. Carbon capture and storage (CCS) is the most promising way of eliminating emissions from use of fossil fuels. Application of CCS is one of the most important elements in the report of the Commission on Low Emissions referred to above.

Norway has 10 years of experience with CCS applied to gas production offshore at the Sleipner field (in place in 1996), where 1 Mt CO2 is separated from the well stream annually and injected in the Utsira aquifer. Extensive monitoring is in place to document any changes in the storage. A similar project sequestering 0.7 Mt/year from the Snøhvit field in the Barents Sea will come into operation late in 2007.

The Norwegian Government has reached an agreement with the oil company Statoil that a gas fired power plant to be built at Mongstad will have a pilot project for CCS storing 0.1 Mt in 2010, and a full scale CCS solution storing about 1 Mt annually will be established by 2014. The project includes capture of CO2 from the flue gases, pipeline transport and storage. Mongstad is a major industrial site, and there are possibilities for using CCS on other activities as well. The Mongstad project will utilize technology that could most likely be applied in most types of fossil fuelled power plants.

In countries using a system with emission permits, it is important that the pollution control authorities include requirements to prepare for future installations of CCS equipment, even if such technologies are not economically feasible today.

Concluding remarks

The above input has been focused on our national experiences. We assume that relevant international organizations will be invited to present information relevant for the broader Annex I/Annex B countries. In response to the opportunity to provide information on relevant organizations, Norway would first of all highlight the importance of making full use of the information provided by the IPCC, particular its Fourth Assessment Report, and to draw upon expertise on mitigation potentials held by the International Energy Agency (IEA). For information on mitigation potentials in international transport, we would propose to invite the International Maritime Organisation (IMO) and the International Civil Aviation Organization (ICAO).

PAPER NO. 6: SAUDI ARABIA

Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol

The Conference of the Parties, acting as the Meeting of the Parties in its second session (CMP.2), held in November 2006 in Nairobi, Kenya,, invited parties to submit to the secretariat, by 23 February 2007, views and information on the mitigation potential ,effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties., appropriate in different national circumstances, taking into account their environmental, economic and social consequences, their sectoral dimensions, and the international context in which they are deployed (Document FCCC/KP/AWG/2006/L.4, paragraph 8).

Saudi Arabia welcomes the opportunity to submit its views on the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol. Saudi Arabia would also like to deliver a presentation on the impact of current polices and measures on developing countries.

Saudi Arabia would like to thank the UNFCCC Secretariat for the successful preparation of all of the in-session workshops on scientific, technical and socio-economic aspects of mitigation.

The fact that mitigation measures undertaken by Annex I will cause affect international trade and lead to adverse impacts on many developing countries has been well established.

Oil exporting countries suffer from several types of adverse trade effects:

- Higher energy prices resulting from taxes on petroleum products in Annex B countries will result in higher prices for energy-intensive goods produced by industries in these countries, and thus higher import costs for developing countries that import these goods;

- Lower world demand for oil significantly reduces earnings of oil exporting countries, especially those where oil represents their major export commodity;

Many other developing countries will, on balance, suffer adverse trade effects. Negative effects on all developing countries include higher prices paid for goods imported from Annex B countries and lower prices received for their agricultural, natural resource and service exports

Sectoral measures are also likely to have adverse impacts on many developing countries

- The largest adverse impacts are on oil exporting countries, no matter what type of sectoral measure is chosen

- Sectoral measures that target the transportation sector have a disproportionately large impact on oil exporting countries

- Sectoral measures will have adverse impacts on non-Annex B countries even if they are costless to the countries that adopt them.

Carbon limits on the transportation sector also cause disproportionately large economic burdens on Annex B countries that already have high fuel taxes.

- Sectoral policies that exempt transportation from carbon limits reduce costs to Annex B countries and impact on oil exporting countries
- It is possible to replace the revenues from current fuel taxes with revenues from a tax on the carbon content of all fuels or from auction emission allowances
- The policy of replacing fuel taxes with carbon levies is also beneficial to both Annex B countries and oil exporting countries.

There are ways and means to minimize impacts on oil producing countries if sectoral measures are taken:

- Redesign of sectoral policies to minimize impacts on oil exporting countries
  - Exempt transportation sector from carbon limits
  - Replace fuel taxes with revenue-neutral carbon taxes or revenues from auctioning allowances
  - Remove subsidies and/or incentives for coal and other forms of energy
  - Emphasize carbon capture and storage technologies
- Preferential tariff and trade treatment
- Increased technology transfer and foreign direct investment to help diversify adversely affected economies

Saudi Arabia believes that any exchange of information regarding this agenda item shall be done within the context of Article 4 of the Convention and 3.14 of the Kyoto Protocol, where commitments for Annex I and non-Annex I Parties have been clearly outlined and identified. Differentiation between Annex I and non-Annex I Parties is an important element for any scientific or technical assessment under mitigation. Non-Annex I commitment under mitigation must be confined to Article 4, Paragraphs 1 and 7 of the Convention and 3.14 of Kyoto Protocol and should be in accordance to their specific national and regional development priorities, objectives and circumstances, without introducing any new commitments, taking into account the provisions of Article 4, Paragraphs 4, 5, 7, 8 and 9 of the Convention and 3.14 of Kyoto Protocol. Any development on mitigation shall be aimed at ANNEX-I meeting their commitment under the Convention in particular Article 4 paragraphs 2 and 7 and 3.14 of Kyoto Protocol. Discussions under this agenda item must be limited to the mandate of SBSTA as described in Article 9 of the Convention.

Saudi Arabia believes that an essential part of this agenda item is to advance robust solutions and opportunities to minimize the negative impacts of Annex I Parties response measures on non-Annex I Parties including negative spillover effects from potential mitigation measures taken by Annex I parties. This agenda item needs to further elaborate on the work of the IPCC-TAR and WGIII on spillover effects and impacts of response measures. This agenda item shall advance options to reduce impact of response measures and spillover effects

The cost of mitigation must be addressed in such a manner as to minimize the potential economic impacts on developing countries that are heavily dependent on fossil fuel export. Developing countries have raised concerns about the potential climate change related energy policies undertaken by developed countries to mitigate greenhouse gas emissions.

Saudi Arabia believes that any exchange of information under this agenda item must focus on identification of measures that would reduce emissions, and at the same time, have minimal effects on oil producing developing countries, such as removal of subsidies, restructuring the tax systems, enhancement of sinks, and CO2 capture and storage technologies. Hence, SBSTA needs to promote the exchange of information on **win-win** type policies and measures.

PAPER NO. 7: SOUTH AFRICA

Ad Hoc Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG)

The AWG, at its second session, invited Parties to submit to the secretariat information and views on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties, appropriate in different national circumstances, taking into account their environmental, economic and social consequences, their sectoral dimensions and international context.

The focus of the work of the AWG is to set further quantified emission reduction commitments for Annex I Parties for subsequent commitment periods through the amendment of Annex B of the Protocol, in accordance with the mandate of Article 3.9. South Africa takes the view that the analysis of mitigation potential should occur in a timely manner and be based on sound principles, in order to have an effective outcome.

In order to make effective progress in setting more ambitious commitments for Annex I Parties, the AWG work needs to be based on sound scientific information to support the setting of future commitments that will effectively contribute to the stabilisation of GHG emissions in the shortest timeframe possible. Analysis by Annex I Parties of their mitigation potential must present clear time-frames within which such potential would be realised. South Africa reiterates the precautionary approach, that lack of full scientific certainty should not be used as a reason for postponing action.

South Africa is of the view that it would be useful for the work of the AWG for the Secretariat to prepare a technical paper based on the submissions from Parties and other relevant sources on the emission reduction potentials of Annex I Parties and the means to achieve these, as a sound scientific basis for realising the maximum emission reduction potentials. We look forward to exchanging views on the preparation of such a paper. South Africa believes that this analytical process should swiftly lead to the submissions by Annex I Parties on a full range of possible and indicative commitments, and the means, tools, policies and measures to achieve these indicative commitments.

At AWG2, Parties agreed on a work plan, sending an important signal to the carbon markets. South Africa is of the view that even clearer signals are now needed, including an end-date for the work plan preferably 2008, but no later by 2009.

South Africa is of the view that the principles of equity, responsibility and capability are of particular relevance in determining mitigation potential, as contained in Article 3.1 of the Convention. We express the hope that Annex I Parties will demonstrate their seriousness in taking the lead in combating climate change.

South Africa has taken note of the analytical approach taken by the European Commission in identifying the large potential for reducing GHG emissions in the EU. A set of technologies, policies and measures have been identified - in the areas of energy policy, emissions trading, limits on transport emissions, efficient buildings and investment in research & development – which indicate how the potential might be realised. South Africa further notes that an impact assessment of proposed mitigation actions has been conducted.

South Africa encourages the EU to include these concrete proposals in their submission to the AWG, and other Annex I Parties to timeously provide analytically-based indications of potential in their national circumstances.

PAPER NO. 8: SWITZERLAND

Information and views from Parties on the mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I Parties

Kyoto Protocol, AWG 3

1. According to the decision of the COP/MOP 2 on the programme of work of the AWG, Switzerland welcomes the opportunity to present initial relevant information for the work of the AWG.

2. Switzerland is currently examining its climate policy for the period after 2012, including national and international aspects.

3. This submission is focused on the efforts done by Switzerland in specific sectors. Addressing emissions reductions in the sectors is one of the often cited approaches in the discussions on the future international climate regime under the Kyoto Protocol.

4. General context of the Swiss national climate policy

- Important elements for the Swiss national policy on climate change that provide the basis for compliance with commitments under the Kyoto are:

  - the Federal Law on the Protection of the Environment, adopted in 1985 and revised in 1995 and 2003; it provides for measures to mitigate emissions from waste disposal (CH4), synthetic gases (HFC, PFC, SF6) and GHG precursors;
  - the Law on the Reduction of CO2 Emissions, which was adopted in 1999; it covers energy related CO2 emissions which make up for about 75% of Switzerland's GHG emissions.

- Other sectoral policies – some of them existed well before climate change became an issue – are relevant to climate policy in Switzerland. Among them:

  - energy policy;
  - transport policy;
  - agriculture policy;
  - forestry policy.

- All policies are embedded in a general approach of sustainable development.

- Consideration of the broader international context is essential for the effectiveness and costs of all these policies.

5. **The CO2 Law**

- This law, which entered into force in 2000, mandates a minus 10% reduction in CO2 emissions, with two sub-targets: minus 15% for stationary fuel emissions, and minus 8% for transport emissions. The main instruments for reaching the 4 million ton CO2 reduction target are (*see Figure 1 below*):

- The energy efficiency and renewables promotion programme "SwissEnergy", which focuses on building standards and refurbishment, renewables, efficient appliances and motors, energy efficiency and waste heat in industry, and efficient and low-emissions transport. Federal, cantonal and private sector expenditures total some € 75 million. The following sub-programmes have the largest emissions abatement impacts:

  - Building standards including the voluntary, more stringent Minergie standard;
  - "Voluntary" agreements, which industry and services have entered into in order to qualify for CO2 tax exemption. These agreements are implemented by the private sector's Energy Agency for the Economy (EAEc) under Government oversight.
  - Promotion of wood energy and biomass;
  - Promotion of heat pumps to substitute oil heating;
  - Municipal sustainable energy management programmes;
  - Eco-Drive (training courses for economic driving);
  - Energy management of large infrastructures.

- A CO2 tax on stationary fuels is to be introduced as from 2008. Its rate is to be adjusted depending on Switzerland's gap from its emissions pathway. The maximum rate is €23/tCO2. Proceeds are to be fully refunded to the population and private sector through health insurance and labour cost rebates.

- To curb transport emissions, a privately administered Climate Cent Fund (about € 60 million p.a.) was established in October 2005. It is funded by a €¢1/liter levy on transport fuels and which finances emissions abatement projects in Switzerland and abroad. The agreement with the Government is that the Fund will provide certified emissions reductions achieved within Switzerland (0.2 MtCO2 p.a.) and carbon credits by means of the project based Kyoto mechanisms (1.6 MT C2 CO2 p.a).

- The Swiss Parliament is currently examining a tax exemption for biofuels, and revised efficiency-based vehicle duties to promote efficient cars.

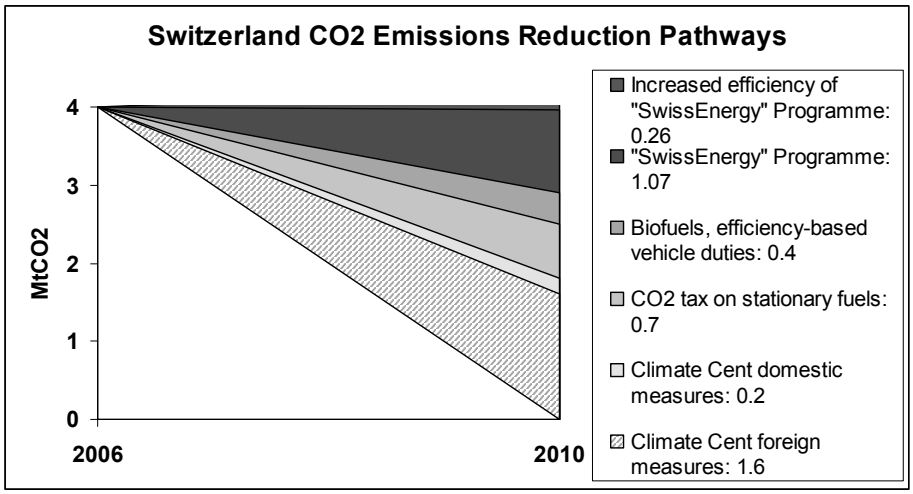


Figure 1. Switzerland CO2 emissions potential reductions pathways.

6. Transport policy : Heavy-vehicle fee (HVF)

- The HVF is levied on heavy-duty vehicles (over 3.5 tonnes). It was introduced at the beginning of 2001. Its prime goal is to internalise external road transport costs. The HVF has curbed road freight mileage by 6% since its inception

- The HVF resulted from protracted bilateral land transport negotiations with the EU. Switzerland was concerned that the lifting of the then prevailing 28-tonne limit on lorries, as demanded by the EU, would unleash massive transit traffic and seriously jeopardise constitutionally mandated modal shift and sustainability policies. The introduction of the HVF was approved by a 57% majority of the Swiss people in a popular vote held in1998

- The HVF is calculated on distance, weight and emissions standards, replacing a previous flat fee. Its initial rate was CHF 0.017/tonne/km, rising to CHF 0.025/tonne/km as from 1.1.2005; it will level off at a maximum CHF 0.0275/tonne/km in 2008. Parallel to the rate increases, the maximum lorry weight was lifted to 34 tonnes in 2001 and to 40 tonnes in 2005. This gradual approach gave hauliers time to improve productivity, which partly offset the cost of the HVF. In the first four years since the introduction of the HVF road transport costs have increased by some 6%.

- Annual revenues ranged between CHF 800-900 million (€ 515-580 million) in the first four years and rose to CHF 1.235 billion (€ 800 million) in 2005. Two-thirds of revenues are allocated to the construction of major rail infrastructure, including two trans-Alpine tunnels, to support modal shift. The administrative cost of the HVF is 7%.

- The effects of the HVF (as well as higher truck load limitations) are compelling (*see Figure 2 below*). Freight mileage decreased 6% in 2001-05 after decade-long uninterrupted growth, while transported freight volumes actually increased. There was virtually no traffic rerouting through neighbouring countries. Transit mileage through the Alps decreased 8%. The decline was the steepest in the first two years due to fleet modernisation and efficiency gains. Modelling indicates that by 2007 CO_2 emissions from road freight transport will be 6-8% below what would have happened without the new regime with HVF and higher weight limit.

- The main effects on transit are expected when high-performance modal shift infrastructure will become operational. Long-term, road freight mileage growth may resume in Switzerland, if overall European transport trends are confirmed, albeit more moderately than in the past. However, the share of rail transport in Switzerland is expected to grow from currently 39% to 47% by 2030, thereby reversing past trends.

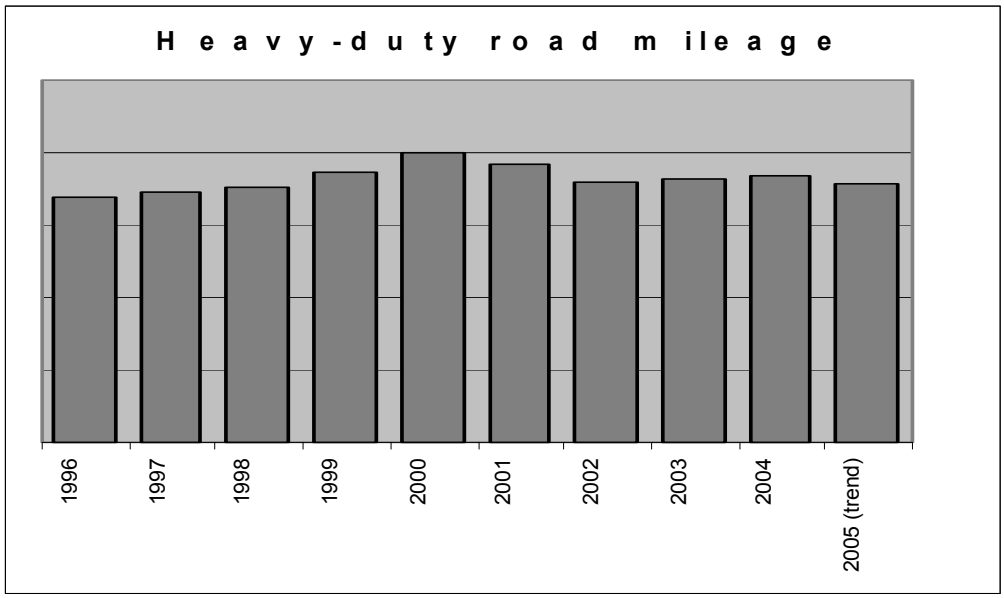


Figure 2. Road freight mileage in Switzerland.

7. Long-term CO2 reductions potentials under various energy scenarios (to 2035)

Longer-term, Switzerland is facing major challenges for further reducing its energy-induced CO2 emissions (other gases and sources are still being assessed), because of the following reasons: i) due to the structure of its economy, the per capita and per GDP emissions from Switzerland are already amongst the lowest among OECD countries (less than half OECD average); therefore, the cost of incremental domestic abatement measures exceeds the cost of measures abroad by ten-fold or more ii) Switzerland's electricity generation is currently practically carbon-free; this might change, depending on how Switzerland will cover a looming electricity supply gap in the future: gas-fired power or nuclear are the two only options, since even ambitious energy efficiency gains and renewables promotion may not suffice to bridge the gap. It should be noted that the cost of the emissions reductions will depend on the level of international commitments and cooperation, in particular through the Kyoto mechanisms.

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