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AD HOC WORKING GROUP ON FURTHER COMMITMENTS FOR ANNEX I PARTIES UNDER THE KYOTO PROTOCOL
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Agenda item 6
Analysis of mitigation potentials and identification of ranges of emission reduction objectives of Annex I Parties

Information and data related to paragraph 17 (a) (i) and (ii) of document FCCC/KP/AWG/2006/4 and to the scale of emission reductions by Annex I Parties, and views on the organization of an in-session workshop on these issues

Submissions from Parties

1. The Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol, at its resumed fourth session, invited Annex I Parties to submit to the secretariat, by 5 September 2008, additional and updated available information and data relating to the tasks set out in paragraph 17 (a) (i) and (ii) of its work programme contained in document FCCC/KP/AWG/2006/4,[1] and on the scale of emission reductions to be achieved by Annex I Parties in aggregate, as well as on the topics to be covered and the experts/organizations to be invited to participate in the in-session workshop referred to in paragraph 21 (c) (ii) of document FCCC/KP/AWG/2007/5.[2]

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

3. The secretariat has also received submissions from accredited non-governmental organizations. In line with established practice, the secretariat has posted these submissions on the UNFCCC website at <http://unfccc.int/parties_and_observers/ngo/items/3689.php>.

[1] These tasks include analysis of mitigation potentials and identification of ranges of emission reductions by Annex I Parties.

[2] FCCC/KP/AWG/2007/5, paragraph 21 (d) (ii).

[*] 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 Croatia, Serbia, the former Yugoslav Republic of Macedonia, and Bosnia and Herzegovina.

PAPER NO. 1: BELARUS

Министерство природных ресурсов и охраны окружающей среды
Республики Беларусь

Сообщение о дополнительной и обновленной информации в отношении анализа потенциала смягчения воздействия на климат и оценки масштаба сокращения эмиссии парниковых газов

в соответствии с документом FCCC/KP/AWG/2007/L.6/Rev.1 и параграфом 17 (a) (i) и (ii) документа FCCC/KP/AWG/2006/4 Специальной рабочей группы по дальнейшим обязательствам согласно Киотскому протоколу для Сторон, включенных в Приложение I к Рамочной конвенции ООН об изменении климата

Аннотация

В соответствии с заключением, принятом Специальной рабочей группой по дальнейшим обязательствам для Сторон, включенных в Приложение I, согласно Киотскому протоколу, на своей итоговой четвертой сессии, проведенной на Бали, 3-11 декабря 2007г., и касающегося пересмотра программы и методов работы, а также плана последующих сессий, Республика Беларусь в настоящем документе представляет информацию и соображения в отношении оценки потенциала в области предотвращения изменения климата. Настоящая информация должна рассматриваться в контексте информации, уже представленной Республикой Беларусь в соответствии с документами FCCC/KP/AWG/2006/4, параграф 17(b) и FCCC/KP/AWG/2007/2, параграф 24 Специальной рабочей группы по дальнейшим обязательствам (FCCC/KP/AWG/2008/MISC.1).

Введение

Республика Беларусь считает, что принцип общей, но дифференцированной ответственности должен учитываться при оценках странового и общего потенциала смягчения воздействия на климат для пост-Киотского периода. Необходимо принять во внимание ряд обстоятельств национальной социально-экономической политики, доступность средств и мер, особенно в странах Приложения I к РКИК ООН с переходной экономикой.

Методологические подходы к оценке потенциала смягчения воздействия на климат

Важным элементом оценки потенциала смягчения воздействия на климат является всесторонний учет национальных обстоятельств в рамках наиболее вероятного из возможных сценариев развития страны. И в этой связи обращаем внимание на пункт 6 статьи 3 Киотского протокола, пункт 21 d решения FCCC/KP/AWG/2007/2, пункт 6 d решения FCCC/KP/AWG/2007/L.2, а также пункт 15 решения FCCC/KP/AWG/2006/4.

Учет имеющихся барьеров и национальных обстоятельств, включает в себя следующее:

1. Анализ планов развития экономики, включая прогноз объемов и структуры потребления топливно-энергетических ресурсов, что позволяет определить базовую динамику выбросов (или сокращений выбросов при снижении объемов производства);
2. Анализ наличия доступных финансовых ресурсов, что позволяет определить количественно потенциал смягчения при объемах планируемой деятельности по предотвращению или сокращению выбросов;
3. Анализ скорости диффузии соответствующей наилучшей доступной технологии, что позволяет определить количественно потенциал смягчения исходя из производительности и темпах распространения данной технологии в стране;
4. Анализ барьеров и доступных средств их преодоления, включая использование механизмов углеродного финансирования.

1 Анализ планов производственной деятельности

Согласно основным программным документам, определяющим социально-экономическое развитие Республики Беларусь, и фактическим данным за последние пять лет, ежегодные темпы роста ВВП, начиная с 2008 г. и до конца рассматриваемого периода (2020 г.), будут не менее 9-11%. В ближайшие годы главными приоритетами государства будут продовольственная и энергетическая безопасность, а также строительство. Это приведет к росту продукции именно этих отраслей в структуре ВВП и потребует дополнительных энергоресурсов.

Республика Беларусь по сравнению с другими странами СНГ имеет самую низкую энергоемкость ВВП, однако, ввиду недостатка инвестиционных ресурсов, этот показатель сохранится на уровне, достигнутом в 2005 году. Поэтому, с учетом отсутствия в последнее время заметных изменений структуры ВВП в сторону менее

энергоемких производств, валовое потребление топливно-энергетических ресурсов к 2020 году может возрасти в 1.5 раза по сравнению с текущим периодом.

В структуре топливного баланса будет продолжать превалировать природный газ, однако его потребление не увеличится. Принимая во внимание принятую концепцию энергетической безопасности, в стране продолжится наращивание электрогенерирующих мощностей. Основной тенденцией будет увеличение доли местных видов топлива, включая торф. Ожидается, также, увеличение потребления различных видов углей и кокса с целью диверсификации поставок энергоносителей.

Почти в три раза увеличится объем производства цемента и извести с соответствующим увеличением выбросов парниковых газов, кроме того, в полтора-два раза могут увеличиться выбросы парниковых газов в сельскохозяйственном секторе и коммунальном хозяйстве.

В результате этих оценок, ежегодные выбросы парниковых газов по всем секторам будут иметь заметную тенденцию к росту.

2 Анализ наличия доступных финансовых ресурсов

В программных документах предусмотрено, что экономия топливно-энергетических ресурсов за период с 2008 по 2020 годы должна составить около 12 млн. т.у.т. В то же время с учетом ограниченных инвестиционных ресурсов и отсутствия возможности привлечения средств углеродного финансирования эта величина ожидаемой экономии в Беларуси, вероятно, не будет достигнута. Ожидается, что бюджетные средства будут приоритетно направлены в сельское хозяйство и строительство, а также на поддержание минимально-отрицательного внешнеторгового баланса, что является важным элементом финансовой политики государства в условиях роста цен за импортируемые энергоносители. В этих условиях объемы планируемой деятельности по повышению энергетической эффективности и снижению энергоемкости продукции будут в значительной мере сокращены, что не позволит изменить имеющуюся тенденцию роста выбросов парниковых газов в промышленном секторе.

Создавая условия для опережающего наращивания выпуска продукции в сельском хозяйстве для достижения целевого показателя продовольственной безопасности, следует ожидать, что средств на переработку отходов сельхозпроизводства будет не достаточно. Одновременно в стране еще пока не будут созданы условия для изменения устоявшейся практики хранения на открытых полигонах и в лагунах разлагающихся отходов коммунального сектора, сельскохозяйственного производства и перерабатывающей промышленности, что

будет способствовать развитию уже имеющейся в стране тенденции роста выбросов метана в этих секторах.

3 Анализ скорости диффузии соответствующей наилучшей доступной технологии

В условиях ограниченного доступа к инвестиционным ресурсам и неразвитой инфраструктуры, а также учитывая географическое положение страны, применение таких технологий как энергоисточники на основе биогазовых установок, ветроустановок и других возобновляемых видах энергии представляет собой убыточный образ экономической деятельности и, соответственно, такое применение может иметь место только при существенной помощи государства. Поскольку государственные приоритеты будут находиться в других областях, а кредитный рейтинг большинства государственных предприятий и организаций Беларуси все еще низкий, то не стоит ожидать заметного роста диффузии наилучших технологий в страну.

Требуется также понимание того факта, что на современном этапе скорость диффузии современных технологий формируется на имеющейся материально-сырьевой базе, которая эволюционирует в определенных пределах, и ее ускоренное реформирование не всегда оправданно (а, иногда, невозможно) по ряду причин, включая социальные (например, рост безработицы в отдельных секторах).

4 Анализ барьеров и доступных средств их преодоления

Начиная с базового 1990 года, еще до вступления в силу Киотского протокола, страны с переходной экономикой существенно сократили выбросы парниковых газов. Эти сокращения были достигнуты в 5-6-ти летний период рецессии экономики, который сопровождался значительными финансовыми потерями. В последующее десятилетие сознательное финансирование правительствами энергосберегающих мероприятий привело к тому, что эти страны, выходя из периода спада и наращивая темпы роста ВВП, стабилизировали выбросы парниковых газов на уровне 50-70% от выбросов, имевших место до начала реформ.

Вклад Республики Беларусь в сокращение выбросов парниковых газов уже сейчас значителен, и обусловлен существенными финансовыми затратами прошлого периода. Сейчас в стране намечен курс на преодоление отставания от индустриально развитых стран (ВВП и энергопотребление на душу населения). Опережающие темпы роста ВВП начали отражаться на увеличении выбросов парниковых газов. В этих условиях страна нуждается в существенных дополнительных финансовых ресурсах для сокращения углеродоемкости своей экономики. Однако уже понесенные затраты

предыдущего периода не позволяют стране аккумулировать необходимое количество средств на пост-Киотский период. Такое положение усугубляет тот факт, что для Беларуси в течение всего первого периода Киотского протокола механизмы гибкости скорее всего будут недоступны.

Результат оценки потенциала смягчения воздействия на климат

Таким образом, национальные обстоятельства и отсутствие доступа к механизмам гибкости Киотского протокола заставляют принять наиболее вероятный сценарий, по которому в ближайшие 10 лет Республика Беларусь не сможет обеспечить сохранение существенного потенциала смягчения воздействия на климат. Вероятность достижения установленного количества разрешенных выбросов уже к концу первого периода ответственности очень высока, а недостаток ресурсов и указанные выше дополнительные обстоятельства не позволяют принять жесткие ограничения на пост-Киотский период без серьезных социальных последствий и угроз устойчивому развитию страны.

На основании изложенного, Республика Беларусь информирует, что в случае вступления поправки к Киотскому протоколу (решение 10/CMP.2 документа FCCC/KP/CMP/2006/10/Add.1) в силу до конца первого периода, Республика Беларусь рассмотрит возможность принятия обязательств на период после 2012 года в пределах 90-95% от уровня 1990 года, а в случае не вступления указанной поправки в силу, Республика Беларусь воздержится от принятия на себя добровольных обязательств на пост-Киотский период по уровню выбросов ниже, чем 100% от уровня 1990 года.

[TRANSLATION AS SUBMITTED]

Unofficial translation

The Ministry of Natural Resources and Environmental Protection
of the Republic of Belarus

Submission on additional and updated available information on the analysis of mitigation potential and the scale of greenhouse emission reduction

in accordance with documents FCCC/KP/AWG/2007/L.6/Rev.1 and FCCC/KP/AWG/2006/4, para 17 (a) (i) and (ii)
of the Ad Hoc Working Group on Further Commitments
for Annex I Parties under the Kyoto Protocol

Summary

According to the conclusion, adopted by the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol at its resumed fourth session held in Bali, 3-11 December, 2007 concerning revision of work programme, methods of work and schedule of future sessions, the Republic of Belarus in the current document represents information and rationale concerning evaluation of climate change mitigation potential and identification of possible scale of emission reductions. The current submission should be considered in the context of the submission presented by the Republic of Belarus in accordance with documents FCCC/KP/AWG/2006/4, para 17(b) and FCCC/KP/AWG/2007/2, para 24 of Ad Hoc Working Group on Further Commitments (FCCC/KP/AWG/2008/MISC.1).

Introduction

The Republic of Belarus considers that the principle of common, but differentiated responsibilities should be considered for evaluation of country-scale and world total climate change mitigation potential for the post-Kyoto period. It is necessary to take into account a number of circumstances of national social-economic policy, availability of means and measures, especially for Annex I countries confronted with difficulties in transition to market economy.

Methodological approaches to the evaluation of climate change mitigation potential

Comprehensive consideration of national circumstances in the framework of the most probable of possible scenarios of the country development is an important element of climate change mitigation potential evaluation. Therefore we draw your attention to the Kyoto Protocol, Article 3, item 6; decision FCCC/KP/AWG/2007/2, item 21(d), decision FCCC/KP/AWG/2007/L.2, item 6(d), and decision FCCC/KP/AWG/2006/4, item 15.

Consideration of the barriers and national circumstances includes the following:

1. Analysis of economy development programmes, including the prognosis of scale and structure of consumption of fuel and energy resources that allows determining the dynamics of baseline emissions (or emission reductions in case of lowering economic output);
2. Analysis of availability of financial resources that allows determining quantitatively the mitigation potential at the given scope of activity planned for emission limitation;
3. Analysis of diffusion rate of corresponding best available technologies that allows determining quantitatively the mitigation potential based on productivity and expansion rate of the given technologies in the country;
4. Analysis of barriers and available means for their removal, for instance, with the use of carbon financing mechanisms.

1 Analysis of economy development programmes

According to the basic policy documents determining social-economic development of the Republic of Belarus and the recent five-year fact sheet, the annual GDP growth since 2008 and through the end of the considered period (2020) will come to not less than 9-11 per cent. For the following years, the main priorities set for the Government are food supply assurance, sustainability and reliability of power production, and construction sector development. This involves the growth of these branches' share in GDP structure and requires additional energy resources.

The Republic of Belarus has the lowest GDP energy intensity as compared to other CIS countries; however, in view of lack of investment resources, this indicator will remain at the level reached in 2005. Therefore, in the absence of notable trends of GDP structure in the direction of less power-consuming industries in recent years, gross consumption of fuel and energy resources by 2020 may increase 1.5 times as much in comparison with the current period.

In fuel balance structure, the natural gas will prevail, although its consumption will not increase. In view of the adopted strategy on safeguarding of energy supply security, the country will continue to increase installed capacity of its power production sector. The main tendency will be consumption growth of local fuels, including peat. In order to diversify fuel supply logistics, an increase of consumption of coals and coke is expected.

The cement and lime production will be increased approx. threefold, and greenhouse gas emissions in agriculture and municipal services will be increased by a factor of 1.5-2.

It follows thereof, that the annual value of GHG emissions in all sectors will have considerable growing tendency.

2 Analysis of availability of financial resources

In the power development policy documents, it makes provisions that the saving of fuel and energy resources should total about 12 million tons of coal equivalent in the period from 2008 till 2020. At the same time, taking into account lack of investment resources and limited availability of carbon financing, this projected figure will be hardly reached. As expected, the state budget funds will be allocated to priority sectors, i.e. agriculture and construction, as well as to supporting of minimum-negative foreign trade balance,

which is an important objective of state financial policy in the conditions when prices for imported energy carriers grow. In these circumstances, the scope of activity planned for enhancement of energy efficiency and reduction of energy intensity of national product will be reduced appreciably, and this will not allow any alteration of the currently tended GHG emission growth in industrial sector.

While creating favorable regimes for outstripping the agriculture production growth in order to achieve a target food supply security indicator, it is wise to expect that the means for agricultural waste processing will not be sufficient. Simultaneously, the conditions will not be created also for changing the established practice of disposing off in open landfills and lagoons the decaying wastes from communal, agriculture and processing industries, and this will promote further development of already existing tendency of methane emission growth in the above-mentioned sectors.

3 Analysis of diffusion rate of best available technologies

In the conditions of limited investment resources available and underdeveloped infrastructure, and taking into account geographic location of the country, any deployment of the technologies related to such energy sources as biogas installations, wind and hydro turbines and other renewable energy sources is a loss making way of economic activities and, therefore, can take place only with the essential support by the Government. As the state priorities will lie in the other areas, and a credit rating of the majority of enterprises and organizations of Belarus is still low, a remarkable diffusion growth of best available technologies should not be expected.

It requires understanding of the fact that at the current stage the diffusion rate of advanced technologies for lowering the carbon intensity is based on present material and raw produce resources, which evolve within certain constraints, and their accelerated reforming would not be always defensible due to a series of reasons including social (for example, unemployment growth in separate sectors).

4 Analysis of barriers and available means of their removal

Starting from basic year 1990, prior to entry into force of the Kyoto Protocol, the countries with economies in transition had already reduced greenhouse gases emission drastically. These emission reductions were achieved during 5-6 year national economy recession period accompanied with considerable financial losses. In the following 10 years, the willful governmental policy of financing the energy saving measures resulted in the fact that these countries, while getting out of recession period and increasing their GDP growth rate, have stabilized greenhouses gas emissions at the level of 50-70 per cent of the emission level, which used to be before the reforms.

Contribution of the Republic of Belarus to GHG emission reduction is significant even now and resulted in essential financial costs. Now the Government has set a policy to overcoming the gap between Belarus and the most industrially advanced countries (as per GDP and energy consumption per capita). The outstripping growth rate of GDP has been already reflected in increasing greenhouse gas emissions. In these conditions, the country needs considerable additional financial resources for reduction of carbon intensity of its economy. However, already incurred expenses of the previous period do not allow the country to accumulate the financial resources required for post-Kyoto regime. Such situation is aggravated by the fact that during the entire first commitment period under the Kyoto protocol the flexible Kyoto mechanisms will be unlikely available for Belarus.

Result of climate change mitigation potential evaluation

Thus, due to the national circumstances and in the absence of access to Kyoto flexible mechanisms the Republic of Belarus is forced to accept the most feasible scenario where the country during the following 10 years will not be able to provide retention of sufficient climate change mitigation potential. The probability of approaching the GHG emission allowed limit already by the end of the first commitment period is very high, and the lack of resources along with the additional circumstances described above do not allow meeting essentially more strict commitments for the coming post-Kyoto period without serious social consequences and threats to sustainable development of the country.

Taking into account the above analysis, the Republic of Belarus informs that if the amendment to the Kyoto protocol (decision 10/CMP.2, FCCC/KP/CMP/2006/10/Add.1) comes into effect before the end of the first commitment period, for the period after 2012 the Republic of Belarus will consider an option of assuming the commitment to meet the target of 90-95% of 1990 emission level; and if the aforementioned amendment does not take effect, the Republic of Belarus will refrains from voluntary commitments for the post-Kyoto period that would establish the target lower than 100% of 1990 emission level.

PAPER NO. 2: FRANCE ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES

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

Paris, 15 September 2008

Subject: **Analysis of mitigation potentials and identification of ranges of emission reduction objectives of Annex I Parties (AWG-KP)**
Additional and updated available information and data from Annex I Parties related to the tasks set out in paragraph 17 (a) (i) and (ii) of FCCC/KP/AWG/2006/4; and on the scale of emission reductions to be achieved by Annex I Parties in aggregate; as well as on the topics to be covered and expert/organizations to be invited to participate in the in-session workshop (to be held at the resumed sixth session of the AWG-KP) on the tasks set out in paragraph 17 (a) (i) and (ii) of FCCC/KP/AWG/2006/4

Summary

The EU believes that with a view to achieving our objective of a global and comprehensive agreement by 2009, all relevant processes need to progress as constructively as possible, coordinate with and draw upon relevant results achieved and work under way in other bodies and processes under the Convention and its Kyoto Protocol. In particular, the work of the AWG-LCA, AWG-KP and the second review of the Kyoto Protocol pursuant to its Article 9 need to progress in harmony and should aim to maximize synergies.

The EU welcomes the invitation in document FCCC/KP/AWG/2007/5 to submit additional and updated information and data on mitigation potentials, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies, possible ranges for emission reduction commitments by Annex I Parties in aggregate as well as topics to be covered and the experts/organisations to be invited to participate in the in-session workshop in Poznan.

We emphasise that the work of the AWG-KP must be based on the best available scientific information and emphasise the important work of the Intergovernmental Panel on Climate Change (IPCC), in particular the 2007 IPCC Fourth Assessment Report (AR4).

We draw the following messages:

Developed countries should continue to take the lead by **committing to collectively reducing their emissions of greenhouse gases (GHGs) in the order of 30% by 2020** compared to 1990, consistent with the range of 25-40% as included in the IPCC AR4.

This constitutes a key contribution to global efforts aimed at a **peak in global GHG emissions by 2020 and a decline to below 50% of 1990 levels by 2050** in order to limit global mean temperature increase to less than 2°C above pre-industrial levels.

For this contribution to be effective it needs to include **comparable efforts by Annex I Parties that are currently not Parties to the Kyoto Protocol** and to be accompanied by substantial deviation from business as usual (BAU) emissions by 2020 by some developing country Parties, in particular in emerging economies.

The necessary emission cuts in developed countries and globally are **technically feasible and economically affordable**. There is **significant mitigation potential** available at reasonable cost both in developed countries and globally. Policies to reduce GHG emissions can provide for **significant co-benefits**, such as energy security, improved air quality and the reduction of associated health impacts.

In supplementing domestic mitigation action **the enhanced carbon market will also play a significant role** in achieving reduction commitments in a cost-effective manner.

It is important for the EU to make progress in the work of AWG-KP on harmony with the work of AWG-LCA. Therefore in addition to consideration of the scale of emission reductions to be achieved by Annex I Parties in aggregate it would be useful to initiate work on allocation of the mitigation effort in Poznan.

The allocation of mitigation efforts among developed countries should follow a balanced approach, taking into account such factors as **mitigation potentials, capabilities, national circumstances and responsibilities**.

A more detailed presentation of these and other messages is given below.

Scale of emission reduction targets required by Annex I Parties

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.

According to the IPCC AR4 ambitious emission reductions in developed countries in the range of 25-40% by 2020 below 1990 levels are necessary as a contribution to putting the international community on a pathway towards stabilising global atmospheric GHG concentrations at around 450 parts per million CO_2 equivalent (ppm CO_2-eq). The IPCC AR4 and a number of more recent studies suggest that such ambitious reductions are technically feasible and economically affordable. Estimated annualised GDP losses are less than 0.19% before 2020 in the EU under a 30% EU target, and comparable costs for other Annex I regions.[1]

Ambitious emission reduction commitments by Annex I Parties on their own are insufficient to combat climate change effectively.

A global emissions peak by 2020 can only be achieved if Annex I Parties that are currently not Parties to the Kyoto Protocol and developing countries contribute to mitigation efforts, in line with their common but differentiated responsibilities and respective capabilities. As pointed out at the in-session workshop (during SB28 in Bonn) the range of 25-40% reductions in Annex I countries in 2020 below 1990 levels is built on the assumption that developed countries that have not currently ratified the Kyoto Protocol will contribute adequately to those emission reduction efforts in the context of a post-2012 agreement. According to the

[1] http://ec.europa.eu/environment/climat/pdf/ia_sec_8.pdf. Even assuming non-perfect carbon markets; analyses based on much lower energy prices that those currently observed indicating mitigation costs may be significantly lower.

IPCC AR4 a substantial deviation from BAU emissions pathways is necessary in a number of developing regions by 2020 and beyond.[2] It should be noted that significant part of the mitigation potential in all regions is available at negative or low cost.

In addition, the rapidly growing emissions from international aviation and maritime transport should be included with clear and meaningful targets in the global mitigation objective.

The EU proposes to start a discussion as soon as possible on the overall reductions to be committed to by Annex I Parties.

The range of a 25-40% reduction commitment by Annex I Parties as a group, to be reached through both domestic and international efforts, provides a valuable starting point for this next step in the work of the AWG-KP. We underline the importance of the means to achieve emission reduction targets of Annex I Parties in enhancing the cost effectiveness of reducing emissions. We would like to see such implications reflected in the AWG-KP's further work in Poznan and beyond to ensure that further emission reduction commitments by Annex I Parties contribute adequately to reaching the ultimate objective of the Convention.

The availability and form of those means could have significant implications for the necessary overall emission reduction efforts of developed countries. For example, different possible options for accounting land use, land-use change and forestry (LULUCF) activities in Annex I countries will result in a different overall contribution of LULUCF to emissions and removals in future commitment periods. Although the scale of this contribution appears to be limited for the main options reflected in the UNFCCC's technical paper on means and discussed in a separate EU submission[3], it could vary depending on a number of parameters used. Further, different options produce significantly different results for individual Annex I Parties.

Further analysis is needed on the possible surplus of AAUs or other units/credits from the period 2008-2012, this should be taken into account when considering necessary scale of emission reductions to be achieved by developed countries in aggregate in order to ensure an effective carbon market and progress towards our 2°C objective.

Mitigation potential and cost

Independent efforts undertaken by diverse organisations to assess mitigation potential, show that appropriate measures to limit the increase of global mean surface temperature to less than 2°C above pre-industrial levels are at hand.

The information provided by the technical paper on the achievable emission reductions in Annex I Parties for different carbon prices (FCCC/TP/2007/1) is useful. We recognise the broad consistency between assessments on mitigation potential in the global and in particular in the Annex I context in a mid- to long-term time horizon, which are confirmed by new studies (see table 1 in the Annex).

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[2] Box 13.7 of Working Group III contribution to IPCC AR4

[3] <http://unfccc.int/files/kyoto_protocol/application/pdf/lulucf_eu.pdf>, relevant information submitted on a voluntary and informal basis to the secretariat by Parties before the AWG-KP 6.1 as encouraged in the AWG-KP 5.2 conclusions on land use, land use change and forestry (FCCC/KP/AWG/2008/L.5).

An analysis of global and regional mitigation potentials estimated of all abatement opportunities up to a 40€ (~USD60) per ton of CO_2 were around 27 gigatonnes (Gt) of CO_2-eq.[4] A significant fraction (7 Gt CO_2-eq) of these abatement opportunities would be available at a negative cost. The regional distribution of this global abatement potential assumes that 40 per cent is available in Annex I Parties in 2030 (around 11 Gt CO_2-eq).

According to the same analysis the total mitigation potential of developed countries at negative cost amounts to 35 to 45 per cent of their total reduction potential.[5] These estimates correspond to the assessment of IPCC AR4, in particular that mitigation opportunities with net negative costs have the potential to reduce emissions by around 6 Gt CO_2-eq per year in 2030 (see table 2 in the Annex).

In its *Energy Technology Perspectives 2008* the IEA has analysed scenarios to reduce global energy related CO_2 emissions to 50% of their 2005 levels by 2050. Recognising the need for urgent implementation of unprecedented and far-reaching new policies in the energy sector, the *average* cost of the technologies needed for the ambitious "BLUE Map" scenario is affordable, i.e. in the range of USD38 to USD117 per tonne of CO_2 saved. These cost estimates are likely to be lower in the face of current fuel prices, as the cost estimates in the report were based on an oil price of USD65 per barrel.

In addition, the IEA estimates that even for the most ambitious BLUE scenarios, the estimated total undiscounted fuel cost savings for coal, oil and gas over the period to 2050 are greater than the additional investment required. These long-term estimates are qualitatively in line with the assessment of IPCC AR4, which expects an annual reduction of the growth in global GDP of 0.12 percentage points up to 2050.

An ambitious climate policy can also have other policy objectives, these may relate to economic investment - delivering cost savings, increased energy security and climate security. To deliver all of these policy objectives a decisive shift towards low-carbon societies in all regions is needed, this should be led by efforts in developed countries.

Tools to further enhance mitigation efforts

Domestic action in developed countries will be the central pillar to achieve the necessary ambitious emission reduction targets for the period beyond 2012.

According to experience within the EU substantial mitigation can be achieved through

- **continuous efforts to improve energy efficiency;**
- **the creation of a liquid global carbon market with a broad coverage and deep emission cuts to create a robust carbon price signal as a key means to deliver cost effective GHG emission reductions and a transition towards a low carbon economy;**
- **the increase of investment in development and deployment of low GHG emitting technologies.**

The enhanced global carbon market will also play a significant role in achieving reduction commitments by increasing the cost effectiveness of action and leveraging investment in lower-GHG emitting technologies in and technology transfer to developing countries.

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[4] McKinsey for Vattenfall, http://www.vattenfall.com/climatemap/

[5] McKinsey Global Institute 2008: The Carbon Productivity Challenge.

To achieve the necessary deep cuts in GHG emissions, policies are urgently required to support the development and deployment of a range of low-carbon and high-efficiency technologies. Existing and soon-to-be-commercialised technology can provide feasible mitigation options for most of the necessary reduction – as much as 70%[6]. The cost of some options is currently high, though expected to decrease with the scale of production, experience and with RD&D investment. Recent analysis suggests that a set of low-carbon technologies, such as carbon capture and storage (CCS), second-generation biofuels and various forms of solar energy are 5 to 15 years away from commercial viability and could deliver more than 10 Gt CO_2-eq of abatement by 2030 if their development and deployment is accelerated.[7]

A substantial increase in public and private investment in development and demonstration of low-GHG emitting technologies is needed to further enhance mitigation opportunities and to reduce the cost of mitigation in the longer term.

The IPCC AR4 and other more recent studies show that there is significant cost-effective mitigation potential across a broad range of sectors in developed countries – including in energy supply, transport, buildings, industry, agriculture, forestry and waste. Realising the mitigation potential in each sector is needed as no single sector can alone deliver the necessary scale of emissions cuts.

Indirect effects and co-benefits of emission reductions in the EU

Policies to reduce GHG emissions can provide other beneficial impacts, such as on energy security, improved air quality and in the reduction of associated health impacts.

The impact assessment for the proposed EU Climate and Energy Package[8] indicates that CO_2 emissions are expected to be reduced by around 17% (as part of a 20% reduction in all GHGs). The reduced fossil fuel consumption combined with the shift to less polluting fuels will reduce emissions of SO_2, NO_X and fine particulate matter (PM2.5) by 10 to 15%. The net effect is a reduction in air pollution control costs of around € 10 to 11 billion in 2020 compared to baseline. Oil and gas imports are expected to go down by some € 50bn per year in 2020. The health benefits due to the reduction of PM2.5 would reduce the number of life-years lost by some 10 million by 2020. We also expect other co-benefits such as the reduction of the area of forests exposed to high levels of acidification and nitrogen.

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6 according to McKinsey&Company analysis referred to above

7 Nicolas Stern 2008: Key Elements of a Global Deal on Climate Change, London School of Economics, available at: http://www.lse.ac.uk/collections/granthamInstitute/publications/KeyElementsOfAGlobalDeal_30Apr08.pdf

8 http://ec.europa.eu/energy/climate_actions/doc/2008_res_ia_en.pdf

Allocation of developed country mitigation effort

Allocation of commitments by developed countries beyond 2012 should acknowledge relevant differences between Parties. These differences relate to such factors as mitigation potentials, capability (relating e.g. to the ability to pay for both domestic mitigation actions and supplemental mitigation efforts abroad), national circumstances (e.g. priority consideration should be given to those national circumstances not easily changed, such as population trends and natural endowments) and responsibility (which relates to e.g. per capita emissions and emission intensity).

As a consequence, allocation of the mitigation effort should result, inter alia, in a narrowing of differences in per capita emissions and emission intensities of developed country economies and should result in comparable cost of mitigation for different countries. The mitigation efforts and achievements undertaken by developed countries should also be taken into account.

Proposals for topics to be covered and experts/organisations to be invited to participate in the in-session workshop at the resumed 6th session of the AWG-KP

Suggested Topics:
- Mitigation potentials in developed countries and other regions
- Mitigation potentials in sectors including in energy supply, transport, buildings, industry, agriculture, forestry and waste
- Cost and co-benefits of ambitious emission reductions
- Necessary contribution of Annex I Parties as a group to reducing emissions with a view to contributing to global effort to ensure peaking of global emissions before 2020 and a reduction of global emissions to at least 50 % below 1990 levels by 2050
- Possible criteria and approaches for allocating the emission reduction efforts among developed countries

Suggested organisations to invite:
- Intergovernmental Panel on Climate Change (IPCC)
- Organisation for Economic Co-operation and Development (OECD)
- International Energy Agency (IEA)
- International Institute for Applied Systems Analysis (IIASA)
- McKinsey & Company
- Center for Clean Air Policy (CCAP, US)
- Ecofys (GER)
- Netherlands Environmental Assessment Agency (PBL, NL)
- Office of Climate Change (OCC, UK)
- Oeko-Institute/Fraunhofer Institute for Systems and Innovation Research (GER)

Ongoing EU work to fight climate change

The European Commission proposed a "Climate and Energy Package" on 23 January 2008[9] intended to transform the EU into a highly energy efficient, low GHG emitting economy. The proposal supports our unilateral commitment to reduce GHG emissions by at least 20% by 2020 compared to 1990 levels and includes the aim of increasing the share of primary energy from renewable sources from 8% to 20% by 2020.

[9] http://ec.europa.eu/energy/climate_actions/index_en.htm

It also reflects the EU objective of a 30% reduction in 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 to contributing adequately according to their responsibilities and respective capabilities.

The package is currently subject to discussions with EU Member States and the European Parliament; these should be finalised before the end of 2008.

Annex

Table 1: Estimates of GHG emission reductions by Annex I Parties using various methods taken from FCCC/TP/2007/1 paragraph 93 to 95[a]

Source of estimate		**2020 % below 1990**	**2030 % below 1990**	**2050 % below 1990**
National communications by some Annex I Parties: estimated effect of "additional measures" on GHG emissions		-57 to -45		
IPCC: required reductions for Annex I Parties based on allocation rules (before emissions trading)	450 ppm CO_2eq	-25 to -40		-80 to -95
	550 ppm CO_2eq	-10 to -30		-40 to -90
	650 ppm CO_2eq	0 to -25		-30 to -80
IPCC: indication[b] of possible reduction by Annex I Parties relative to SRES scenarios A1B and B2, based on different levels for carbon price	USD 100		A1B: -22 to -39 B2: -18 to -34	
	USD 50		A1B: -27 B2: -23	
	USD 20		A1B: -19 B2: -15	
IEA – Energy Technology Perspectives 2008 – "Blue Scenario"	USD 38 to 117			50[c]

[a]: Except for IEA as indicated;
[b]: These figures exclude the agriculture and land use, land-use change and forestry sectors;
[c]: Based on a scenario analysis to reduce global energy related CO_2 emissions to 50% of their 2005 levels by 2050 at an oil price level of USD 65 per barrel.

Table 2: Estimates of GHG emission reductions potentials globally and in Annex I Parties in 2030 using various methods at different abatement cost levels in line with the EU's 2°C target

Source of estimate	**Region**	**Price level**	**Reductions potential** in Gt CO2eq per year
IPCC AR4	Globally	USD 50	13 to 26
		USD 100	16 to 32
	Annex I	Negative costs	6[a]
McKinsey for Vattenfall ("Global Abatement Map")	Globally	€ 40	27[b]
	Annex I	€ 40	11
		Negative costs	7

[a]: for reference, global annual emissions were 43 Gt CO_2-eq in 2000
[b]: for reference, projected baseline global emissions are 58 Gt CO_2-eq in 2030

PAPER NO. 3: JAPAN

Submission by Japan
Additional and Updated available information and data related to Analysis of mitigation potentials and ranges of emission reduction objectives of Annex I parties; and on scale of emission reductions to be achieved by Annex I Parties in aggregate; and the topics to be covered and the experts / organizations to be invited to participate in the in-session workshop

■ Overview

- The analysis for the emission reduction potentials can be more accurate when economic activities are divided into sectors, for each of which emission reduction potential is calculated based on both efficiency indicators (including intensities calculated with considerations for possible new introduction of policies and measures and technologies) and projected production volumes. Sector-specific estimates are aggregated to calculate the national emission reduction potential. More viable reduction potentials can be estimated by incorporating factors such as national circumstances and differences in abatement costs. It will also lead to securing equitability and comparability in target-setting.
- The Vienna session initiated debate on emission reduction potentials based on the technical paper provided by the Secretariat. The AWG noted that further analysis on mitigation potential should be continued
- Since then, significant progress has been made by governments, international institutions and industries, on the efforts to collect data and develop efficiency indicators, and some applied studies have been conducted as well. The outcomes of these studies can be taken to the UNFCCC and developed into methodologies upon which Parties can agree, thus enabling the calculation of reduction potentials.
- Japan's view on the basic concept of sectoral approaches, examples of its application and additional information on related work in international institutions will be provided below, followed by proposals on how future work should be taken forward.

■ Basic Concept of Sectoral Approaches (Conceptual Diagram: Appendix 1)

※ The overall concept of sectoral approaches has been elaborated in the submission made by Japan towards the Accra AWG-LCA meeting (**FCCC/AWGLCA/2008/MISC.4)**. Excerpts on the reduction potential of Annex I countries will be provided herein.

(Advantages)

- Sectoral approaches are useful in considering appropriate realistic measures based on analyses of reduction potentials and the costs, with consideration for sectoral circumstances.
- A bottom-up aggregation of sectoral reduction potential estimates derived from intensities and production activity volumes to determine the nation-wide reduction potential, which will serve as a basis for establishing the national reduction target, can secure equitability and comparability.
- Furthermore, reduction potential analysis and indicator setting can accelerate transfer of technology and best practice from developed countries to developing countries, thus achieving global emission reductions.

(Method for Mitigation Potential Analysis and Setting Quantified National Emission Reduction Targets)

1) Sectoral Analyses

- Emission trends in each sector need to be analyzed by evaluating changes observed in both intensity (e.g. energy intensity, emission intensity) and production activity volume.
- In the analysis, (a) it is beneficial to analyze the sector-specific reduction potential for the case in which Best Available Technologies(BATs) and best practices have been disseminated, employing data on the introduction rate of technologies and existing equipment. In addition, (b) the reduction potentials of policies and measures, such as the introduction of new energy sources and nuclear power and those for the low-carbonization of social structures(through economic instruments or visualization of information etc.) should also be calculated.
- If data such as technology introduction rates are difficult to obtain, the reduction potential of a sector can also be calculated from expectation of the intensity improvement in the country with due consideration of costs.
- Such analysis should employ reliable data including indicators and BATs currently being identified by international industry associations, IEA and APP for effective results.
- Model analysis based on marginal abatement costs can also contribute to providing images of how much reduction potential can be developed in a specific sector in a country in comparison with those of other countries.

2) Establishment of Comparable National Quantified Emission Reduction Targets

- Quantified national emission reduction targets should be established by estimating sectoral reduction potentials and aggregating them to calculate the national reduction potential.
- Even in the case that targets are set by a top-down approach, identifying the current technology introduction rate and level of emission intensity for each sector can also be useful in determining the steps towards achieving those targets. A cross-national comparison of target levels should be done based on such work.
- The final adjustment of the appropriateness of the level of aggregated economy-wide reductions target should be achieved by comparing the results of sectoral verification with the analyses calculated with multiple indicators such as emission intensity, marginal abatement costs and accumulated costs.[1]

(Scheme of Sectoral Approach)

- In order to achieve sectoral specific reductions, each country should enhance data collection, promote technology introduction and implement policies and measures.
- It is important to identify technologies and best practices with cross-border perspectives, and share and compare them among countries. It is especially important to focus on sectors with

[1] The model analysis based on the marginal abatement cost can serve not only to identify comparable economy-wide reduction potentials of developed countries but also to assess the worldwide reduction potential with identifying potentials by developing countries' nationally appropriate mitigation actions.

relatively homogenous technologies, namely iron and steel, cement, aluminum (industry), coal-fired generation (power generation) and road transport (transport) sectors, and to ensure international equity in these sectors.

■ Application of Sectoral Approaches

(The Outlook for Long-Term Energy Supply and Demand)

- The Outlook for Long-Term Energy Supply and Demand of Japan is one of applications of a sectoral approach. Sector-specific future production activity volumes are predicted in order to calculate projected energy supply-demand, based upon which CO2 emissions are forecasted.
- According to the forecast in case of maximum introduction of cutting-edge technologies under certain conditions, the possible reduction of sectoral energy related CO2 in 2020 is estimated to be 9.3% in the industry sector, 17% in the office sector, 25.4% in the household sector, 16.5% in the transport sector. This can be aggregated to represent a possible reduction of 13% of total energy-related CO2 (all comparisons made to 2005 figures). (Appendix 2)

(Model Analyses of Reduction Potential)

- International research institutions (including Japan's National Institute for Environmental Studies (NIES) and Research Institute of Innovative Technologies for the Earth (RITE)) have been engaged in model analyses of reduction potential based on marginal abatement costs. In order to gather and share such scientific findings, Japan hosted an international workshop in May.
- The NIES's study, introduced at the workshop, calculated the reduction potential of major countries under given costs. Considering the difference of annual discount rate, reduction potentials of 8.8~11.3 GtCO2eq in global scale and 2.5~3.6 GtCO2eq in Annex I countries (6.3~7.7GtCO2-eq. in Non-Annex I countries) under the 100 US$/tCO2 marginal abatement cost in 2020 are estimated. While the major sectors which have large reduction potentials vary depending on the socio-economic characteristics of each region, the power generation and industry sectors represent approximately 50% of global reductions (Appendix 3).
- In RITE studies, energy related CO2 reduction potentials and costs were evaluated by using a consistent assessment model which has high resolutions in regions and mitigation technologies. If mitigation measures below around 50 US$/tCO2 are adopted, reduction potentials of Annex I countries in aggregate in 2020 is around 20% from 2005 emission levels. In this case, the potential reduction from the 2005 emission level in Japan, EU27 and US is around 15%, 20% and over 30%, respectively. Power sectors have large potentials to reduce CO2 emissions. (Appendix 4)

■ Developments in Related Work in International Institutions

(APP's Efforts)

- Public-private collaboration comprising seven countries (Japan, the US, Canada, China, India, Republic of Korea and Australia). Experts representing eight sectors identify efficient technologies in the respective sectors and discuss measures for their dissemination and transfer. They are also engaged in setting sectoral energy efficiency benchmarks and verifying reduction potentials.

・ The Steel Task Force under the APP identified ten existing effective technologies, which were estimated to account for a reduction potential of 127 million tons annually when deployed in the six partner countries (excluding Canada). (Appendix 5)

(IEA's Efforts)

・ The IEA collected data on energy indicators and best practices for the sectors of power generation, iron and steel, cement and so on, and reported on its findings at the Hokkaido Toyako Summit in July 2008 ("Worldwide Trends in Energy Use and Efficiency" http://www.iea.org/G8/2008/Indicators_2008.pdf). It currently continues to pursue the further elaboration of its task enhancing data collection, expanding country and sector coverage and integrating measurement methods.
・ The industrial indicators published in June 2007 ("Tracking Industrial Energy Efficiency and CO2 Emissions") analyzed reduction potential based on intensity indicators derived from BATs and found a reduction potential of 370-470 million tons in the petrochemicals sector, 220-360 million tons in the iron and steel sector, 480-520 million tons in the cement sector, 52-105 million tons in the pulp and paper sector, and 20-30 million tons in the aluminium sector, concluding that the industry sector as a whole could potentially reduce emissions by 19-32% and that energy-originated CO2 could be mitigated by 7.4-12.4% per year. (Appendices 6, 7)

(International Efforts by Industry Associations and ISO)

・ International industry associations such as IISI, WBCSD-CSI and IAI have also studied methodologies to secure comparability, including identifying best available technologies, collecting data and developing energy efficiency indicators. (Appendix 8)
・ Furthermore, work based on common guidelines by the IEA and ISO on international standards to develop and promote energy efficiency and renewable energy sources could also be effectively employed.

■ Procedures for Future Work

(topics to be covered and the experts / organizations to be invited to participate in the in-session workshop at Poznan session)

♦ In order to make further analyses on sectoral reduction potential, stakeholders including research institutions, international organization (e.g. IEA), public-private partnership (e.g. APP), and industry associations (e.g. IISI, WBCSD and IAI) should be widely invited to share their experiences.

(2009 Work Program, Linkage between 2 AWGs)

・ At the Poznan session, Parties should agree on a process to leverage the abovementioned efforts and to establish a methodology for reduction potential analysis. The agreed process should also be incorporated into the 2009 work program.
・ It should also be noted that the linkage of tasks under the AWG-KP and those under the AWG-LCA is indispensable in discussing the 2009 work program.

(Sectoral Approaches)

- There is a need to collect and organize information on achievements within and outside the UN framework regarding sectoral reduction potential analysis. Specialized organizations and industries must be invited into such debate to fully utilize their knowledge.
- Japan will take the initiative in such efforts by hosting a workshop on analysis on sectoral reduction potential on October 22.
- At the recent Accra session, Japan proposed the sharing of information on sectoral approaches among governments and academics at the Poznan session. Japan is also looking into hosting a workshop on sectoral approaches embracing the participation of industry and academics in March 2009. These workshops will yield significant input for tasks under AWG-KP, and thus should be included in the AWG-KP work program.

(LULUCF and non-CO2 gases)

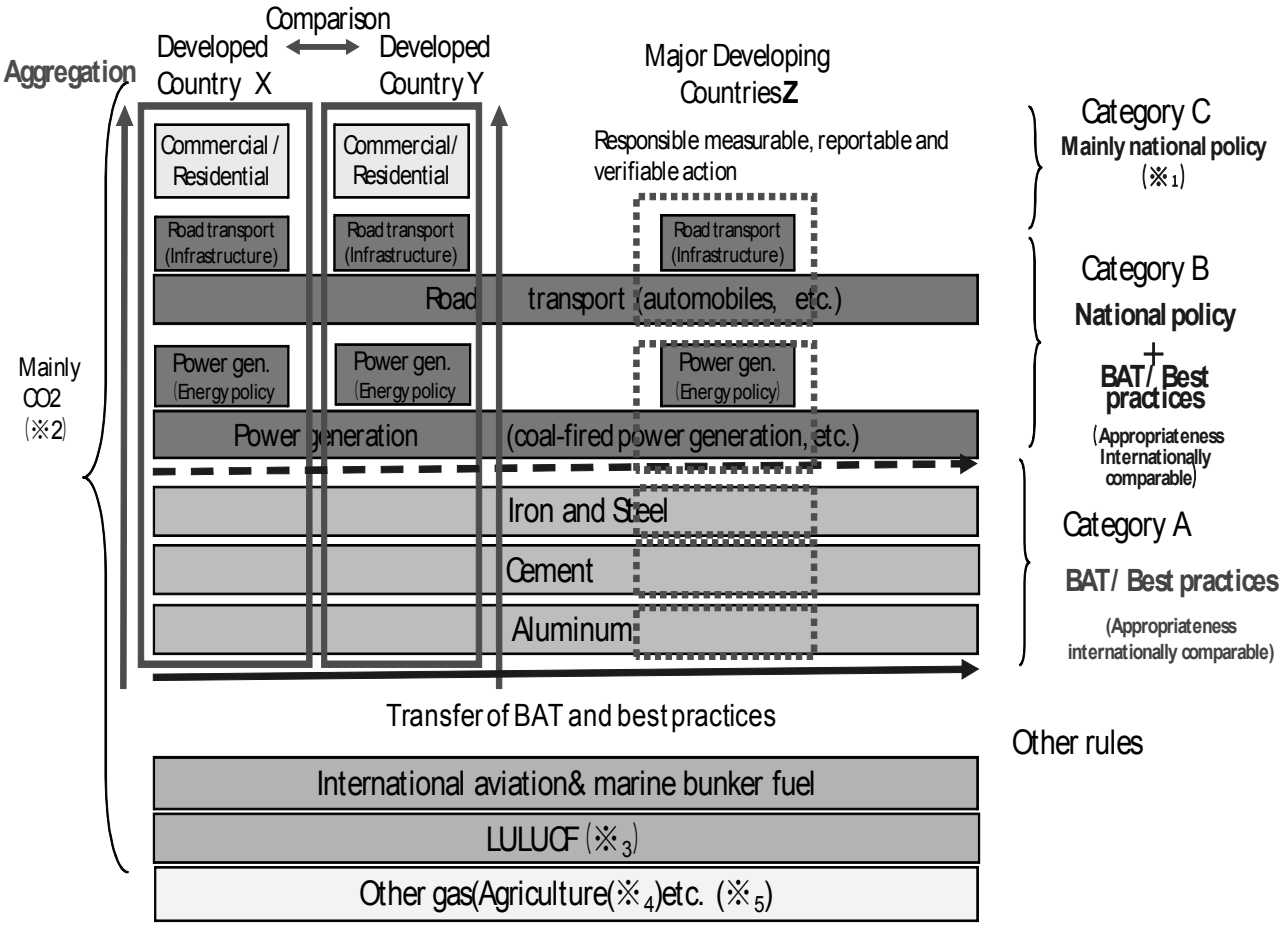
- Removal and emission potential analyses need to be conducted on LULUCF and non-CO2 gases (including the case in which covered gases are expanded) respectively as well. The rules to be applied in the next commitment period, which has been discussed under the consideration of "means to reach emission reduction targets" and "methodologies", must, however, be established beforehand based on the experience in the first commitment period.

(Flexible mechanisms)

- Flexible mechanisms are supplementary to domestic reduction efforts, as acknowledged at the Bangkok session. Reduction potential analysis should first be conducted for domestic reduction measures with the aim of maximizing their implementation. Flexible mechanisms, together with technology transfer, capacity-building and innovative technology development, should be discussed from the perspectives of comprehensive contribution by developed countries to global mitigation efforts.

(Appendix 1) Basic Concept of Sectoral Approaches

Appendices



※1 In the commercial /residential sector, it is also possible to share technologies and best practices for certain appliances etc.. Although efforts to compare and standardize these technologies and best practices are important, their significance in the sector varies among countries, thus complicating comparisons across the entire sector; and hence they are omitted in this figure.

※2 Iron and steel, cement and aluminum sectors embrace emissions other than energy-originated CO2 emissions.

※3 In LULUCF sector, volume of emission and removal can be calculated only after the establishment of the rules for accounting. Volume of emission and removal will become part of total emission reduction target for developed countries.

※4 In the agricultural sector, further consideration is needed as the uncertainties of GHG emissions are high considering the difference of production system, varieties, GHG emissions calculation method and emission coefficients by nation or regions, due to climate and land conditions.

※5 As for other gases, reduction volume through consideration of possible measures will become part of total emission reduction target for developed countries.

(Examples of sector-specific intensity)

- ✧ Iron & steel, cement, aluminum: emissions per unit production or energy consumption per unit production
- ✧ Electricity: heat efficiency
- ✧ Road transport: fuel efficiency
- ✧ Other industries: emissions per unit production value (or, emissions per unit production volume)
- ✧ Commercial: emissions per production value
- ✧ Residential, waste, other: per capita emissions

(Examples of Reduction potential by policies & measures)

＜Power generation sector＞Consider the potential for introducing new energy, renewable energy and nuclear power based on energy security policy.

＜Road transport sector＞Traffic flow measures, improvement of public transport, promotion of environment-friendly driving (“eco-driving”)

＜Commercial/residential sector＞ Low-carbonization of social system (by economic instruments and, visualization of information, etc.), national campaigns, enhanced recycling

(Appendix 2) The Outlook for Long-Term Energy Supply-Demand
(http://www.enecho.meti.go.jp/english/ltesd.htm)

Structure of Sectors and CO2 Emission

1. Basic sectors are constructed by sub-sectors.
2. Energy demand and CO2 emission are evaluated by sub-sectoral basis.
3. "Power Sector" is separately estimated.

1. Industry sector

4 Manufacturing Industries Iron & steel, cement, chemicals, paper & pulp	energy demand / unit production (ton)
Others	energy demand / million yen (value added)

2. Commercial and Residential sector

Commercial	energy demand / unit floor (m2)
Residential	energy demand / unit household

3. Transportation sector

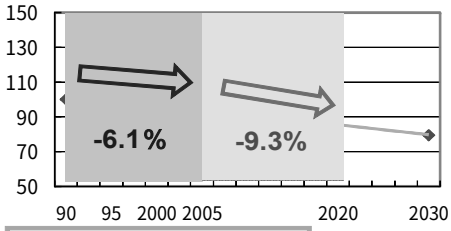
Passenger transport	energy demand / passenger * km
Cargo transport	energy demand / ton * km

4. Power sector

Decrease in Quantity of CO2 Emissions

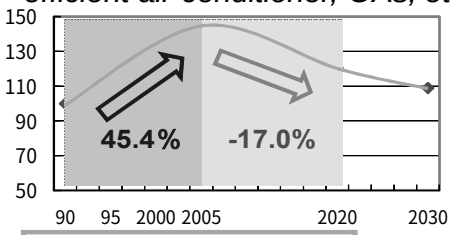
Industrial Sector

Steady decrease by continuing effort and introducing technology



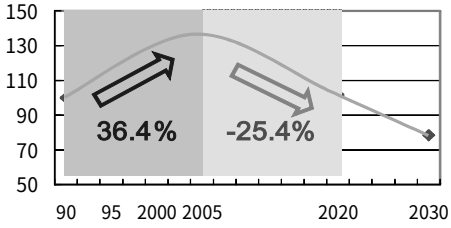
Commercial Sector

Peak out and reduce by improving building insulation and introducing efficient air-conditioner, OAs, etc.



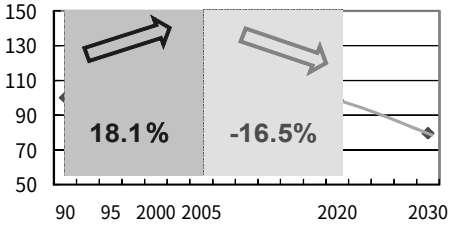
***Residential* sector**

Peak out and reduce by improving house insulation and introducing efficient home appliances



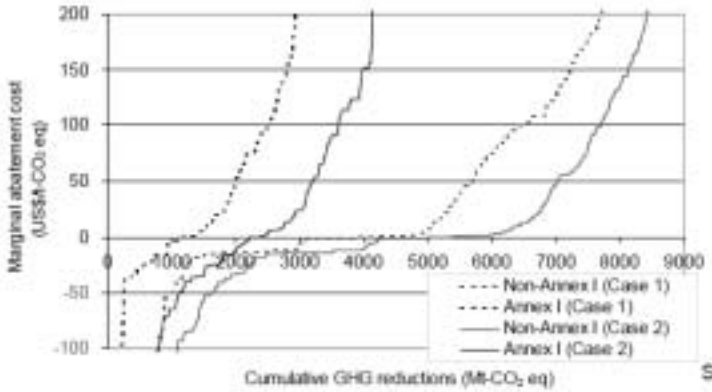
Transport Sector

Peak out and reduce by introducing next generation vehicles, biofuel, etc.



(Appendix 3) Model Analysis by National Institute for Environmental Studies

Marginal abatement cost curves in Annex I and Non-Annex I in 2020

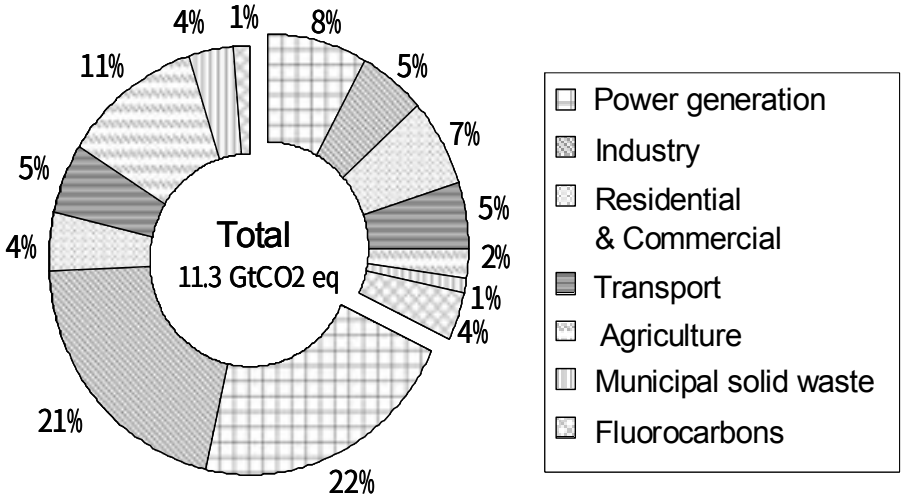


Source:NIES

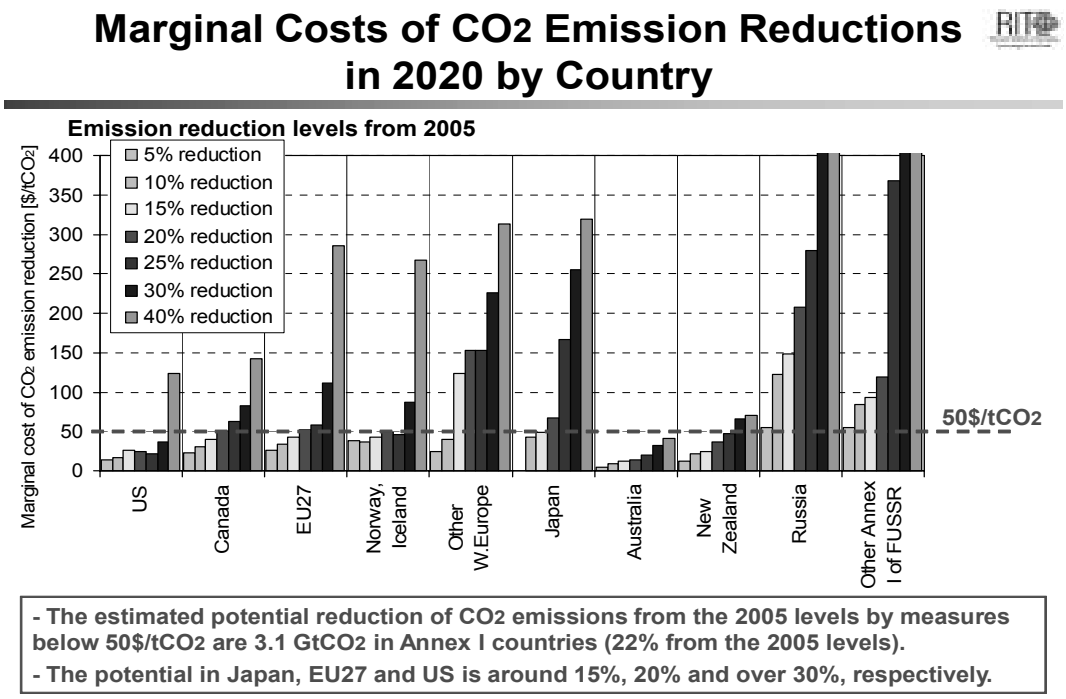
- Marginal abatement cost curves in Annex I and Non-Annex I regions in 2020 are estimated under two different discount rates.
- There are much larger reduction potentials for cost-effective measures in Non-Annex I regions. Thus international cooperation in technology transfers and financial assistance to developing countries may play an important role in achieving GHG emission reductions.

Sector-wide reduction potentials in 2020

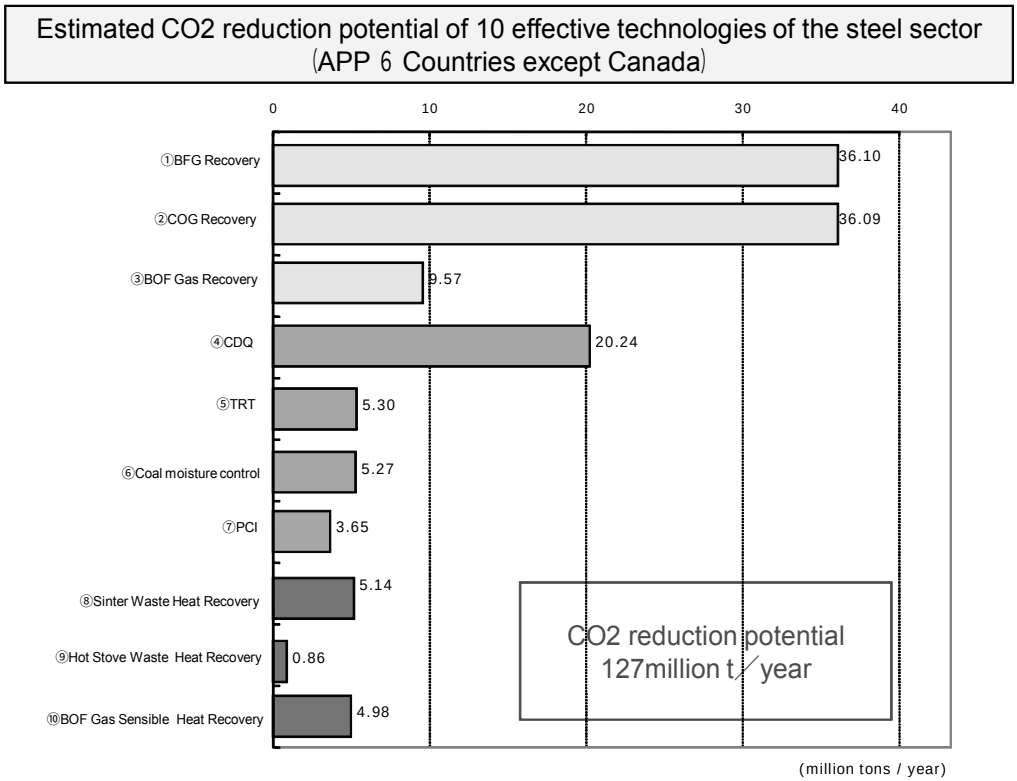
Reduction potentials under the 100US$/t-$CO_2$ marginal abatement cost



(Appendix 4) Model Analysis by Research Institute of Innovative Technologies for the Earth



(Appendix 5) Estimates of Sectoral CO2 Reduction potential by APP Steel TF



（Appendix 6）“Tracking Industrial Energy Efficiency and CO2 Emissions”, the IEA

Table 1.1 ▶ ***Savings from Adoption of Best Practice Commercial Technologies in Manufacturing Industries***

(Primary Energy Equivalents)

	Low – High Estimates (Final energy, includes overlap)	Low – High Estimates of Technical Savings Potential (Primary energy, excludes overlap)			Total Energy & Feedstock Savings Potentials
	EJ/yr	*EJ/yr*	*Mtoe/yr*	*Mt CO_2/yr*	*%*
Sectoral Improvements					
Chemicals/petrochemicals	4.0 – 11.0	5.0 – 6.5	120 – 155	370 – 470	13 – 16
Iron and steel	2.0 – 4.0	2.3 – 4.5	55 – 108	220 – 360	9 – 18
Cement	2.2 – 2.7	2.5 – 3.0	60 – 72	480 – 520	28 – 33
Pulp and paper	1.0 – 2.4	1.3 – 1.5	31 – 36	52 – 105	15 – 18
Aluminium	0.1 – 0.6	0.3 – 0.4	7 – 10	20 – 30	6 – 8
Other non-metallic minerals and non-ferrous metals	0.4 – 0.8	0.5 – 1.0	12 – 24	40 – 70	13 – 25
System/life cycle Improvements					
Motor systems	2.6	6 – 8	143 – 191	340 – 750	
Combined heat and power	4.5	2 – 3	48 – 72	110 – 170	
Steam systems	3.3	1.5 – 2.5	36 – 60	110 – 180	
Process integration	2 – 5	1 – 2.5	24 – 60	70 – 180	
Increased recycling	3 – 4.5	1.5 – 2.5	36 – 60	80 – 210	
Energy recovery	3 – 4.5	1.5 – 2.3	36 – 55	80 – 190	
Total		**25 – 37**	**600 – 900**	**1 900 – 3 200**	
Global improvement potential – share of industrial energy use and CO_2 emissions		**18 – 26%**	**18 – 26%**	**19 – 32%**	
Global improvement potential – share of total energy use and CO_2 emissions		**5.4 – 8.0%**	**5.4 – 8.0%**	**7.4 – 12.4%**	

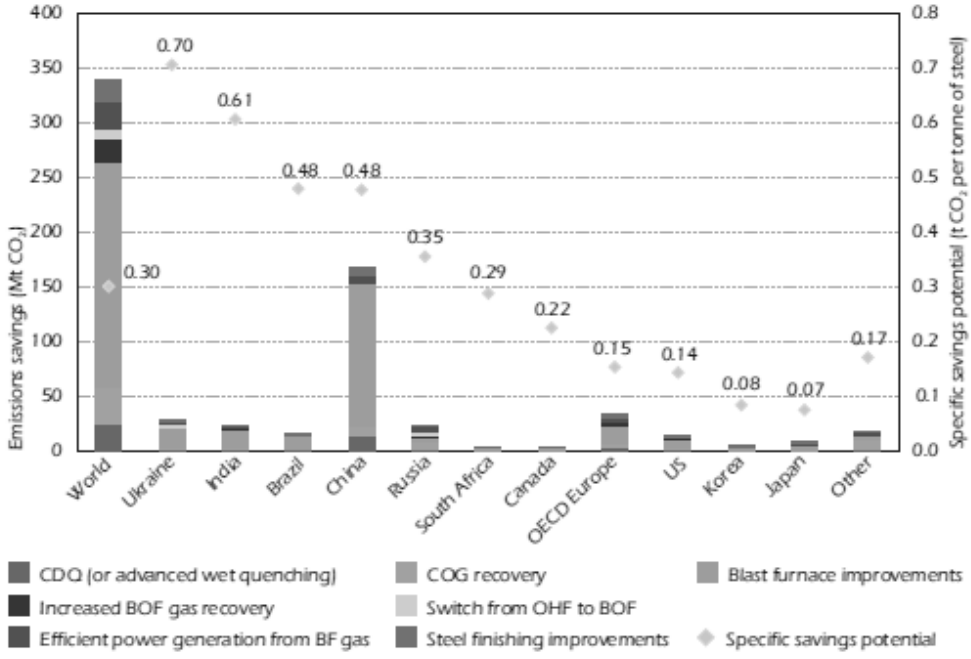
Note: Data are compared to reference year 2004. Only 50% of the estimated potential system/life cycle improvements have been credited except for motor systems. The global improvement potential includes only energy and process CO_2 emissions; deforestation is excluded from total CO_2 emissions. Sectoral final savings high estimates include recycling. Sectoral primary savings exclude recycling and energy recovery. Primary energy columns exclude CHP and electricity savings for chemicals and petrochemicals. Primary energy columns exclude CHP for pulp and paper.

3. One exajoule (EJ) equals 10^{18} joules.

(Appendix 7) “Worldwide Trends in Energy Use and Efficiency” , The IEA
（http://www.iea.org/G8/2008/Indicators_2008.pdf）

○Iron and Steel

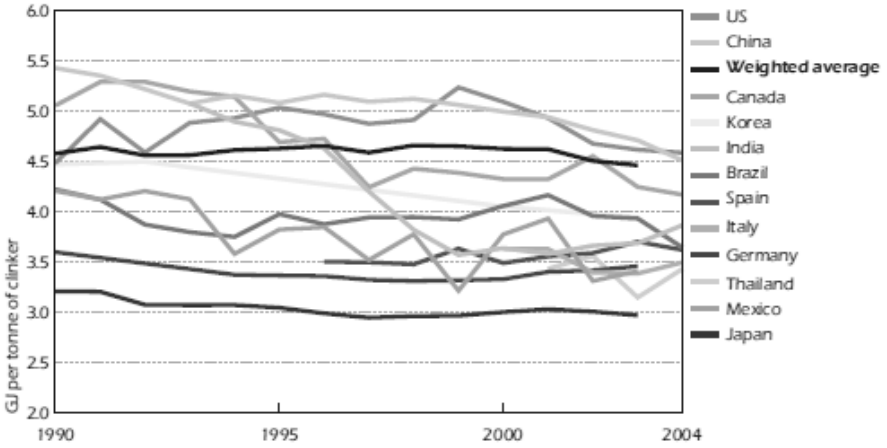
CO2 Reduction Potentials in Iron and Steel in 2005, Based on Best Available Technology



Source: IEA analysis.

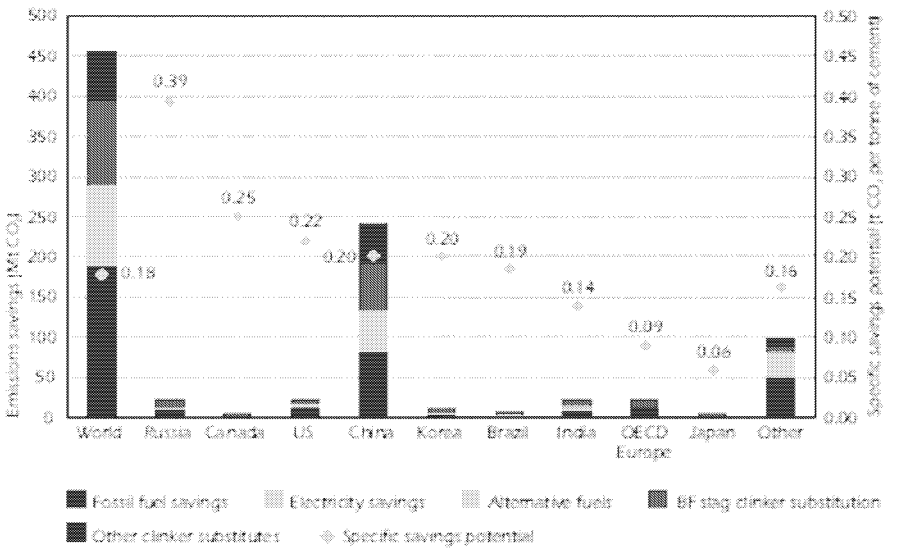
○Cement

Energy Consumption per Tonne of Clinker by Country, Including Alternative Fuels



Source: IEA, 2007a.
Note: Care must be taken in interpreting the absolute values in this figure, due to the possibility that countries are using different boundaries and definitions.

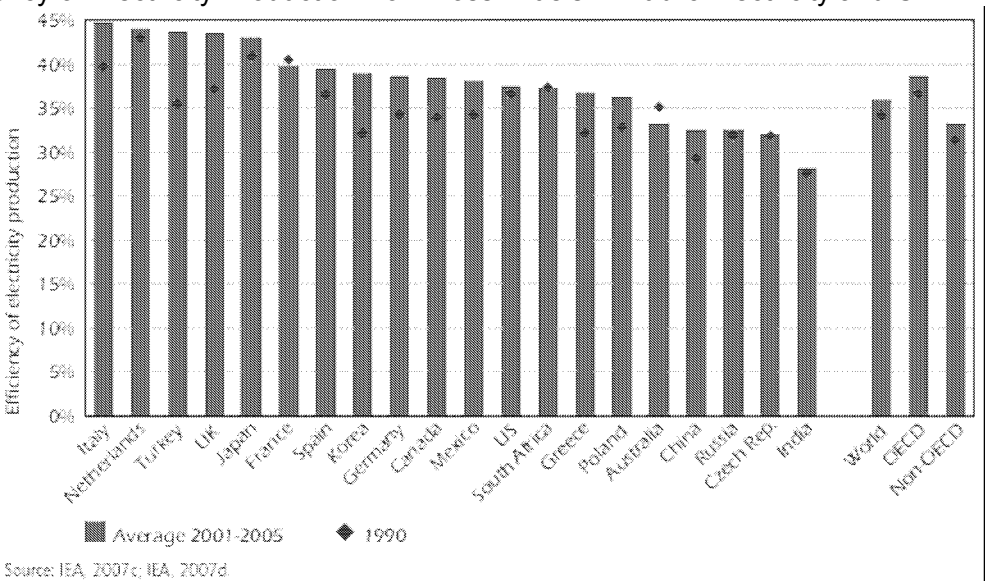
CO2 Reduction Potentials in Cement in 2005, Based on Best Available Technology



Source: IEA analysis.

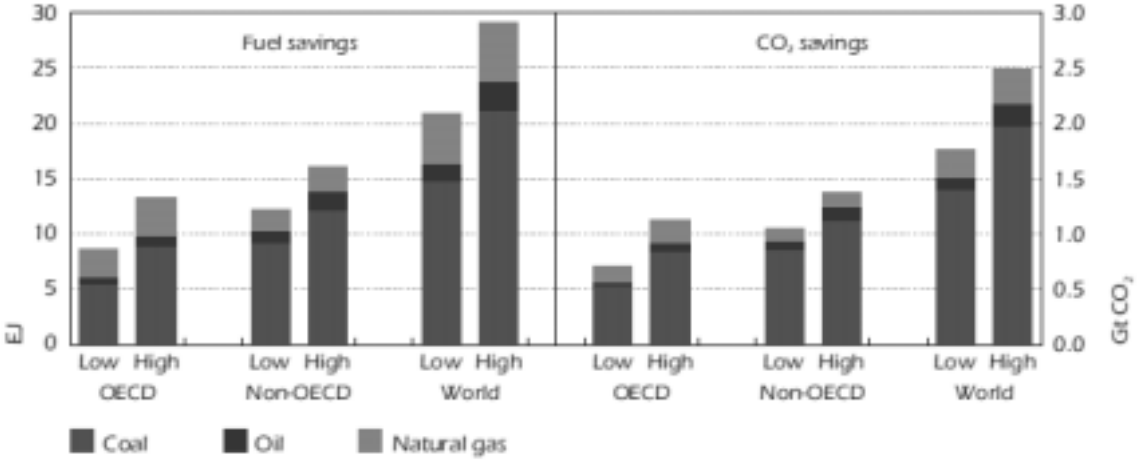
○Power Generation

Efficiency of Electricity Production from Fossil Fuels in Public Electricity and CHP Plants



Source: IEA, 2007c; IEA, 2007d.

Technical Fuel and CO2 Savings Potentials in 2005 from Improving the Efficiency of Electricity Production



Source: IEA analysis.

○Chemical

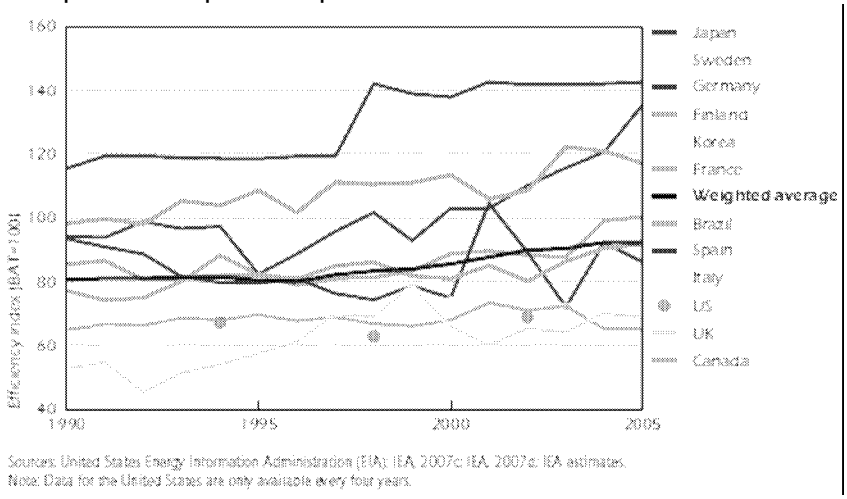
Indicator Use for Country Analysis of Global Chemical and Petrochemical Industry, 2005

	Energy Use (Incl. Electricity)				Energy Use (Excl. Electricity)			
	Reported Energy Use EJ	BPT Energy Use EJ	EEI	Improvement Potential	Reported Energy Use EJ	BPT Energy Use EJ	EEI	Improvement Potential
United States	7.8	5.2	0.67	33%	6.9	4.6	0.67	33%
Saudi Arabia	1.2	0.9	0.75	25%	1.2	0.9	0.75	25%
Taiwan	0.9	0.7	0.75	25%	0.7	0.6	0.76	25%
Netherlands	0.7	0.5	0.78	22%	0.6	0.5	0.78	22%
Brazil	0.7	0.5	0.79	21%	0.6	0.5	0.8	20%
India	1.1	0.9	0.82	18%	1.1	0.9	0.82	18%
China	4.4	3.7	0.84	16%	3.6	3.1	0.86	14%
France	0.7	0.6	0.86	14%	0.6	0.6	0.87	14%
Japan	2.2	1.9	0.86	14%	2	1.7	0.87	13%
Germany	1.3	1.1	0.87	14%	1.1	1	0.88	12%
Italy	0.5	0.4	0.86	14%	0.4	0.3	0.88	12%
Republic of Korea	1.5	1.3	0.88	12%	1.4	1.2	0.89	11%
Canada	0.9	0.8	0.92	8%	0.8	0.7	0.94	6%
United Kingdom	0.5	0.5	0.93	7%	0.5	0.4	0.96	4%
Total	33.4	26.1	0.78	22%	30.0	23.6	0.79	21%

Sources: IEA, 2007c; IEA, 2007d; SRI consulting; Ministry of Energy, Trade and Industry Japan; IEA analysis.

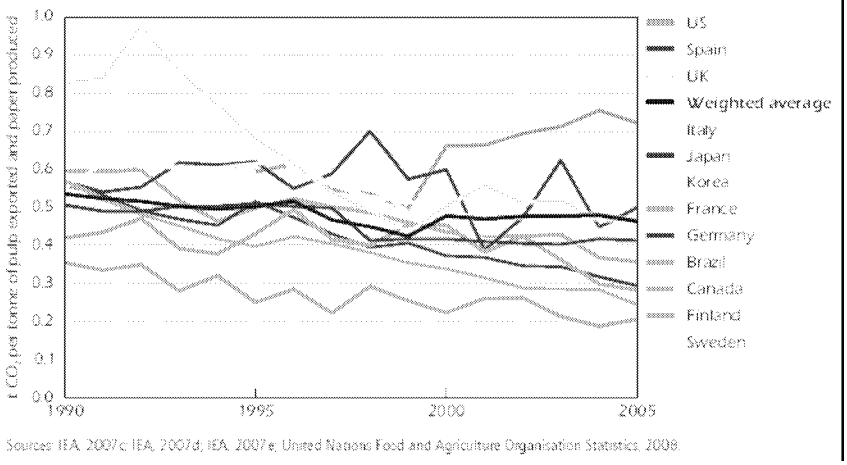
○Pulp and Paper

Heat Consumption in Pulp and Paper Production versus Best Available Technology



Sources: United States Energy Information Administration (EIA); IEA, 2007c; IEA, 2007e; IEA estimates.
Note: Data for the United States are only available every four years.

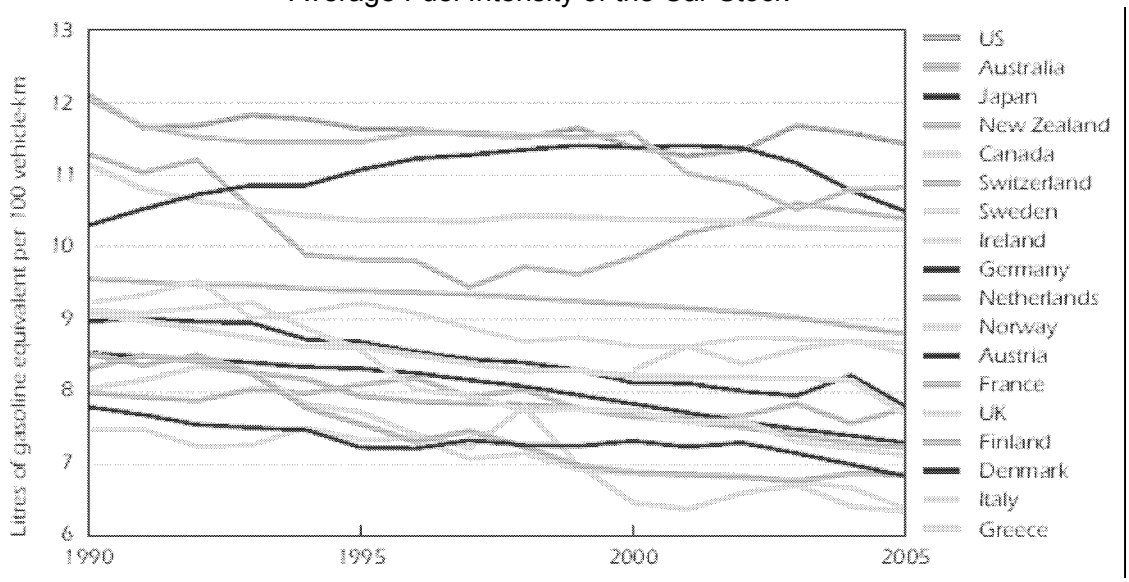
CO2 Emissions per Tonne of Pulp Exported and Paper Produced



Sources: IEA, 2007c; IEA, 2007d; IEA, 2007e; United Nations Food and Agriculture Organisation Statistics, 2008.

○Transport

Average Fuel Intensity of the Car Stock



（Appendix 8）International Efforts by Industry

○IISI

Membership of approximately 180 leading steel producers of the world (covering approximately 60% of world emissions from the iron and steel industry). Agreed on the integration of measurement method: launched data collection program.

○WBCSD-CSI

Represents 18 cement producers of the world. Promotes collection of best practices regarding climate change measures, development of guidelines, and compilation of a database on CO2 emissions. (Agreement on using CO2 emission / cement production (ton) as intensity indicator)

Data collection using the CSI CO_2 protocol

INFORMATION

General Plant Information				1990	2000	2005
A1	Company					
A2	Coownership 1					
A3	Coownership 2					
B	Plant country					
C	Plant name					
D	Plant type					
E1	Plant description	kiln type				
E2		nominal capacity	[tpd]			

Clinker and Cement Production			1990	2000	2005
	Clinker:				
8	Clinker production	[t/yr]			
21	Total cements + substitutes: Portland, Blended, Slag	[t/yr]			
21a	Total cementitious products	[t/yr]			

CO2 Emissions

Direct CO2 Emissions			1990	2000	2005
CO2 from Raw Materials					
35a	Calcination emission factor, corrected for CaO- and MgO imports	[kg CO2/ t cli]			
39	Total CO2 from raw materials	[t CO2/yr]			
CO2 from Kiln Fuels					
41	CO2 from alternative fossil fuels	[t CO2/yr]			
CO2 from Non-Kiln Fuels					
45c	CO2 from on-site power generation	[t CO2/yr]			

Direct CO2 from Biomass Fuels (Memo Item)			1990	2000	2005
50	CO2 from combustion of biomass fuels (kiln and non-kiln)	[t CO2/yr]			

PERFORMANCE INDICATORS

Gross CO2 Emissions (= total direct CO2; all sources)			1990	2000	2005
59	Absolute gross CO2	[t CO2/yr]			
60	Specific gross CO2 per tonne of clinker produced	[kg CO2/t cli]			
62	Specific gross CO2 per tonne of cementitious product	[kg CO2/t cem prod]			

Net CO2 Emissions (= gross CO2 minus emission savings through alternative fossil fuels			1990	2000	2005
71	Absolute net CO2	[t CO2/yr]			
73	Specific net CO2 per tonne of clinker produced	[kg CO2/t cli]			
74	Specific net CO2 per tonne of cementitious product	[kg CO2/t cem prod]			

Specific CO2 from Indirect and Biomass Sources			1990	2000	2005
83	Specific CO2 from biomass fuels (Memo Item)	[kg CO2/t cem prod]			

General Performance Indicators			1990	2000	2005
92	Clinker/cement factor in cements	[%]			
93	Specific heat consumption of clinker production	[MJ/t cli]			
95	Alternative fossil fuel rate (fossil wastes)	[%]			
96	Biomass fuel rate	[%]			
97	Specific power consumption	[kWh/t cement]			

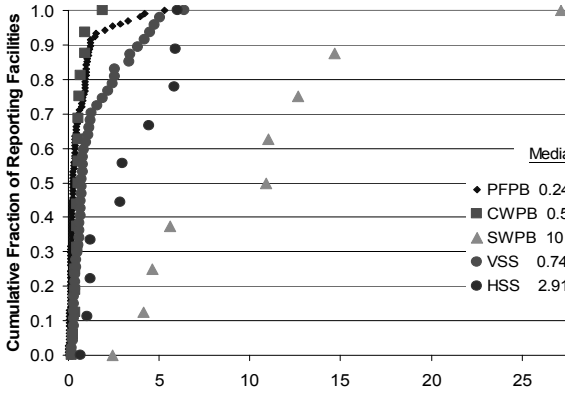
KILN FUELS - DETAILED INFORMATION

Kiln Fuel Consumption in tonnes per year			1990	2000	2005
108	**Alternative fossil fuels (fossil wastes) : sum**	[t/yr]			
115	**Biomass fuels : sum**	[t/yr]			

○IAI

- Represents 80% of world aluminum production. Successful achievements in GHG emission reductions in aluminum industry through integrating measurement methods, establishing common reduction targets, benchmarking, reporting and monitoring (14% GHG emission reductions from 2000 through 2005 while achieving 20% increase in production). Sets the following voluntary intensity-based targets: 86% reduction of PFC emission / production (tons) in 2010 compared to 1990 levels; 10% reduction of energy consumption / production (tons) in 2010 compared to 1990 levels.

Benchmark Data on PFC Emissions per tonne of Aluminium Production
An Opportunity for Improved Performance

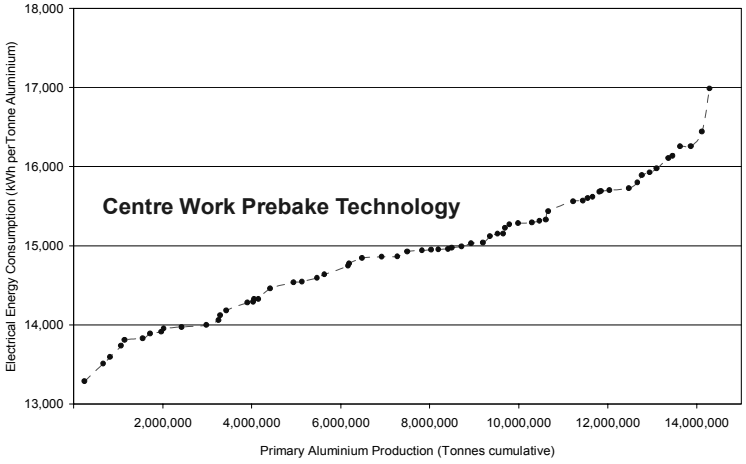


PFPB – Point Fed Prebake
CWPB – Centre Work Prebake
SWPB – Side Work Prebake
VSS – Vertical Stud Søderberg
HSS – Horizontal Stud Søderberg

Source: IAI 2006 Anode Effect Survey

6

BENCHMARKING:
Primary Aluminium Smelting - Electrical (AC) Energy Consumption



Source: IAI 2003 Energy Survey 7

PAPER NO. 4: NEW ZEALAND

SEPTEMBER 2008

1. The Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) has invited Annex I Parties to provide additional and updated available information and data on the mitigation potential of policies, measures and technologies at their disposal, appropriate in different national circumstances. Further, the AWG-KP has requested Parties to identify possible ranges of reductions that could be achieved through their domestic and international efforts, and on the scale of emission reductions to be achieved by Annex I Parties in aggregate. Finally, the AWG-KP has invited Parties to submit views on the topics to be covered and the experts/organisations to be invited to participate in the in-session workshop in Poznan.

2. New Zealand welcomes the opportunity to submit information on these issues, and notes that information contained within this submission is supplementary to our submissions to the AWG-KP of February and June 2007.

Summary of key points

- New Zealand has an atypical emissions profile when compared with other developed countries. National circumstances mean that New Zealand has relatively limited domestic mitigation potential. The New Zealand Government has a number of domestic policies in place however to ensure that the currently limited opportunities are realised and that mitigation potential is improved in the future.

- There is a clear linkage between mitigation potential and individual Parties' emission reduction commitments, as recognised by the AWG-KP. The relative cost of domestic mitigation should be one of the criteria used to differentiate the emission reduction commitments of individual Annex I Parties. This will ensure that individual Parties' emission reduction commitments fairly reflect the costs that a country faces in meeting them.

- The AWG-KP should further elaborate and agree on other factors and criteria to compare mitigation potential across countries. This should be a topic for the in-session workshop.

- Given the diversity that exists within Annex I Parties, including with respect to criteria such as mitigation potential, we would expect a large spread in individual Parties' emission reduction commitments - greater than the corresponding spread in the first commitment period and more on the scale of the EU member states' allocations within its ETS.

- New Zealand supports an indicative range of aggregate emissions reductions for Annex I Parties as a group, corresponding to the lowest feasible level of global greenhouse gas concentrations in the atmosphere. Accordingly, New Zealand supports an indicative range of emissions for Annex I Parties as a group of 25 to 40 per cent below 1990 levels by 2020 (as the lowest greenhouse gas stabilisation band currently assessed by the Intergovernmental Panel on Climate

Change), in the context of a global goal and agreement that has comparable effort from all developed countries and nationally appropriate mitigation action from developing countries[1].

- A shared vision, including a long term global goal, is required to guide future mitigation efforts under the Convention and its Kyoto Protocol. Further defining the range of emission reductions to be achieved by Annex I Parties in aggregate will depend upon defining the shared vision to guide actions by all Parties to the Convention and its Kyoto Protocol.

- Four topics suggested for the in-session workshop: (i) how to compare mitigation potential across Parties, (ii) the shared vision, including the relationship between long-term and near-term action under the AWG-KP and AWG-LCA, (iii) the potential impact on supply and demand of specific global emission reduction commitments/actions from 2013 onwards, and (iv) an initial exploration of issues related to the base year, nature and length of the second commitment period.

General remarks

3. New Zealand is prepared to take on its fair share of future commitments to address climate change, in the context of a global agreement that has comparable effort from all developed countries and nationally appropriate mitigation action from developing countries. A long term global goal will be important to guide the international community's mitigation efforts.

4. In this regard, New Zealand is encouraged by recent developments at the G8 Summit in Japan, where they stated their desire to work with all Parties in the UNFCCC towards a goal of achieving at least a 50 percent reduction of global emissions by 2050, recognising that this global challenge can only be met by a global response, in particular, by the contributions from all major economies.

5. To reach an ambitious global long-term emission reduction target, and ensure that global emissions begin to decrease in the next 10-15 years[2], will require nationally appropriate mitigation commitments and actions from all major emitting developed and developing countries. Relying only on further commitments from those Annex I Parties that have ratified the Kyoto Protocol will not be enough, as aggregate emissions from these Parties make up less than 30 percent, and a rapidly declining share, of total world emissions. New Zealand's support of a new Annex I[3] aggregate target will therefore be contingent on a comparable and equitable effort from all

[1] At the SBSTA 28 workshop in June 2008, the IPCC provided further explanation of the AR4 Working Group III report (pg. 776): an aggregate emissions reduction for Annex I Parties of 25-40 percent below 1990 by 2020 had a concurrent reduction in non-Annex I Parties' emissions in the range of 15-30 percent below baseline.

[2] To avoid any major overshoot of atmospheric concentrations, the IPCC AR4 states that global emissions will need to peak in the next 10-15 years.

[3] Refers to both the scale of mitigation ambition and future composition of Annex I.

countries (developed and developing), so that in aggregate global emissions are set on a trajectory that avoids dangerous levels of climate change[4].

6. A decision in the AWG-KP on the aggregate emissions reduction target for Annex I Parties to the Kyoto Protocol is, scientifically and politically, complementary to the mitigation commitments and actions agreed under the AWG-LCA for developed and developing countries, with both contributing to a shared vision and global goal. As the level of ambition for mitigation under the AWG-LCA is not yet well defined, we need to ensure that both work programmes progress in tandem as there are clearly links between the two. One important link between the two is the fact that both the AWG-LCA and the AWG-KP refer to a shared vision in their terms of reference. Logically, this shared vision will be common to the two AWGs. Indeed, the shared vision under the AWG-KP refers to the challenge set by the ultimate objective of the Convention.

7. To ensure an equitable effort from each developed country, and in discussion on effort sharing principles and associated ranges of emission reduction targets for individual Annex I Parties, it is necessary to take into consideration the mitigation potential that is available within each country. Given the extra effort and associated costs that countries with limited mitigation potential face in reducing emissions and meeting commitments, New Zealand is encouraged that the AWG-KP has made a clear linkage between national circumstances, mitigation potential and targets for individual Parties. We look forward to further discussion on factors and criteria that could be used to compare the national circumstances and mitigation potential across countries.

8. The concept of "rules before commitments" is an important guide for our work in the AWG-KP. The AWG-KP has not completed its work on the means available to Annex I Parties to reach their emission reduction targets, nor on methodological issues. Further refinement of countries' mitigation potential, and concluding discussions on effort sharing principles and the associated ranges for emission reduction targets, will be required after the work on means and methodologies is completed. This is of particular relevance for New Zealand, where the estimation and accounting of a large portion of our emissions and removals, and mitigation technologies, are subject to improvements and changes to the future rules. These include proposed improvements to LULUCF rules and changes to CO_2 equivalence metrics.

National circumstances

9. A description of a country's national circumstances is a useful starting point for estimating mitigation potential and identifying possible ranges of emission reduction targets. When compared with other developed countries, New Zealand has unique national circumstances in terms of our emissions profile.

[4] The IPCC AR4 Working Group III report (pg. 776), and elaborated by the IPCC at SBSTA 28, illustrates the type of commitments and action needed from all Parties to ensure atmospheric greenhouse gases are stabilised at specific concentrations.

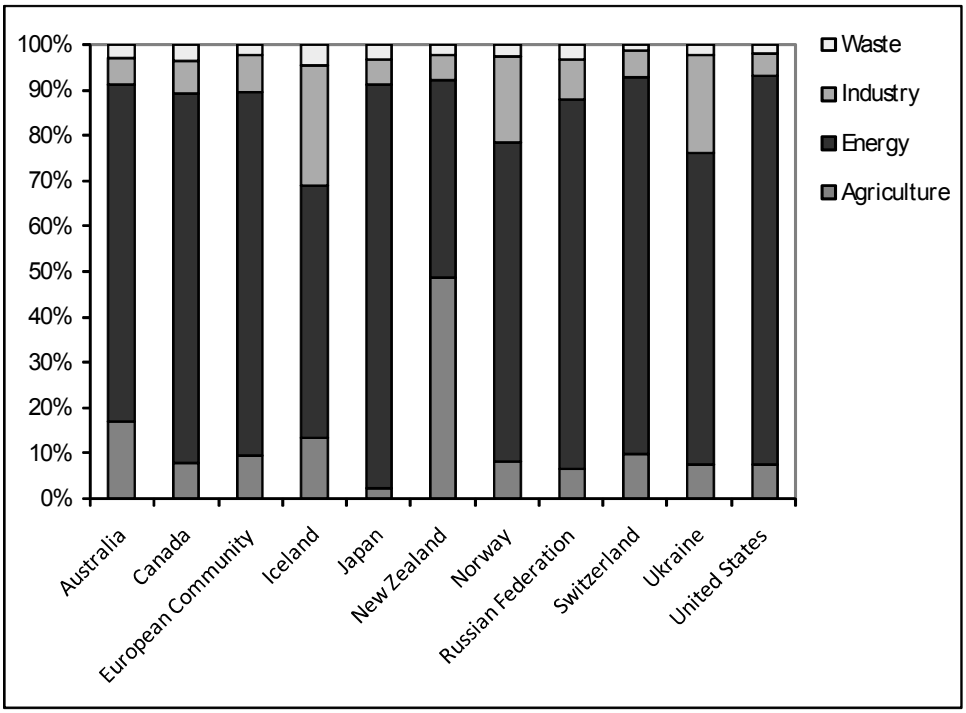


Figure 1: 2005 GHG emission profiles for Annex I Parties[5]

10. As Figure 1 illustrates, relative to other Annex I Parties New Zealand has a considerably higher proportion of emissions from the agriculture sector and a much lower share from energy and industry related emissions.

11. At a more disaggregated level, Figure 2 shows that New Zealand has a relatively small share of energy emissions from electricity generation, and that the emissions from agriculture are primarily from enteric fermentation and soils.

[5] Data sourced from 2007 submissions from Parties on their 2005 inventory. Note that this data excludes solvents and other product use and any other reported memo items. http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php

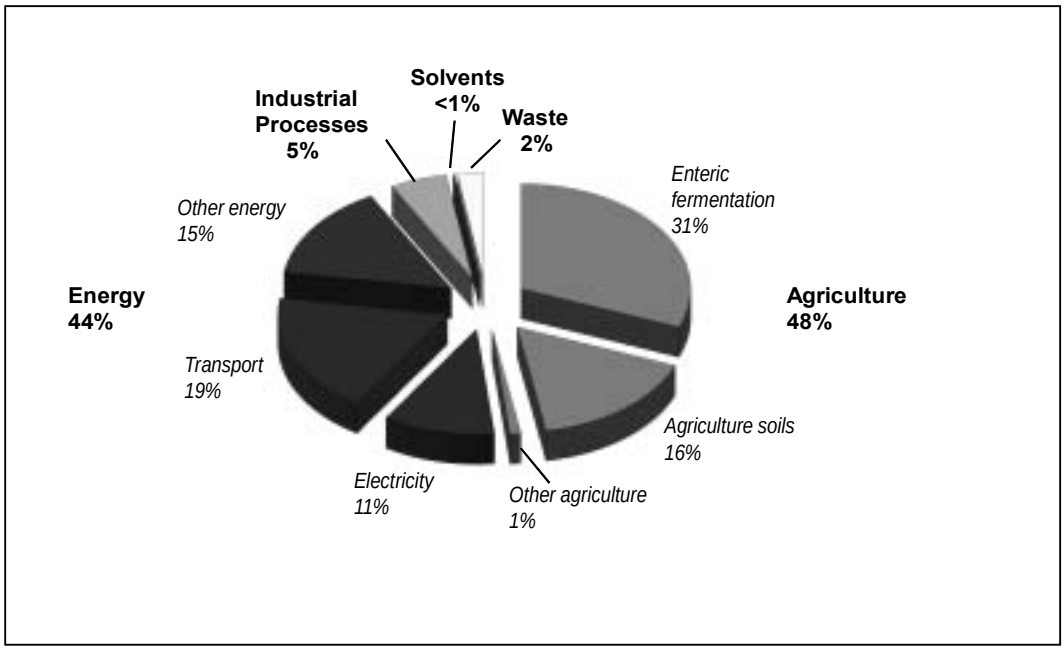


Figure 2: New Zealand Greenhouse Gas Emissions by Sector for the year 2006[6]

12. This set of national circumstances has important implications when estimating and comparing the mitigation potential that exists within New Zealand and other Annex I countries, and the associated costs of reducing emissions and meeting specific emission reduction targets.

Mitigation potential

13. The Intergovernmental Panel on Climate Change 4th Assessment Report (IPCC AR4) uses the concept of mitigation potential to assess the scale of reductions that could be made, relative to an emission baseline, for any given carbon price. Mitigation potential is therefore best expressed as a net cost per unit of emissions avoided or reduced.

14. To ensure an accurate assessment of the mitigation potential within a country, the UNFCCC technical paper on this issue states that a detailed sectoral analysis that takes into consideration broad national circumstances and specific sector efficiencies is necessary[7].

15. There are five important national circumstances which are most relevant when estimating the mitigation potential that exists within New Zealand:

    i. nearly 50 percent of domestic emissions from the grazing livestock agriculture sector;

[6] New Zealand 2006 greenhouse gas inventory - http://www.mfe.govt.nz/publications/climate/nz-greenhouse-gas-inventory-apr08/

[7] FCCC/TP/2007/1: *Synthesis of information relevant to the determination of the mitigation potential and to the identification of possible ranges.*

ii. a large proportion of electricity generated from renewable sources;
iii. a small industrial sector;
iv. a large planted production forestry sector; and
v. a low population density, geographically isolated from the rest of the world.

16. Grazing livestock agriculture dominates land use and economic output in New Zealand, and produces nearly 50 percent of domestic emissions - primarily from methane created by enteric fermentation within cattle and sheep and nitrous oxide from fertiliser and animal urine. Unlike other forms of agriculture, where energy efficiency, manure management and methane capture provide cost-effective mitigation potential, there are currently only limited technologies available, or under development, to reduce enteric methane or nitrous oxide emissions. When comparing the mitigation potential that exists in the agriculture sector in New Zealand with the mitigation potential more broadly within other Annex I Parties, it is important that these circumstances are recognised.

17. New Zealand also has an atypical energy sector, when compared to most other Annex I Parties, with about 65 percent of electricity generated from renewable sources and very little heavy industry. The mitigation opportunities that exist within New Zealand through moving to low emission fuels within these sectors are therefore limited. The characteristics of these sectors also have important implications for the cost-effectiveness of mitigation that can be achieved through investments in energy efficiency. While there have been a number of international studies that highlight the importance of energy efficiency, including the IPCC AR4, which states that energy efficiency plays a key role in contributing to emission reductions, the cost-effectiveness in terms of emission reductions is much less in countries with a high share of renewable electricity and a small industrial sector.

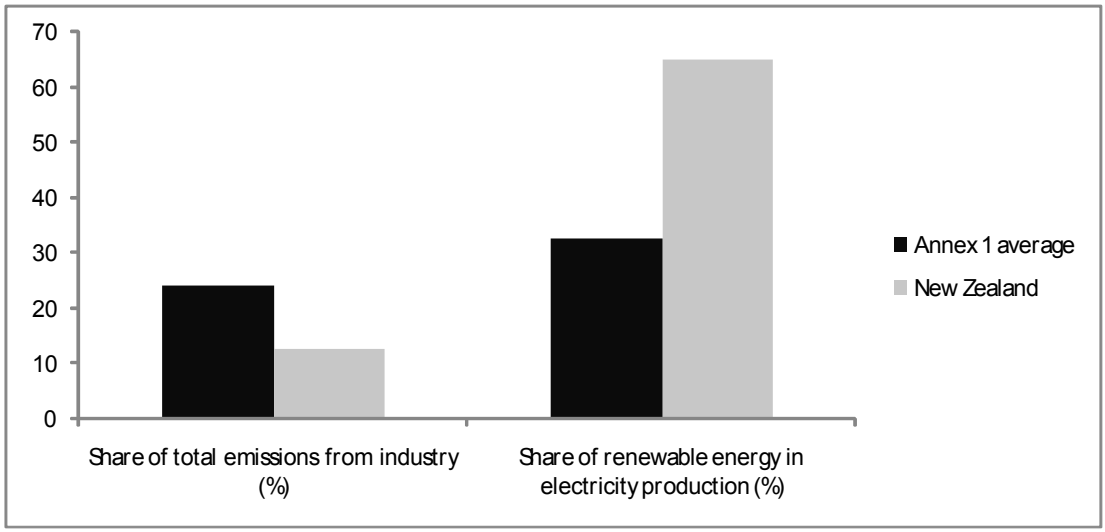


Figure 3: Size of industry and proportion of renewable (2005)[8]

[8] Information contained within UNFCCC Technical Paper - *Synthesis of information relevant to the determination of the mitigation potential and to the identification of possible ranges of emission reduction objectives of Annex I Parties* (FCCC/TP/2007/1)

18. The LULUCF sector is of particular relevance to New Zealand's mitigation potential, due to the large proportion of forested and agricultural land in New Zealand. Production forestry in New Zealand contributes over time significant emissions and removals, relative to New Zealand's overall emissions profile. Given the importance of this sector to New Zealand, we are encouraged that the AWG-KP is considering rule changes that will improve the effectiveness of these mitigation opportunities, and remove unnecessary costs. With respect to the emission reduction opportunities that exist within commercial forestry in New Zealand, such as afforestation and biomass grown specifically for biofuels, it is important to note that the availability of land is increasingly under pressure from competing land uses, such as food production, which increases the price of land and thereby reduce the cost-effectiveness of these mitigation options. The current LULUCF rules also cause significant barriers to the cost effectiveness of mitigation options.

19. New Zealand has a relatively low population density compared to most Annex I Parties. This means there is a correspondingly limited number of cost-effective opportunities to significantly reduce domestic transport emissions, through initiatives such as public transport campaigns, compared to high density populations. However, beyond 2020, new technologies that are commercially viable, such as electric vehicles and second generation bio-fuels may enable New Zealand, along with other Annex I Parties, to make substantial reductions in transport sector emissions.

20. New Zealand is geographically isolated compared to most Annex I Parties, with a high reliance on international aviation and maritime for trade and tourism. The International Maritime Organization and the International Civil Aviation Organization are leading work within their respective sectors. New Zealand supports the work these organizations are doing. This work is part of the global approach to reducing greenhouse gas emissions.

Current and future domestic policies

21. The New Zealand Government is committed to enabling the potential mitigation opportunities that exist domestically to be realised. The Government has recently passed legislation that introduces a domestic emissions trading scheme (ETS) which will cover all sectors and all gases within the economy by 2013. The ETS will encourage the whole economy to undertake cost-effective emission reductions, and help realise the full scope of mitigation opportunities that are available domestically. The legislation also recognises that some mitigation opportunities may not be realised by simply pricing carbon, and it therefore establishes a number of funds to provide information to consumers about mitigation opportunities that may exist, address and remove barriers to cost-effective options, and provide incentives for firms to invest in mitigation measures.

22. The New Zealand Government has also continued to support regulatory measures to enhance mitigation, including standards on household appliances, a bio-fuel sales obligation, enhanced building codes and improvements to resource management legislation. The Government has also initiated a plan to make six of the key government agencies carbon neutral by 2012. Finally, there is continued investigation of new policies to further encourage cost-effective domestic mitigation.

23. While there may be limited mitigation potential currently, the Government is committed to increasing this in the future, and has therefore invested in a large number of research and development and demonstration (RD&D) projects. These include programmes within the New Zealand Energy Efficiency and Conservation Strategy (NZEECS) to enhance efficiency within energy intensive businesses, and funds for development of marine energy set up under the New Zealand Energy Strategy (NZES). The government has also invested, along with industry, into the research and development of possible technologies to reduce emissions from the pastoral agriculture sector through the Pastoral Greenhouse Gas Research Consortium. Furthermore, the New Zealand established Livestock Emissions and Abatement Research Network (LEARN), is providing a forum for exchanging information on the research and development of technologies to reduce emissions from pastoral agriculture as well as providing capacity building opportunities for scientists and other experts from developing countries.

Possible ranges of emission reduction targets by individual Annex I Parties through their domestic and international efforts

24. New Zealand is committed to taking on its fair share of the global effort to reduce emissions so as to avoid dangerous human interference with the climate system. To ensure the future emission reduction commitments by New Zealand accurately reflects a fair share of international effort, an assessment of the costs we would face in meeting our emission reduction commitments is essential.

25. When assessing (or comparing across different countries) the costs of meeting a particular range of emission reduction targets for individual Parties, one of the most important factors to consider is the mitigation potential that is available within each country. A country with large amounts of cost-effective domestic mitigation potential will be able to meet a future target at less cost than a country with limited potential, all else being equal. This relationship between mitigation potential and the costs that countries face in meeting a particular target can be illustrated using a domestic mitigation cost curve.

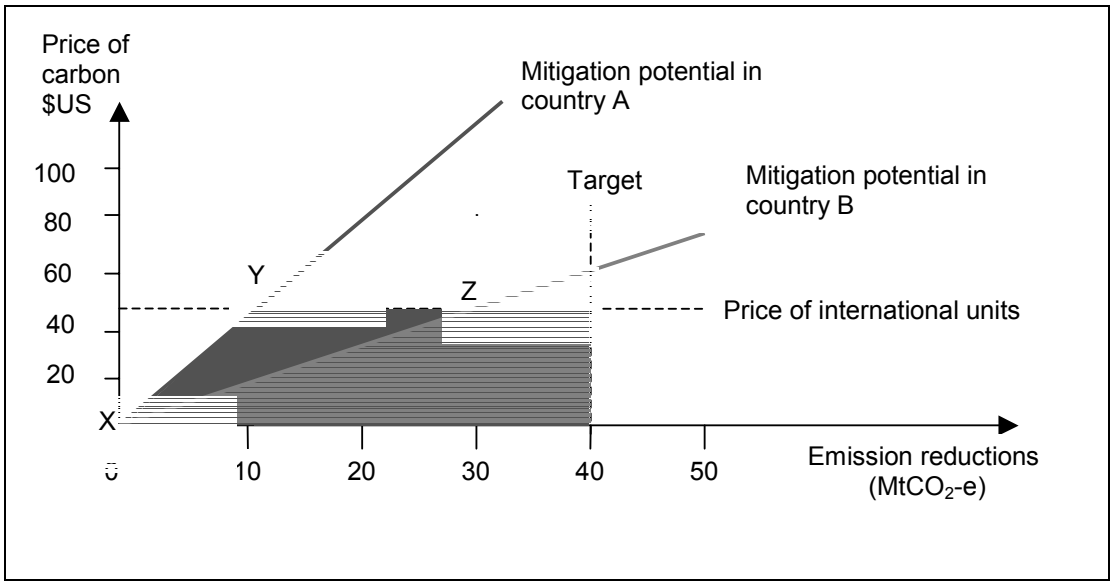


Figure 4: Relationship between mitigation potential and the costs of meeting a target[9]

26. In Figure 4, country A has less domestic mitigation potential compared to country B (i.e. there is a lower quantity of mitigation available at any given carbon price). Assuming that the price of carbon on the international market is US$50/tonne, and each country has a target which requires them to reduce emissions by 40MT below BAU, the cost that each country faces in meeting the target is equal to the shaded area under each curve but below the international price of carbon. Country A faces considerably greater costs in meeting the commitment[10], because they need to purchase substantially more international units (at US$50) compared to country B,

[9] Prices and emission reduction values in the Figure and explanatory paragraph are arbitrary and for illustrative purposes only.

[10] The additional costs that country A faces are equal to the area of triangle XYZ.

which has a larger amount of domestic mitigation opportunities that are available below this international price. Given that both countries face the same costs in using the mitigation potential available through the flexibility mechanisms (i.e. purchasing at the international price) to ensure a more equitable level of effort, country A should receive a target that is less than country B, all else being equal.

27. Taking into consideration domestic mitigation potential when setting individual country targets is therefore fair, as it shares the costs of the mitigation effort relative to the opportunities that exist in each country. Furthermore, it also appropriately avoids penalising countries who have more carbon efficient economic production (as the more carbon efficient a country is the less potential they have to reduce emissions), thereby providing an incentive for countries to continually strive to improve their carbon efficiency.

28. Another important factor to consider when assessing the costs faced by individual countries to reduce emissions is the extent to which their export sector faces the cost of carbon and competes with production from countries that do not face this cost. The more competitiveness-at-risk the exports of a country are, the more financial support that this sector requires to ensure that emissions are not 'leaked' to other countries. The economic cost to a nation is heavily influenced by the extent of any leakage of economic activity. From an environmental viewpoint, it is particularly important if the emissions are leaked to countries that do not have a cap on their emissions, in addition to having less efficient forms of production – thus undermining environmental integrity.

29. The issue of competitiveness, and leakage concerns, is relevant to New Zealand, as our carbon-efficient agricultural sector will be facing a price of carbon under the domestic ETS but will compete with other countries' export products that do not bear a carbon price[11]. Furthermore, these competitors may increasingly be located in countries which do not have a price on carbon. Given the large proportion of emissions from this sector, it could have major economic costs for New Zealand, with an associated dis-benefit to the climate from a global viewpoint [12].

30. New Zealand recognises that while mitigation potential and related competitiveness effects are important factors to consider when discussing effort sharing principles and associated ranges of emission reduction targets for individual parties, there are other criteria that should be considered, such as GDP per capita, emissions per capita, population growth, and historical emissions[13]. Furthermore, there are some significant challenges with comparing mitigation potential across countries, due to data constraints and varying assumptions, and it will therefore be necessary for

[11] There are stronger incentives on New Zealand to include agriculture in our ETS than other countries. These incentives are driven by our comparative advantage in undertaking pastoral agricultural production and exacerbate risks of leakage.

[12] This is of particular importance for pastoral agriculture, which relies on the particular physical characteristics of a country that cannot be replicated offshore – unlike an efficient steel mill, which can be located in almost any country.

[13] For further details on the types of criteria that could be used, see New Zealand's June 2007 submission, FCCC/KP/AWG/2007/MISC.1. For a broader view on possible criteria and indicators see a synthesis of all Parties submissions to the UNFCCC, FCCC/TP/2007/1.

Parties to agree on factors and criteria that reflect mitigation potential[14]. New Zealand looks forward to further discussion on this, as well as other relevant criteria that would ensure the ranges of emissions reductions for individual parties reflect an equitable level of effort – based on common but differentiated responsibilities and respective capabilities.

31. Finally, given the potentially large differences between Annex I Parties, in terms of mitigation potential and other relevant criteria, it is to be expected that there will be a large spread in the emission reduction targets for individual Annex I Parties, greater than the corresponding spread in the first commitment period and more on the scale of the EU member states' allocations within its ETS.

Scale of emission reductions to be achieved by Annex I Parties in aggregate

32. New Zealand supports discussion on the scale of a new Annex I aggregate target that represents an equitable contribution, in the context of a global agreement, to what the most recent scientific evidence says is necessary in terms of a global emission reduction effort to avoid dangerous levels of climate change.

33. In this regard, New Zealand recognises the clear relationship between work on the scale of reductions to be achieved by Annex I under the guidance of the AWG-KP, and the work on mitigation commitments and actions taking place under the Ad hoc Working Group on Long term Cooperative Action (AWG-LCA) – including the long-term goal for global emission reductions which makes up part of the shared vision. We need to ensure both work programmes progress in tandem.

34. The recent IPCC AR4 conclusions indicate that to avoid exceeding a stabilisation concentration of 450ppm CO_2-e, Annex I Parties in aggregate would need to reduce emissions by 25-40 percent below 1990 by 2020. As this is the lowest stabilisation range assessed by the IPCC, New Zealand considers it as a useful indicative range to inform the setting of a new Annex I aggregate target, as part of a broad global effort. New Zealand notes that doubts have been expressed by some commentators as to whether the lowest concentration range assessed by the IPCC is achievable. This makes it all the more important for the Parties who do not have emissions reduction or limitation commitments under the Kyoto Protocol to indicate both their endorsement of a long term global goal and the scale of the action they are able to take.

35. New Zealand's support of a 25-40 percent reduction for Annex I Parties in aggregate is contingent on comparable effort from all developed countries, and action from developing countries that reduces their aggregate emissions in the range of 15-30 percent below baseline[15]. This reduction effort from developing countries should be done in a measurable, reportable and verifiable manner, and be additional to any

[14] Ibid.

[15] This latter range was presented by the IPCC at the SBSTA workshop at Bonn in June 2008 as a further explanation of information contained within Box 13.7 of the IPCC AR4 Working Group III report (pg. 776), and gives the concurrent scale of reductions required by non-Annex I Parties if Annex I Parties were to reduce, in aggregate, their emissions by 25-40 percent below 1990 by 2020.

reductions that result from projects used to meet Annex I Parties' commitments (for example the Clean Development Mechanism).

36. We would not expect that all individual Annex I Party emission reduction targets would fall within an aggregate range of 25-40 percent below 1990 by 2020. As discussed in this submission, commitments for individual Parties should be determined through an assessment of mitigation potential and other criteria, to ensure an equitable effort from all Parties towards an aggregate ambition. And as with the results of the effort sharing that has taken place within the EU, this is likely to lead to a broader range of emission reduction targets for individual Parties.

37. While 25-40 percent below 1990 provides a useful indicative range for where aggregate Annex I emissions need to be by 2020 (as does the 15-30% reduction below baseline for non-Annex I countries), New Zealand considers further discussion and clarification is needed on the relationship between the long-term global emission reduction goal and the necessary commitments and actions that developed and developing country Parties will need to undertake from 2013 to ensure this goal can be met. This will require discussion on how to allocate the effort of developed and developing countries as part of a shared vision – in particular the long-term goal for global emission reductions.

38. Depending on the length of the second commitment period, and the corresponding time frame for action under the Convention, consideration may be needed on whether a process should be established to review the stringency of the commitments and actions required from all countries to ensure they continue to reflect an equitable effort over time.

39. It will also be important to understand how a specific emission reduction target (such as 25-40 percent below 1990 by 2020) would translate into an aggregate Assigned Amount for the second commitment period. New Zealand considers work is also required on the implications of different base years or base periods, and rules combinations, for different lengths of the second commitment period, with a view to deciding the parameters of the second commitment period.

40. Finally, we would like to emphasise that building support domestically for a stringent level of emission reductions by Parties will be less difficult if the full potential of emission reduction opportunities that exist globally are made available. Unnecessarily increasing the costs of meeting international climate change agreements reduces the prospects of the international community achieving its goals in terms of reducing greenhouse gas emissions. Changes to the rules for the second commitment period, in ways that maximise these opportunities, will be of benefit to all Parties, and be consistent with Article 3 of the Convention – that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.

Topics to be covered and experts to invite to the in-session workshop

41. New Zealand looks forward to participating in an in-session workshop on the above issues, and welcomes the opportunity to provide input on the topics that could be covered and potential experts that might be invited.

42. The first topic that New Zealand would like to address is how to compare mitigation potential across Parties. As discussed, we believe that mitigation potential is an essential criterion when assessing equitable commitments and it will therefore be important that all Parties agree on the basis for comparison. New Zealand appreciates the work done by the secretariat in preparing the technical paper on this issue[16], and would like this paper to form the basis of a discussion on which factors and criteria could be used as useful indicators for mitigation potential. New Zealand would also like a broader discussion on other criteria that could be used to differentiate the commitments of individual Parties.

43. There are a number of experts that could contribute to a discussion on suitable factors to assess mitigation potential and other effort sharing criteria. These include experts from the Center for Clean Air Policy, ECOFYS, Pew Center on Global Climate Change, World Resources Institute, the OECD, as well as officials who have been involved with the EU's effort sharing work.

44. The second topic that New Zealand would appreciate discussion on is the relationship between the long-term global emission reduction goal and the necessary commitments and actions that developed and developing country Parties will need to undertake from 2013 to ensure this goal can be met. This will require discussion on how to share the mitigation effort between developed and developing countries and linkages to the shared vision within the AWG-LCA – in particular the long-term goal for global emission reductions. It will also be important to understand how a specific emission reduction target (such as 25-40 percent below 1990 by 2020) would translate into an aggregate Assigned Amount across the second commitment period –under different base years/periods and commitment period lengths and rules combinations.

45. The experts who contributed to the results in the IPCC AR4, in particular those from Working Group I and III would be valuable contributors to this discussion, in particular those who worked on the development of Box 13.7 and the supplementary analysis presented in Bonn (see footnote 15).

46. As a third topic, it would be useful to understand how specific global emission reduction commitments/actions impact on the potential supply and demand of emission reductions from 2013 onwards. While New Zealand is wary of options that would prematurely restrict cost-effective supply, and does not support discussions aiming to achieve a specific carbon price, this would be useful information for both Parties and private institutions internationally.

47. Potential experts to invite for this third topic could include academics and officials who are working on some of the world's leading models, for example IMAGE, MESSAGE, MiniCAM and World Scan.

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[16] *Synthesis of information relevant to the determination of the mitigation potential and to the identification of possible ranges of emission reduction objectives of Annex I Parties* FCCC/TP/2007/1

48. Finally, and as discussed in paragraph 39 above, the in-session workshop could helpfully provide for an initial exploration of issues related to the base year, nature and length of the second commitment period.

PAPER NO. 5: NORWAY

Analysis of mitigation potentials and identification of ranges of emission reduction objectives of Annex I Parties

With reference to FCCC/KP/AWG/2006/4, Norway welcomes the invitation to submit additional and updated information and data from Annex I Parties related to analysis of mitigation potential, effectiveness, efficiency, costs and benefits of current and future policies, measures and technologies at the disposal of Annex I parties.

Norway believes it important to continue to exchange information on possible ranges of emission reductions by Annex I Parties, both through domestic and international efforts, as a means to strengthen the work on achieving the ultimate aim of the Convention. We would also like to point out the importance of building on the best available scientific and technological knowledge regarding mitigation potentials and ranges of possible emission reduction objectives, in the further work of the AWG-KP.

General remarks

The ultimate aim of the Convention of preventing dangerous anthropogenic interference with the climate system warrants deep emission cuts. In Norway's view, to fulfil this objective, the global mean temperature should be kept below 2ºC compared to pre-industrial levels. This implies reductions in global emissions of at least 50% compared to 1990, by the middle of this century. Emission reductions undertaken by developed countries must be in the range of 25 to 40 per cent already in 2020. Furthermore, emissions in developing countries have to deviate below their projected baseline emissions within the next few decades.

The analyses in, *inter alia*, the 2007 Fourth Assessment Report (AR4) of the IPCC and the Stern Review report on the Economics of Climate Change, show significant potential for emission reductions, using well-known technologies and at reasonable costs. In Norway's opinion, we have a solid basis for developing further commitments for significant global emission reductions. Developed countries should continue to take the lead in this, and commit to reductions in their collective emissions in the order of 30% by 2020.

Norway has an ambitious climate policy. By 2020, emission reductions of 30% relative to Norway's 1990 emissions shall be undertaken. About 2/3 of these reductions will be cuts in domestic emissions. A central part of the Norwegian policy is that Norway will undertake to achieve carbon neutrality by 2030 at the latest, if an ambitious global climate agreement is achieved in which other developed countries also take on extensive obligations.

Mitigation potentials and technologies at the disposal of Norway

Norwegian emissions in 2007 were 55 million tonnes of CO_2 equivalents. The mitigation potential in Norway, current and future climate policies have been analysed in a recent White Paper to the Norwegian parliament. A report delivered in 2006 by the Low Emissions Commission and an analysis of the technical mitigation potential, prepared by the Norwegian Pollution Control Authority, contributed with documentation on the mitigation possibilities in Norway.

Projected emissions in 2020 are 59 million tonnes CO_2 equivalents in the reference scenario. Overall, Norway has a reduction target of 15-17 million tonnes CO_2 equivalents relative to the reference scenario, when CO_2 uptake by forests is included. The dominating emitting sectors, and also sectors with a substantial potential for emission reductions, are transportation, petroleum, energy and industry. There are also significant emission reductions to be achieved in the agricultural sector and in waste treatment.

Existing industries in Norway – including refineries, production of fertilizer, chemical industry – are estimated to have an emission reduction potential of about 5 million tonnes CO_2 equivalents in 2020. A central mitigation option is carbon capture and storage. A test plant for carbon capture and storage at the Mongstad refinery will be in operation in 2011, providing valuable experience with post combustion capture technologies. By 2014, full scale carbon capture and storage shall be implemented at the Mongstad plant. Norway will increase investment in RD&D related to carbon capture and storage in the years to come, in order to reduce costs and expand the range of available technologies. Another important mitigation option for manufacturing industries is increased energy efficiency and shifting from fossil fuels to bioenergy as fuels in energy production. This will be stimulated continuously.

In the petroleum sector, emission reduction possibilities amounting to 3-5 million tonnes CO_2 equivalents have been described. Combined with general improvements in efficiency, electricity supply from land or centralised electricity supply offshore will be a central mitigation option. To ensure real emission reductions from electrification of offshore installations, the electricity supply must come from reduced energy demand on shore, or be produced by gas-fired power plants with CCS or by renewable energy sources.. A general target for 2020 is to increase energy efficiency by 20% in the electricity grid and in electricity production by upgrading the electricity grid, introducing efficiency measures to reduce grid losses, and upgrading existing hydropower plants. A government agency is in place to promote energy efficiency measures and support increased production of renewable energy.

In the transport sector, a mitigation potential of 2-4 million tonnes CO_2 equivalents has been identified. Measures include fuel change from oil to gas in the coastal fleet and fisheries, and introduction of low emission vehicles. More compact city planning to reduce transport demand is also among the measures that will be promoted. A strategy to increase the use of bio fuel is also in place, taking into consideration important aspects of sustainability.

For the agricultural and waste sectors, emission reduction potentials of 1 - 1.5 million tonnes CO_2 equivalents have been identified, including reduced nitrogen fertilisation, changes in the use of peatland and mires, reducing methane gas emissions through collection and extraction from landfills and by reducing the amount of biodegradable materials at landfills. A prohibition of landfilling of biodegradable waste will turn into effect 1. July 2009. The prohibition covers wood, paper, wet-organic wate, textiles and organic sludge. Methane emissions from landfills are expected to decrease by 2/3 within 2040.

The mitigation potentials identified in the industry, transport, petroleum and energy sectors for Norway, which are considered to be economically and technologically feasible, correspond well with international analyses on possible emission reduction measures. We believe that there are considerable similarities between countries in this respect.

Mitigation potentials related to forests
Globally, deforestation and forest degradation are considerable sources of carbon emissions, amounting to around 20% of global emissions of CO_2 equivalents. Hence, mitigation options and measures to counteract deforestation and improve the sink capacity of forests will be important contributions to combating climate change and should be further considered by the AWG-KP.

Domestically, Norway will encourage tree planting and active use of silviculture to increase forest production, giving priority to measures that contribute both to mitigation of climate change and to conservation of biodiversity and other environmental assets. This includes measures that will result in a continued high annual increment and large net uptake of CO_2 in forests, and increasing support for research and competence-building in fields relating to forestry, forest products, bioenergy and the impacts of climate change on the agricultural sector, including building up knowledge on the protection of existing carbon sinks in forest.

Internationally, Norway will continue its support to efforts to prevent deforestation in developing countries. Efforts are now put into developing rules and methods, and also establishing pilot projects. We believe this will contribute to the development of adequate policy instruments for taking advantage of the mitigation potential in the LULUCF sector.

Current and future policies
Norway's climate policy will be designed to give the greatest possible emission reductions relative to the resources used. Cross-sectoral economic instruments form the basis for decentralised, cost-effective and well-informed measures to ensure that the polluter pays. For the Kyoto period, a national emissions trading system was introduced in 2008, and will link to the EU emissions trading scheme. Norwegian purchases of carbon credits from Joint Implementation and the Clean Development Mechanisms will supplement domestic efforts. The emissions trading scheme and the CO_2 tax regime cover more than 70 per cent of our CO_2 emissions. Norway believes that it is important to build on the experiences so far with cost effective policies like emission trading systems, to continually improve their functioning and to develop a global carbon market. Such instruments provide an incentive for producers and consumers to reduce their emissions, and encourage the development of environmentally sound technology.

Measures may become cost effective with a projected rise in carbon prices over the lifetime of the investment, and still not necessarily be implemented in response to current policy instruments. Priority will be given to measures that promote technological developments and can contribute to heighten the future emission reduction potential. To promote the development of climate friendly technologies, Norway has greatly increased public R&D spending on renewable energy technologies and technologies for carbon capture and storage. A demonstration programme for the development and introduction of deep water off shore wind power technologies is also established.

The price signals provided by taxes and carbon prices will not necessarily have the desired effect in all sectors or on all actors, and they may therefore need to be supplemented with other policy instruments. The Norwegian Pollution Control Act is cross-sectoral, and in principle applies to greenhouse gas emissions.

In 2010, the Norwegian Government shall present to the Parliament an assessment of our climate policy and the possible need for additional policy instruments to fulfil the national climate ambition.

Possible ranges of emission reductions by Annex I Parties
The technical mitigation potential described for various sectors in Norway is based on known technologies and applies to sectors which to a large extent are important emission sources also for other Annex I Parties. By 2020, new technological solutions and a different set of framework conditions may reduce costs and offer opportunities to further reduce emissions. However, the benefits of early action in changing emission baselines, described in AR4, clearly indicate that efforts to develop new mitigation options must be parallel to implementing emission reduction measures using known technologies.

As a basis for further work on ranges of emission reductions, Norway recommends that the AWG-KP refers to theAR4 and particularly Working Group III under the IPCC, on adaptation and mitigation. The report presents considerable mitigation potentials in the energy, housing, transport and industry sectors, based on known technologies. However, all stabilization scenarios concur that 60-80% of emission reductions would come from the energy and industry sectors. For instance, in the energy sector, the AR4 shows a mitigation potential of 0.39Gt CO_2-equivalents for the OECD by 2030 through fuels switches and increased plant efficiency, and a total potential of 1.07 Gt CO_2-equivalents for the world as a whole. Similarly, there is a global potential to reduce approximately 30% of the projected baseline emissions from the residential and commercial sectors cost effectively by 2020.

Norway would finally underline that greenhouse gas emissions from international aviation and shipping are growing faster than emissions from any other sector. Norway is of the view that these emissions have to be dealt with in a global context, with clear and meaningful targets. The roles of ICAO and IMO in contributing to this should be addressed by the AWG-KP in context with the overall issue of emission reduction potentials.

Proposals for topics to be covered and participants to be invited to the in-session workshop
The in-session workshop should cover mitigation potentials and emission reductions relative to baseline scenarios, emission intensities and the role of improved technology, the effectiveness of different policies and approaches to allocation of emission reduction efforts.

It should also address:
- Mitigation potentials in developed countries
- Enhancement of the carbon market
- Mitigation potential and instruments to stimulate measures in the LULUCF-sector, globally
- International air and maritime transport

Suggested participants:
- International Panel on Climate Change (IPCC), particularly Working Group III
- Organisation for Economic Co-operation and Development (OECD)
- International Energy Agency (IEA)
- International Maritime Organisation (IMO)
- International Civil Aviation Organization (ICAO)
- International Institute for Applied Systems Analysis (IIASA)

PAPER NO. 6: SRI LANKA

1. Analysis of mitigation potentials and identification of ranges of emission reduction objectives of Annex I Parties (FCCC/KP/AWG/2006/4)

- Sri Lanka appreciates the efforts of the Ad hoc Working Group preparing the report on Further Commitments for Annex I Parties under the Kyoto Protocol.

- Sri Lanka is of the view that the second commitment period must deliver more in order to reach emission reduction targets and hence there should be specific means for monitoring and achieving of targets by Annex I parties. Furthermore, a mechanism should be available to make Annex I parties who have not complied accountable.

- According to the above, a regulatory regime should be made available to ensure that non complying Annex I parties bear a considerable burden of the cost of adaptation, since the climate change risks increase the longer the emissions remain at high levels.

- It is also necessary that such regime should take into consideration the fact that Annex I countries should compensate for their historical emissions, financially, proceeds of which should go to the Adaptation Fund.

- Concrete research should be undertaken to decouple the emission from economic growth. Sri Lanka as a country is not satisfied with the decreases achieved by Annex I parties to the Kyoto Protocol during the period 1990-2004. Furthermore, it is necessary to establish an independent mechanism to verify these reduction data.

- Sri Lanka support the recommendation of the AWG that CDM assist Annex I parties to meet their commitments. However, it is suggested that initiatives such as REDD and sustainable forestry management should be included in to the CDM process, since obliterating of sinks contribute to increased emissions.

- Sri Lanka strongly feels that there are much more important emission sources and sinks to be seriously considered before attempting research on reducing emissions from agriculture. It is necessary to promote agriculture in order to ensure food security in the face of the climate change threats. For example, Carbon capture and storage, identification and development of tree species with high CO2 absorbing capacity are much more important research area.

To prevent dependency on fossil fuel, which is the highest emitter of CO2, it is necessary to facilitate more research and development on renewable energy sources such as wind, solar and geothermal. The Annex I parties are morally responsible, and financially and technically capable of implementing targeted action plans for such research actively and to facilitate transfer of technologies.

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