Future EU Climate Change Policy

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Challenges and Opportunities for new Member States, Acceding and Candidate Countries

International Conference in Warsaw,

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Background Information

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1 Introduction

Under the UN Framework Convention on Climate Change (UNFCCC), agreed in 1992, developed countries aim to return individually or jointly to their 1990 levels of greenhouse gas emissions, with the goal of stabilising greenhouse gas concentrations in the atmosphere in order to avoid dangerous human interference with the climate system.

In recognition that greater reductions were needed to successfully stabilise greenhouse gas concentrations, in 1997 the international community agreed the Kyoto Protocol. The Kyoto Protocol aims for an overall reduction in emissions by developed country Parties to 5.2% below 1990 levels by 2008-2012 – the Protocol's "first commitment period." Since this agreement was achieved, scientific assessments have shown that far greater reductions are needed to avoid dangerous climate change, and that there is little time to achieve these reductions.

Under Article 3.9 of the Kyoto Protocol, the COP/MOP is required to "initiate the consideration" of commitments for subsequent periods at least seven years before the end of the first commitment period. At the first meeting of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (COP/MOP 1), which took place in Montreal in December 2005, Kyoto Parties established an ad hoc open-ended working group of Parties to consider further commitments for Annex I Parties to the Protocol. This group will meet for the first time in May 2006. Parties to the Kyoto Protocol are invited to submit their views regarding further commitments to the UNFCCC Secretariat by 15 March 2006. The EU will be an active player in these discussions and in the negotiations that establish commitments for EU member countries in the second commitment period, the so-called post-2012 period.

It is plain that not all countries have the same capacity to participate effectively in the discussions and negotiations that will determine the shape of the international climate regime after 2012, given the extreme complexity of international climate change policies, and the diversity of national circumstances. Many countries may lack the human resources and the technical and administrative capacity to follow and address every detail of this process, even though the ultimate nature of the post-2012 regime may have far reaching economic consequences for these countries. Despite great differences between the New Member States of the EU (NMS), Acceding Countries (AC) and Candidate Countries (CC), there is wide agreement that these countries must strengthen their capacities to make their voices heard in the up-coming negotiations.

In this context, Ecologic - Institute for International and European Environmental Policy - organises the international conference "Future EU Climate Change Policy – Challenges and Opportunities for new Member States, Acceding and Candidate Countries". The European Commission has commissioned the conference. The conference is the first of a series of events and is organised in co-operation with

- the Institute for Sustainable Development (ISD), Warsaw,
- the Institute for Environmental Studies (IVM) at the Free University of Amsterdam,

- the Foundation for International Environmental Law and Development (FIELD), London,
- the German Institute for Economic Research (DIW), Berlin as well as a network of experts.

With a focus on the NMS, the conference aims at strengthening the capacity of the NMS, AC as well as CC to prepare for and participate in the negotiations on future actions under the UNFCCC and Kyoto Protocol through

- fostering public debate on future climate change policy in these countries,
- bringing together policy-makers and stakeholders, and
- strengthening and initiating networks between them.

This paper provides background information to support and structure the conference discussions. After presenting some major aspects and starting points for discussion, this paper highlights the challenges posed by climate change and the most significant aspects of current and future EU climate change policies. The paper then analyses the economic opportunities and challenges of future climate change policies for NMS, AC and CC. Finally, the paper highlights key elements for consideration in negotiations on the post-2012 climate regime.

2 Starting points for discussion

Participants are invited to consider the following elements as starting points for discussions. There are many aspects to the negotiation of the Post-2012 climate regime, and both the science and the political context are likely to evolve over the next few years. Hence this list is non-exhaustive, and intended merely to assist in framing discussions:

- Research gathered by the Intergovernmental Panel on Climate Change (IPCC) indicates that the Earth's average surface temperature will warm by 1.4–5.8°C by the year 2100, with potentially very severe consequences for the environment, economies and societies alike. All simulations suggest that temperature rise in the late 20th century can only be explained by man-made increases in greenhouse gas concentration. To avoid or mitigate these consequences, it is widely agreed that average temperature should not increase by more than 2°C above pre-industrial temperature, a target more likely to be achieved if GHG concentrations do not exceed 450 ppm CO_2 -equivalent.

- To stabilise greenhouse gas (GHG) concentrations at 450 ppm CO_2 -equivalent, scientists agree that further cuts in GHG emissions are required. Despite various uncertainties, the European Council has stated that reduction pathways for the group of developed countries in the order of 15-30% by 2020 should be considered. For the long term, the European Parliament suggests a reduction target of 60-80 % by 2050.[1]

- Most NMS and AC are currently on track to meet their reduction targets under the Kyoto-Protocol, sometimes with a substantial reduction surplus. However, the bulk of these emission reductions were achieved in the first half of the 1990s. Since that time, emissions have stabilised or even have grown in many NMS and AC, at times significantly. In light of the reductions required to stabilise global GHG concentrations in the atmosphere - in the range of 15-30% by 2020 and of 60-80% by 2050 respectively - NMS and AC will have to prepare to accept further GHG reductions.

- NMS and AC have different capacities to respond to the challenges of climate change, though most have weak administrative and financial resources in this area. Also, the level of environmental awareness in society on climate change issues is likely to differ from the EU-15 – which may pose additional challenges.

- In light of recent sharp increases and fluctuations in energy prices, improved energy efficiency and increasing the share of renewable energies in the domestic energy mix can provide a boost to the competitiveness of NMS economies. It is now well-established that measures that reduce GHG emissions do not necessarily entail an impediment to economic growth. Instead, these measures lead to less fossil-fuel dependent economies, with greater energy security, decreased exposure to volatile energy prices and multiple

[1] See below, page 10.

sustainable development and health co-benefits.

- Key priorities in the short term will be to expand and strengthen resources allocated to energy efficiency improvements in households and industries and to remove institutional barriers that oppose such improvements. The uptake of cleaner technologies, as well as the adoption of policies promoting their wider use, will play a key role in shifting to less GHG-intensive pathways.
- NMS and AC have great capacity to reduce CO_2 emissions in a cost-effective manner. Energy efficiency in these countries is still considerably lower than in the EU-15 and economic restructuring provides a variety of opportunities to take advantage of investment cycles. In this context, the involvement of business will be essential.
- Early negotiations on post-2012 commitments will be difficult and complex. Emerging issues within these negotiations, such as technological change and the inclusion of new sectors, may present a great challenge for NMS, AC and CC, given the financial, technical, and human resources needed to participate fully and effectively in these discussions.
- At the same time, NMS, AC and CC stand to benefit greatly from investments in Joint Implementation projects under the Kyoto Protocol, and will wish to ensure that the post-2012 framework continues to provide market incentives for investments in these projects and in other clean energy projects in NMS, AC and CC.
- The extreme complexity of the post-2012 negotiations will require dedicated human and technical resources from NMS, AC and CC. The involvement of stakeholders from a range of government ministries and key industrial sectors will be essential over the next few years, in order to achieve the most effective and most equitable outcomes at both the international and national levels.

3 The Challenge

3.1 Human-induced aspects of climate change

Global average temperature has increased in the last hundred years by about 0.7°C, the European average temperature by 0.95°C.[2] Globally, the 10 warmest years on record all occurred after 1991. Though the extent of the anthropogenic greenhouse effect is uncertain, the Intergovernmental Panel on Climate Change (IPCC) has concluded that the Earth on average will warm by 1.4–5.8°C by the year 2100, with temperatures in Europe expected to

[2] Cf. European Environmental Agency, Impacts of Europe's changing climate. 2004, Copenhagen.

rise by 2.0–6.3°C. The European Commission has acknowledged that climate change is already happening.[3]

All simulations suggest that temperature rise in the late 20th century can only be explained by man-made increases in greenhouse gas concentration. According to the IPCC, "the balance of evidence suggests that there is a discernible human influence on global climate."[4] The concentration of CO_2 in the lower atmosphere has increased from its pre-industrial concentration of 280 ppm (parts per million) to 375 ppm in 2003, the highest level in the last 500,000 years.

3.2 What is dangerous climate change?

Article 2 of UNFCCC provides that "the ultimate objective of this Convention […] is to achieve […] stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The EU has chosen an official policy target to limit global warming at 2ºC above pre-industrial temperatures. Any global warming above 2°C is likely to be increasingly dangerous, due to increases in tropical storms, floods and monsoon variability, increases in drought frequency and heat waves, shifts in vegetation zones and loss of biodiversity, causing irreversible damages.[5] As the impact of these negative consequences will be most severe in the Southern hemisphere, developing countries are particular affected, aggravated by their insufficient capacities to respond and adapt to climate change.

If, hypothetically, all human-induced emissions were stopped immediately today, temperatures would still rise by about 0.7°C by the year 2100. Latest science suggests that there is a more than 66% chance of keeping temperature increases below 2°C by 2100 if future GHG concentrations can be kept at about 440 ppm CO_2-equivalent (i.e. CO_2 only below 400 ppm). If no climate policy measures are implemented, a further increase to 650–1215 ppm CO_2-equivalent is projected[6], diminishing the chance of meeting the 2°C target drastically.

3.2.1 Precipitation and temperature

Annual precipitation trends in Europe for the period 1900–2000 show a contrasting picture between northern Europe (10–40% wetter) and southern Europe (up to 20% drier). Changes have been greatest in winter in most parts of Europe. These changes are projected to continue in the future. Cold winters are projected to disappear almost entirely by 2080 and hot summers are projected to become much more frequent.[7]

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3 See "Winning the Battle Against Global Climate Change", COM(2005) 35 final, 9.2.2005

4 Cf. Jones, P.D. and M.E. Mann, Climate Over Past Millennia. Reviews of Geophysics, 2004. 42(RG2002, doi: 10.1029/2003RG000143); Mann, M.E., et al., On Past Temperatures and Anomalous Late 20th Century Warmth. Eos, 2003. 84: p. 256-258.

5 EEA Draft Technical Report no. 7/2005: Vulnerability and Adaptation to Climate Change in Europe

6 Hare, B. and M. Meinshausen, How much warming are we committed to and how much can be avoided? - PIK Report No. 93. 2004, Potsdam Institute for Climate Impact Research: Potsdam.

7 Cf. European Environmental Agency, Impacts of Europe's changing climate. 2004, Copenhagen.

3.2.2 Extreme events

In addition, extreme weather events, such as droughts, heatwaves and floods have increased while cold extremes (frost days) have decreased. The European summer of 2003 was extremely hot and dry.[8] In Europe, 64% of all catastrophic events since 1980 have been directly attributable to climate extremes; 79% of economic losses caused by catastrophic events result from these climate-related events. In the past decade, 1,940 people have died during floods and 417,000 have been made homeless. In 2002, 15 major floods occurred in Austria, the Czech Republic, Germany, Hungary and the Russian Federation. These floods affected one million people and killed approximately 250 persons.

3.2.3 Marine environment

The marine system is mainly affected by an increase in sea surface temperature, especially in isolated basins. The Baltic and North Seas and the western Mediterranean show a slight warming of about 0.5°C over the past 15 years. Sea levels around Europe increased by between 0.8 mm/year (Brest/France and Newlyn/UK) and 3.0 mm/year (Narvik/Norway) in the past century. The projected rate of sea level rise between 1990 and 2100 is 2.2 to 4.4 times higher than the rate in the twentieth century. Fish catches could deteriorate due to changing water temperatures and higher acidity[9], with severe consequences for local coastal economies.

3.2.4 Vegetation and agriculture

The average annual growing season in Europe lengthened by about 10 days between 1962 and 1995, and is projected to increase further in the future. The slight positive effects of temperature increase on vegetation growth are likely to be more than outweighed by an increased risk of water shortage. While agriculture in Northern Europe, including the Baltic States, is expected to potentially benefit from increasing CO_2 concentrations and rising temperatures, most parts of Central and South-eastern Europe, e.g. parts of Poland, Czech Republic, Slovakia, Hungary, Romania and Bulgaria, agriculture will be threatened by increased water stress. During the heatwave in 2003, cereal production in the EU-15 member states dropped by about 10%, while in the Eastern European Accession Countries it dropped on average by about 20%. In Bulgaria, Croatia, Hungary, Slovakia and Slovenia, cereal production even dropped by more than 25%. In Hungary, the Balaton area may become significantly drier with severe hydrological consequences. Bad harvests could become more common due to more frequent extreme weather events as well as a rise in pests and diseases, possibly entailing a wider use of pesticides.[10]

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8 Schar, C. and G. Jendritzky, Climate change: Hot news from summer 2003. Nature, 2004. 432(7017): p. 559-560.

9 Ibid. and http://www.climate.org/topics/climate/ocean_acidity.shtml; http://www.stabilisation2005.com/impacts/impacts_ecosystems.pdf

10 Ibid.

3.2.5 Biodiversity

A large number of species might become extinct under future climate change. Due to non-climate-related factors, such as the fragmentation of habitats, extinction rates are likely to increase. These factors will limit the migration and adaptation capabilities of species to respond to climate change. Northward movement of plant species (induced by a warmer climate) has probably increased species diversity in north-western Europe, but climate change has caused a decline in biodiversity in Southern and South-eastern parts of Europe.[11] Particularly vulnerable ecosystems, such as mountains, coastal wetlands and ecosystems in the Mediterranean region might suffer considerable loss of species and habitats.[12]

In sum, as only recently stated by the European Environment Agency (EEA), "South-eastern Europe, the Mediterranean and central European regions are the most vulnerable to climate change. Here, considerable adverse impacts are projected to occur on natural and human systems that are already under pressure from changes in land use, for example. Northern and some western regions of Europe, on the other hand, may experience beneficial impacts, particularly within agriculture, for some period of time."[13]

4 Climate Change policy in the EU, in the new Member States, Acceding and Candidate Countries

4.1 Status of commitments in the EU

Under the Kyoto Protocol, the EU committed itself to reduce greenhouse gas (GHG) emissions by an overall target of 8% below 1990 levels by 2008-2012, the first commitment period. This target only covers the 15 Member States that comprised the EU at the time the Protocol was agreed. The EU made use of Article 4 of the Kyoto Protocol, which allows groups of countries to accept a common emission target and to redistribute that target internally ('bubbling'). Table 1 below summarises the different GHG emissions reduction targets of the old EU Member States and their implementation status.[14] Table 2 below contains the reduction targets of the NMS, AC and CC (see page 10).

Table 1. Emission Reduction Commitments of EU-15 under the Kyoto Protocol

	EU-15	*Austria*	*Belgium*	*Denmark*	*Finland*	*France*	*Germany*	*Greece*
Target	-8%	-13%	-7,5%	-21%	0%	0%	-21%	+25%

11 Ibid.

12 EEA Draft Technical Report no. 7/2005: Vulnerability and Adaptation to Climate Change in Europe

13 Ibid.

14 Data source: Annual European Community greenhouse gas inventory 1990-2003 and inventory report 2005, available at: http://reports.eea.eu.int/technical_report_2005_4/en/EC_GHG_Inventory_report_2005.pdf. The base year for the 'old' Member States is 1990, except for the base year 1995 chosen by some States for fluorinated gases.

2003	-1,7%	+16,6%	+0,6%	+6,3%	+21,5%	-1,9%	-18,5%	+23,2%

	Ireland	*Italy*	*Luxem-bourg*	*Nether-lands*	*Portugal*	*Spain*	*Sweden*	*UK*
Target	+13%	-6,5%	-28%	-6%	+27%	+15%	+4%	-12,5%
2003	+25,2%	+11,6%	-11,5%	+0,8%	+36,7%	+40,6%	-2,4%	-13,3%

4.2 EU climate policy: history, instruments and the way forward

4.2.1 Historical and current policies and measures

The European Commission first took climate change related initiatives in 1991, when it issued a strategy to limit CO_2 emissions in different sectors. Since then, a wide set of policies and measures have been adopted, aimed at reducing greenhouse gas emissions. These include, most notably:

- the **Greenhouse Gas Emission Allowance Trading Scheme** (EU ETS), which limits the total carbon dioxide emissions from almost 12000 installations across the 25 EU Member States [15],
- the **Linking Directive**[16]**,** which combines the EU ETS with the Kyoto Protocol's project-based Joint Implementation (JI) and Clean Development Mechanism (CDM),
- the **"Renewables Directive"**[17]**,** which sets the indicative target to reach a 22 % share of electricity from renewable sources by 2010 (with specific indicative targets for each Member State),
- the **Directive on the promotion of cogeneration**[18], which requires Member States to use their potential for high efficiency cogeneration,
- green paper on **energy efficiency**[19], according to which the EU should save 20 % of its energy consumption by 2020,
- draft **end-use efficiency directive**[20]**,** which proposes mandatory targets for annual energy savings for the period of 2006-2012,

15 Directive on Establishing a Scheme for Greenhouse Gas Emissions Allowance Trading within the Community and Amending Council Directive 96/61/EC; OJ L275.

16 Directive amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms 2004/101/EC; OJ L338/18.

17 Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market; OJ L 283/33.

18 Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC; JO L 052, 21/02/2004.

19 Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC

20 Proposal for a Directive of the European Parliament and of the Council on energy end-use efficiency and energy services, COM(2003) 739.

- **Framework directive on the eco-design of energy-using products**,[21] which sets conditions and criteria for requirements related to environmentally relevant product characteristics, such as energy consumption,
- proposal for a **regulation to reduce emissions of fluorinated gases**[22] (F-gases)

4.2.2 Perspectives and timetable for further development

In March 2005, the European Council stated that reduction pathways for the group of developed countries in the order of 15-30% by 2020, compared to the baseline envisaged in the Kyoto Protocol (typically 1990 emission levels), should be considered. EU leaders pointed out that this reduction range "will have to be viewed in the light of future work on how the objective can be achieved, including the cost-benefit aspect". The Council welcomed the Commission Communication "Winning the Battle Against Global Climate Change" of 9 February 2005[23], which outlines the following core elements of the EU's future climate change policy and negotiation strategy:

- To **broaden participation**, the Commission recommends the adoption of a negotiation strategy persuading the major world emitters to comply with a binding system. In order to accelerate progress at the global level, the installation of a small discussion group including EU, US, Canada, Russia, Japan, China and India as the largest emitters is an option.

- **More policy areas should be included**, i.e. international action must be enlarged to cover all greenhouse gases and sectors, with a particular focus on emissions from aviation and maritime transport, as well as consideration of how to combat deforestation, an important source of emissions.

- Climate-friendly, **low-emission technologies must be promoted** and related research needs to be enhanced.

- **Flexible, market- and project-based mechanisms**, such as the ETS and JI/CDM should be maintained in the post-2012 system. Targets and timetables are efficient instruments, but the international negotiations should also link climate change issues with technology innovation, energy efficiency promotion, the development of low-carbon sources of energy and development policy.

- Finally, **adaptation policies** must be included, and financial support should be provided for the adaptation efforts of the poorest and worst-affected countries.

The European Parliament welcomed the conclusions by the European Council, in particular the 15 – 30 % target. The Parliament insisted that emission targets for the long-term are

21 Directive 2005/32/EC on the eco-design of Energy-using Products

22 Proposal for a Regulation of the European Parliament and of the Council on certain fluorinated greenhouse gases; 7.3.2005, COM (2003) 492, 2003/0189/COD.

23 "Winning the Battle Against Global Climate Change", COM(2005) 35 final, 9.2.2005.

needed and suggested a reduction target of 60-80 % by 2050.[24] The Environment Council on 17 October 2005 stressed that the post 2012 process requires a clear timetable and a mechanism for taking it forward.

4.3 The specific situation of NMS and AC

NMS and AC are not a uniform group of countries. While economies of most NMS and AC were dominated by the Soviet model of central planning for decades, other NMS and AC have had market economies in place for many years. Nevertheless, many NMS and AC experienced deep social, economic and – last but not least - environmental changes after the collapse of the communist block. A distinct drop in CO_2 emissions accompanied these changes. Consequently, most NMS and AC are on track to meet their commitments under the Kyoto Protocol, quite often with large surpluses.

Significantly, most of these considerable emission reductions came about only in the first half of the 1990s. In light of recent economic growth and increased emissions from transport, it is projected that NMS and AC may repeat the experience of Greece, Ireland, Portugal and Spain in which high economic growth brings with it strong growth in transport and hence in greenhouse gas emissions from transport.[25]

In sum, emissions aggregated from all new Member States (excluding Cyprus and Malta for which data were not available) are projected to increase after 2003 but will still be 19 % below the base-year level by 2010. Only the Czech Republic and Estonia project decreasing emissions between 2003 and 2010. In Hungary and Poland greenhouse gas emissions in 2010 are projected to be significantly above 2003 emission levels. [26]

Despite these trends, it is quite likely that NMS and AC will have the greatest capacity to reduce CO_2 emissions in a cost-effective manner, as energy efficiency in these countries is still considerably lower than in the EU-15[27] and economic restructuring provides various opportunities to take advantage of investment cycles for a more sustainable economy. In this context, social challenges need to be considered as well.

4.4 Commitments of new Member States, Acceding and Candidate Countries under the UNFCCC and Kyoto Protocol

Differences among NMS, AC and CC are reflected in their status under the UNFCCC: all former communist countries and Turkey are Annex I countries; Cyprus and Malta are non-

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[24] European Parliament Resolution on the Communication from the Commission “Winning the Battle Against Global Climate Change” (2005/2049 (INI)) of 17 November 2005

[25] EEA Report No 8/2005: Greenhouse Gas Emission Trends and Projections in Europe 2005, page 21. The Polish National Allocation Plan predicts a 80% increase of CO_2 emission from the transport sector between 2001 and 2015.

[26] EEA Report No 8/2005: Greenhouse Gas Emission Trends and Projections in Europe 2005, page 21

[27] See below: table 3

Annex countries.[28] At COP 3 in Kyoto, most NMS and AC adopted the 8% reduction commitment of the EU. Poland and Hungary committed to reduce their GHG emissions by 6%. Malta and Cyprus have no reduction targets. Turkey has not ratified the Kyoto Protocol; Croatia has signed, though not ratified, the Protocol and agreed to a 5% reduction target.

In light of the 1990s economic crisis, the Kyoto Protocol grants NMS and AC the right to choose a base year other than 1990 to allow for more accurate reflection of their economic potential. Several countries in the region took advantage of this possibility, i.e. Bulgaria, Hungary, Romania, Poland and Slovenia. Commitments of NMS, AC and CC under the Kyoto Protocol as well as recent emission data are summarised in table 2 below[29].

Table 2. Commitments of NMS, AC and CC under the Kyoto Protocol

Country	base year emissions (million tons)	KP target (%)	KP target (million tons)	2003 emissions (million tons)	change base year – 2003 (%)
Bulgaria	141.8	- 8%	130.5	62.2	- 56.0%
Croatia	31.6	- 5%	30.0	28.0	- 11.4%
Cyprus	6.0	None	None	9.2	52.8%
Czech Rep.	192.1	- 8%	176.7	145.4	- 24.3%
Estonia	43.5	- 8%	40.0	21.4	- 50.8%
Hungary	122.2	- 6%	114.9	83.2	- 31.9%
Latvia	25.4	- 8%	23.4	10.5	- 58.5%
Lithuania	50.9	- 8%	46.8	17.2	- 66.2%
Malta	2.2	None	None	2.9	29.1%
Poland	565.3	- 6%	531.4	384.0	- 32.1%
Romania	261.0	- 8%	240.1	139.0	- 46.8
Slovakia	72.0	- 8%	66.2	51.7	- 28.2%
Slovenia	20.2	- 8%	18.6	19.8	- 1.9%
Turkey		None	None		

[28] Annex-I countries are OECD members and the former countries of the Soviet bloc, while those in Annex II are the richest countries which are OECD members. The non-Annex group consists of more than 150 developing countries.

[29] Table 2: Commitments of NMS/AC under Kyoto Protocol: or the most recent available data: Romania – 2001, Bulgaria, Croatia – 2002; GHG emissions in CO_2 equivalents (excl. LUCF); source EEA, Annual European Community greenhouse gas inventory 1990-2003 and inventory report 2005

5 Analysis of the economic opportunities and challenges for New Members States, Acceding and Candidate Countries

5.1 Global benefits and costs of climate change policies

As discussed in Chapter 2, unrestricted climate change may result in a broad array of mostly negative impacts on the environment, human well-being and the economy. Though the magnitude, timing and regional distribution of impacts is still very uncertain, recent research suggests that climate change could increase annual financial losses due to increases in the frequency and severity of hurricanes, typhoons and windstorms by two-thirds in this century.[30]. Other recent meta-analysis of climate change damage studies found a wide range of damage estimates with a mean of about € 20 per ton of CO_2eq. for current emissions. [31] The European Commission has reported estimates ranging from € 14 to over € 80 per ton of CO_2eq.[32] Most studies agree that the marginal damages resulting from greenhouse gas emissions will increase over time.

In terms of economic costs and benefits, these damage estimates suggest that current mitigation measures with social costs below € 20 per ton of CO_2eq. (or even higher) may already be justified from a global economic efficiency point of view. Over time, more expensive mitigation measures would be justified.

5.2 Benefits and costs of climate change policies for the New Member States, Acceding and Candidate Countries

Apart from limiting damages resulting from climate change – as described in chapter 2.2. - mitigation measures could bring additional benefits to NMS, AC and CC in the form of increased energy-efficiency of industries, reduced dependency on foreign sources of energy,[33] reduced air pollution, [34] job creation,[35] and additional investment opportunities. For example, with regard to investment opportunities, it has been estimated that the recently

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30 Annual financial losses of $27bn by 2080 in the IPCC high emissions scenario (atmospheric CO_2 concentration of 810 ppm in 2080): Association of British Insurers, June 2005, Financial Risks of Climate Change.

31 Tol, R.S.J. (2005). The marginal damage costs of carbon dioxide emissions: an assessment of the uncertainties. *Energy Policy*, 33, 2064-2074.

32 European Commission (2005). Winning the battle against global climate change. Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. COM(2005)35 final, Brussels.

33 Wieczorek, A., Kuik, O.J. and Berkhout, F. (2004). Interdependenz oder Autonomie: Kohlenstoffe zwischen Ost und West. Osteuropa, 54 (9-10): 292-299.

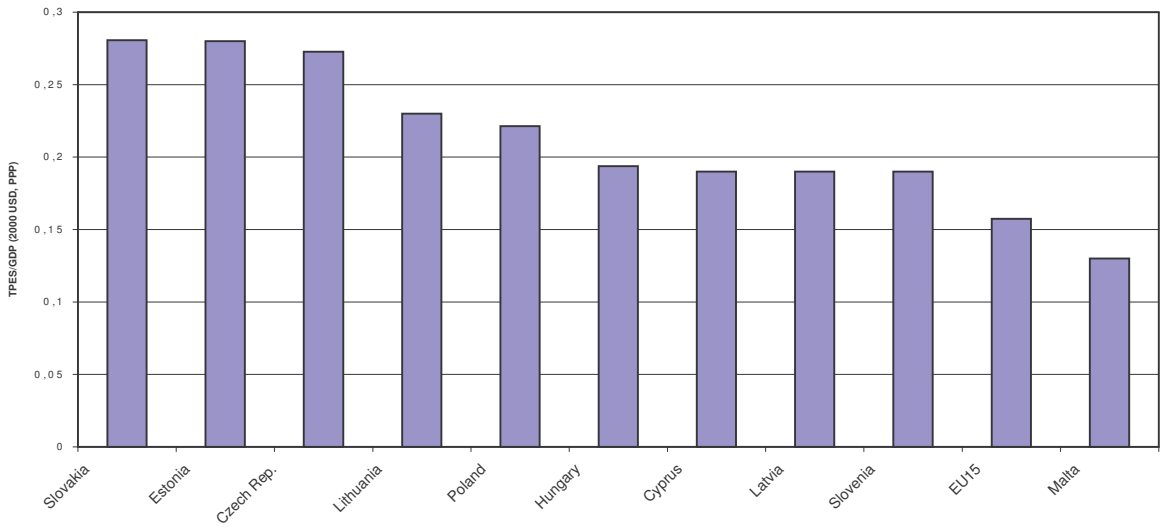
34 See, for example, EEA (2004). Exploring the ancillary benefits of the Kyoto Protocol for air pollution in Europe. EEA Technical report No. 93, European Environment Agency, Copenhagen and Swart, R., Amann, M., Raes, F. and Tuinstra, W. (2004). A good climate for clean air: linkages between climate change and air pollution, Climatic Change, 66: 263-269.

35 See, EC Green Paper on Energy Efficiency (2005), citing a large number of studies on the employment effects of energy-efficiency improvements. The German Council for Sustainable Development claims that more than 2000 full-time jobs could be created for each million tonnes of oil equivalent that will be saved [through improvements in] energy efficiency as compared to investing in energy production.

introduced Renewable Energy Act of the Czech Republic will attract domestic and foreign investments of € 1.6 billion over a five-year time period.[36]

Many studies have identified a vast potential for relatively cheap energy efficiency measures in NMS, AC and CC.[37] The International Energy Agency estimates the economic potential of these energy savings to exceed 20% of total current final energy consumption in Central and Eastern European countries.[38] Table 3 below underlines the high energy-intensities (energy per unit of GDP) of most NMS, AC and CC countries compared to the EU-15.[39]

Table 3. Energy Intensity of NMS, AC, CC compared to EU-15



5.3 Impacts on industrial competitiveness

The European Union has recognized in its Lisbon strategy that increasing energy efficiency is one means to revitalize the European economy and to make it more competitive. In most NMS, AC and CC, the great potential for energy efficiency improvements promises large benefits in the form of increased competitiveness of businesses and industrial sectors,and enhanced standards of living for citizens. Recently, the sharp increase in energy prices has

36 Source: http://moderniobec.ihned.cz/1-10001115-16245420-C00000_detail-a0 (19-9-2005).

37 See, for example, Ürge-Vorsatz, D., Metz, L., Miladinova, G., Antypas, A., Bursik, M., Baniak, A., Jánossy, J., Beranek, J., Nezamoutinova, D., and Drucker, G. (2003). The impact of structural changes in the energy sector of CEE countries on the creation of a sustainable energy path. Final Report No. IV/2002/07/03 for the European Parliament, Strasbourg; and WWF (2004). Ending wasteful energy use in Central and Eastern Europe. An essential step for climate change policy in a competitive EU-25. World Wide Fund for Nature, Brussels.

38 International Energy Agency (December 2004). Energy Efficiency in Economies in Transition (EITs): A Policy Priority. at: http://www.iea.org/textbase/papers/2004/effeit.pdf

39 Energy-intensities of the economies of EU15 and NMS, AC and CC (Total Primary Energy Supply per unit of GDP in 2003, using Purchasing Power Parities). Source: International Energy Agency, Energy Balances of OECD Countries 2002-2003 and Energy Balances of Non-OECD Countries 2002-2003, Paris, 2005.

forcefully underlined the need for both increased energy efficiency and a shift away from (imported) fossil fuels. The International Energy Agency warns, however, that the resources allocated to energy efficiency in Central and Eastern Europe remain largely insufficient to meet this challenge.[40] European climate change policies could provide incentives and resources for further energy efficiency improvements and investments in the development of renewable energy sources.

In the longer term, Europe's competitive advantage will increase if foreign competitors are forced to catch-up with necessary mitigation measures and if early movers in Europe can supply advanced technologies and techniques to these competitors. It would thus be in the interest of NMS, AC and CC to belong to the group of early movers.

5.4 Kyoto mechanisms

At present, there are three so-called "Kyoto mechanisms" available for the financing of mitigation measures in most NMS, AC and CC. These include: (1) Joint Implementation, under which Annex I Parties may earn credits by undertaking emission reduction projects in another Annex I Party; (2) the Clean Development Mechanism, under which an Annex I Party may earn credits by undertaking emission reduction projects in non-Annex I Parties; and (3) international emissions trading, whereby Parties in Annex B to the Protocol may participate in emissions trading with other Annex B Parties to fulfill their mitigation commitments.

While countries' experiences with Joint Implementation projects to date have been mixed, the availability of this mechanism certainly has stimulated various projects that will reduce emissions and improve local conditions. To what extent Joint Implementation will remain available for NMS, AC and CC after 2012 is not certain, but it is likely to be limited.[41]

Detailed analysis of the European Emissions Trading Scheme (modeled upon international emissions trading under the Protocol, but engaged in at the installation level) has revealed that the scheme does not threaten the competitiveness of most industrial sectors in Europe, including most energy-intensive sectors.[42] Indeed, several sectors, such as power generation, have the potential to profit from the scheme. As many energy-intensive firms in NMS, AC and CC still have the opportunity to reduce greenhouse gas emissions at relatively low marginal costs, these firms might well become sellers of "greenhouse gas allowances" in the Emissions Trading Scheme, thereby generating additional financial resources.

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40 Ibid.

41 The scope of Joint Implementation projects will probably be limited by accession because of the exclusive coverage of sectors and sources by the European Emissions Trading Scheme and by the emissions reductions required by the *acquis communautaire* for other sectors and sources. See, Christiansen, A.C. (2004). The role of flexibility mechanisms in the EU climate strategy: lessons learned and future challenges? *International Environmental Agreements*, 4: 27-46.

42 See, for example, Carbon Trust (2004). The European Emissions Trading Scheme: Implications for industrial competitiveness. The Carbon Trust, London, and Reinaud, J. (2005). Industrial competitiveness under the European Union Emissions Trading Scheme. IEA Information Paper, International Energy Agency, Paris.

A challenge for NMS, AC and CC is to start thinking about opportunities to become investor countries in the CDM in the near future. Becoming a CDM investor will, on the one hand, increase the portfolio of cost-effective mitigation measures that can be pursued, and, on the other hand, provide an avenue for NMS, AC and CC firms to become international players in the international market for mitigation technologies.

6 International negotiations on post-2012 commitments

6.1 Status of the international debate following COP 11

The Eleventh Conference of the Parties (COP 11) to the UNFCCC, held in Montreal from 28 November to 9 December 2005, represented a landmark in the international climate negotiations. Because the Kyoto Protocol entered into force in February 2005, the Montreal session represented the first Conference of the Parties (COP) serving as the first Meeting of the Parties to the Kyoto Protocol (COP/MOP). There were three key outcomes from the Montreal session:

- **First, Kyoto Protocol Parties formally adopted a series of draft decisions on international emissions trading, the Clean Development Mechanism, Joint Implementation and the Kyoto Protocol's compliance system**. These draft decisions had been agreed at earlier sessions of the COP, and forwarded to the first session of the COP/MOP for formal adoption. With adoption, the machinery for the flexible mechanisms has now come into full operation.
- **Second, Kyoto Protocol Parties initiated a process for discussing future commitments for the period beyond 2012.** The Kyoto Protocol defines a five-year period from 2008-2012 as its "first commitment period". Under Article 3.9 of the Kyoto Protocol, the COP/MOP is required to "initiate the consideration" of commitments for subsequent periods at least seven years before the end of the first commitment period (in 2005). In Montreal, the Parties established an ad hoc open-ended group to consider future commitments of Annex I Parties for the period beyond 2012.[43] This ad hoc open-ended group will meet for the first time in conjunction with the twenty-fourth session of the Subsidiary Bodies in Bonn, Germany in May 2006, and aim to complete its work in time to ensure no gap between the first and second commitment periods. It will report back to each COP/MOP on its progress.
- **Third, UNFCCC Parties resolved to engage in a dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention**.[44] The dialogue will be held in up to four workshops that will be open to all Parties. Parties will exchange experiences and analyse strategic approaches for long-

[43] FCCC/KP/CMP/2005/L.8/Rev.1

[44] FCCC/CP/2005/L.4/Rev.1

term cooperative action that include: (1) advancing development goals in a sustainable way; (2) addressing action on adaptation; (3) realising the full potential of technology; and (4) realising the full potential of market-based opportunities. The dialogue will be informed by the best available scientific information and assessment on climate change from the IPCC as well as other relevant scientific, social, and economic information. It will serve as a forum to identify actions to promote research, development and deployment of cleaner technologies. It will also provide a forum to identify ways to support voluntary actions by developing countries, and promote access by developing countries to climate-friendly technologies and technologies for adaptation. The dialogue will report back to COP 12 and COP 13.

6.2 Most significant challenges for future negotiations under the UNFCCC and Kyoto Protocol

Three key issues remain to be addressed in future international negotiations under the UNFCCC and the Kyoto Protocol:

- **How to stabilize atmospheric GHGs at an appropriate level?** Targets and actions under the climate regime must be designed to allow for early and significant emission reductions, to increase the likelihood of stabilizing GHG concentrations at a level that will avoid dangerous climate change. The lower the GHG concentration target (in parts per million by volume), the greater the chance of staying within a 2ºC increase.[45]
- **How to secure *deeper* emission reductions by *more* countries?** In order to stabilise GHG levels as soon as possible, deeper emission reductions by more countries are needed. This requires greater incentives for countries. What incentives can encourage greater reductions by Kyoto Parties, greater reductions by non-Kyoto Parties, and broader participation by developing countries?
- **How to address adaptation?** GHG emissions that have already occurred will affect the climate system for the years to come. Most countries will have to adapt to some impacts of climate change, even if very strict mitigation measures and undertaken by the global community. The UNFCCC also requires certain developed countries (including the EU) to assist particularly vulnerable developing countries in meeting the costs of adaptation. Further arrangements for adaptation will need to be elaborated to address the needs of vulnerable countries, and consideration will have to be given to how the burden of adaptation can be shared equitably – given the very different contributions of many countries to historical GHG emissions. In addition, the national climate change policies of developing and develop countries alike, including those of old and new EU Member States, will have to develop a systematic approach to meet domestic adaptation challenges.

[45] den Elzen, M.G.J., and Meinshausen, M., Meeting the EU 2°climate target: global and regional emission implications (2005).

6.3 What options are under discussion?

Researchers outside the formal negotiating process have suggested a range of approaches to meet the challenge of securing deeper emission reductions by more countries in the post-2012 period, in order to avoid dangerous climate change. Various types of mitigation commitments have been proposed that may build upon or complement Kyoto commitments. Many are designed to offer ways to engage developing countries in mitigation efforts. Examples include:[46]

- **absolute targets** – Kyoto-like numerical targets that reflect emission limitations or emission reductions compared to emissions in a country's base-year (for example, a limitation of X% over 1990 levels, or a reduction of X% below 1990 levels). Targets build directly on the Kyoto framework and lead to measurable overall reductions.
- **carbon intensity targets** – requiring a limitation or reduction of emissions per unit of output, relative to GDP or another indicator. These can be applied to sectors or economies as a whole.
- **sectoral targets** – applicable to specific sectors in an economy (e.g. energy, cement, steel, transport), with the type of target differing with the characteristics of the sector.
- **renewable energy targets** – requiring a specific level of, or increase in, the generation and use of renewable energy (for example, the EC Renewables Directive aims to achieve a 22% share of electricity from renewable energies by 2010).
- **energy efficiency targets** – requiring improved energy efficiency with targets for energy-saving (for example, in industry, housing construction, or the design of energy-using products).

In addition to these types of mitigation commitments, there are a number of approaches that could be used to agree upon post-2012 commitments:

- **top-down approaches** – overarching targets could be agreed (e.g., an overall percentage reduction) and then responsibility is distributed among countries through multilateral negotiations;
- **a menu approach** – countries in differentiated groups (e.g., at different stages of development or with different capabilities) could be permitted to choose from among a prescribed menu of possible commitments;

[46] See generally, Pallemaerts, M., Parker, C.N., Shukla, P.R., and van Schaik, L.G., The Greenland Dialogue on Climate Change: A Policy Discussion Paper (July 2005); Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005) at 44-45; Baumert, K., Pershing, J., Climate Data: Insights and Observations, World Resources Institute (December 2004); Bodansky, D., International Climate Efforts Beyond 2012: A Survey of Approaches, Pew Center on Climate Change (December 2004).

- **bottom-up approaches** – countries could decide what types of commitments they are prepared to take (e.g. sectoral targets, a specified level of investment in technology, a specified level of installed capacity, implementation of specific policies and measures).

The post-2012 climate regime could also allow for a **staged approach** to mitigation commitments. A staged approach might allow for differentiation among groups of developing countries, with different kinds of participation in GHG reduction efforts available or applicable to different groups of countries at different points in time. **Differentiation** could occur through application of a set of **objective criteria,** such as historic GHG emissions, capacity to reduce emissions, GDP per capita, emissions per capita, emissions per unit of GDP, human development index, emission growth rates, or some combination of these indicators. Countries could then **graduate between stages of mitigation effort** and take on greater commitments when they reach or cross one or more thresholds. **Criteria for graduation** would be developed to allow countries to move automatically or voluntarily through levels of participation. Staged approaches would offer **incentives** for participation at different levels, to encourage countries to move through stages and increase their reduction efforts.

6.4 Technology development and transfer to support emission reductions

Technologies that may play a significant role in post-2012 negotiations include energy efficient technologies, renewable energy technologies, hydrogen, fuel cells, and carbon capture and storage.

- **Energy efficiency and energy conservation** – it is estimated that 50% of future global emissions could be eliminated through energy efficiency and energy conservation measures.[47] These include improved building design, improved design of home appliances and industrial equipment, more energy-efficient transport, and alternative technologies that either increase the efficiency of the energy conversion process or that utilise waste heat. Many of these technologies are commercially available, though some supply only small markets or suffer from market barriers, such as a lack of awareness or information. In addition to reducing emissions, energy-efficient technologies reduce fuel costs, increase energy security, and reduce exposure to fossil fuel price fluctuations.

- **Renewables** – world energy demand could potentially be satisfied entirely by renewable energy sources, including wind, hydro, solar, biomass, tidal, wave and geothermal energy. Most of these technologies are technically viable and well-proven, and wind, hydro and some forms of biomass have already reached competitiveness with conventional energy sources. Commercial and market barriers present the main obstacles to their broader uptake. The rapid deployment of renewable energy technologies has in the past led to substantial decreases in their unit costs. For example, from 1980-1995, the unit cost of energy from photovoltaics dropped by 65%; the unit cost

[47] See Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005) at 41.

of electricity from wind dropped by 82%, and the cost of electricity from biomass dropped by 85%.[48] While other categories of renewables still have a high cost relative to conventional energy sources, further decreases in cost can be expected through research and development, operating experience, and the removal of subsidies for competing non-renewable energy sources.

- **Hydrogen and fuel cells** – hydrogen technologies are not well-advanced, and will not be commercially viable for some time. Nevertheless, many see hydrogen and fuel cells as an important future energy carrier. The life-cycle GHG emissions of these technologies may present a challenge, however, as hydrogen molecules must themselves be produced from fossil fuels, from biomass, or from electricity and water.[49]

- **Carbon capture and storage** – this technology holds appeal for coal-dependent economies that seek to use coal in a more clean way, by capturing the CO_2 that results from industrial processes, transporting it to suitable destinations, and injecting it into underground cavities for long term storage to avoid emissions to the atmosphere. World wide storage underground capacity is large, and the technology is already in use for certain processes, such as enhanced oil recovery.[50] However, the technology can be very expensive, depending on the distance CO_2 must be transported and the location of the storage site, and it has also yet to be demonstrated that CO_2 can be safely stored underground, contained and monitored for long periods of time without leakage to the atmosphere or damage to the surrounding environment.[51] As carbon capture and storage does not reduce emissions, but merely reduces emissions to the atmosphere, it might serve as a potential bridging technology for coal-dependent economies until cleaner energy sources can be mobilised.

Technology development and deployment are already supported by the UNFCCC's existing framework. Under Article 4.1(c) of the Convention, Parties have agreed to cooperate in the development, application and diffusion of technologies, practices and process that control, reduce or prevent GHG emissions in the energy, transport, industry, agriculture, forestry and waste management sectors. The Kyoto Protocol's flexible mechanisms also facilitate technology development and deployment, by encouraging investment in cleaner technologies in developing countries (under CDM), and in developed countries with lower abatement costs (under JI).

Explicit agreements between countries on technology may form a suitable supplement to the existing regime architecture, though not an effective replacement. Supplementary agreements on technology might address: international research collaboration; guaranteed markets; research and development expenditures; technology targets; progressive

48 See Ibid. at 37.

49 Ibid. at 41-42.

50 Ibid. at 42.

51 Ibid.

international standards; and improvement of conditions for trade in environmentally-friendly goods.[52]

6.5 International transport: aviation and shipping

Emissions from international aviation and marine transport are becoming increasingly significant, and will need to be addressed.

- **International aviation emissions** from developed countries increased by 51% from 1990 to 2003.[53] The EU's emissions from international flights grew at an even higher rate, increasing by 73% from 1990 to 2003 – a rate of 4.3% per year.[54] If present growth continues, emissions from international flights from EU airports will have grown by 150% over 1990 levels by 2012.[55]
- **International maritime transport emissions** from developed countries as a whole decreased by 5% from 1990 to 2003, while emissions from the EU-15 increased by about 35%.[56] These emissions are expected to increase still further as international trade expands, driving the demand for larger, faster ships that consume more fuel.

The international aviation and maritime transport sectors are not regulated under the targets agreed in Kyoto. GHG emissions from domestic aviation and maritime transport activities do form part of Parties' national emissions for purposes of Kyoto commitments. However, emissions associated with international transport are reported as part of national GHG inventories, but excluded from national emissions totals and hence from Kyoto targets.

Article 2.2 of the Kyoto Protocol provides that "*Annex I Parties are to pursue limitation or reduction of emissions of greenhouse gases from aviation and marine bunker fuels, working through the International Civil Aviation Organization [ICAO] and the International Maritime Organization [IMO] respectively.*" Most of the work done through the ICAO and IMO to date has involved methodologies for determining and allocating emissions, and consideration of technical, operational and market-based approaches to reduce emissions and increase GHG efficiency for aviation and maritime transport.

Future operational and technological options for addressing emissions from international aviation and maritime transport include:

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52 Ibid. at 39.

53 FCCC/SBI/2005/17, National greenhouse gas inventory data for the period 1990-2003 and status of reporting at 8; FCCC/SBSTA/2005/INF.2, Information on greenhouse gas emissions from international aviation and maritime transport at 5.

54 EU Press Release 29.07.2005, Climate change: public consultation underlines support for tackling aviation's contribution (hereinafter 'EU Press Release 29.07.2005')

55 Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Reducing the Climate Change Impact of Aviation, COM(2005) 459 Final, 27.9.2005 (hereinafter 'COM(2005) 459 Final, 27.9.2005') at 2.

56 FCCC/SBSTA/2005/INF.2 at 7.

- **For international aviation**: new aircraft; improved passenger management; improved load factors; improved air traffic management; fuel taxation; and emissions trading.[57] The EU will likely propose that aviation emissions be included in the EU Emissions Trading System for the post-2012 period, including all emissions from flights departing from the EU.[58]

- **For international maritime transport:** reducing speed; using higher quality fuels; improved voyage planning procedures that take weather factors into account; advances in hull shape, propulsion systems, injection systems and use of alternative energy sources.

6.6 Initial positions of Parties and stakeholders in the post-2012 debate

There are a number of factors that will influence the positions that countries take in post-2012 negotiations. These include national responsibility for past GHG emissions, present emission levels, projected emission trends, national opportunities for GHG reductions and the cost of these reductions, existing challenges in meeting Kyoto targets, and possible incentives offered inside and outside the process for active participation in a post-2012 regime.

Some broad aspects of the initial positions of major actors are highlighted below.[59] It must be remembered, however, that national positions on the range of underlying issues can be quite complex.

- **EU-25** – committed to Kyoto's fixed target approach, and seeks ways to deepen and broaden commitments among a larger number of players.

- **United States** – rejects Kyoto's fixed target approach, and is interested in a long-term technological 'solution' to GHG emissions, and further research and development, rather than binding emissions targets.

- **Australia** – supports 'technological' solutions, researching carbon capture and geological storage, hydrogen and fuel cells.

- **Japan** – prefers voluntary agreements, pledges and technological approaches.

- **China** – emphasises that developed countries must take the lead in addressing climate change, but has a strong incentive to improve its own energy efficiency due to its energy endowment constraints; interested in technology transfer.

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57 EU Press Release 29.07.2005; COM(2005) 459 Final, 27.9.2005.

58 EU Press Release 29.07.2005.

59 See generally Joint Declaration of the Heads of State and/or Government of Brazil, China, India, Mexico and South Africa participating in the G8 Gleneagles Summit; Commission Staff Working Paper, Winning the Battle Against Climate Change, Background Paper (February 2, 2005).

- **India** – emphasises that developed countries must take the lead in addressing climate change, but interested in increased CDM opportunities and technology transfer.
- **Emerging developing country economies (e.g., Brazil, South Africa, Korea, Mexico)** - interested in measures that provide strong incentives for actions taken by developing countries to reduce or limit emissions (for example afforestation, reforestation, or measures in specific sectors (e.g., steel, cement, transport)).
- **Least Developed Countries** – interested in adaptation measures to increase their resilience to the impacts of climate change (including droughts, floods and other extreme weather events), and in access to affordable clean energy supplies for sustainable development.
- **AOSIS** (40+ small island states) – supports Kyoto's fixed target approach; seeks broader and deeper emission reductions commitments by major emitters; seeks immediate attention to the adaptation needs of particularly vulnerable countries including small island states.
- **OPEC/Saudi Arabia** – interested in compensation for any reduction in fossil fuel consumption or prices resulting from global efforts to reduce GHG emissions.
- **Environmental NGOs** – seek immediate GHG reductions based on the Kyoto approach, with the increased involvement of non-Kyoto Parties and developing countries.
- **Financial sector and business community** – concerned about the direct impact of climate change on assets, investments and global economic performance; also aware of business opportunities created by the climate change regime, including emissions trading, renewable energy and climate-friendly technologies, and new insurance and financial products that may help manage environmental risks.

6.7 Potential stumbling blocks for the post-2012 negotiations

A number of elements could present major stumbling blocks for the successful negotiation of the post-2012 regime. These include:

- failure to build sufficiently large economic incentives and opportunities into the post-2012 regime to engage developing countries and non-Kyoto Parties in a global agreement
- threats to the environmental integrity of the Kyoto Protocol framework, through dilution of the criteria for CDM credits
- refusal by developing countries to consider commitments of any sort (especially without reduction/limitation target from the US)
- failure to satisfactorily address the adaptation needs of vulnerable countries
- disagreement over criteria for developing country differentiation

- insistence of OPEC countries on compensation for the implementation of climate policies by other countries that could undermine consensus within the Group of 77 and China and stall negotiations
- lack of public interest and understanding

A number of equity issues will also have to be considered in negotiating the post-2012 climate regime:

- **At what concentration level should GHGs be stabilised in the atmosphere?** Different stabilisation concentrations (e.g., 400 ppm, 450 ppm, 550 ppm) will have different impacts on the climate system and on vulnerable populations and ecosystems. The opportunity to stabilise concentrations at certain levels will be lost if sufficient emission reductions cannot be secured in the second commitment period.
- **What degree of effort is needed over what time frame to achieve stabilisation?** The Kyoto Protocol aimed for developed countries to reduce their emissions as a group to 5.2% below 1990 levels by 2008-2012. Much larger reductions are needed to stabilise GHG emissions. Neither the Convention nor the Protocol sets out a long-term reduction target, or a timeframe for meeting that target through a sequence of shorter-term milestones.
- **How should the principle of 'common but differentiated responsibilities and respective capabilities' be applied to developing countries, in view of rapidly increasing emissions from this group?** Kyoto targets apply to developed countries only. Should developing countries be asked to take on commitments? If so, when, and what kind of commitments? What incentives are needed to encourage broad participation and how can these incentives be provided?
- **How long should the Kyoto Protocol's second commitment period be?** Should a second commitment period be 5 years, like the first commitment period, or longer, to provide regulatory certainty to industry and guide long-term investment decisions?
- **What types of commitments could be taken in a second commitment period?** If commitments other than fixed Kyoto-like targets are to be permitted or encouraged for some countries (e.g., carbon intensity targets, sectoral targets, energy efficiency targets, renewable energy targets, policies and measures), how can countries' different efforts from these different kinds of commitments be compared? How can overall progress measured?
- **How should technology development and transfer be achieved?** Can sufficient technology transfer occur through the flexible mechanisms or other market-based mechanisms? Or, should a supplemental technology agreement be negotiated that builds upon the Convention and Kyoto Protocol?

- **How can equitable burden sharing for adaptation be achieved?** The Convention requires developed countries to assist particularly vulnerable countries in meeting the costs of adaptation, but provides no detail on how this is to be done. How can a secure and predictable revenue stream for adaptation be generated that draws upon the resources of all Annex I parties equitably?
- **What should be the role of the flexible mechanisms in a second commitment period?** The Kyoto Protocol does not resolve the scope of activities that can be included in the CDM in the second commitment period. Can the flexible mechanisms be used to create additional opportunities for cost-effective emission reductions and support sustainable development, without jeopardizing the environmental integrity of the Kyoto Protocol?